V. INTERNATIONAL ICONTECH CONFERENCE ON INNOVATIVE SURVEYS IN POSITIVE SCIENCES

February 5-6, 2022
Sanliurfa, Turkey

PROCEEDINGS BOOK

Editor:
Prof. Dr. Samir LADACI

ISBN: 978-625-7464-73-4

V.INTERNATIONAL ICONTECH CONFERENCE ON INNOVATIVE SURVEYS IN POSITIVE SCIENCES

February 5-6, 2022
Sanliurfa, Turkey

PROCEEDINGS BOOK

Editor:
Prof. Dr. Samir LADACI

All rights of this book belong to Iksad Global -2022©.
Without permission can't be duplicate or copied.
Authors of chapters are responsible both ethically and juridically.
Issued: 13.02.2022

WWW.ICONTECHSURVEYS.ORG
ISBN: 978-625-7464-73-4

CONFERENCE ID

TITLE OF CONGRESS

V.International
ICONTECH CONFEERENCE
on Innovative Surveys in Positive Sciences

DATE - PLACE

February 5-6, 2022
Sanliurfa, Turkey

ORGANIZATION

Institute of Economic Development and Social Researches

EDITED BY

Prof. Dr. Samir LADACI

COORDINATOR

Alina AMANZHOLOVA

EVALUATION PROCESS

All applications have undergone a double-blind peer review process

PARTICIPATING COUNTRIES

Turkey, Ukraine, Iran, Iraq, Spain, Algeria, India, Nigeria, Pakistan, Morocco, France, Tunisia, Poland, Libya, Indonesia, Italy

TOTAL NUMBER OF PAPERS: 99
THE NUMBER OF PAPERS FROM TURKEY: 44
OTHER COUNTRIES: 47

HEAD OF CONFERENCE

Samir LADACI

Full Professor (Automatics & Control Engineering)
* Chairman of the Scientific Committee of the E.E.A. Department,* Head of the Doctoral Committee on Automatics,* Member of the Administration Council of the Polytechnic School National Polytechnic School of Constantine, Department of Electronic, Electrotechnic and Automatic, Constantine, Algeria

ORGANIZING COMMITTEE MEMBER(S)

Dr. Muhammad Imran - Department of Food Science, Faculty of Life Sciences Government College University, Faisalabad, Punjab, Pakistan
Dr. Betul APAYDIN YILDIRIM - Ataturk University
Dr. Shaukat Aref Mohammed - University of Zakho
Dr. Kenes JUSUPOV - M. Tinisbaev Kazakh Communication Academy
Dr. Guguli DUMBADZE- Batumi Shota Rustaveli State University
Dr. Almaz AHMETOV -Ministry of Health of Azerbaijan
Dr. Yıldırım İsmail TOSUN -Sirnak University
Dr. Seyithan SEYDOŞOĞLU -Siirt University
Elvan CAFEROV –ADPU
Dr. D. Bria - Faculty of Sciences, UMP, Oujda, Morocco
Dr. Smaail RADI- Dean of Faculty of Sciences, UMP
M. El Malki - Faculty of Sciences, UMP, Oujda, Morocco
Dr. F. Jeffali - Superior School of Technology, UMP, Oujda, Morocco
Dr. Z. Tahri - National School of Applied Sciences, UAE, Al Hoceïma, Morocco
Dr. R. Benkaddour - Superior School of Technology, UMP, Oujda, Morocco
Dr. A. Khaled - National School of Applied Sciences, UAE, Al Hoceïma, Morocco
Dr. A. Nasser - Superior School of Technology, UMP, Oujda, Morocco
Dr. A. Ghadban - National School of Applied Sciences, UAE, Al Hoceïma, Morocco
Dr. Seyithan Seydosoglu - Siirt University, Turkey
Dr. Nilgun Ulutasdemir - Gumushane University, Turkey
F. Z. Elamri - Faculty of Sciences, UMP, Oujda, Morocco
Dr. Y. Ben-Ali - Faculty of Sciences, UMP, Oujda, Morocco
Dr. A. Bakdid - Faculty of Sciences, UMP, Oujda, Morocco

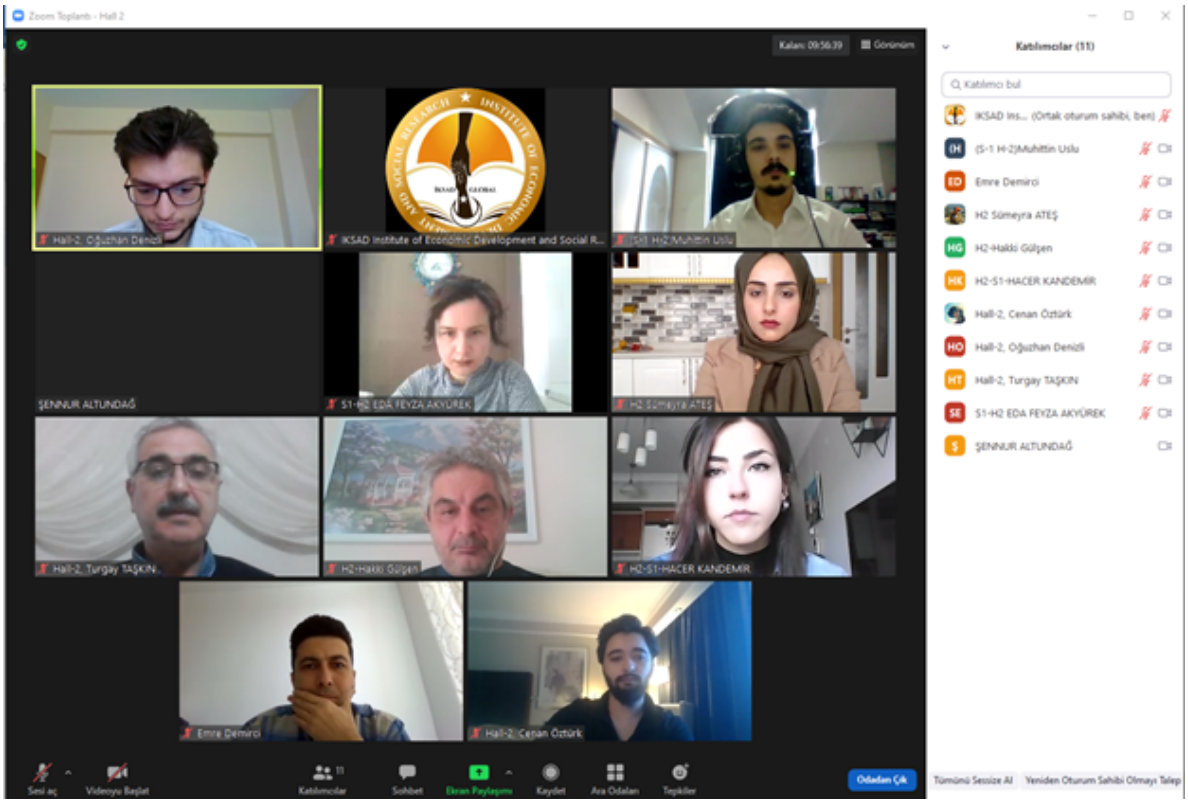
SCIENTIFIC & REVIEW COMMITTEE

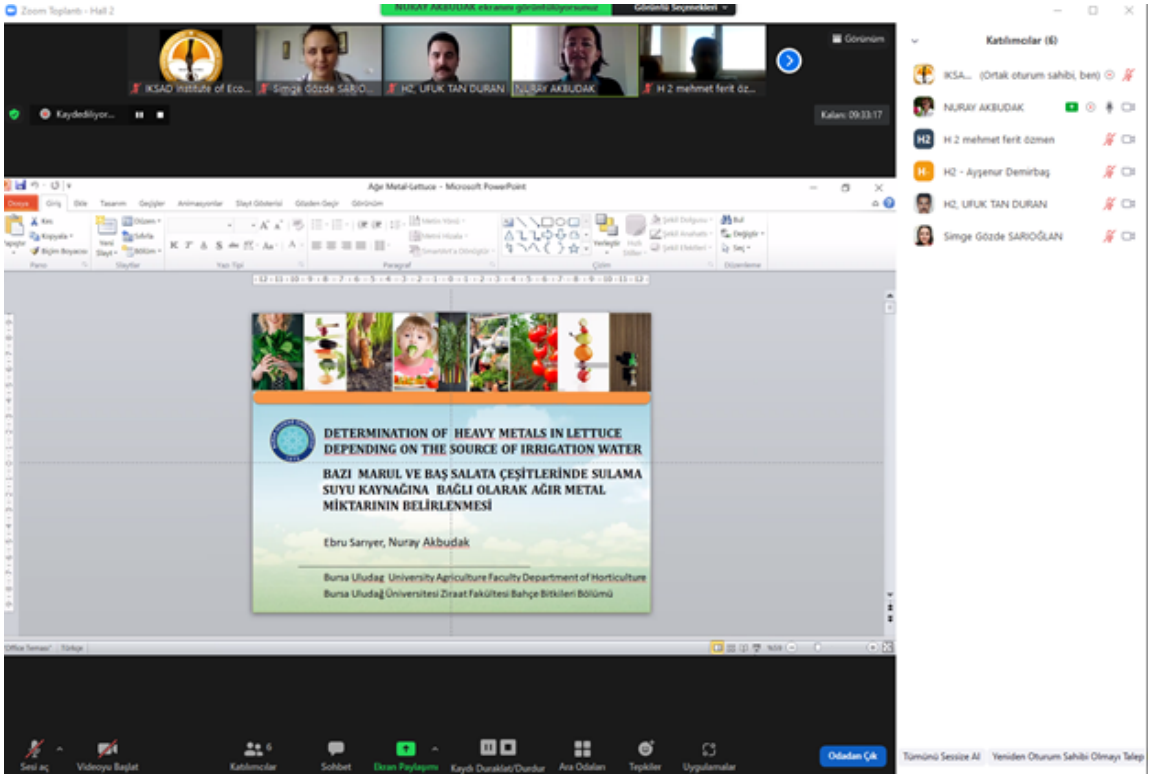
Dr. Melike (YÖNDER) ERTEM-İzmir Kâtip Çelebi University, Faculty of Health Sciences
Dr. M.Meena - Department of Science and Humanities (Chemistry), R.M.K.Engineering College Kavaraipettai, India
Dr. ANURADHA THAKARE - Pimpri Chinchwad College of Engineering Pune, India
Dr. Nilay ÖZDEMİR-Ege University
Dr. Hülya ÇİÇEK - Gaziantep University
Dr. Adem AKPINAR - Uludağ University
Dr. Ahmet Hanifi ERTAŞ - Bursa Technical University
Dr. M. Özgün KORUKÇU- Bursa Uludağ University
Dr. Duygu İNCİ-Kocaeli University, Faculty of Applied Sciences
Dr. Emine GUL CANSU-ERGUN-Baskent University, Department of Electrical and Electronics Engineering,
Dr. Seyfi ŞEVİK-Hitit University
Dr. Betul APAYDIN YILDIRIM - Ataturk University
Dr. Fatih YILDIRIM - Ataturk University
Dr. Ramazan İLGÜN-Aksaray University, Veterinary Faculty
Dr. A. El Moussaouy - Regional Center for Education and Training, UMP, Oujda, Morocco
Dr. A. Kerkour El Miad - Superior School of Technology, UMP, Oujda, Morocco
Dr. M. El Ghorba - National School of Electricity and Mechanics, UH2, Cassablanca, Morocco
Dr. Mourad GHARBI - Faculty of Sciences, M5U, Rabat, Morocco
Dr. Kenes JUSUPOV - M. Tinisbaev Kazakh Communication Academy
Dr. Lille TANDIVALA- Shota Rustavelli State University
Dr. Guguli DUMBADZE- Batumi Shota Rustaveli State University
Dr. Maha Hamdan ALANAZI - Riyad King Abdulaziz Technology University
Dr. N.N. KERMANOVA - Al – Farabi Kazakh National University
Dr. Sudabe SALİIHOVA - Azerbaijan State University
Dr. Rovshan ALIYEV - Bakü State University
Dr. Ayetül GELEN- Bursa Technical University
Dr. Muharrem Kemal ÖZFIRAT -Dokuz Eylül University
Dr. A.Vijayalakshmi - Asst. Professor, Science & Humanities (Chemistry), R.M.K. Engineering College
Dr. Mustafa Kemal BİLİCİ -Marmara University
Dr. Rahşan KOLUTEK -Nevşehir Hacı Bektaş Veli University
Dr. Hilal KILINÇ- Dokuz Eylül University
Dr. Esra LAKOT ALEMDAĞ -Recep Tayyip Erdoğan University
Dr. Özlem ÖZDEMİR -Gazi University

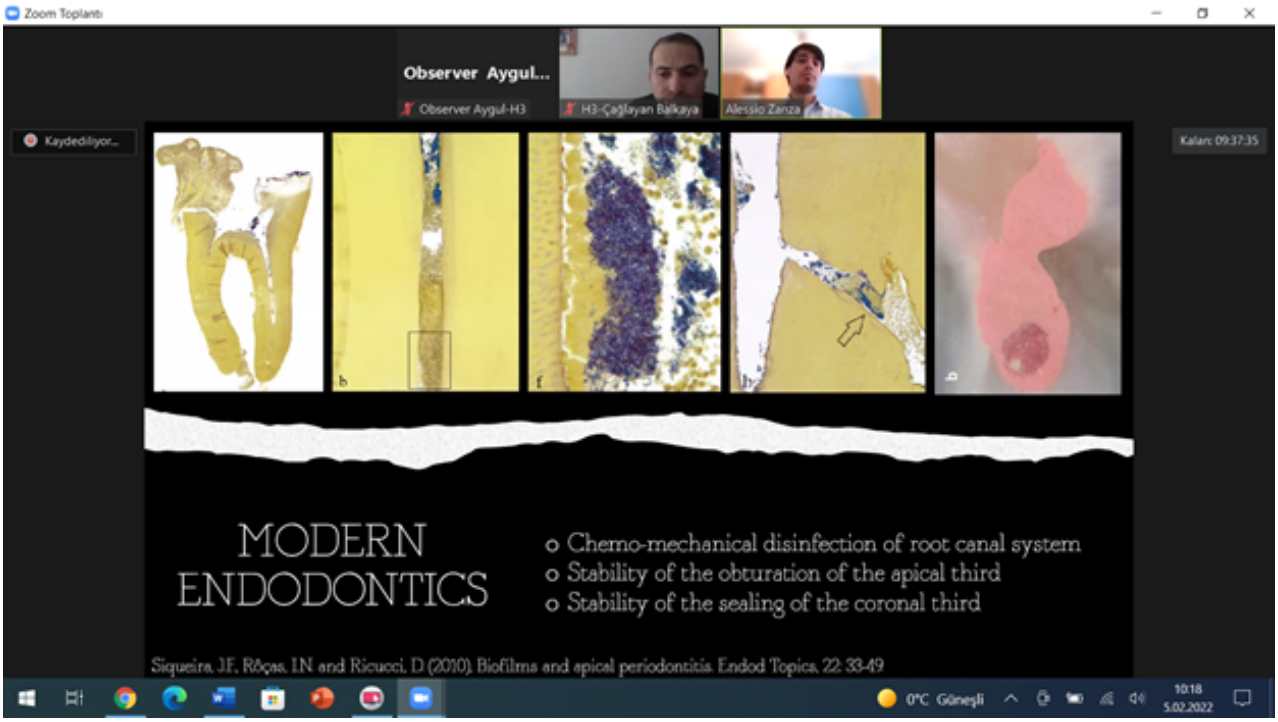
SCIENTIFIC & REVIEW COMMITTEE

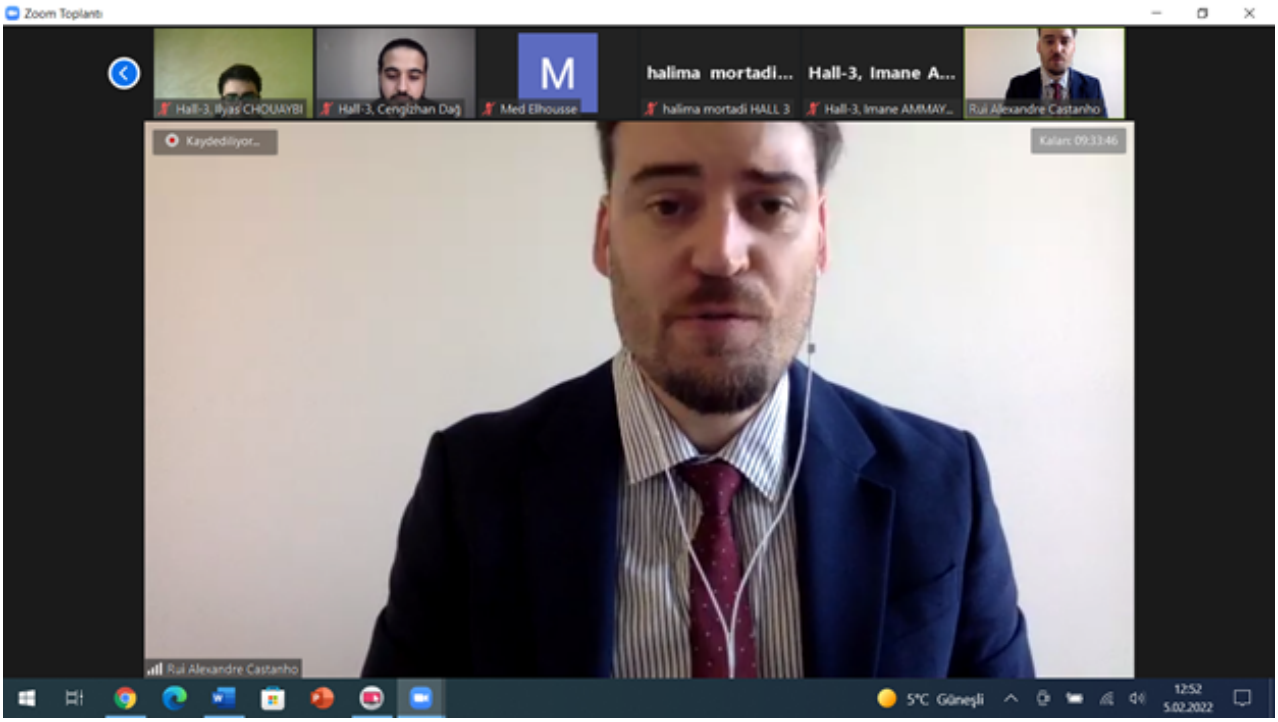
Dr. Alpay Tamer ERTÜRK- Kocaeli University
Dr. Gülden ELEYAN - Avrasya University
Dr. Derya ÜNLÜ - Bursa Technical University
Dr. Murat EYVAZ -Gebze Technical University
Dr. Cengiz MORDENİZ - Tekirdağ Namık Kemal University
Dr. Aslı KÖSE- Gümüşhane University
Dr. Neslihan AYDIN - Uludağ University
Dr. Tülay ÖNCÜ ÖNER - Manisa Celal Bayar University
Dr. Mert GULUM - Karadeniz Technical University
Dr. F. Tayeboun - Djillali Liabes University, Sidi-Bel-Abbes, Algeria
Dr. K. A. Meradi - Institute of Technology, University of Ain Temouchent, Algeria
Dr. Muhammad Imran - Department of Food Science, Faculty of Life Sciences Government College University, Faisalabad, Punjab, Pakistan
Dr. Karim Sellami - Military Technological College Muscat, Sultanate of Oman
Dr. Adnane Benzirar - Faculty of Medicine and Pharmacy, UMP, Oujda, Morocco
Dr. Najib Abdeljaouad - Faculty of Medicine and Pharmacy, UMP, Oujda, Morocco
Dr. Madani Hamid - Faculty of Medicine and Pharmacy, UMP, Oujda, Morocco
Dr. H. BOUALI, Superior School of Technology, UMP, Oujda, Morocco
Dr. A. Kerkour El Miad - Faculty of Sciences, UMP, Oujda, Morocco
Dr. R. Malek - National School of Applied Sciences, UMP, Oujda, Morocco
Dr. J. Barkani - Multidisciplinary Faculty, TAZA, Morocco
Dr. I. Zorkani - Faculty of Sciences Dhar El Mahraz, SMBA University, Fez, Morocco
Dr. M. I. Sedra - Sciences and technologies Faculty, Errachidia, Morocco
Dr. F. Dimane - National School of Applied Sciences, UAE, Al Hoceïma, Morocco
Dr. B. Tidhaf - National School of Applied Sciences, UMP, Oujda, Morocco
Dr. Nilgun Ulutasdemir - Gumushane University, Turkey
Dr. M. Serhini - Faculty of Sciences, UMP, Oujda, Maroc
Dr. K. Ghoumid - National School of Applied Sciences, UMP, Oujda, Maroc
Dr. H. Bekkay - National School of Applied Sciences, UMP, Oujda, Maroc
Dr. Mustafa Kemal Bilici - Marmara University
Dr. Mehmet Cemal Adiguzel - Ataturk University
Dr. J. JASMINE HEPHZIPAH M.E. - Asst Professor in ECE Dept, R.M.K Engineering College, Chennai

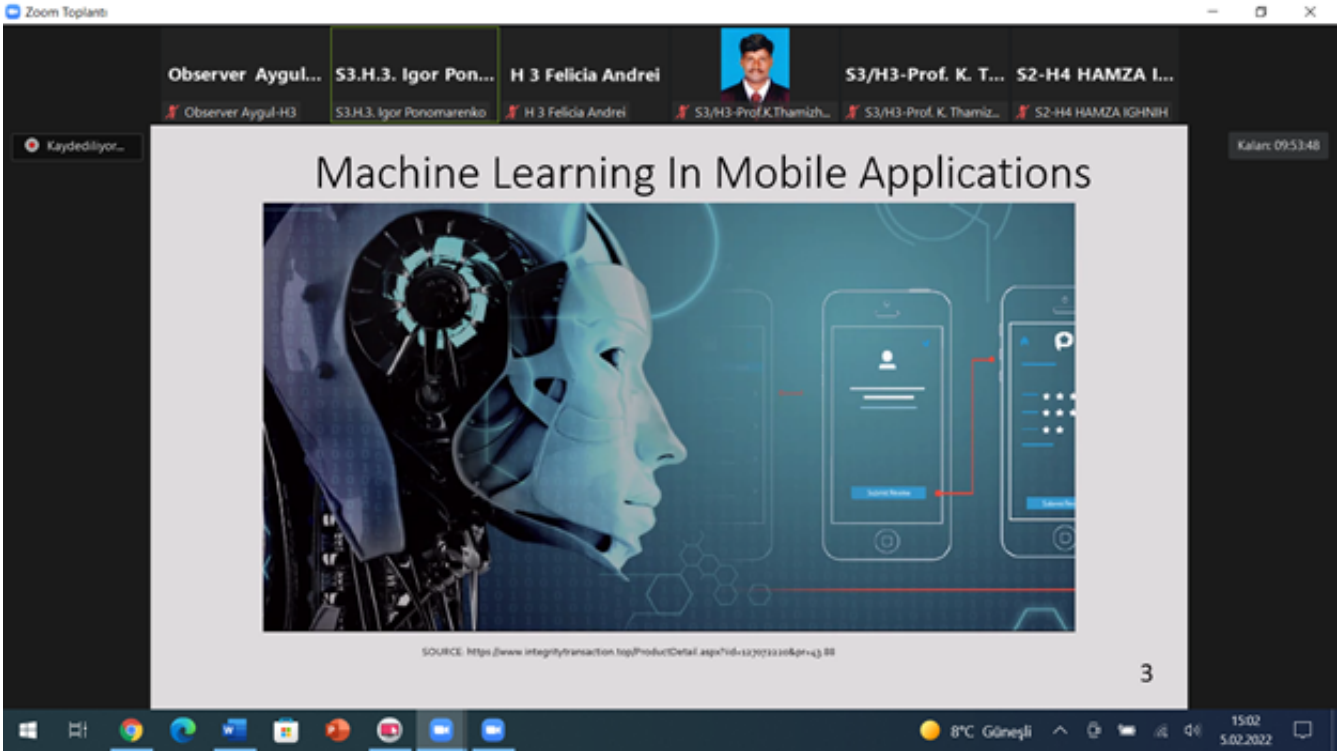
PHOTO GALLERY

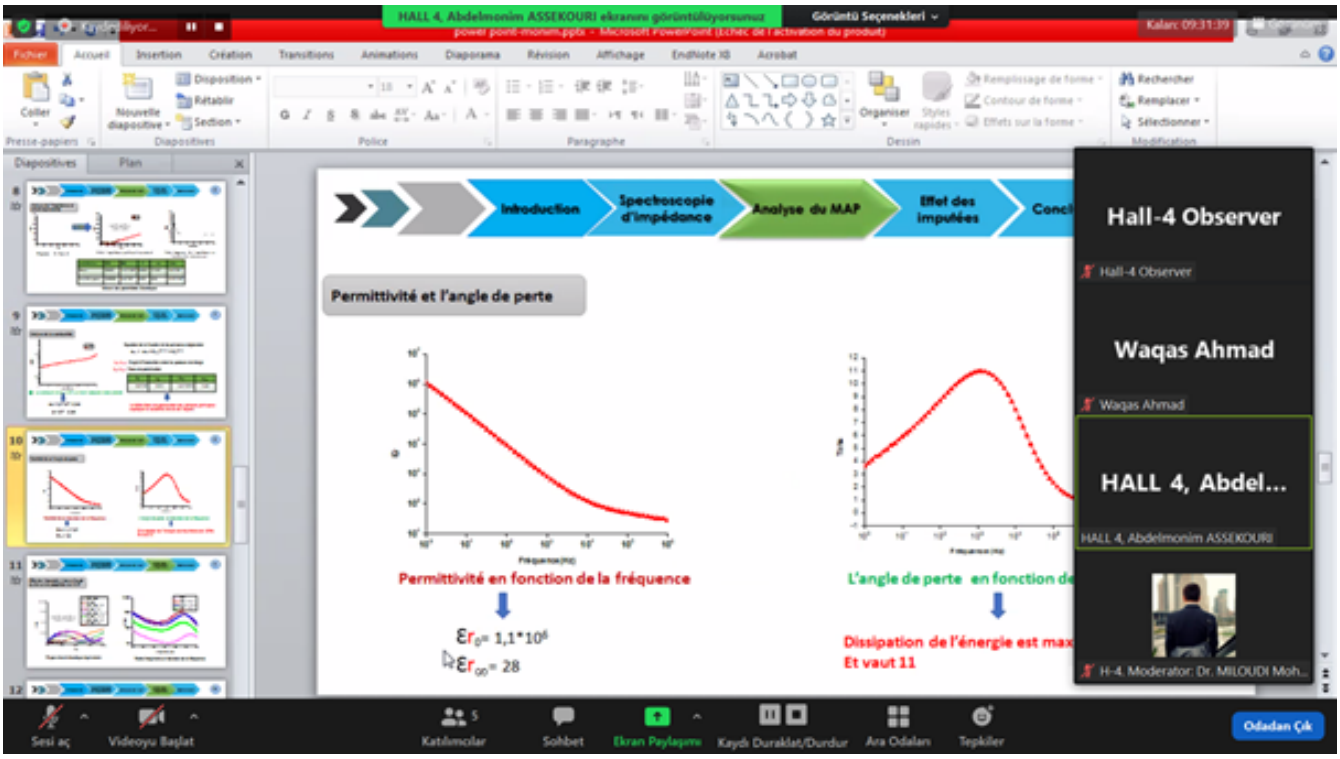


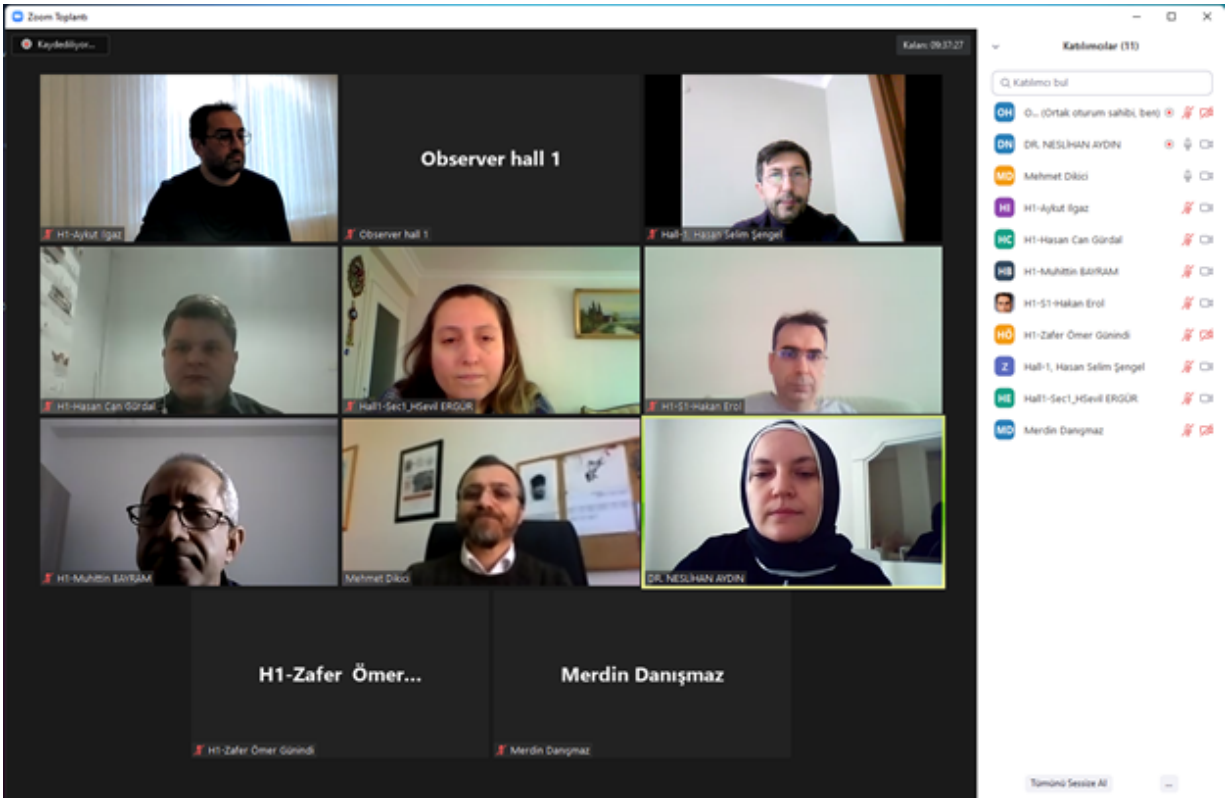


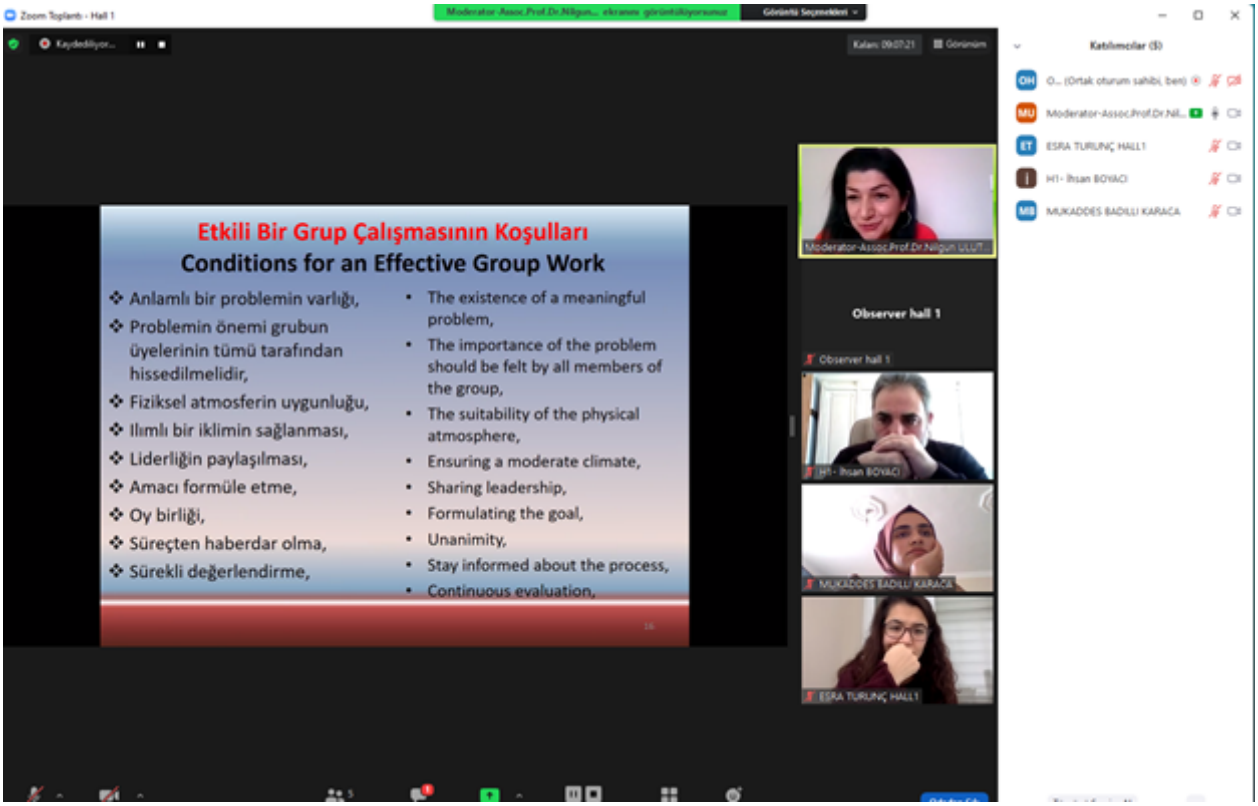

Zoom Toplantı
Observer Aygul...
Observer Aygul-H3
H3-Çağlayan Balkaya
Alessio Zanza
Kaydediliyor...
Kalan: 09:37:35
MODERN ENDODONTICS
o Chemo-mechanical disinfection of root canal system
o Stability of the obturation of the apical third
o Stability of the sealing of the coronal third
Siqueira, JF, Rôças, IN and Ricucci, D (2010). Biofilms and apical periodontitis. Endod Topics, 22: 33-49
0°C Güneşli
10:18
5.02.2022


Zoom Toplantı
Hall-3, Ilyas CHOUAYBI
Hall-3, Cenglzhan Dag
Med Elhousse
halima mortadi...
halima mortadi HALL 3
Hall-3, Imane A...
Hall-3, Imane AMMAY...
Rui Alexandre Castanho
Kaydediliyor...
Kalan: 09:33:46
Rui Alexandre Castanho
5°C Güneşli
12:52
5.02.2022


Zoom Toplantı
Observer Aygul...
S3.H.3. Igor Pon...
H 3 Felicia Andrei
S3/H3-Prof. K. T...
S2-H4 HAMZA I...
Observer Aygul-H3
S3.H.3. Igor Ponomarenko
H 3 Felicia Andrei
S3/H3-Prof.K.Thamizh...
S3/H3-Prof. K. Thamiz...
S2-H4 HAMZA IGHNIH
Kaydediliyor...
Kalan: 09:53:48
Machine Learning In Mobile Applications
SOURCE: https://www.integritytransaction.top/ProductDetail.aspx?id=12370210&pr=43.88
3
8°C Güneşli
15:02
5.02.2022


HALL 4, Abdelmonim ASSEKOURI ekranını görüntülüyorsunuz
Görüntü Seçenekleri
power point-morum.pptx - Microsoft PowerPoint (Echec de l'activation du produit)
Kalan: 09:31:39
Introduction
Spectroscopie d'impédance
Analyse du MAP
Effet des impulées
Permittivité et l'angle de perte
Permittivité en fonction de la fréquence
$\varepsilon r_0 = 1{,}1 * 10^6$
$\varepsilon r_\infty = 28$
L'angle de perte en fonction de
Dissipation de l'énergie est max
Et vaut 11
Hall-4 Observer
Hall-4 Observer
Waqas Ahmad
Waqas Ahmad
HALL 4, Abdel...
HALL 4, Abdelmonim ASSEKOURI
H-4 Moderator: Dr. MILOUDI Moh...
Sesi aç
Videoyu Başlat
Katılımcılar
Sohbet
Ekran Paylaşımı
Kaydı Duraklat/Durdur
Ara Odaları
Tepkiler
Odadan Çık


Observer hall 1
H1-Zafer Ömer...
Merdin Danışmaz
Katılımcılar (11)


Etkili Bir Grup Çalışmasının Koşulları
Conditions for an Effective Group Work
❖ Anlamlı bir problemin varlığı,
❖ Problemin önemi grubun üyelerinin tümü tarafından hissedilmelidir,
❖ Fiziksel atmosferin uygunluğu,
❖ Ilımlı bir iklimin sağlanması,
❖ Liderliğin paylaşılması,
❖ Amacı formüle etme,
❖ Oy birliği,
❖ Süreçten haberdar olma,
❖ Sürekli değerlendirme,
• The existence of a meaningful problem,
• The importance of the problem should be felt by all members of the group,
• The suitability of the physical atmosphere,
• Ensuring a moderate climate,
• Sharing leadership,
• Formulating the goal,
• Unanimity,
• Stay informed about the process,
• Continuous evaluation,
Observer hall 1
Katılımcılar (5)

ICONTECH JOURNAL
ISSN 2717-7270

ICONTECH

5. INTERNATIONAL CONFERENCE ON INNOVATIVE SURVEYS IN POSITIVE SCIENCES

February 5-6, 2022
Sanliurfa, Turkey

CONFERENCE PROGRAM

Online (with Video Conference) Presentation

Meeting ID: 827 6383 8878
Passcode: 700777

Join Zoom Meeting
https://us02web.zoom.us/j/82763838878?pwd=TU9vcVE4TDBKWTlLaXVGcnVqTDBSdz09

PARTICIPANT COUNTRIES (16):
Turkey, Ukraine, Iran, Iraq, Spain, Algeria, India, Nigeria, Pakistan, Morocco, France, Tunisia, Poland, Libya, Indonesia, Italy

ÖNEMLİ, DİKKATLE OKUYUNUZ LÜTFEN / IMPORTANT, PLEASE READ CAREFULLY

Önemli, Dikkatle Okuyunuz Lütfen

- ✓ Kongremizde Yazım Kurallarına uygun gönderilmiş ve bilim kurulundan geçen bildiriler için online (video konferans sistemi üzerinden) sunum imkanı sağlanmıştır.
- ✓ Online sunum yapabilmek için **https://zoom.us/join** sitesi üzerinden giriş yaparak "Meeting ID or Personal Link Name" yerine ID numarasını girerek oturuma katılabilirsiniz.
- ✓ Zoom uygulaması ücretsizdir ve hesap oluşturmaya gerek yoktur.
- ✓ Zoom uygulaması kaydolmadan kullanılabilir.
- ✓ Uygulama tablet, telefon ve PC'lerde çalışıyor.
- ✓ Her oturumdaki sunucular, sunum saatinden 15 dk öncesinde oturuma bağlanmış olmaları gerekmektedir.
- ✓ Tüm kongre katılımcıları canlı bağlanarak tüm oturumları dinleyebilir.
- ✓ Moderatör – oturumdaki sunum ve bilimsel tartışma (soru-cevap) kısmından sorumludur.

Dikkat Edilmesi Gerekenler- TEKNİK BİLGİLER

- ✓ Bilgisayarınızda mikrofon olduğuna ve çalıştığına emin olun.
- ✓ Zoom'da ekran paylaşma özelliğine kullanabilmelisiniz.
- ✓ Kabul edilen bildiri sahiplerinin mail adreslerine Zoom uygulamasında oluşturduğumuz oturuma ait ID numarası gönderilecektir.
- ✓ Katılım belgeleri kongre sonunda tarafınıza pdf olarak gönderilecektir
- ✓ Kongre programında yer ve saat değişikliği gibi talepler dikkate alınmayacaktır

IMPORTANT, PLEASE READ CAREFULLY

- ✓ To be able to attend a meeting online, login via **https://zoom.us/join** site, enter ID "Meeting ID or Personal Link Name" and solidify the session.
- ✓ The Zoom application is free and no need to create an account.
- ✓ The Zoom application can be used without registration.
- ✓ The application works on tablets, phones and PCs.
- ✓ The participant must be connected to the session 15 minutes before the presentation time.
- ✓ All congress participants can connect live and listen to all sessions.
- ✓ Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.

Points to Take into Consideration - TECHNICAL INFORMATION

- ✓ Make sure your computer has a microphone and is working.
- ✓ You should be able to use screen sharing feature in Zoom.
- ✓ Attendance certificates will be sent to you as pdf at the end of the congress.
- ✓ Requests such as change of place and time will not be taken into consideration in the congress program.

Before you login to Zoom please indicate your name_surname and HALL number,

exp. Hall-1, Awais Khan

Meeting ID: 827 6383 8878
Passcode: 700777

Session 1 / Hall-1

05.02.2022

Moderator: Assist. Prof. Dr. Mehmet Dikici

Meeting ID: 827 6383 8878 / Passcode: 700777

Ankara Local Time: 10:00 – 12:00

Author(s)	Title	Affiliation
Aykut ILGAZ	THE EFFECT OF GLASS FIBER RATIO ON THE ELECTRICAL PROPERTIES OF SMC POLYMER COMPOSITE REINFORCED WITH SINGLE WALL CARBON NANOTUBES	Balıkesir University
Neslihan AYDIN	SCANNING PROTOTYPING PROCESSES WITH A THREE-DIMENSIONAL PRINTER FOR MODELING A NEW AERODYNAMIC WING	Kafkas University, Kars, TURKEY
Zafer Ömer Günindi	ELIMINATION OF STRUCTURAL FLEXIBILITY FAILURE AND VIBRATION ANALYSIS BY APPLICATION OF PREDICTIVE MAINTENANCE METHOD OF COOLING FAN	Eti Soda AŞ., Ankara, Türkiye.
Ali Osman Kurban		Kırşehir Ahi Evran University
Merdin Danışmaz		Kırşehir Ahi Evran University
Muhittin BAYRAM	ANALYSIS OF THE LORENZ CHAOTIC SYSTEM WITH THE STLmax METHOD	Dicle University, Diyarbakir, TURKEY
Hayriye Sevil Ergür	ANALYSIS OF ENERGY SAVINGS IN FANS	Eskisehir Osmangazi University
Hasan Can GÜRDAL	EXPERIMENTAL INVESTIGATION OF IMPACT LOAD BEHAVIOR OF SLABS REINFORCED WITH CARBON TEXTILE	Eskisehir Osmangazi University
Hasan Selim ŞENGEL		Eskisehir Osmangazi University
Hakan EROL		Eskisehir Osmangazi University
Assist. Prof. Dr. Mehmet Dikici	SIGNIFICANT PROBABILITY DISTRIBUTIONS FOR FLOOD FLOW	ALKÜ, Alanya/Türkiye

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 1 / Hall-2

05.02.2022

Moderator: Assist. Prof. Eda Feyza AKYÜREK

Meeting ID: 827 6383 8878 / Passcode: 700777

Ankara Local Time: 10:00 – 12:00

Author(s)	Title	Affiliation
Gülsüm Aydın	PRODUCTION OF ALGINATE BASED BEADS AND INVESTIGATION OF THEIR USE IN CONTROLLED DRUG RELEASE	Selçuk University, Turkey.
Cenan Öztürk		Selçuk University, Turkey.
Sümeyra ATEŞ	SANLIURFA PROVINCE SOLID WASTE CHARACTERIZATION AND MEDICAL WASTE DISPOSAL BY COVID-19 EFFECT	Harran University, Sanliurfa, Turkey
Hakki GÜLŞEN		Harran University, Sanliurfa, Turkey
Hacer KANDEMİR	NANOMATERIALS USED FOR PERSONAL PROTECTIVE MEDICAL EQUIPMENTS	Dokuz Eylül University, İzmir, Turkey
Levent CAVAS		Dokuz Eylül University, İzmir, Turkey
Assist. Prof. Eda Feyza AKYÜREK	THE EFFECT OF TEMPERATURE ON PHOTOVOLTAIC PANEL EFFICIENCY AT DIFFERENT LOCATIONS	Erzurum Teknik University, Erzurum, Türkiye
Muhittin USLU	GLUCOCORTICOIDS AND CANINE ATOPIC DERMATITIS	Selcuk University, Konya
Muhittin USLU	ANTIVIRAL TREATMENT IN CATS	Selcuk University, Konya
Ali USLU	SUDDEN DEATHS DUE TO STAPHYLOCOCCUS IN POST-PARTUM SHEEP	Selcuk University, Konya, TURKEY
Oğuzhan DENİZLİ		Selcuk University, Konya, TURKEY
Tuncay Çökülgen		Selcuk University, Konya, TURKEY
Aslı SAKMANOĞLU		Selcuk University, Konya, TURKEY
Zafer SAYIN		Selcuk University, Konya, TURKEY
Turgay TAŞKIN	AN EVALUATION on SUSTAINABILITY of SHEEP BREEDING in TURKEY	Ege University
Çağrı KANDEMİR		Ege University
Sait ENGİNDENİZ		Ege University
Emre DEMİRCİ PhD.	USING THE THERMAL CAMERA (THERMOGRAPHY) IN BULLS	Kure Agriculture and Forestry District Directorate
Şennur ALTUNDAĞ	CREATING AN ENVIRONMENTAL LABEL (ECO-LABEL) SYSTEM FOR DRINKING WATER OBTAINED FROM CITY DRINKING WATER TREATMENT FACILITIES	Harran University, Sanliurfa, Turkey
Mehmet Fatih DİLEKOĞLU		Harran University, Sanliurfa, Turkey

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 1 / Hall-3
05.02.2022
Moderator: Çağlayan BALKAYA
Meeting ID: 827 6383 8878 / Passcode: 700777
Ankara Local Time: 10:00 – 12:00

Author(s)	Title	Affiliation
Çağlayan BALKAYA	INVERSION OF SELF-POTENTIAL ANOMALIES USING CULTURAL ALGORITHM	Süleyman Demirel University, Isparta, Turkey.
Nevbahar EKİN		Süleyman Demirel University, Isparta, Turkey
Çağlayan BALKAYA	ARCHAEO-GEOPHYSICAL INVESTIGATIONS AROUND THE AEDICULUS BASILICA OF THE PISIDIA ANTIOCHEIA ANCIENT CITY (YALVAÇ, ISPARTA)	Süleyman Demirel University, Isparta, Turkey
Mehmet Metin ÜNYAY		Süleyman Demirel University, Isparta, Turkey
Khouloud Alaa	HYBRIDIZATION OF DIVIDE-AND-CONQUER TECHNIQUE AND SINE COSINE ALGORITHM FOR BETTER CONTRAST ENHANCEMENT IN MEDICAL IMAGES	University Mohammed First, Morocco
Fatima Aqel		University Mohammed First, Morocco
Mohamed Atounti		University Mohammed First, Morocco
Kamal TABTI	COMPUTATIONAL INVESTIGATION OF PYRROLIDIN DERIVATIVES AS NOVEL GPX4 / MDM2–P53 INHIBITORS BY USING 3D/2D-QSAR, MOLECULAR DOCKING, MOLECULAR DYNAMICS SIMULATIONS AND MMGBSA FREE ENERGY	Sultan Moulay Sliman University, Benimellal, Morocco
Larbi ELMCHICHI		Sultan Moulay Sliman University, Benimellal, Morocco
Abdelouahid SBAI		Sultan Moulay Sliman University, Benimellal, Morocco
Hamid MAGHAT		Sultan Moulay Sliman University, Benimellal, Morocco
Mohammed BOUACHRINE		Sultan Moulay Sliman University, Benimellal, Morocco
Tahar LAKHLIFI		Sultan Moulay Sliman University, Benimellal, Morocco
Dr. Rodolfo REDA	TORSIONAL RESISTANCE OF NITI ROTARY INSTRUMENTS A CRISTALLOGRAPHIC PHASE STUDY	Sapienza University of Rome, 00161 Rome, Italy
Dr. Alessio ZANZA		Sapienza University of Rome, 00161 Rome, Italy
Dr. Maurilio D'ANGELO		Sapienza University of Rome, 00161 Rome, Italy
Dr. Dario DI NARDO		Sapienza University of Rome, 00161 Rome, Italy
Prof. Dr. Luca TESTARELLI		Sapienza University of Rome, 00161 Rome, Italy
Shiva Eshaghi	APPROXIMATE ANALYTICAL SOLUTIONS FOR FRACTIONAL EUROPEAN OPTIONS	Alzahra University, Tehran, Iran
Liliam Sayuri SAKAMOTO	SIEM – SECURITY INFORMATION EVENT MANAGEMENT IMPROVEMENT USING PARACONSISTENT ANNOTATED EVIDENTIAL LOGIC E	Paulista University-UNIP
Jair Minoro ABE		Paulista University-UNIP
Luiz Antonio de LIMA		Paulista University-UNIP

Vidya Padmakumar	SEASONAL VARIATIONS IN PHYSICO-CHEMICAL PARAMETERS OF THE GORAI CREEK, WESTERN MUMBAI, INDIA	Mangalore University, Mangalagangotri, Mangalore, Dakshina Kannada, Karnataka, India
Shine P Joseph		Mangalore University, Mangalagangotri, Mangalore, Dakshina Kannada, Karnataka, India

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 1 / Hall-4
05.02.2022
Moderator: Dr. Faiz Muhammad Shaikh
Meeting ID: 827 6383 8878 / Passcode: 700777
Ankara Local Time: 10:00 – 12:00

Author(s)	Title	Affiliation
Dr. Faiz Muhammad Shaikh	IMPACT OF COVID-19 PULSES MARKET AND DEVELOPING VALUE CHAIN ON RETAIL, WHOLESALE AND DAAL FACTORY LEVEL ANALYSIS IN SINDH-PAKISTAN	SZABAC-Dokri
Prof. Dr. Fateh Muhammad Marri		Vice Chancellor SAU-Tando jam
Prof. Dr. Jan Muhammad Mrri		Sindh Agriculture University Tando jam
Widya Pintaka Bayu Putra, M.Sc.	HAPLOTYPE DIVERSITY IN THE MITOCHONDRIAL CYTOCHROME OXIDASE I (COI) GENE IN YAT-SEN'S TORRENT FROGS (Amolops yatseni)	Research Center for Biotechnology - National Research and Innovation Agency, Indonesia
Dr.Jyothi.H.	PREVALENCE OF MALNUTRITION AMONG PRESCHOOL CHILDREN IN RURAL NORTHERN KERALA-INDIA	Government College for Women, Trivandrum, Kerala, India
Dr.Mini Joseph		Government College for Women, Trivandrum, Kerala, India
BOURIGA Nawzet	NOVEL METHOD FOR DETERMINATION OF FATTY ACID COMPOSITION USING OTOLITH SHAPE IN SIX BENTHIC AND PELAGIC FISH SPECIES FROM THE GULF OF TUNIS	University of Carthage University of Tunis El Manar, Tunis, Tunisia
BEN AHMED Raja		University of Carthage University of Tunis El Manar, Tunis, Tunisia
GAMMOUDI Mehrez		University of Carthage University of Tunis El Manar, Tunis, Tunisia
TRABELSI Monia		University of Carthage University of Tunis El Manar, Tunis, Tunisia
Gammoudi Mehrez	CHECKLIST OF "TURBELLARIANS" SAMPLED AMONG CULTIVATED MUSSELS *MYTILUS GALLOPROVINCIALIS* IN BIZERTA LAGOON (NORTHERN TUNISIA)	University of Tunis El Manar, Tunis, Tunisia.
Ben Ahmed Raja		University of Tunis El Manar, Tunis, Tunisia.
Bouriga Nawzet		University of Tunis El Manar, Tunis, Tunisia.
Oyewole M. F	FACTORS INFLUENCING EATING HABIT OF RURAL DWELLERS DURING COVID-19 ERA IN DELTA STATE, NIGERIA	University of Ibadan, Nigeria
Odioko .B. O		University of Ibadan, Nigeria
Fatemeh Montazeri	INVESTIGATING THE MOST IMPORTANT ECONOMIC AND SOCIAL FACTORS AFFECTING THE SUSTAINABLE DEVELOPMENT OF RURAL COMMUNITIES (CASE STUDY: MAZANDARAN PROVINCE, IRAN)	Sari Agricultural Sciences and Natural Resources University, Iran
Hamid T. AL-Saad		University of Basrah, Basrah, Iraq
Hamzah A. Kadhim		University of Basrah, Basrah, Iraq
Makia M.Al-Hejuje		University of Basrah, Basrah, Iraq

Waqas Ahmad	EVALUATION OF GENETIC DIVERSITY AND GENOME FINGERPRINTING OF BITTER GOURD GENOTYPES(MOMORDICA CHARANTIA) BY MOLECULAR MARKER	Bahauddin Zakariya University Multan
Noshaba Ashraf		Bahauddin Zakariya University Multan
Ben Ahmed Raja	LETHAL EFFECT OF ZN ON THE SPERMATOGENESIS OF MEDICINAL LEECH HIRUDO tROCTINA (ANNELIDA, HIRUDINEA) FROM TUNISIA	University of Tunis El Manar, Tunis, Tunisia.
Bouriga Nawzet		University of Tunis El Manar, Tunis, Tunisia.
Gammoudi Mehrez		University of Tunis El Manar, Tunis, Tunisia.

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 2 / Hall-1

05.02.2022

Moderator: Asssit. Prof. Dr. Melike Karaman

Meeting ID: 827 6383 8878 / Passcode: 700777

Ankara Local Time: 12:30 – 14:30

Author(s)	Title	Affiliation
Kemal Serhan SANDIKÇI	INTRACARDIAC THROMBUS DUE TO CENTRAL VENOUS CATHETER-CASE REPORT	Osmancık Devlet Hastanesi, Çorum, Turkey
Kemal Serhan SANDIKÇI	AIRWAY MANAGEMENT IN A PATIENT WITH INTRAORAL TUMOR - CASE REPORT	Osmancık Devlet Hastanesi, Çorum, Turkey
Resul Yılmaz	ERECTOR SPINAE PLANE BLOCK FOR AWAKE VİDEO ASISTED THORACOSCOPIC SURGERY	N.E. University, Konya, Turkey
Numan Demiralp		N.E. University, Konya, Turkey
Gülçin Hacıbeyoğlu		N.E. University, Konya, Turkey
Şule Arıcan		N.E. University, Konya, Turkey
Alper Kılıçaslan		N.E. University, Konya, Turkey
Assist. Prof. Dr. Nazlı Pınar ARSLAN	BACTERIA-DERIVED ANTICANCER MOLECULES	Bingol University, Bingol, Turkey
Assist. Prof. Dr. Handan ÇINAR-YILMAZ		Bingol University, Bingol, Turkey
Lect. Meryem DOYMUŞ		Ataturk University, Erzurum, Turkey
Emine TORAMAN	OPTOGENETIC APPROACHES IN ZEBRAFISH NEUROBIOLOGY	Atatürk University, Science Faculty, Department of Molecular Biology and Genetics, Erzurum, Turkey
Ekrem SULUKAN	OPTOGENETIC APPROACHES IN ZEBRAFISH NEUROBIOLOGY	Atatürk University, Fisheries Faculty, Aquaculture Department, Erzurum, Turkey
Asssit. Prof. Dr. Melike Karaman	ANTISENSE OLIGONUCLEOTIDE APPROACHES FOR INHIBITION OF *STAPHYLOCOCCUS AUREUS* GROWTH	Atatürk University, Science Faculty, Department of Molecular Biology and Genetics, Erzurum, Turkey
Assist. Prof. Dr. Erdem SARI	INTERNAL HERNIATION DUE TO FALCIFORM LIGAMENT	Bandırma 17 Eylül Üniversitesi Tıp Fakültesi Genel Cerrahi ABD
Ezgi Avşar Abdik	EVALUATION OF ANTI-CANCER ACTIVITY OF CAPE AND HYDROQUINONE COMBINATION ON MELANOMA CELLS	Istanbul Kültür University, Istanbul, Turkey Yeditepe University, Istanbul, Turkey

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 2 / Hall-2

05.02.2022

Moderator: Nuray Akbudak

Meeting ID: 827 6383 8878 / Passcode: 700777

Ankara Local Time: 12:30 – 14:30

Author(s)	Title	Affiliation
Cengiz YÜRÜRDURMAZ	EFFECT ON PRODUCTION AND PRODUCTION FACILITIES OF CHICKPEA (CICER ARIETINUM L.) PLANTS IN MALATYA ECOLOGICAL CONDITIONS	Kahramanmaraş Sütçü İmam University
Simge Gözde SARIOĞLAN		Kahramanmaraş Sütçü İmam University
Yusuf GÜLER		Kahramanmaraş Sütçü İmam University
Ebru Sarıyer	DETERMINATION OF HEAVY METALS IN LETTUCE DEPENDING ON THE SOURCE OF IRRIGATION WATER	Bursa Uludag University
Nuray Akbudak		Bursa Uludag University
Nuray Akbudak	THE EFFECTS OF ORGANIC FERTILIZER APPLICATIONS ON PRODUCTIVITY AND TOTAL PHENOLIC COMPOUND AMOUNTS IN GREEN LEAFY VEGETABLES	Bursa Uludag University
Ozan Zambi		Ankara University
Ufuk Tan Duran		Bursa Uludag University
Ayşenur Demirbaş	THE IMPORTANCE OF PROBIOTICS AND PREBIOTICS IN NUTRITIONAL SUPPORT	Bezmialem Vakif University, Istanbul, Turkey
Ayşe Güneş Bayır		
Mehmet Ferit ÖZMEN	THE RELATIONSHIP OF SEASON AND PREGNANCY RATE IN DAIRY CATTLE IN DİYARBAKIR PROVINCE	Dicle University, Diyarbakır, Türkiye
Mehriban EMEK Emirullah MEHMETOV Süleyman YILMAZ Ethem İlhan ŞAHİN	EFFECTS OF PHASE TRANSFORMATIONS IN NEMATIC LIQUID CRYSTAL MATERIALS ON ELECTROOPTICAL PROPERTIES	Adıyaman University, Adıyaman-Türkiye Bilkent University, NANOTAM, Bilkent, Ankara, Türkiye Aksaray Unıversıty, Aksaray-Türkiye Adana Alparslan Türkeş Science and Technology University, Adana-Türkiye

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 2 / Hall-3
05.02.2022
Moderator: Małgorzata Waniek & Prof. Dr. Rui Alexandre Castanho
Meeting ID: 827 6383 8878 / Passcode: 700777
Ankara Local Time: 12:30 – 14:30

Author(s)	Title	Affiliation
Małgorzata Waniek	THE IMPACT OF THE CORONAVIRUS PANDEMIC ON THE DEVELOPMENT OF DEPRESSION IN THE WORLD	WSB University, Dąbrowa Górnicza, Poland
Rui Alexandre Castanho		WSB University, Dąbrowa Górnicza, Poland
Felicia Andrei	SELECTIVE DISTRIBUTION THROUGH E-COMMERCE OF DERMO-COSMETIC PRODUCTS	University of Medicine and Pharmacy VICTOR BABES Timisoara, Romania.
Srdjan Nikoric		University of Medicine and Pharmacy VICTOR BABES Timisoara, Romania.
Imane AMMAYEN	CHARACTERIZATION OF INDUSTRIAL EFFLUENTS AND CONTRIBUTION TO THE INSTALLATION OF A WASTE WATER TREATMENT STATION WITHIN THE CIBELII COMPANY	Ibn zohr University, Faculty of Sciences, chemical process engineering, Agadir, Morocco
Assist. Prof. Dr. Ipek AYTAÇ	HEAT TRANSFER ENHANCEMENT USING NANOFLUIDS IN HEAT PIPES	University of Turkish Aeronautical Association, Ankara, Turkey
Mohamed El housse	THE STUDY OF THE ORIGIN OF THE SCALING PHENOMENON FORMED IN WATER DISTRIBUTION INSTALLATIONS AND THE EFFECT OF AN INORGANIC INHIBITOR AS AN ENVIRONMENTALLY FRIENDLY INHIBITOR	Ibn zohr university
Abdallah Hadfi		Ibn zohr university
Abdelghani El kihal		Ibn zohr university
Said Ben-aazzaa		Ibn zohr university
Mohamed Errami		Ibn zohr university
Ali Driouiche		Ibn zohr university
Cengizhan DAG	CURRENT SOLUTIONS AND EVALUATIONS ON THE ANTIFOULING COATINGS USED IN AQUACULTURE	Dokuz Eylül University, İzmir, Turkey
Levent CAVAS		Dokuz Eylül University, İzmir, Turkey
Halima Mortadi	ELECTRICAL, DIELECTRIC AND OPTICAL PROPERTIES STUDIES OF PYROVANADATES $LI_XCU_{2-X/2}V_2O_7$ (X = 0.05; 0.1; 0.2)	University Chouaib Doukkali, El Jadida, Morocco.
Abdelmonim.Assekouri		University Chouaib Doukkali, El Jadida, Morocco.
Elmouloudi sabbar		University Chouaib Doukkali, El Jadida, Morocco.
Mohammed Bettach		University Chouaib Doukkali, El Jadida, Morocco.
Ilyas CHOUAYBI	ADSORPTION STUDIES OF ALIZARIN YELLOW R ONTO PRISTINE AND CALCINED HYDROCALUMITE: COMPARATIVE STUDY	Chouaïb Doukkali University, El Jadida, Morocco.
El mostafa MOUJAHID		Chouaïb Doukkali University, El Jadida, Morocco.
Hasna OUASSIF		Chouaïb Doukkali University, El Jadida, Morocco.
Oumaima MATBOUT		Chouaïb Doukkali University, El Jadida, Morocco.
Mohammed BETTACH		Chouaïb Doukkali University, El Jadida, Morocco.

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 2 / Hall-4
05.02.2022
Moderator: Dr. Miloudi Mohamed
Meeting ID: 827 6383 8878 / Passcode: 700777
Ankara Local Time: 12:30 – 14:30

Author(s)	Title	Affiliation
Miloudi Mohamed	EMC MODELING OF THE ACTIVE ELEMENTS	University of Relizane, Relizane, Algeria
Miloudi Houcine		University of Sidi Bel Abbes, Sidi Bel Abbes, Algeria
Bendaoud Abdelber		University of Sidi Bel Abbes, Sidi Bel Abbes, Algeria
Rami Abdelkader		University of Sidi Bel Abbes, Sidi Bel Abbes, Algeria
Benhadda Nassireddine		University of Sidi Bel Abbes, Sidi Bel Abbes, Algeria
Habib DJOURDEM	EXISTENCE THEORY OF BOUNDARY VALUE PROBLEMS FOR A HADAMARD FRACTIONAL DIFFERENTIAL INCLUSIONS	Relizane University, Algeria
Amhimmid .Q. Almabrouk	DIGITAL POSITION SYSTEM CONTROL OF ANALOG SERVOMECHANISM	Higher Institute of Engineering Technology, Bani Walid, Libya
Abdrrazek EL-KORDY	REMOVAL OF A TOXIC POLLUTANT (PHENOL) BY ADSORPTION ON THE FAUJASITE ZEOLITE	Moulay Ismail University, Zitoune, Meknes P. O. Box 11201
Najib TIJANI		Moulay Ismail University, Zitoune, Meknes P. O. Box 11201
Abdelaziz ELGAMOUZ		Moulay Ismail University, Zitoune, Meknes P. O. Box 11201
Hamza Ighnih	NEW ECO-FRIENDLY MAGNETIC NANOCOMPOSITE FOR EFFICIENT REMOVAL OF TOXIC DYES FROM WASTEWATER: EQUILIBRIUM AND THERMODYNAMIC STUDIES	Ibn Zohr University, Agadir, Morocco
Brahim Ennasraoui		Ibn Zohr University, Agadir, Morocco
Redouane Haounati		Ibn Zohr University, Agadir, Morocco
Hassan Ouachtak		Ibn Zohr University, Agadir, Morocco
Naima Hafid		Centre Régional des Métiers de l'Education et de la Formation Souss Massa, Morocco
Amane Jada		Université de Haute Alsace (UHA), F-68100 Mulhouse, France
Abdelaziz Ait Addi		Ibn Zohr University, Agadir, Morocco
Abdelmonim ASSEKOURI	IMPEDANCE SPECTROSCOPY STUDY OF MAP FERTILIZERS ENRICHED WITH DIFFERENT LEVELS OF IRON (III) OXIDE IMPURITIES	University Chouaib Doukkali, El Jadida–Morocco
Nacira LEBBAR		University Chouaib Doukkali, El Jadida–Morocco
El mouloudi SABBAR		University Chouaib Doukkali, El Jadida–Morocco
Mehdib KHOULOUD		University Chouaib Doukkali, El Jadida–Morocco
Rachid BOULIF		University Chouaib Doukkali, El Jadida–Morocco

Salman Ahmad	COMPRESSIBLE NAVIER-STOKES EQUATIONS WITH HEAT TRANSFER BY FINITE ELEMENT METHOD	The Chinese University of Hong Kong

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 3 / Hall-1
05.02.2022
Moderator: Assoc. Prof. Dr. Nilgun ULUTASDEMIR
Meeting ID: 827 6383 8878 / Passcode: 700777
Ankara Local Time: 15:00 – 17:00

Author(s)	Title	Affiliation
Uzm. Dr. İlke TAMDOĞAN	ANESTHESIA AND INTENSIVE CARE MANAGEMENT OF THE PATIENT WHO WAS TAKEN EMERGENCY CESAREAN SECTION DUE TO PREECLAMPSIA/ECLAMPSIA	GRÜ Kadın Doğum ve Çocuk Hastalıkları Eğitim Araştırma Hastanesi, Giresun,Türkiye
Uzm. Dr. Esra TURUNÇ		Ondokuz Mayıs Üniversitesi, Samsun, Türkiye
Uzm. Dr. İlke TAMDOĞAN	SPINAL ANESTHESIA FOR CESAREAN SECTION IN A MORBIDLY OBESE PARTURIENT: A case report	GRÜ Kadın Doğum ve Çocuk Hastalıkları Eğitim Araştırma Hastanesi, Giresun,Türkiye
Uzm. Dr. Esra TURUNÇ		Ondokuz Mayıs Üniversitesi, Samsun, Türkiye
Mukaddes BADILLI	RELATIONSHIP BETWEEN AUTISM AND ALPHA-SYNUCLEIN	Erciyes University
Reyhan TAHTASAKAL		Erciyes University
Mürşide ŞAHİN		Erciyes University
Şeyda Nur PİRENCİOĞLU		Erciyes University
Emre TUĞHAN		Erciyes University
Fatma DAL		Erciyes University
Esra DEMİRCİ		Erciyes University
Elif Funda ŞENER		Erciyes University
İhsan BOYACI	A CASE OF SUBACUTE THYROIDITIS WITH NORMAL THYROID HORMONE PROFILE ON ADMISSION	İstanbul Medipol University, Fatih, Istanbul
İhsan BOYACI	A CASE OF AIDS PRESENTING WITH WEIGHT LOSS AND ORAL CANDIDIASIS	İstanbul Medipol University, Fatih, Istanbul
Uzm. Dr. Esra TURUNÇ	CONSIDER EXTUBATION WHILE INTUBATING - CASE REPORT	Ondokuz Mayıs Üniversitesi, Samsun, Türkiye
Uzm. Dr. İlke TAMDOĞAN		GRÜ Kadın Doğum ve Çocuk Hastalıkları Eğitim Araştırma Hastanesi, Giresun,Türkiye
Uzm. Dr. Esra TURUNÇ	ANESTHESIA MANAGEMENT IN COVID 19 + PATIENT WITH GLUCOSE-6-PHOSPHATE DEHYDROGENASE DEFICIENCY: CASE REPORT	Ondokuz Mayıs Üniversitesi, Samsun, Türkiye
Uzm. Dr. İlke TAMDOĞAN		GRÜ Kadın Doğum ve Çocuk Hastalıkları Eğitim Araştırma Hastanesi, Giresun,Türkiye
Assoc. Prof. Dr. Nilgun ULUTASDEMIR	THE IMPORTANCE OF THE GROUP PROCESS IN GROUP THERAPY	Gümüşhane University
Research Asist. Sevda UZUN		Gümüşhane University
Assoc. Prof. Dr. Nilgun ULUTASDEMIR	VALUES AND IMPORTANCE IN NURSING	Gümüşhane University
Instructor Nursen KULAKAC		Gümüşhane University

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 3 / Hall-2
05.02.2022
Moderator: Dr. Binyam Zigta
Meeting ID: 827 6383 8878 / Passcode: 700777
Ankara Local Time: 15:00 – 17:00

Author(s)	Title	Affiliation
Faryal Nawab	INFLUENCE OF MATERNAL EDUCATION ON CHILD HEALTH STATUS IN SINDH, SECONDARY DATA ANALYSIS FROM PDHS 2017-18	Dept, of Community Health Sciences, Jinnah Medical and Dental College
Sanowar Ali		Dept, of Community Health Sciences, Jinnah Medical and Dental College
Kiran Fatima		Dept, of Community Health Sciences, Jinnah Medical and Dental College
Mohammed Jimoh SAKA	PERCEPTION AND DETERMINANTS OF NURSING INVOLVEMENT IN POLITICS AND POLICY MAKING PROCESS IN KWARA STATE, NIGERIA	University of Iloirn, Ilorin, Kwara State, Nigeria
Elisha Taye IGE		University of Iloirn Teaching Hospital, Ilorin, Kwara State, Nigeria
Shuadat Oluwakemi DANZAKI		General Hospital, Ilorin, Kwara State, Nigeria
Dr.Farhanul Huda	CAN WOUND SURFACE PH AND TEMPERATURE PREDICT WOUND HEALING IN DIABETIC FOOT ULCER	Faculty in Department of General Surgery AIIMS Rishikesh,India
Dr.Manisha Naithani		Faculty in Department of General Surgery AIIMS Rishikesh,India
Dr.Bhavaniprasad		Faculty in Department of General Surgery AIIMS Rishikesh,India
S. A. Adegoke	AFLATOXIN STATUS OF GROUNDNUT (ARACHIS HYPOGEA) SAMPLES SOLD IN ANYIGBA, KOGI STATE, NIGERIA	Department of Microbiology, kogi State University, Anyigba
Y. Lamidi		Department of Microbiology, kogi State University, Anyigba
Dr. Kave Koorehpaz	EFFECT OF HEAT STRESS ON THE REPRODUCTION OF FARM ANIMALS	Urmia University, Iran.
NOUIOURA Ghizlane	EVALUATION OF ANTIOXIDANT ACTIVITY OF PARSLEY (PETROSELINUM CRISPUM) ESSENTIAL OIL GROWING IN THE NORTH REGION (MOROCCO) AND IDENTIFICATION OF ITS ANTIOXIDANT CONSTITUENTS	Université sidi Mohammed ben Abdellah, Fès, Maroc
TOURABI Maryem		Université sidi Mohammed ben Abdellah, Fès, Maroc
DERWICH El houssine		Université sidi Mohammed ben Abdellah, Fès, Maroc
Mulatu Liyew Berihun	MODELING THE IMPACT OF LAND USE AND MANAGEMENT OPTIONS ON RUNOFF AND SEDIMENT LOSS IN THE ETHIOPIAN HIGHLANDS	Tottori University, 1390 Hamasaka, Tottori 680-0001, Japan
Atsushi Tsunekawa		Tottori University, 1390 Hamasaka, Tottori 680-0001, Japan
Nigussie Haregeweyn		Tottori University, 1390 Hamasaka, Tottori 680-0001, Japan
Mitsuru Tsubo		Tottori University, 1390 Hamasaka, Tottori 680-0001, Japan
Ayele Almaw Fenta		Tottori University, 1390 Hamasaka, Tottori 680-0001, Japan
Kindiye Ebabu		Bahir Dar University, P.O. Box 1289, Bahir Dar, Ethiopia
Dagnenet Sultan		Tottori University, 1390 Hamasaka, Tottori 680-0001, Japan

Dr. Binyam Zigta	THERMAL RADIATION, CHEMICAL REACTION AND VISCOUS DISSIPATION EFFECTS ON MHD MICRO POLAR BLOOD FLOW WITH STRETCHING CAPILLARY IN THE PRESENCE OF HEAT GENERATION/ ABSORPTION	Wachemo University College of Natural and Computational Science

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

Session 3 / Hall-3

05.02.2022

Moderator: Dr. CHUKWUEMEKA G. EME & Volodymyr PAVLENKO

Meeting ID: 827 6383 8878 / Passcode: 700777

Ankara Local Time: 15:00 – 17:00

Author(s)	Title	Affiliation
Rohma Ashraf	PERSONALITY TRAITS: A PIVOTAL PREDICTOR OF ACADEMIC PERFORMANCE IN UNIVERSITY STUDENTS	University of Management and Technology, Lahore, Pakistan
Ifzonia Babar		University of Management and Technology, Lahore, Pakistan
Sana Fatima		University of Management and Technology, Lahore, Pakistan
Aliza Ali	EMOTIONAL BURNOUT, WORK-FAMILY CONFLICT AND MARITAL SATISFACTION AMONG PROFESSIONALS	University of Management and Technology, Lahore, Pakistan
Hifza Imran		University of Management and Technology, Lahore, Pakistan
Saira Iftikhar		University of Management and Technology, Lahore, Pakistan
Mubashera Habib		University of Management and Technology, Lahore, Pakistan
Cristina Guerrero Rodríguez		University of Cádiz, Department of Psychology
Laura González Verde		University of Cádiz, Department of Psychology
PhD. Consolación Gómez Íñiguez		University Jaime I of Castellón
Sibgha Farooqi	COMPETITIVE ANXIETY IN UNIVERSITY ATHLETES: A PSYCHOMETRIC STUDY	University of Management and Technology, Lahore, Pakistan
Rabia Khadim		University of Management and Technology, Lahore, Pakistan
Dr. CHUKWUEMEKA G. EME	ENVIRONMENTAL DEGRADATION AND SOCIO-ECONOMIC DEVELOPMENT OF THE NIGER-DELTA-REGION OF NIGERIA- A CASE OF OGONI-LAND	National Open University of Nigeria, Jabi, Abuja
Dr. CHUKWUEMEKA G. EME	THE ROLE OF BUSINESS ETHICS IN THE EFFICIENT MANAGEMENT OF THE NIGERIAN PUBLIC SERVICE	National Open University of Nigeria, Jabi, Abuja
Dr. CHUKWUEMEKA G. EME	THE ROLE OF STAFF TRAINING AND MANAGEMENT DEVELOPMENT ON EMPLOYEE ENGAGEMENT AND MOTIVATION IN THE NIGERIAN PUBLIC SECTOR - A CASE OF NATIONAL OPEN UNIVERSITY OF NIGERIA (NOUN)	National Open University of Nigeria, Jabi, Abuja
Volodymyr PAVLENKO	MOBILE APPLICATIONS DEVELOPMENT USING MACHINE LEARNING ALGORITHMS	Kyiv National University of Technologies and Design, Kiyv, Ukraine
Ihor PONOMARENKO		Kyiv National University of Technologies and Design, Kiyv, Ukraine

KAWURE, JIBRIL HUSSEIN	ENHANCED DATA AGGREGATION SCHEME FOR INTERNET OF THINGS (IoT) DATA IN HETEROGENEOUS NODES	Centre Director, Professor Iya Abubakar Community Resources Centre
AMINU ADAMU AHMED		ICT Programme Analyst, Federal Polytechnic Kaltungo
K. Thamizhmaran	ENHANCED NETWORK LIFE TIME USING SECURE ACKNOWLEDGEMENTS WITH CRYPTOGRAPHY	Dept. of Electronics and Communication, Government College of Engineering, Tamilnadu, India

All participants must join the conference 15 minutes before the session time.
Every presentation should last not longer than 10-12 minutes.
Kindly keep your cameras on till the end of the session.

CONTENT

CONGRESS ID	1
SCIENTIFIC COMMITTEE	2
PHOTO GALLERY	3
PROGRAM	4
CONTENT	5

PROCEEDINGS BOOK

Widya Pintaka Bayu Putra ***HAPLOTYPE DIVERSITY IN THE MITOCHONDRIAL COI GENE IN YAT-SEN'S TORRENT FROGS (Amolops yatseni)***	1
Amhimmid .Q. Almabrouk ***DIGITAL POSITION SYSTEM CONTROL OF ANALOG SERVOMECHANISM***	8
Erdem SARI ***INTERNAL HERNIATION DUE TO FALCIFORM LIGAMENT***	13
Mehmet Dikici ***SIGNIFICANT PROBABILITY DISTRIBUTIONS FOR FLOOD FLOW***	16
Neslihan AYDIN & İrfan KARAGÖZ ***SCANNING PROTOTYPING PROCESSES WITH A THREE-DIMENSIONAL PRINTER FOR MODELING A NEW AERODYNAMIC WING***	23
S. A. Adegoke & Y. Lamidi ***AFLATOXIN STATUS OF GROUNDNUT (ARACHIS HYPOGEA) SAMPLES SOLD IN ANYIGBA, KOGI STATE, NIGERIA***	27
İlke TAMDOĞAN & Esra TURUNÇ ***ANESTHESIA AND INTENSIVE CARE MANAGEMENT OF THE PATIENT WHO WAS TAKEN EMERGENCY CESAREAN SECTION DUE TO PREECLAMPSIA/ECLAMPSIA***	33
Eda Feyza AKYÜREK ***THE EFFECT OF TEMPERATURE ON PHOTOVOLTAIC PANEL EFFICIENCY AT DIFFERENT LOCATIONS***	36
Hasan Can GÜRDAL, Hasan Selim ŞENGEL & Hakan EROL ***EXPERIMENTAL INVESTIGATION OF IMPACT LOAD BEHAVIOR OF SLABS REINFORCED WITH CARBON TEXTILE***	43
İlke TAMDOĞAN & Esra TURUNÇ ***SPINAL ANESTHESIA FOR CESAREAN SECTION IN A MORBIDLY OBESE PARTURIENT: A case report***	51
Muhittin USLU ***GLUCOCORTICOIDS AND CANINE ATOPIC DERMATITIS***	54
Muhittin USLU ***ANTIVIRAL TREATMENT IN CATS***	60
Mukaddes BADILLI, Reyhan TAHTASAKAL, Şeyda Nur PİRENCİOĞLU, Mürşide ŞAHİN & Emre TUĞHAN, Fatma DAL, Esra DEMİRCİ, Elif Funda ŞENER ***RELATIONSHIP BETWEEN AUTISM AND ALPHA-SYNUCLEIN***	66

Esra TURUNÇ & İlke TAMDOĞAN ***ANESTHESIA MANAGEMENT IN COVID 19 + PATIENT WITH GLUCOSE-6-PHOSPHATE DEHYDROGENASE DEFICIENCY: CASE REPORT***	**73**
Ali USLU, Oğuzhan DENİZLİ & Tuncay ÇÖKÜLGEN, Aslı SAKMANOĞLU, Zafer SAYIN ***SUDDEN DEATHS DUE TO STAPHYLOCOCCUS IN POST-PARTUM SHEEP***	**76**
Emine TORAMAN & Ekrem SULUKAN ***OPTOGENETIC APPROACHES in ZEBRAFISH NEUROBİOLOGY***	**83**
Melike KARAMAN ***ANTISENSE OLIGONUCLEOTIDE APPROACH IN INHIBITION OF Staphylococcus aureus GROWTH***	**87**
Esra TURUNÇ & İlke TAMDOĞAN ***CONSIDER EXTUBATION WHILE INTUBATING - CASE REPORT***	**93**
Volodymyr PAVLENKO & Ihor PONOMARENKO ***MOBILE APPLICATIONS DEVELOPMENT USING MACHINE LEARNING ALGORITHMS***	**96**
Hayriye Sevil Ergür ***ANALYSIS OF ENERGY SAVINGS IN FANS***	**101**
Çağlayan Balkaya & Nevbahar Ekin ***INVERSION OF SELF-POTENTIAL ANOMALIES USING CULTURAL ALGORITHM***	**109**
Çağlayan Balkaya & Mehmet Metin Ünyay ***ARCHAEO-GEOPHYSICAL INVESTIGATIONS AROUND THE AEDICULUS BASILICA OF THE PISIDIA ANTIOCHEIA ANCIENT CITY (YALVAÇ, ISPARTA)***	**116**
Hacer Kandemir & Levent Cavas ***NANOMATERIALS USED FOR PERSONAL PROTECTIVE MEDICAL EQUIPMENTS***	**122**
Turgay TAŞKIN, Çağrı KANDEMİR & Sait ENGİNDENİZ ***AN EVALUATION ON SUSTAINABILITY OF SHEEP BREEDING IN TURKEY***	**127**
Nilgun ULUTASDEMIR & Sevda UZUN ***THE IMPORTANCE OF THE GROUP PROCESS IN GROUP THERAPY***	**134**
Nilgun ULUTASDEMIR & Nursen KULAKAC ***VALUES AND IMPORTANCE IN NURSING***	**140**
Gammoudi Mehrez, Ben Ahmed Raja & Bouriga Nawzet ***CHECKLIST OF "TURBELLARIANS" SAMPLED AMONG CULTIVATED MUSSELS MYTILUS GALLOPROVINCIALIS IN BIZERTA LAGOON (NORTHERN TUNISIA)***	**145**
Bouriga Nawzet, Ben Ahmed Raja & Gammoudi Mehrez, TRABELSI Monia ***NOVEL METHOD FOR DETERMINATION OF FATTY ACID COMPOSITION USING OTOLITH SHAPE IN SIX BENTHIC AND PELAGIC FISH SPECIES FROM THE GULF OF TUNIS***	**150**
Cengizhan DAG & Levent CAVAS ***CURRENT SOLUTIONS AND EVALUATIONS ON THE ANTIFOULING COATINGS USED IN AQUACULTURE***	**159**

Ebru SARIYER & Ebru SARIYER ***DETERMINATION OF HEAVY METALS IN LETTUCE DEPENDING ON THE SOURCE OF IRRIGATION WATER***	**165**
Nuray AKBUDAK & Nuray AKBUDAK, Ufuk Tan DURAN ***THE EFFECTS OF ORGANIC FERTILIZER APPLICATIONS ON PRODUCTIVITY AND TOTAL PHENOLIC COMPOUND AMOUNTS IN GREEN LEAFY VEGETABLES***	**170**
Resul Yılmaz, Numan Demiralp, Gülçin Hacıbeyoğlu & Şule Arıcan, Alper Kılıçaslan ***ERECTOR SPINAE PLANE BLOCK FOR AWAKE VIDEO ASISTED THORACOSCOPIC SURGERY***	**178**
Nazlı Pınar ARSLAN, Nazlı Pınar ARSLAN & Meryem DOYMUŞ ***BACTERIA-DERIVED ANTICANCER MOLECULES***	**182**
Emre DEMİRCİ ***USING THE THERMAL CAMERA (THERMOGRAPHY) IN BULLS***	**190**
Ben Ahmed Raja, Bouriga Nawzet & FouzaI Farah, Gammoudi Mehrez ***LETHAL EFFECT OF ZN ON THE SPERMATOGENESIS OF MEDICINAL LEECH HIRUDO TROCTINA (ANNELIDA, HIRUDINEA) FROM TUNISIA***	**194**
Faiz Muhammad Shaikh & Fateh Muhammad Marri, Jan Muhammad Mrri ***IMPACT OF COVID-19 PULSES MARKET AND DEVELOPING VALUE CHAIN ON RETAIL, WHOLESALE AND DAAL FACTORY LEVEL ANALYSIS IN SINDH-PAKISTAN***	**201**
Rodolfo REDA, Alessio ZANZA, Maurilio D'ANGELO & Dario DI NARDO, Luca TESTARELLI ***TORSIONAL RESISTANCE OF NITI ROTARY INSTRUMENTS A CRISTALLOGRAPHIC PHASE STUDY***	**202**
Jyothi. H & Mini Joseph ***PREVALENCE OF MALNUTRITION AMONG PRESCHOOL CHILDREN IN RURAL NORTHERN KERALA-INDIA***	**203**
Aykut ILGAZ ***THE EFFECT OF GLASS FIBER RATIO ON THE ELECTRICAL PROPERTIES OF SMC POLYMER COMPOSITE REINFORCED WITH SINGLE WALL CARBON NANOTUBES***	**204**
Kamal TABTI1, Larbi ELMCHICHI1, Abdelouahid SBAI & Hamid MAGHAT1, Mohammed BOUACHRINE1, Tahar LAKHLIFI1 ***COMPUTATIONAL INVESTIGATION OF PYRROLIDIN DERIVATIVES AS NOVEL GPX4 / MDM2–P53 INHIBITORS BY USING 3D/2D-QSAR, MOLECULAR DOCKING, MOLECULAR DYNAMICS SIMULATIONS AND MMGBSA FREE ENERGY***	**206**
Miloudi Mohamed, Miloudi Houcine & Miloudi Houcine, Rami Abdelkader, Rami Abdelkader ***EMC MODELING OF THE ACTIVE ELEMENTS***	**207**
Gülsüm Aydın & Cenan Öztürk ***PRODUCTION OF ALGINATE BASED BEADS AND INVESTIGATION OF THEIR USE IN CONTROLLED DRUG RELEASE***	**208**
CHUKWUEMEKA G. EME ***ENVIRONMENTAL DEGRADATION AND SOCIO-ECONOMIC DEVELOPMENT OF THE NIGER-DELTA-REGION OF NIGERIA- A***	**210**

CASE OF OGONI-LAND	
CHUKWUEMEKA G. EME	**227**
THE ROLE OF BUSINESS ETHICS IN THE EFFICIENT MANAGEMENT OF THE NIGERIAN PUBLIC SERVICE	
CHUKWUEMEKA G. EME	**240**
THE ROLE OF STAFF TRAINING AND MANAGEMENT DEVELOPMENT ON EMPLOYEE ENGAGEMENT AND MOTIVATION IN THE NIGERIAN PUBLIC SECTOR - A CASE OF NATIONAL OPEN UNIVERSITY OF NIGERIA (NOUN)	
Sümeyra ATEŞ & Hakki GÜLŞEN	**245**
SANLIURFA PROVINCE SOLID WASTE CHARACTERIZATION AND MEDICAL WASTE DISPOSAL BY COVID-19 EFFECT	
Zafer Ömer Günindi, Ali Osman Kurban & Merdin Danışmaz	**247**
ELIMINATION OF STRUCTURAL FLEXIBILITY FAILURE AND VIBRATION ANALYSIS BY APPLICATION OF PREDICTIVE MAINTENANCE METHOD OF COOLING FAN	
Khouloud Alaa, Fatima Aqel & Mohamed Atounti	**249**
HYBRIDIZATION OF DIVIDE-AND-CONQUER TECHNIQUE AND SINE COSINE ALGORITHM FOR BETTER CONTRAST ENHANCEMENT IN MEDICAL IMAGES	
Habib Djourdem	**250**
EXISTENCE THEORY OF BOUNDARY VALUE PROBLEMS FOR A HADAMARD FRACTIONAL DIFFERENTIAL INCLUSIONS	
Małgorzata Waniek & Rui Alexandre Castanho	**251**
THE IMPACT OF THE CORONAVIRUS PANDEMIC ON THE DEVELOPMENT OF DEPRESSION IN THE WORLD	
İhsan BOYACI	**252**
A CASE OF SUBACUTE THYROIDITIS WITH NORMAL THYROID HORMONE PROFILE ON ADMISSION	
Şennur ALTUNDAĞ & Mehmet Fatih DİLEKOĞLU	**254**
CREATING AN ENVIRONMENTAL LABEL (ECO-LABEL) SYSTEM FOR DRINKING WATER OBTAINED FROM CITY DRINKING WATER TREATMENT FACILITIES	
Ayşenur Demirbaş & Ayşe Güneş Bayır	**256**
THE IMPORTANCE OF PROBIOTICS AND PREBIOTICS IN NUTRITIONAL SUPPORT	
Felicia Andrei & Srdjan Nikoric	**257**
SELECTIVE DISTRIBUTION THROUGH E-COMMERCE OF DERMO-COSMETIC PRODUCTS	
Imane Ammayen, Mohamed ERRAMI & Khadija Kouya, Abdallah HADFI	**258**
CHARACTERIZATION OF INDUSTRIAL EFFLUENTS AND CONTRIBUTION TO THE INSTALLATION OF A WASTE WATER TREATMENT STATION WITHIN THE CIBELII COMPANY	
İpek Aytaç	**259**
HEAT TRANSFER ENHANCEMENT USING NANOFLUIDS IN HEAT PIPES	
Mohamed El housse, Abdallah Hadfi, Abdelghani El kihal & Said Ben-aazza, Mohamed Errami, Ali Driouiche	**260**
THE STUDY OF THE ORIGIN OF THE SCALING PHENOMENON	

FORMED IN WATER DISTRIBUTION INSTALLATIONS AND THE EFFECT OF AN INORGANIC INHIBITOR AS AN ENVIRONMENTALLY FRIENDLY INHIBITOR	
Muhittin Bayram ***ANALYSIS OF THE LORENZ CHAOTIC SYSTEM WITH THE STLmax METHOD***	**261**
İhsan BOYACI ***A CASE OF AIDS PRESENTING WITH WEIGHT LOSS AND ORAL CANDIDIASIS***	**262**
Cengiz YÜRÜRDURMAZ, Simge Gözde SARIOĞLAN & Yusuf GÜLER ***EFFECT ON PRODUCTION AND PRODUCTION FACILITIES OF CHICKPEA (CICER ARIETINUM L.) PLANTS IN MALATYA ECOLOGICAL CONDITIONS***	**264**
Kemal Serhan SANDIKÇI ***AIRWAY MANAGEMENT IN A PATIENT WITH INTRAORAL TUMOR - CASE REPORT***	**266**
Kemal Serhan SANDIKÇI ***INTRACARDIAC THROMBUS DUE TO CENTRAL VENOUS CATHETER-CASE REPORT***	**268**
Mehmet Ferit ÖZMEN ***THE RELATIONSHIP OF SEASON AND PREGNANCY RATE IN DAIRY CATTLE IN DİYARBAKIR PROVINCE***	**270**
Kave Koorehpaz ***EFFECT OF HEAT STRESS ON THE REPRODUCTION OF FARM ANIMALS***	**274**
Halima Mortadi, Abdelmonim Assekouri & Elmouloudi sabbar, Mohammed Bettach ***ELECTRICAL, DIELECTRIC AND OPTICAL PROPERTIES STUDIES OF PYROVANADATES LixCu2-x/2V2O7 (X = 0.05; 0.1; 0.2)***	**275**
Ilyas CHOUAYBI, El Mostafa MOUJAHID & El Mostafa MOUJAHID, El Mostafa MOUJAHID, Mohammed BETTACH ***ADSORPTION STUDIES OF ALIZARIN YELLOW R ONTO PRISTINE AND CALCINED HYDROCALUMITE: COMPARATIVE STUDY***	**276**
Assekouri Abdelmonim, Nacira LEBBAR, Elmouloudi SABBAR & Mehdib KHOULOUD, Rachid BOULIF ***IMPEDANCE SPECTROSCOPY STUDY OF MAP FERTILIZERS ENRICHED WITH DIFFERENT LEVELS OF IRON (III) OXIDE IMPURITIES***	**277**
Abdrrazek EL-KORDY, Najib TIJANI & Abdelaziz ELGAMOUZ ***REMOVAL OF A TOXIC POLLUTANT (PHENOL) BY ADSORPTION ON THE FAUJASITE ZEOLITE***	**278**
Rohma Ashraf, Ifzonia Babar & Sana Fatima ***PERSONALITY TRAITS: A PIVOTAL PREDICTOR OF ACADEMIC PERFORMANCE IN UNIVERSITY STUDENTS***	**279**
Faryal Nawab, Sanowar Ali & Kiran Fatima ***INFLUENCE OF MATERNAL EDUCATION ON CHILD HEALTH STATUS IN SINDH, SECONDARY DATA ANALYSIS FROM PDHS 2017-18***	**280**
Hamza Ighnih, Brahim Ennasraoui, Redouane Haounati, Hassan Ouachtak & Naima Hafid, Amane Jada, Abdelaziz Ait Addi	**281**

NEW ECO-FRIENDLY MAGNETIC NANOCOMPOSITE FOR EFFICIENT REMOVAL OF TOXIC DYES FROM WASTEWATER: EQUILIBRIUM AND THERMODYNAMIC STUDIES	
Mohammed Jimoh SAKA, Elisha Taye IGE & Shuadat Oluwakemi DANZAKI ***PERCEPTION AND DETERMINANTS OF NURSING INVOLVEMENT IN POLITICS AND POLICY MAKING PROCESS IN KWARA STATE, NIGERIA***	**282**
Aliza Ali, Hifza Imran & Saira Iftikhar, Mubashera Habib ***EMOTIONAL BURNOUT, WORK-FAMILY CONFLICT AND MARITAL SATISFACTION AMONG PROFESSIONALS***	**283**
Cristina Guerrero Rodríguez, Laura González Verde & Consolación Gómez Íñiguez ***EMOTIONAL RECOGNITION THROUGH SPEECH AND COGNITIVE IMPAIRMENT: A PRELIMINARY STUDY***	**284**
Fatemeh Montazeri ***INVESTIGATING THE MOST IMPORTANT ECONOMIC AND SOCIAL FACTORS AFFECTING THE SUSTAINABLE DEVELOPMENT OF RURAL COMMUNITIES (CASE STUDY: MAZANDARAN PROVINCE, IRAN)***	**285**
Hamid T. AL-Saad & Hamzah A. Kadhim, Makia M.Al-Hejuje ***ACCUMULATION OF N-ALKANES IN PLANT SPECIES OF WEST QURNA-1 OIL FIELD IN BASRA CITY, SOUTHERN IRAQ***	**286**
Farhanul Huda & Manisha Naithani, Bhavaniprasad ***CAN WOUND SURFACE PH AND TEMPERATURE PREDICT WOUND HEALING IN DIABETIC FOOT ULCER***	**287**
Sibgha Farooqi & Rabia Khadim ***COMPETITIVE ANXIETY IN UNIVERSITY ATHLETES: A PSYCHOMETRIC STUDY***	**289**
Oyewole M. F and Odioko .B. O ***FACTORS INFLUENCING EATING HABIT OF RURAL DWELLERS DURING COVID-19 ERA IN DELTA STATE, NIGERIA***	**290**
Shiva Eshaghi ***APPROXIMATE ANALYTICAL SOLUTIONS FOR FRACTIONAL EUROPEAN OPTIONS***	**291**
Liliam Sayuri SAKAMOTO, Jair Minoro ABE & Luiz Antonio de LIMA ***SIEM – SECURITY INFORMATION EVENT MANAGEMENT IMPROVEMENT USING PARACONSISTENT ANNOTATED EVIDENTIAL LOGIC E***	**292**
Binyam Zigta ***THERMAL RADIATION, CHEMICAL REACTION AND VISCOUS DISSIPATION EFFECTS ON MHD MICRO POLAR BLOOD FLOW WITH STRETCHING CAPILLARY IN THE PRESENCE OF HEAT GENERATION/ ABSORPTION***	**293**
Waqas Ahmad & Noshaba Ashraf ***EVALUATION OF GENETIC DIVERSITY AND GENOME FINGERPRINTING OF BITTER GOURD GENOTYPES(MOMORDICA CHARANTIA) BY MOLECULAR MARKER***	**294**

Mulatu Liyew Berihun, Atsushi Tsunekawa, Nigussie Haregeweyn & Mitsuru Tsubo, Ayele Almaw Fenta, Kindiye Ebabu1, Dagnenet Sultan ***MODELING THE IMPACT OF LAND USE AND MANAGEMENT OPTIONS ON RUNOFF AND SEDIMENT LOSS IN THE ETHIOPIAN HIGHLANDS***	**295**
KAWURE, JIBRIL HUSSEIN & AMINU ADAMU AHMED ***ENHANCED DATA AGGREGATION SCHEME FOR INTERNET OF THINGS (IoT) DATA IN HETEROGENEOUS NODES***	**296**
NOUIOURA Ghizlane & TOURABI Maryem, DERWICH El houssine ***EVALUATION OF ANTIOXIDANT ACTIVITY OF PARSLEY (PETROSELINUM CRISPUM) ESSENTIAL OIL GROWING IN THE NORTH REGION (MOROCCO) AND IDENTIFICATION OF ITS ANTIOXIDANT CONSTITUENTS***	**297**
K. Thamizhmaran ***ENHANCED NETWORK LIFE TIME USING SECURE ACKNOWLEDGEMENTS WITH CRYPTOGRAPHY***	**298**
Vidya Padmakumar, Shine P Joseph ***SEASONAL VARIATIONS IN PHYSICO-CHEMICAL PARAMETERS OF THE GORAI CREEK, WESTERN MUMBAI, INDIA***	**305**
Salman Ahmad ***COMPRESSIBLE NAVIER-STOKES EQUATIONS WITH HEAT TRANSFER BY FINITE ELEMENT METHOD***	**306**
Ezgi Avşar Abdik ***EVALUATION OF ANTI-CANCER ACTIVITY OF CAPE AND HYDROQUINONE COMBINATION ON MELANOMA CELLS***	**307**
Mehriban EMEK, Emirullah MEHMETOV & Süleyman YILMAZ, Ethem İlhan ŞAHİN ***EFFECTS OF PHASE TRANSFORMATIONS IN NEMATIC LIQUID CRYSTAL MATERIALS ON ELECTROOPTICAL PROPERTIES***	**309**

HAPLOTYPE DIVERSITY IN THE MITOCHONDRIAL COI GENE IN YAT-SEN'S TORRENT FROGS (*Amolops yatseni*)

Widya Pintaka Bayu Putra

Research Center for Biotechnology, National Research and Innovation Agency, Cibinong 16911, Indonesia

ORCID NO: 0000-0002-1102-6447

ABSTRACT

Yat-Sen's Torrent frogs (*Amolops yatseni*) inclused of *Ranidae* family frogs that originated from China. This species is not listed in the IUCN Red List. However, the conservation program to protect this species is important to prevent from extinction. The preliminary effort to arrange a conservation program for *A. yatseni* can be assessed with observing their genetic diversity. The genetic diversity is important for survival rate and adaptability of species in specific environments.

This study has been carried out in order to observe the haplotype diversity in mitochondrial Cytochrome Oxidase I (COI) gene of *A. yatseni* frogs at Guangdong Province, China with a meta-analysis study. Total sixteen (16) mitochondrial COI gene (637 bp) of *A. yatseni* frogs were collected from GenBank as the primary data. Four (3) molecular softwares of BioEdit, MEGA-X, DNAsp and NETWORK were used for analyzing the collected sequences.

Research showed that six (6) haplotype were observed in the *A. yatseni* frogs with the Hap.6 as the major haplotype (37.50%). Total thirteen (13) mutation sites were detected in the COI gene of *A. yatseni* frogs. The haplotype diversity (H_d) and nucleotide diversity (P_i) in observed *A. yatseni* frogs were 0.81 and 0.01, respectively. In addition, the Fu,s Fs statistic and Tajima's D values were showed positive. Hence, it can be concluded that the allele variations in the *A. yatseni* population was low because of no expansion. The phylogenetic tree among haplotype of *A. yatseni* frogs reveals of two (2) haplogroup of Haplogroup 1 (Hap.1 and Hap.6) and Haplogroup 2 (Hap.2 to Hap.5). In conclusion, about 89% of COI sequence variations was influenced by geographical factor.

Keywords: *Amolops yatseni*, COI gene, Haplotype, Mitochondria, Phylogenetic tree

1. INTRODUCTION

Yat-Sen's Torrent frog (*Amolops yatseni*) is one of endemic frogs species originated from China. In the world, the *Amolops* frogs consisted of fiftyone (51) species and widely distributed in the southern and eastern Himalaya, eastward to southeastern mainland China and Indo-China region [1]. *A. yatseni* was classified into an *A. ricketti* cluster group together with *A. sinensis, A. albispinus, A. yankaiensis* and *A. wuyiensis* [2]. Recently, Yat-Sen's Torrent (YST) frogs was not listed in the IUCN Red List. However, the other species group such as *A. albispinus* was under vulnerable, *A. yankaiensis* was under near threatened and *A. wuyiensis* was under least concern. However, the conservation program to conserve YST frog is important as one of endemic frogs species in China.

Amphibians are one of the most threatened and poorly known groups of vertebrates in several geographic areas [3], even though they play a central role in their own ecosystems. At different levels, amphibians make their contribution to proper ecosystem functioning. They act as regulators of the food web and nutrient cycling [4,5], and they also provide several valuable ecosystem services, e.g., as a food source and as animal models for lab research [6,7].

As a one of endemic frogs species in China, a molecular characterization in this species is important to reveal their common ancestral and kinship with the same species from another habitat. The mitochondrial Cytochrome oxidase subunit I (COI) gene has been widely used to observe the genetic diversity in many frogs species [8,9]. Recently, study to characterize YST frogs from Guangdong based on their haplotype has not been reported. This study was aimed to observe the haplotype diversity in the mitochondrial COI gene in YST frogs with a meta-analysis study. The results of this study can be used as the early information to characterize YST frogs based on the molecular information.

2. MATERIALS & METHODS

A total of sixteen (16) sequences of mitochondrial COI gene (637 bp) in Yat-Sen's Torrent (YST) frog (*Amolops yatseni*) were used in this study. The frog's COI gene sequences in this study were collected from the GenBank database as presented in Table 1. Five (5) molecular packages of BioEdit [10], MEGA-X [11], DNAsp [12], NETWORK [13] and ARLEQUINE [14] were used for the bioinformatics analysis. A BioEdit package was used to conduct sequence alignment and contiq analysis. A MEGA-X package was used to construct the phylogenetic tree and pairwise distance. A DNAsp package was used to determine number of mutation site, number of haplotype, haplotype diversity (H_d), nucleotide diversity (P_i), Fu's Fs statistic test and Tajima's D value. A NETWORK package was used to obtain the Median joining network. An ARLEQUINE package was used to compute the analysis of molecular variance (AMOVA).

Table 1. The origin of *Amolops yatseni* sequences that used in the present study

Location [2]	N	GenBank
Zhongshan City, Guangdong, China	6	MK263323 - MK263328
Shangchuan Island, Guangdong, China	2	MK263304; MK263305
Mt. Gudou, Guangdong, China	2	MK263306; MK263307
Ehuangzhang Nature Reserve, Guangdong, China	3	MK263308 - MK263310; MZ448269
Yunkaishan Nature Reserve, Guangdong, China	2	MK263316 - MK263317

N: number of sequence;

3. RESULTS AND DISCUSSION

3.1. Genetic Diversity

The genetic diversity parameters in the COI gene of YST frogs were presented in Table 2. A total of six (6) haplotypes were detected in the YST frogs with thirteen (13) mutation sites (Table 3). The haplotype diversity (H_d) in COI gene of YST frogs was high. However, the Neutrality test of Fu's statistic and Tajima's D values were showed in a positive value. A positive value in the Neutrality test indicated that the allelic diversity in a species population was low and can be caused by migration and isolated geographical environment. In addition, a negative value in Neutrality test suggested that no occurance of species expansion [15]. According to the fixation index (Fst) value, almost the COI gene sequence of YST frogs is fixed.

Table 2. The results of statistical analysis in mitochondrial COI gene of *Amolops yatseni* frogs species

Parameter	Value
Number of observed sequence	16
Number of site	637 bp
Number of mutation site	13
Number of haplotype	6
Haplotype diversity (H_d)	0.81
Nucleotide diversity (P_i)	0.01
Fu's Fs statistic	1.33
Tajima's D	0.20
Fixation index (Fst)	0.89

Table 3. The mutation site in the mitochondrial COI gene among haplotype of *Amolops yatseni* frogs species

Haplotype	Nucleotide position												
	27	105	141	156	342	354	384	393	441	465	480	603	630
Hap.1	C	T	G	A	C	A	G	T	A	C	C	C	G
Hap.2	C	T	G	G	T	A	G	T	A	C	C	T	G
Hap.3	C	T	G	A	T	G	G	C	A	C	C	T	G
Hap.4	C	T	G	A	T	A	G	T	G	C	T	T	G
Hap.5	T	T	G	A	T	G	G	C	A	T	C	T	G
Hap.6	C	C	A	A	T	A	A	T	A	C	C	T	A

3.2. Hapotype Distribution

The haplotype distribution of YST frogs was presented in Table 4. The frequency of haplotype 6 was higher than those in other haplotypes. Mostly YST frogs in each location were classified into different haplotype. Contrastly, YST frogs at YNR have two haplotypes (Hap.4 and Hap.5). The distribution of YST frogs haplotype in Guangdong, China was ilustrated in Figure 1. The H_d value in animal studies was higher than in Graham's frog (*Odorrana grahami*) and Goliath frog (*Conraua goliath*) *i.e.* 0.61 and 0.04, respectively [16,17]. The genetic variation in YST frogs may be affected by the difference of geographical distance. Hence, the gene flow from other frogs habitat was not occured.

Table 4. The haplotype variation in *Amolops yatseni* frogs species

Haplotype	Location (N)					Total
	ZC	SI	MG	ENR	YNR	
Hap.1	0	2	0	0	0	2

Hap.2	0	0	2	0	0	2
Hap.3	0	0	0	4	0	4
Hap.4	0	0	0	0	1	1
Hap.5	0	0	0	0	1	1
Hap.6	6	0	0	0	0	6

N: number of sequence; ZC: Zhongshan City; SI: Shangchuan Island; MG: Mt. Gudou; ENR: Ehuangzhang Nature Reserve; YNR: Yunkaishan Nature Reserve

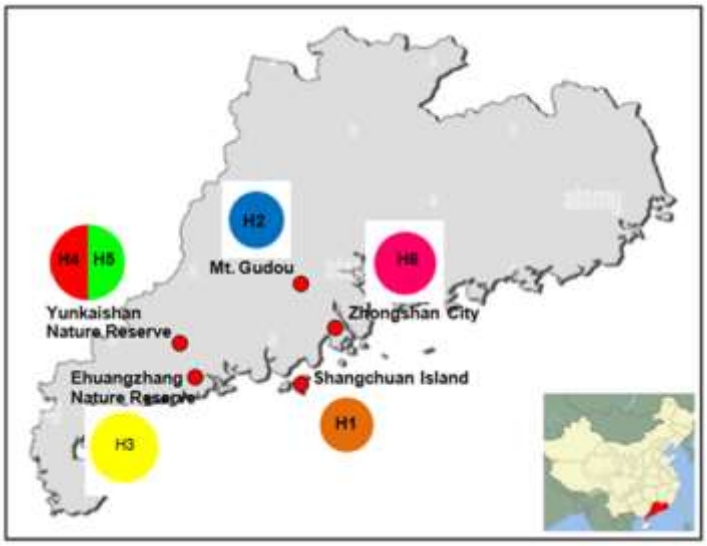


Figure 1. The haplotype distribution map in *Amolops yatseni* frogs at Guangdong, China based on mitochondrial COI gene

3.3. Pairwise Distance and Phylogenetic Tree

The Pairwise genetic distance was ranged from 0.0032 (Hap.3 - Hap.5) to 0.0127 (Hap.5 - Hap.6) as presented in Tabel 5. Hence, YST frog from YNR and ZC locations have high genetic relationship. Meanwhile, YST frog from ENR and YNR locations have low genetic relationship. In addition, these findings can be confirmed based on the haplotype distribution map (Figure 1). The distance of YNR - ZC was farther than YNR - ENR. Hence, the geographical distance able to affect the genetic diversity in animals. The Neighbor-joining tree revealed that YST frogs from Guangdong consisted of two clades. Clade 1 consisted of Hap.2, Hap.3, Hap.4 and Hap.5 frogs. Clade 2 consisted of Hap.1 and Hap.6 frogs (Figure 2). According to the Median-joining network, The Hap.3 frogs (ENR) was observed as the common ancestral for Hap.5 frogs (YNR).

Table 5. Pairwise genetic distance distance among haplotype in *Amolops yatseni* frogs species

Haplotype	**1**	**2**	**3**	**4**	**5**	**6**
1	1.0000					
2	0.0047	1.0000				
3	0.0063	0.0047	1.0000			
4	0.0063	0.0047	0.0063	1.0000		

5	0.0095	0.0079	0.0032	0.0095	1.0000	
6	0.0095	0.0080	0.0095	0.0095	0.0127	1.0000

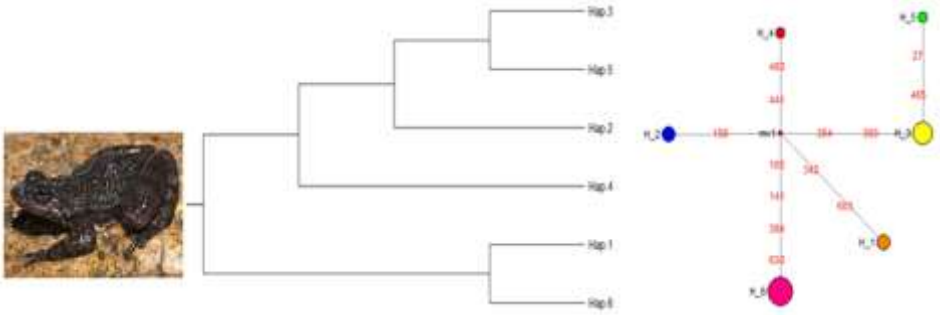


Figure 2. The Neighbor-joining tree and Median-joining network among haplotype of *Amolops yatseni* frogs species based on mitochondrial COI gene

3.4. Analysis of molecular variance (AMOVA)

The AMOVA for YST frogs revealed that about 89.11% of the sequence variations in COI gene was influenced by population / geographical factor. Thus, the remains of 10.89% was influenced by among individu in population (Table 6). A previous studies reported that a geographical factor was affected to the COI gene sequence variation about 52.70% in Graham's frog [16]. Interestingly, the geographical factor was affected to the 16s-rRNA sequence variation about 53.17% in Sabah Splash frog (*Staurois latopalmatus*) but only 11.38% in Black-Spotted Rock frog (*Staurois guttatus*) [18].

Table 6. Analysis of molecular variance (AMOVA) in the *Amolops yatseni* from five regions at Guangdong, China

Source of variation	DF	Sum of squares	Variance components	Percentage of variation (%)
Among populations	4	27.88	2.23	89.11
Within populations	11	3.00	0.27	10.89
Total	15	30.88	2.50	100.00

4. CONCLUSION

The SYT frogs in the present study have 6 haplotypes and separated into two clades. However, the allelic variations in this frogs species were low and signed by high Fst value. In addition, the species expansion was not occured in frog studies. A further research with large sample and mitogenome analysis were important to obtain the results accurately.

REFERENCES

[1] Fei, L., Hu, S. Q., Ye, C. Y. & Huang, Y. Z. (2009). Fauna Sinica. Amphibia Vol. 2 Anura. Science Press, Beijing,. pp. 957.

[2] Lyu, Z. T., Huang, L. S., Wang, J., Li, Y. Q., Chen, H. H., Qi, S. & Wang Y. Y. (2019). Description of two cryptic species of the *Amolops ricketti* group (Anura, Ranidae) from Eastern China. ZooKeys, 812: 133-156.

[3] Stuart, S. N., Chanson, J. S., Cox, N. A., Young, B. E., Rodrigues, A. S. L., Fischman, D. L. & Waller, R. W. (2004). Status and trends of amphibian declines and extinctions worldwide. *Science*, 306: 1783-1786.

[4] Cortés-Gomez, A. M., Ruiz-Agudelo, C. A., Valencia-Aguilar, A. & Ladle, R. J. (2015). Ecological functions of neotropical amphibians and reptiles: a review. *Universitas Scientiarum*, 20: 229-245.

[5] Hocking, D. J. & Babbitt, K. J. (2014). Amphibian contributions to ecosystem services. *Herpetological Conservation and Biology*, 9: 1-17.

[6] Warkentin, I. G., Bickford, D., Sodhi, N. S. & Bradshaw, C. J. A. (2009). Eating frogs to extinction. *Conservation Biology*, 23: 1056-1059.

[7] Deichmann, J. L., Mulcahy, D. G., Vanthomme, H., Tobi, E., Wynn, A. H., Zimkus, B. M. & McDiarmid, R. W. (2017). How many species and under what names? Using DNA barcoding and GenBank data for west Central African amphibian conservation. *PLoSONE*, 12: e0187283.

[8] Packer, L., Gibbs, J., Sheffields, C. & Hanner, R. (2009). DNA barcoding and the mediocrity of morphology. Molecular Ecology Resources, Special issue on Barcoding Life, supplement 1, 42-50.

[9] Hebert, P. D. N., Ratnasingham, S. & DeWaard, J. R. (2003). Barcoding animal life: cytochrome c oxidase subunit 1 divergences among closely related species. Proceedings of the Royal Society B: Biological Sciences, 270: S96-S99.

[10] Hall, T. (2001). BioEdit version 5.0.6. Department of Microbiology, North Carolina State University. USA.

[11] Hall, B. G. (2013). Building phylogenetic trees from molecular data with MEGA. Molecular Biology and Evolution, 30: 1229-1235.

[12] Librado, P. & Rozas, J. (2009). DnaSP v5: A software for comprehensive analysis of DNA polymorphism data. Bioinformatics, 25: 1451-1452.

[13] Bandelt, H. J., Forster P. & Rohl A. (1999). Median-joining networks for inferring intraspecific phylogenies. Molecular Biology and Evolution, 16: 37-48.

[14] Excoffier, L. & Lischer, H. E. L. (2010). Arlequin suite ver 3.5: a new series of programs to perform population genetics analyses under Linux and Windows. Molecular Ecology Resources, 10: 564-567.

[15] Ismet, D. & Nurhan, D. (2017). Statistical test for neutrality: a review. Turkiye Klinikleri Journal of Biostat, 9: 167-174.

[16] Chen, G. Y., Wang, B., Liu, J. Y., Jiang J. P. & Gao, P. (2018). Population genetic diversity of an odorous frog *Odorrana grahami* (Amphibia: Anura: Ranidae) in relation to conservation based on mitochondrial DNA. Mitochondrial DNA Part B, 4: 1-5.

[17] Nguiffo, D. N., Mpoame, M. & Wondji, C. S. (2019). Genetic diversity and population structure of goliath frogs (*Conraua goliath*) from Cameroon. Mitochondrial DNA Part A, 30: 657-663.

[18] Putra, W. P. B. (2021). The genetic diversity of mitochondrial 16s-rRNA gene in Black Spotted Rock (*Staurois guttatus*) and Sabah Splash (*Staurouis latopalmatus*) frogs at Borneo Island: A meta-analysis study. In Proceedings of the ISPEC 8th International Conference on Agriculture, Animal Science and Rural Development. Bingol, Turkey. 24-25 December 2021. pp. 1467-1475.

DIGITAL POSITION SYSTEM CONTROL OF ANALOG SERVOMECHANISM

Amhimmid .Q. Almabrouk

Mechatronics Department, Higher Institute of Engineering Technology, Bani Walid, Libya

ABSTRACT

RC-servos are widely used to build robots with many degrees of freedom, because they are small, inexpensive, and easy to interface. Their main advantage, though, is their good weight-to-torque ratio. Many robots in the RoboCup Humanoid League, for example, almost entirely consist of servos. RC-servos come in two flavors: analog and digital. In analog servos, the internal controller is synchronized to the pulse train that encodes the target position. A typical problem of analog servos is that they suffer from large position tracking errors and variations of the zero-position which are caused by changes in temperature and/or supply voltage. To overcome these problems, digital servos have been introduced in the last years. Digital servos are, however, about twice as expensive as analog servos. Furthermore, all large servos are still analog. The project design the arm of a some centimeters humanoid robot from large analog servos. To improve position control, we modified the servos by replacing in the internal circuit the potentiometer with two equivalent resistors. The potentiometer is now interfaced to a microcontroller that measures position, implements digital position control, and sends motion commands to the analog servo controller. This approach makes it possible to use more advanced control techniques, compared to the original controller.

Key words:(position, control, robot, microcontroller).

INTRODUCTION

The choice of actuators is one of the most critical design decisions when creating robots with numerous degrees of freedom (DOF). When choosing actuators, there are a few things to keep in mind. The actuators, for example, must be powerful and fast enough to drive the load at the necessary speeds. They should be simple to manage. Onboard the robot, there must be a source of energy. They need to be small, light, and durable. Last but not least, the actuators' cost is an essential consideration. In model airplanes and cars, same limits must be satisfied. RC-servos have been created for various purposes. A DC motor, a matching gear, a position sensor, and an electronic controller make up the system. RC-servos are compact, cheap, and simple to use. Analog and digital RC servos are available. The internal controller of analog servos is synchronized to the 50Hz pulse train that encodes the desired location. Large position tracking errors and variations in the zero-position, which are caused by changes in temperature and/or supply voltage, are a common problem with analog servos. Several manufacturers have produced digital servos in recent years to address these issues. They incorporate a microcontroller with a quicker time scale for position control. However, digital servos are available. Analog servos are nearly twice as expensive as digital servos. Furthermore, each and every Analog servos are still used in large servos. This paper explains how to use digital position control to control analog servos. The internal circuit of the servos was adjusted by replacing the potentiometer with two equivalent resistors. The potentiometer is now connected to a microprocessor, which measures position, performs digital position control, and transmits motion orders to the analog servo controller. In comparison to the original controller, this approach allows for the employment of more advanced control techniques. Long-term position mistakes, for example, can be prevented by integrating the short-term error. The parameters of the controller, like those of other intelligent actuators , can be altered on a short time scale, for example, based on the gait phase. In addition, the digital actuator can provide feedback for higher control levels.

ANALOG SERVOS

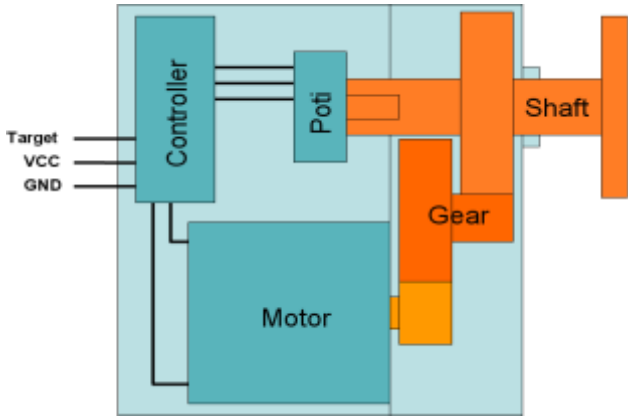


Fig. 1. Working principle of analog RC-servos. See text for details.

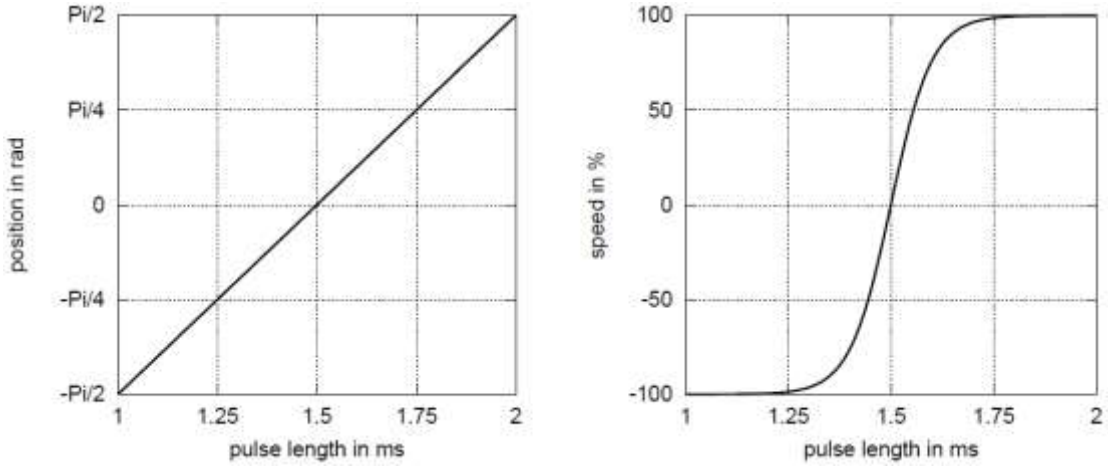


Fig. 2. Effect of the control signal: (a) position control in unmodified servos;

(b) speed control in modified servos.

The functioning concept of analog servos is depicted in the diagram below.Fig.1.Ground, operational voltage, and power are all supplied by three wires. an objective for position

This goal is represented as a variable-length train. pulses with an usual inter-pulse distance of 20 milliseconds The target position is represented by the pulse length, which is 1ms. The servo is moved to the leftmost position by the pulse length. 1.5 milliseconds equate to the middle position, and 2 milliseconds to the top position. position on the right. The pulse-length-to-position curve is linear. is depicted in Fig.2(a). This position target is compared to the shaft position, which is sensed using a potentiometer, by the internal servo controller. Depending on the position error, the motor is driven into the direction that minimizes the error. The driving force is proportional to the extent of the mistake

DIGITAL POSITION CONTROL

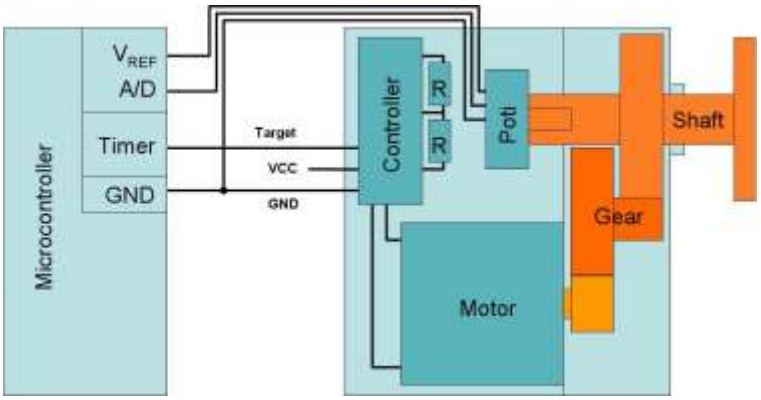


Fig. 3. Digital position control wrapped around analog servo.

As shown in Fig. 3, we expanded on the above-mentioned change to create digital position control. The servo shaft and potentiometer are mechanically attached, but the potentiometer is electrically isolated from the internal servo controller. It's connected to a microcontroller's A/D converter. The potentiometer voltage, which corresponds to the shaft position, may now be read by the microcontroller. It compares the current position to the goal position and sends motion orders to the servo in the form of a pulse train. The microcontroller's timer module generates the pulses with 16-bit accuracy. The internal servo controller is substantially less flexible than this digital position control.

Because the controller is now represented in software, more complex control techniques are simple to build.

By observing not only the current position error e(t), but also its integral and derivative, a full PID-controller can be realized:

$$output = kc.\left[e(t) + \frac{1}{I} + \int e(t)dt + D\,\frac{de(t)}{dt}\right]$$

The controller gain is denoted by Kc. While part I of the integrator prevents long-term position inaccuracy, component D of the differentiator can be employed to dampen overshoots. A PID controller's parameters can be fine-tuned, for example, using Ziegler and Nichols' method .

In contrast to hardware controllers, it is easy to change the parameters of a software controller. This can even be done on a fast time scale, yielding an intelligent actuator that can be configured not only by the target position, but also by control gain, maximal speed, etc. This on-the-fly configuration makes it possible to adapt the control to changing load conditions, which are typical for bipedal walking. Finally, the microcontroller can easily provide feedback about the current state of its controller to higher control layers. Possible quantities of interest include the current position,

the position error, the integrated error, and the issued motion command.

Fig. 4. its left leg, and its left knee

the leg of humanoid robot , appeared at last figure, has one microcontroller in each leg that's associated by means of CAN bus and RS232 to a fundamental PC. The PC sends frequently target positions for the person joints to the microcontroller. The microcontroller reports back almost its state. The PC is utilized to keep track of both targets and state variables. Prior to the alteration, each leg-microcontroller generated pulses encoding the target positions for its analog leg servos. Now, it executes for each servo a PID controller, as described over. This has the advantage that as it were two resistors per servo are required for the modification. Because the beats for the person servos are interleaved (one beat each 2.5ms), the usage of up to eight controllers does not require more computing control than needed for each person controller. This interleaving has moreover the advantage that the crest current utilizations of the servos do not happen at the same time, but are disseminated in time.

In arrange to compare the behavior of the executed digital controller to the behavior of the initial analog controller, we made the robot sit on the edge of a table. Both legs were adjusted to be parallel. The thigh of each leg was settled in horizontal position at the tabletop. The shanks of the legs hung in a vertical position at whatever point the servos were not powered. For the cleared out knee joint, we implemented digital position control, though the correct knee was driven by an unmodified analog servo. Since each lower leg weights approx. 0.7kg and its center of mass is approx. 27cm away from the knee hub, holding the lower legs in horizontal position actuates a torque of approx. 18.9kg·cm.

CONCLUSIONS

In comparison to the original controller, digital control allowed for the adoption of more advanced control techniques. Long-term position errors, for example, were prevented by integrating the short-term error.

This was particularly effective for correcting drifts in the analog servo's zero position caused by temperature variations. The actuator's interface is much more adaptable. The controller's parameters, for example, can be altered on a short time scale. To reduce mechanical stress and overshoots, we used this to build a gradual startup of the position control. When the load circumstances change predictably, such as in bipedal walking, changing control settings can be beneficial. The suggested digital

actuator's third advantage is that the microcontroller may generate feedback regarding the state of its joint controllers, allowing for higher control levels. This feedback can also be utilized to keep track of the variables in the state.

REFERENCES

[1] S. Behnke. Humanoid soccer robots. *it - Information Technology*,47(5):292–298, 2005.

[2] Sven Behnke. Playing soccer with humanoid robots. *KI – Zeitschrift K¨unstliche Intelligenz*, 03/06:51–56, 2006.

[3] Sven Behnke, Maren Bennewitz, J¨urgen M¨uller, and Michael Schreiber.Nimbro 2005 team description. In *Humanoid LEague Team Descriptions, RoboCup 2005, Osaka, Japan*, 2005.

[4] Tonegawa-Seiko Co., Ltd. Industrial Type Servos.http://www.tonegawaseiko.com.

[5] Robotis. Dynamixel Actuators. www.robotis.com.

[6] G. Reshko, M.T. Mason, and I.R. Nourbakhsh. Rapid prototyping of small robots. Technical Report CMU-RI-TR-02-11, Robotics Institute,CMU, 2002.

[7] J. Blanch and S. Tosunoglu. Servo and sensor control on small mobile platforms. *ASME Southeastern Region XI Technical Journal*, 2(1), 2003.

[8] F. Haugen. *PID Control of Dynamic Systems*. Tapir Akademisk Forlag,2004.

FALSİFORM LİGAMAN KAYNAKLI İNTERNAL HERNİASYON

INTERNAL HERNIATION DUE TO FALCIFORM LIGAMENT

Dr. Öğr. Üyesi Erdem SARI

Bandırma 17 Eylül Üniversitesi Tıp Fakültesi Genel Cerrahi ABD

ORCID ID: https://orcid.org/0000-0002-8307-267X

ABSTRACT

Internal herniation is protruding of intra-abdominal organs from mesentery tissue defects and being obstructed. Internal herniations due to falciform ligament defects are rare. They may be congenital defects or develop after laparoscopic surgeries due to trocar defects.

Our case, a 46-year-old female patient presented to the emergency department with complaints of abdominal pain and vomiting. In her anamnesis, learned that he had cramp-like pain that appeared especially two hours after meals since childhood. Her pain had increased in the last five days and had been accompanied by nausea and vomiting since yesterday. The patient has no history of previous surgery.

On physical examination, the abdomen was distended and there was widespread tenderness. The leukocyte count was 11,100/mm³. Diffuse colonic air-fluid levels were found on the direct abdominal X-ray. On computered tomography, dilatation in the colonic loops and swirling appearance were detected in the mesentery tissue supporting internal herniation.

The patient was operated urgently. Laparotomy was preferred instead of laparoscopy because of the severe dilatation of the bowel loops. During exploration, it was observed that there was a congenital defect in the falciform ligament and a 15 cm transverse colon segment was herniated from this defect. It was observed that the colon segment, which was obstructed by the falciform ligament, was edematous, but peristalsis continued. The obstructed colon segment was freed. The falciform ligament was excised and the operation was terminated. Oral intake was opened on the 1st postoperative day, and the patient was discharged on the 2nd day.

Small intestine, omentum and colon are frequently obstructed in internal herniation cases. These cases are rare but delay in diagnosis cause high morbidity and mortality.

Key words: falciform ligament internal herniation ileus

GİRİŞ

İnternal herniasyon, karın içi organların mezenter doku defektlerinden protrüze olup obstruksiyona uğraması tablosudur. Nadir görülen bir patoloji olup sıklıkla ince barsak obstrüksiyonu görülmekle birlikte daha az sıklıkta omentum ve kolon da obstrüksiyonuna da rastlanmaktadır (1). Konjenital defektler olabileceği gibi laparoskopik ameliyatlara bağlı trokar defektleri nedeniyle sonradan da gelişebilirler. Kliniğimizde opere ettiğimiz falsiform ligaman kaynaklı internal herniasyon olgusunu sunduk.

OLGU

Olgumuz, 46 yaşında kadın hasta, karın ağrısı kusma şikayeti ile acil servise başvurdu. Anamnezinde, çocukluk çağından beri özellikle yemeklerden iki saat sonra ortaya çıkan çıkan kramp tarzı ağrıları olduğu öğrenildi. Ağrılarının son beş gündür artmış olduğu, dünden beri bulantı ve kusma şikayetlerinin eşlik ettiği öğrenildi. Hastanın geçirilmiş cerrahi operasyon öyküsü yok.

Fizik muayenesinde batın distandü, yaygın hassasiyet mevcuttu. Lökosit sayısı 11,100/mm³ saptandı. Ayakta direkt batın grafisinde yaygın kolonik hava-sıvı seviyeleri mevcuttu. Bilgisayarlı tomografide kolonik anslarda dilatasyon ve internal herniasyonu destekleyen mezenter dokusunda girdap görünümü saptandı.

Hasta acil opere edildi. Barsak anslarının ileri derecede dilate olması nedeniyle laparoskopi yerine laparotomi tercih edildi. Eksplorasyonda falciform ligamentte konjenital bir defekt olduğu ve bu defektten yaklaşık 15 cm'lik transvers kolon segmentinin herniye olduğu görüldü (resim 1). Falciform ligaman tarafından obstruksiyona uğratılan kolon segmentinin ödemli olduğu ancak peristaltizmin devam ettiği gözlendi. Obstrukte olmuş kolon segmenti serbestleştirildi. Falciform ligaman eksize edildi ve operasyon sonlandırıldı (resim 2). Postoperatif 1. gün oral alım açıldı, 2. gün taburcu edildi.

TARTIŞMA

Falsiform ligamana bağlı internal herniasyon olguları falsiform ligamandaki konjenital veya geçirilmiş operasyona sekonder (trokar defekti vb.) anormal açıklıktan karın içi organların girmesi ve obstrüksiyona uğraması ile meydana gelir. İlk kez 1929 yılında tanımlanmış olup, laparoskopik cerrahinin yaygınlaşması ile beraber daha sık karşılaşılmaktadır (2). Operasyon geçmişi olmayan hastamızda sebep konjenital defektti.

Klinik bulguları ağrı,bulantı kusmadır; bilier hastalıklar, peptik ülser hastalıkları ile karışabilir(2). Olgumuzda da bulantı,kusma ve ağrı şikayetleri mevcuttu. Tedavi herniye olan organın kurtarılması ve fasiform ligaman defektinin ortadan kaldırılmasıdır. İskemi ve nekroz durumunda rezeksiyon gerekebilmektedir. Operasyon laparoskopik olarak yapılabileceği gibi olgumuzdaki gibi barsakların aşırı distandü olduğu durumda organ yaralanmasına neden olmamak için laparotomi ile de uygulanabilmektedir.

Bu vakalar nadir görülür ancak tanıda gecikme yüksek morbidite ve mortalite sebebidir.

Anahtar kelimeler: falsiform ligaman internal herniasyon ileus

Resim 1

Resim 2

KAYNAKLAR

1.Doishita, S., Takeshita, T., Uchima, Y., Kawasaki, M., Shimono, T., Yamashita, A., Sugimoto, M., Ninoi, T., Shima, H., & Miki, Y. (2016). Internal Hernias in the Era of Multidetector CT: Correlation of Imaging and Surgical Findings. Radiographics : a review publication of the Radiological Society of North America, Inc, 36(1), 88–106. https://doi.org/10.1148/rg.2016150113

2. Macina, S., Testa, T., & Losacco, C. (2016). Congenital internal hernia through defect in the falciform ligament in adult: A case report and review of the literature. International journal of surgery case reports, 26, 104–107. https://doi.org/10.1016/j.ijscr.2016.05.003

SIGNIFICANT PROBABILITY DISTRIBUTIONS FOR FLOOD FLOW

TAŞKIN DEBİSİ İÇİN ÖNEMLİ OLASILIK DAĞILIMLARI

Mehmet Dikici

ALKÜ Mühendislik Fakültesi İnşaat Mühendisliği Bölümü Alanya/Türkiye

ORCID ID: 0000-0001-5955-3425

ABSTRACT

With climate change, drought and flood have come to the fore more. Since there are many factors affecting the event in natural events, there is uncertainty in the values of the random variable of this event. This uncertainty stems from the inadequacy of the models established to explain the physical event and the inadequacy of the available data about the event. For the random variable, it is often sufficient to work with the mean value. The effect of the said variable can be evaluated according to the most unfavorable conditions, such as flooding, or if life safety is in question. Since observed flood flows may be repeated in the future, a flow may take values equal to or greater than this value in a certain period of time. For floods, it is very important to know the flood flow rate. The accuracy of the methods of determining the flood flow rate has been the subject of many studies for years in order to accurately calculate the effects of floods and to take precautions. Theoretical probability distributions are one of these methods. In this study, Normal, lognormal, three-parameter lognormal, GEV, Gumbel, Pearson III and Log-Pearson III distributions, which are the most used in the literature, are discussed. The use of theoretical probability distributions in the prediction of floods is also referred to as the analytical method, and the additive distribution functions of the distributions are considered as the frequency curves of the floods. Also known as Normal Family (N, LN, LN3), Gaussian method or normal distribution, this method is a widely used distribution type in statistical studies, and it is also the basis for lognormal (LN) and three-parameter lognormal (LN3) distributions.

Keywords: Normal, Gumbel, Pearson, Flood Flow

ÖZET

İklim değişikliği ile birlikte kuraklık ve taşkın daha fazla gündeme gelmiştir. Doğal olaylarda olayı etkileyen pek çok faktör bulunduğundan bu olayın rastgele değişkeninin alacağı değerlerde belirsizlik mevcuttur. Bu belirsizlik fiziksel olayı açıklamak için kurulan modellerin yetersiz oluşu ve olaya ait mevcut verilerin yetersizliğinden kaynaklanmaktadır (Bayazıt, 1996). Rastgele değişken için çoğu zaman ortalama değer ile çalışmak yeterli olmaktadır. Söz konusu değişkenin etkisi taşkın gibi çok önemli veya can güvenliği söz konusu ise en olumsuz koşullara göre değerlendirilebilir. Gözlenmiş taşkın debileri gelecekte de tekrarlanabileceğinden belirli bir zaman periyodunda bir debi bu değere eşit veya daha büyük değerleri alabilir. Taşkınlar için özellikle taşkın debisinin bilinmesi çok önemlidir. Taşkınların etkilerinin doğru bir şekilde hesap edilmesi ve tedbirlerin alınması için taşkın debisinin belirlenme yöntemlerinin doğruluğu yıllardır birçok çalışma konusu olmuştur. Teorik olasılık dağılımları da bu yöntemlerden biridir. Bu çalışmada literatürde en fazla kullanılan Normal, lognormal, üç parametreli lognormal, GEV, Gumbel, Pearson III ve Log-Pearson III dağılımları ele alınmıştır. Taşkınların tahmininde teorik olasılık dağılımlarının kullanılması analitik yöntem olarak da anılır ve dağılımların eklenik dağılım fonksiyonları taşkınların frekans eğrileri olarak kabul edilir. Normal Ailesi (N,LN,LN3), Gauss metodu veya normal dağılım olarak da bilinen bu yöntem istatistik çalışmalarda fazlaca kullanılmakta olan dağılım şekli olup, lognormal (LN) ve üç parametreli lognormal olarak bilinen (LN3) dağılımlarına da esas teşkil etmektedir.

Normal Dağılım

Merkezi sınır teoremince rastgele bir değişkeni (X), n tane bağımsız değişkenlerin toplamından oluşuyorsa n fazlalaştıkça X'in dağılım şekli hızla normal dağılıma yaklaşır. Esas değişkenlerin dağılımı ne olursa olsun bu surum değişmez. X normal rastgele değişken ihtimal yoğunluk fonksiyonu (oyf):

$$f(x) = \frac{1}{\sqrt{2\pi\sigma_x^2}}\exp\left[-\frac{1}{2}\left(\frac{x-\mu_x}{\sigma_x}\right)^2\right] \quad (1)$$

Dağılımın şekli üstten ve alttan limitsiz ($-\infty \leq x \leq \infty$) olup ortalama μ_x, varyans 2 σ_x 'dir. Normal dağılım şekli simetriktir ve çarpıklık katsayı değeri sıfır ve kurtosisi 3 olur. Dağılıma ait iki moment μ_x ve 2 σ_x aynı zamanda parametreleridir. Örnek tahminleri ortalama ve varyans ifadeleri ile hesaplanabilir. Varyans ifadesinde paydadaki N yerine N-1 kullanılarak örnek varyansının maksimum olabilirlik yöntemi ile tahmini elde edilir. *Dağılımın L-momentleri:*

$$\lambda_1 = \mu \quad (2)$$

$$\lambda_2 = 0.564\ \sigma = \pi^{-1/2}\sigma \quad (3)$$

$$\tau_3 = 0 \quad (4)$$

$$\tau_4 = 0.1226 \quad (5)$$

Dağılımın Parametreleri:

$$\mu = \lambda_1 \qquad \sigma = \pi^{-1/2}\lambda_2 \quad (6)$$

Normal dağılıma ait eklenik dağılımın fonksiyonuysa (e.d.f.) analitik yöntemle sağlanamadığından sayısal yöntemlerle tablo şekline getirilmiştir. Aynı şekilde tablo oluşturabilmek için rastgele değişkeni standart değişkene (z) dönüştürme yolu seçilmiştir.

$$z = \frac{x-\mu_x}{\sigma_x} \quad (7)$$

Standart normal değişkenin e.d.f. $\Phi(z)$, sade yaklaşımlara $0<z\leq5$ aralığında aşağıdaki ifade ile belirlenebilen formülü aşağıdadır.

$$\Phi(z) = 1\text{-}0.5\ \exp\left[-\frac{(83z+351)z+562}{\frac{703}{z}+165}\right] \quad (8)$$

P olasılığı ile normal dağılıma karşılık gelen kuantil ise (Bayazıt, 1998);

$$X_p = \mu_x + z_p\sigma_x \quad (9)$$

formülü ile hesaplanabilmektedir.

Lognormal Dağılım

X değişkenine ait logaritma ile bilinen Y değişkeni normal dağılıma uygun ise ise X'in dağılım şekli lognormal diyebiliriz. Dağılımı $X>0$ değeri için tanımlayabildiğimizden hidrolojide çoğu pozitif rastgele değişkenlere uyum göstermektedir.

$$Y = \ln\ (X) \quad (10)$$

X lognormal değişkenine ait eklenik dağılımın fonksiyonu (e.d.f.):

$$F(x) = P(X \leq x) = P[Y\leq\ln(X)] = P\left[\frac{Y-\mu_y}{\sigma_y} \leq \frac{\ln(x)-\mu_y}{\sigma_x}\right] \quad (11)$$

$$=\Phi\left[\frac{\ln(x)-\mu_y}{\sigma_y}\right]$$

ifadesinde Φ standart normal dağılım ise e.d.f. olarak görülür. Lognormal dağılıma ait değişim ve çarpıklık katsayısı arasındaysa aşağıda verilen bağıntı vardır.

$$C_{sX} = 3C_{VX} + C_{VX}^3 \quad (12)$$

Lognormal dağılım için değişim ve çarpıklık katsayısı sıfır değerine yaklaşınca normal dağılıma da yaklaşır. Lognormal dağılımda ilk iki moment için aşağıdaki förmüller geçerlidir.

$$\mu_X = \exp\left(\mu_y + \frac{\sigma_y^2}{2}\right) \quad (13)$$

$$\sigma_x^2 = \mu_x^2\left[exp\left(\sigma_y^2\right) - 1\right] \quad (14)$$

X ve *Y* değişkenlerinin dağılımlarının momentleri arasında olan bağıntı:

$$\sigma_y = \left[\ln\left(1 + \frac{\sigma_x^2}{\mu_x^2}\right)\right]^{1/2} \quad (15)$$

$$\mu_y = \ln(\mu_x) - \frac{1}{2}\sigma_y^2 \quad (16)$$

Aşağıdaki denklemle *X*'in parametrelerini kullanarak μ_y ve σ_y hesaplamak mümkündür. Dağılımda ikinci L momentiyse:

$$\lambda_2 = \exp\left(\mu_y + \frac{\sigma_y^2}{2}\right)\text{erf}\frac{\sigma_y}{2} = 2\exp\left(\mu_y + \frac{\sigma_y^2}{2}\right)\left[\Phi\left(\frac{\sigma_y}{\sqrt{2}} - \frac{1}{2}\right)\right] \quad (17)$$

olarak ifade 3 parametreli lognormal dağılıma uygundur (Bayazıt, 1998). Verilmiş bir *p* ihtimali için X_p kuantili

$$X_p = \exp\left(\mu_y + z_p\sigma_y\right) \quad (18)$$

ifadesi ile belirlenir.

Üç-Parametreli Lognormal Dağılım

Çoğu zaman *X* rastgele değişkeninin logaritmasını alarak değişkenin normal dağılıma uymadığını görmek mümkündür. Ancak X_0 bir alt sınır değeri bulunarak sonra da logaritmik dönüşüm yapılırsa değişkenin normal dağılıma uyması mümkündür.

$$Y = \ln(X - X_0) \quad (19)$$

X_0 alt sınır olarak *Y*'nin dağılımıysa normal dağılıma uymaktadır. (19) denkleminden *X* esas değişken

$$X = X_0 + \exp(Y) \quad (20)$$

elde edilir. *X* değişkenine ait iki momentse

$$\mu_x = X_0 + \exp\left(\mu_y + \frac{1}{2}\sigma_y^2\right) \quad (21)$$

$$\sigma_x^2 = \left[exp\left(2\mu_y + \sigma_y^2\right)\right]\left[exp\left(\sigma_y^2\right) - 1\right] \quad (22)$$

Olarak bulunur. Çarpıklık katsayısı

$$C_{SX} = 3ß + ß^3 \quad (23)$$

denklemde $ß = \left[exp\left(\sigma_y^2\right) - 1\right]^{0.5}$ dir. 3 parametresi olan lognormal dağılım parametrelerinde momentler yöntemiyle bulunan tahminler etkili tahmin olmayıp daha etkili tahminler X_0 alt sınır değeri için kuantil alt sınırı ifadesiyle elde edilir.

$$X_0 = \frac{X_{(1)}X_{(N)} - X_{med}^2}{x_{(1)} + x_{(N)} - 2X_{med}} \quad (24)$$

Bulunan X_0 değeri alınarak μ_Y ve 2 σ_Y parametreleri hesaplanır. Hesaplanan parametrelerin tahminleri maksimum olabilirlik yöntemiyle benzer seviyede kabul edilmektedir. Dağılımın ilk L-momenti

$$\lambda_1 = \mu \quad (25)$$

olup λ_2 (17) ifadesiyle bulunabilir (Bayazıt ve Önöz, 2008).

GEV Ailesi (Gumbel, GEV)

Maksimum veya minimum değerlerinin yakın olması durumu, hidrolojide birçok olayda vardır. Rastgele değişken dağılımlarında ekstrem değer dağılımları arasından (general extreme value GEV) birisi olma ihtimali Gumbel (1958) tarafından ortaya atılmıştır. İstatistikte ekstrem değer teorisince, bağımsız değişken sayısının sonsuza gitme durumunda örneklerde maksimumların dağılımının ekstrem değerler dağılımından birine yakınsadığı kabul edilir. Bu dağılımlar Tip I, II ve III dağılımları olarak adlandırılır.

Gumbel Dağılımı: M_1, M_2,…,M_N günlük akımlar ve yağışlar olsun. *X* rastgele değişkeniyse yıllık $X=\max(M_i)$ i=1,2,…,365 olarak tanımlanırsa şu şekilde bir yol izlenir. Eğer M_i'ler bağımsız, dağılımı da aynıysa ve üstte limitsiz iseler *N*'nin büyük değerlerinin *X* değişkenindeki dağılımıysa; Gumbel veya ekstrem Tip I (EVI) dağılımıdır. Ek olarak, M_i'lerin üst kuyruk kısmının dağılımıysa eksponansiyeldir. Literatür taramasında yıllık en büyük akımlar, en büyük 24 saatlik yağışlarda dağılım için çoğunlukla Gumbel dağılım kabulüyle karşılaşmak mümkündür. Gumbel dağılımı oyf ve eklenik dağılımı fonksiyonu (edf) aşağıdaki gibidir:

$$f(x) = \frac{1}{a} exp\left[-\frac{x-\xi}{a} - exp\left(-\frac{x-\xi}{a}\right)\right] \quad -\infty < x < \infty \tag{26}$$

$$F(x) = \exp\left[-exp\left(-\frac{x-\xi}{a}\right)\right] \tag{27}$$

α ve ζ dağılım parametreleri olarak tanımlanır. Dağılımda varyans, ortalama ve çarpıklık katsayıları:

$$\mu_x = \xi + 0.5772\alpha \tag{28}$$

$$\sigma_x^2 = \frac{\pi^2 a^2}{6} \approx 1.645 a^2 \tag{29}$$

$$C_{s_x} = 1.1396 \approx 1.14 \tag{30}$$

Dağılımın L-Momentleri:

$$\lambda_1 = \xi + 0.5772\alpha \tag{31}$$

$$\lambda_2 = \alpha \ln(2) \tag{33}$$

Moment oranları:

$$\tau_3 = 0.1699 \tag{34}$$

$$\tau_4 = 0.1504 \tag{35}$$

Dağılımın parametrelerinin tahmini:

$$\alpha = \frac{\lambda_2}{\ln(2)} = 1.443\lambda_2 \tag{36}$$

veya momentler yöntemi ile

$$\alpha = \frac{S_x\sqrt{6}}{\pi} = 0.7797 S_x \tag{37}$$

$$\xi = \bar{x} - 0.5772\alpha \tag{38}$$

L-momentleri yöntemiyle yapılmış olan gözlemler ve tahminler Gumbel dağılımıyla uyum gösteriyorsa daha üstündür. Gumbel dağılımının oyf, LN dağılımında C_{sx}=1.13 olan dağılımıyla çok benzerdir. ξ ve α değiştiğinde Gumbel oyf'nun merkezden hareketiyle beraber çarpıklık katsayısının sabit olmasından şekli değişmez. *p* olasılığına karşı gelen kuantil:

$$X_p = \xi - \alpha \ln[-\ln(F)] \tag{39}$$

Ekstrem Değer Dağılımı

Dağılımda genel hal olarak değerlendirilir EVI (Gumbel), II ve III tiplerini de içerir. GEV adıyla literatürdeki adı edf,

$$F(x) = \exp\left\{-\left[1-\frac{k(x-\xi)}{a}\right]^{1/k}\right\} \quad (40)$$

α, k ve ξ dağılımda parametrelerdir, α, ölçek parametresini, k, biçim parametresini ve ξ, yer parametresini gösterir. k=0 için GEV dağılımıysa EVI (Gumbel) olarak tanımlanır.

Dağılımın Momentleri: Momentler Γ(.) gamma fonksiyon ile gösterilmektedir.

$$\mu_x = \xi + \left(\frac{a}{k}\right)[1-\Gamma(1+k)] \quad (41)$$

$$\sigma_x^2 = \left(\frac{a}{k}\right)^2 \{\Gamma(1+2k) - [\Gamma(1+k)]^2\} \quad (42)$$

k>-0.5 için 2 σ_x mevcuttur. *Çarpıklık:*

$$C_{S_x} = \frac{-\Gamma(1+3k)+3\Gamma(1+k)\Gamma(1+2k)-2\Gamma^3(1+k)}{[\Gamma(1+2k)-\Gamma^2(1+k)]^{3/2}}\text{sign(k)} \quad (43)$$

Sign (k), ifadesindeki k'nın işaretiyle çarpılacağı anlaşılmaktadır. Γ(.) fonksiyonuysa aşağıda verilen formüllerden bulunabilir veya verilen tablodan hesaplanmaktadır.

$0 \le \delta \le 1$ olarak alınırsa

$$\Gamma(1+\delta) = 1 + \sum_{i=1}^{5} a_1 \delta^i + \varepsilon \quad (44)$$

a_1= - 0.5748646

a_2= 0.9512363

a_3= - 0.6998588

a_4= 0.4245549

a_5= - 0.1010678

$|\varepsilon| \le 5.10^{-5}$

Daha yalın bir yaklaşım ile

$$\Gamma(1+w) = w\Gamma(w) \qquad 0 < w < 1 \quad (45)$$

tam sayılar w'ler için

$$\Gamma(1+w) = w! \quad (46)$$

Dağılımdaki L-momentlerinin değerleri:

$$\lambda_1 = \xi + \frac{a}{k}\{1-\Gamma(1+k)\} \quad (47)$$

$$\lambda_2 = \frac{a}{k}\left(1-2^{-k}\right)\Gamma(1+k) \quad (48)$$

Moment oranları:

$$T_3 = \left\{\frac{2(1-3^{-k})}{(1-2^{-k})} - 3\right\} \quad (49)$$

$$T_4 = \frac{1-5(4^{-k})+10(3^{-k})-6(2^{-k})}{1-2^{-k}} \quad (50)$$

Dağılım parametrelerini tahmin L-momentler türünden yapılabilir

$$k = 7.8590\, c + 2.9554\, c^2 \quad (51)$$

k 'nın tahmini ortalama sıfır, varyans değeri Var(k) = 0.5633/N

$$a = \frac{k\lambda_2}{\Gamma(1+k)(1-2^{-k})} \quad (52)$$

$$\xi = \lambda_1 + \frac{a}{k}[\Gamma(1+k) - 1] \tag{53}$$

$$c = \frac{2\lambda_2}{\lambda_3 + 3\lambda_2} - \frac{\ln(2)}{\ln(3)} = \frac{2\beta_1 - \beta_0}{3\beta_2 - \beta_0} - \frac{\ln(2)}{\ln(3)} \tag{54}$$

Rastgele bir *p* ihtimali için quantil aşağıda verilen ifadeyle bulunabilir.

$$X_p = \xi + \frac{a}{k}\{1 - [-\ln(F)]^k\} \tag{55}$$

Pearson Tip III Ailesi (Pearson Tip III, Log-Pearson Tip III)

Çoğunlukla taşkın hidroloji hesaplarında Pearson Tip III ve Log-Pearson Tip III dağılımlarına başvurulur. Pearson Tip III (P3) dağılımın oyf:

$$f(x) = |\beta|[\beta(x-\xi)]^{a-1}\frac{exp[-\beta(x-\xi)]}{\Gamma(a)} \tag{56}$$

Dağılımın α, biçimi, β ölçeği ve ξ yer parametresi olarak kullanılır. $\alpha>0$, $\beta>0$ için $x>\xi$ olup ξ alt sınırı meydana getirir. $\beta<0$ için $x<\xi$ olup ξ üst sınır içindir.

$X>\zeta$ için $C_{s_x} = \frac{2}{\sqrt{a}}$ ve $x<\xi$ için $C_{s_x} = \frac{-2}{\sqrt{a}}$ dır.

Ek olarak $\beta>0$ ve $\xi=0$ için $C_{sx}=2C_{Vx}$ alınır ve dağılım Gamma dağılımı olarak değerlendirilir. Sabit ortalaması ve varyansı için limit durumunda, α sonsuz değere doğru iken çarpıklığı sıfır değerine gider ve Pearson Tip III dağılımıysa normal dağılım şeklini alır. Yine $\alpha=1$ ve $C_{sx}=2$ için 2 parametresi olan eksponansiyel dağılımı buluruz. Momentler:

$$\mu_x = \xi + \frac{\alpha}{\beta} \tag{57}$$

$$\sigma_x^2 = \frac{\alpha}{\beta} \tag{58}$$

Dağılımın L-momentleri:

$$\lambda_1 = \xi + \frac{\alpha}{\beta^2} \tag{59}$$

$$\lambda_2 = \frac{\Gamma(a+0.5)}{\sqrt{\pi}\beta\Gamma(a)} \tag{60}$$

Dağılımın parametrelerinin tahmini momentler yöntemi ile:

$$\alpha = \frac{4}{C_{S_X}^2} \tag{61}$$

$$\beta = \frac{2}{\sigma^x C_{s_x}} \tag{62}$$

$$\xi = \mu_x - \frac{\alpha}{\beta} = \mu_x - \frac{2\sigma_x}{C_{s_x}} \tag{63}$$

Pearson Tip III dağılımının edf 'si elde edilemediğinden tablo veya bazı yaklaşık formüller kullanılmaktadır. Tablolar çarpıklığa bağıntılı olarak *K* (frekans faktörü) değeri bulunmaktadır. Ortalama sıfır, varyans 1 kabul edilen standart P_3 değişkeni çarpıklığa bağlı birçok p kuantili bu tablolardan okunup

$$X_p = \mu + \sigma K_p(C_{s_x}) \tag{64}$$

olarak hesaplanabilir. *Kp* frekans faktörü Wilson-Hilferty transformasyon formülü ile aşağıda verilen ifadeden güvenli bir biçimde hesaplanır (Bayazıt ve Önöz, 2008).

$$K_p(C_{s_x}) = \frac{2}{C_{s_x}}\left(1 + \frac{C_{s_x}Z_p}{6} - \frac{C_{s_x}^2}{36}\right)^3 - \frac{2}{C_{s_x}} \tag{65}$$

Z_p, Standart normal dağılımda *p* quantilinde bulunan standart değişken olarak tanımlanır.

Log-Pearson Tip III (LP3)

Rastgele değişken logaritması P3 dağılmışsa (*Y* değişkeni) esas değişken (*X*) dağılımıysa LP3 olarak tanımlanır.

$$Y = \ln(X) \tag{66}$$

α biçimi, β ölçeği ve ξ yer parametresini gösterir ve dağılım için oyf:

$$f(x) = |\beta|\{\beta[\ln(X) - \xi]\}^{\alpha-1} \frac{exp\{-\beta[\ln(X)-\xi]\}}{\alpha\Gamma(\alpha)} \tag{67}$$

$\beta < 0$ *için* $0 < x < \exp(\xi)$ *olup* ξ *üst sınır,*

$\beta > 0$ *için* $\exp(\xi) < x < \infty$ ξ *alt sınır olmaktadır.*

Dağılımın momentleri:

$$E(x^r) = e^{r\xi}\left(\frac{\beta}{\beta - r}\right)^{\alpha} \qquad \beta > r \text{ veya } \beta < 0 \text{ için} \tag{68}$$

$$\mu_x = e^{\xi}\left(\frac{\beta}{\beta-1}\right)^{\alpha} \quad \text{ve} \tag{69}$$

$$\sigma_x^2 = e^{2\xi}\left[\left(\frac{\beta}{\beta-2}\right)^{\alpha} - \left(\frac{\beta}{\beta-1}\right)^{2\alpha}\right] \tag{70}$$

Çarpıklık katsayısı:

$$C_{s_x} = \frac{E[x^3] - 3\mu_x E[x^2] + 2\mu_x^3}{\sigma_x^3} \tag{71}$$

Rastgele bir p ihtimali için X_p kuantilin bulunabilmesi veri logaritmalarına Pearson Tip III dağılımı uydurulmasıyla elde edilir. $Y=\mu_y+\sigma_y Kp((C_s)$ hesaplanır (Bayazıt ve Önöz, 2008).

REFERANSLAR

Bayazıt, M., 1996, *İnşaat Mühendisliğinde Olasılık Yöntemleri*, İTÜ, İstanbul.

Bayazıt, M. ve Önöz, B., 2008, Taşkın ve Kuraklık Hidrolojisi, İstanbul

Bayazıt, M., 1998, *Hidrolojik modeller*, İstanbul Teknik Üniversitesi İnşaat Fakültesi Matbaası, İstanbul.

Gumbel, E.J., 1958, *Statistics of Extremes*, Columbia Univ. Press, Columbia.

SCANNING PROTOTYPING PROCESSES WITH A THREE-DIMENSIONAL PRINTER FOR MODELING A NEW AERODYNAMIC WING

Neslihan AYDIN

Kafkas University, Engineering and Architecture Faculty, Department of Hydraulic and Hydromechanical Machines, Kars, TURKEY.

ORCID ID: https://orcid.org/00000-0003-3650-0886

İrfan KARAGÖZ

Uludag University, Engineering Faculty, Department of Mechanical Engineering, Bursa, TURKEY.

ORCID ID: https://orcid.org/0000-0002-7442-2746

ABSTRACT

In this study, the principles and benefits of scanning a wing that is evaluated as aerodynamic performance with a three-dimensional printer will be discussed. Inventions inspired by nature are joining our lives every day. Many houses from tools to ships, from the sea to the Olympic stadiums, from many natures inspired designs are available. Since the existence of mankind nature has been imitated. In three-dimensional printer technologies, there are four different production techniques:FDM (Fused Deposition Modelling), SLA (Stereolithography), MJF (Multi Jet Fusion), SLS (Selective Laser Sintering). In our study, we applied MJF technology to the bionic wing. MJF Technology provides more precise results and products with high quality of production with tolerance than other methods. In addition, considering its performance aerodynamically, the natural structure of the bionic wing was obtained using MJF technology.

Keywords: 3D printer- Aerodynamic wing-MJF technology.

INTRODUCTION

Until the industrial revolution, different working styles were not adopted, except for handmade production and design. With the industrial revolution, the increase of mechanization and the introduction of new technologies into our lives has paved the way for achieving low material prices and fast delivery times. Despite all this forward-looking movement, the basic design and manufacturing process has not changed fundamentally over the past 100 years[1-3].

With MJF (Multi Jet Fusion) technology, a different perspective has come to production and design. Today, many leading companies are taking advantage of MJF technology by using 3D printing method. In this way, it can produce products for final use or prototyping. The flexibility offered to the designer, the fact that the raw material is reusable for the next production, high surface quality, low cost per part and the ability to produce 10 times faster than competitors have allowed HP MJF technology to lead the industry[4-6].

MATERIALS AND METHODS

Aerodynamics is the study of phenomena around objects moving in air, or a constant an event that occurs due to the movement of air around an object or one of these two in the form of a combination, which again occurs with the movement of air around a moving object it is a branch of science that studies events. In order to design and produce maple seed in the form of turbine blades in the form of first of all, there are about a hundred different lengths and sizes of various parks and gardens in Bursa dried maple seeds were collected on the expanses.

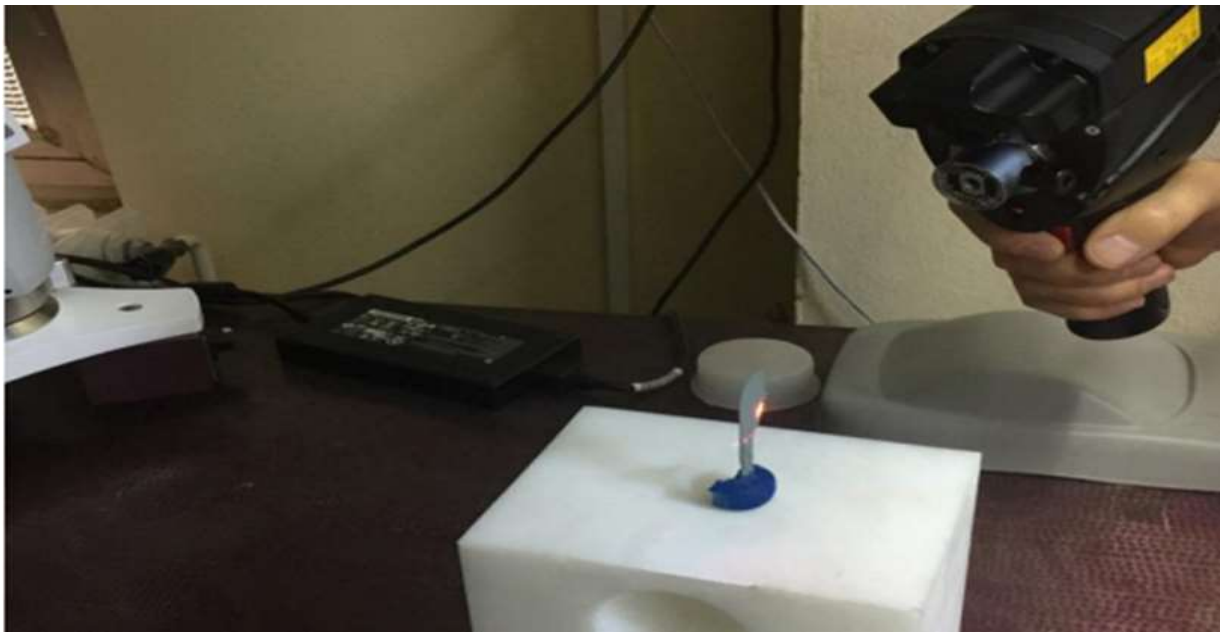


Figure 1. The process of screening the collected maple seeds [9].

RESEARCH FINDINGS AND DISCUSSION

Fused Deposition Modeling (FDM)

Fused deposition modeling (FDM) is a technology where the melt extrusion method is used to deposit filaments of thermal plastics according to a specific pattern. Similar to 3DP, the layout for FDM consists of a printhead able to move along X and Y directions above a build platform.

Stereolithography (SLA)

Stereolithography (SLA or SL; also known as stereolithography apparatus, optical fabrication, photo-solidification, or resin printing) is a form of 3D printing technology used for creating models, prototypes, patterns, and production parts in a layer by layer fashion using photochemical processes by which light causes chemical monomers and oligomers to cross-link together to form polymers [7-8].

Selective Laser Sintering (SLS)

Selective laser sintering is an additive manufacturing (AM) technology that uses a high power laser to sinter small particles of polymer powder into a solid structure based on a 3D model. SLS 3D printing has been a popular choice for engineers and manufacturers for decades. Rosso et al 2020 have experimented with the mechanical properties of materials produced by MJF and SLS 3d printers. They have observed that there is less porosity and ductility for MJF technology [1].

Multi Jet Fusion (MJF)

Multi Jet Fusion uses a fine-grained materials that allows for ultra-thin layers of 80 microns. This leads to parts with high density and low porosity, compared to parts produced with Laser Sintering. It also leads to an exceptionally smooth surface straight out of the printer, and functional parts need minimal post-production finishing. That means short lead times, ideal for functional prototypes and small series of end-parts.

Figure 2. Multi Jet Fusion Technology [9].

The following table shows the cost calculation per unit volume. In addition, the average cost calculation that occurs when 4 types of production technologies are used is given.

Table 1. Cost analysis of printing method.

	Cost		
Printing Method	1 Unit	10 Units	25 Units
FDM	$143.20	$1,428.90	$3,567.25
SLA	$269.46	$2,541.40	$6,210.25
SLS	$182.29	$1,432.30	$3,530.25
MJF	$287.54	$1,491.40	$2,648.50

This bionic wing, scanned with a 3D printer MJF Technology, was mounted in a wind tunnel on an experimental set and aerodynamic forces were measured. Detailed one-to-one prototype production has been provided so that the dimensions of the aerodynamic wing are tested in the wind tunnel and optimal performance is ensured at the design point.

CONCLUSION

MJF 3D Printers use PA (Polyamide) as a printing material. Due to the material it uses, it is possible to produce parts with features such as high strength, chemical resistance, impermeability, resistance to climatic conditions, high surface quality, waterproofing in production with MJF.

- For this reason, you can produce not only prototypes but also products that will go to the end user with the MJF 3D Printing method.
- Since it is possible to get high surface quality prints with MJF, the need for post-printing is minimized. Due to the reduced need for post-press processing, delivery times and printing costs will also be reduced.
- MJF is a 3D printer technology that allows 3D printing without using support, due to the way it is produced. Therefore, with MJF, you can easily produce complex models without any limitations.

REFERENCES

[1] Rosso, Stefano & Meneghello, Roberto & Biasetto, Lisa & Grigolato, Luca & Concheri, Gianmaria & Savio, Gianpaolo. (2020). In-depth comparison of polyamide 12 parts manufactured by Multi Jet Fusion and Selective Laser Sintering. Additive Manufacturing. 36. 1-13. 10.1016/j.addma.2020.101713.

[2] Tagliaferri, V., Trovalusci, F., Guarino, S., & Venettacci, S. (2019). Environmental and economic analysis of FDM, SLS and MJF additive manufacturing technologies. Materials, 12(24), 4161. https://dx.doi.org/10.3390%2Fma12244161

[3] Mattia Mele, Giampaolo Campana, Gian Luca Monti, Modelling of the capillarity effect in Multi Jet Fusion technology, Additive Manufacturing, Volume 30, 2019, 100879, ISSN 2214-8604, https://doi.org/10.1016/j.addma.2019.100879.

[4] Çelebi, A., Tosun H., Önçağ A. Ç. 2017. Hasarlı Bir Kafatasının Üç Boyutlu Yazıcı İle İmalatı ve İmplant Tasarımı, Internatıonal Journal Of 3d Prıntıng Technologıes And Dıgıtal Industry, 1(1): 27-35.

[5] Özgül, H. G., & Tatlı, O. (2020). 3D PRINTER DESIGN, MANUFACTURING AND EFFECT OF INFILL PATTERNS ON MECHANICAL PROPERTIES. ICONTECH INTERNATIONAL JOURNAL, 4(1), 13-24.

[6] https://doi.org/10.46291/ICONTECHvol4iss1pp13-24.

[7] formlabs. https://3d3teknoloji.com/3d-baski-hizmeti/ Date of Access: january,2022.

[8] poligon. https://www.poligonmuhendislik.com/hizmetlerimiz/uretim/hizli-imalat/mjf Date of Access: january,2022.

[9] Aydın, N. (2021). Investigation of aerodynamic characteristics on bio inspired wings. http://193.140.245.211/handle/11452/22610

AFLATOXIN STATUS OF GROUNDNUT (*ARACHIS HYPOGEA*) SAMPLES SOLD IN ANYIGBA, KOGI STATE, NIGERIA

S. A. Adegoke and Y. Lamidi

Department of Microbiology, Faculty of Natural Sciences, Kogi State University, Anyigba.

ABSTRACT

Aflatoxins are highly potent member mycotoxins. They are known to be genotoxic and carcinogenic. Consequently, aflatoxins presence in food threatens food safety and quality. Aflatoxins associated with groundnut samples in Anyigba market, Kogi State was assessed. Fungi isolation was done from fresh groundnut samples, using serial dilution method. The macroscopic and microscopic identification revealed five fungal species (Aspergillus flavus, Mucor sp, Fusarium sp, Penicillium sp and Rhizopus sp). Aflatoxin analysis of the groundnut seed samples was performed using High Performance Liquid Chromatography (HPLC). Four types of aflatoxin detected in the groundnut samples, include; Aflatoxin B1, Aflatoxin B2, Aflatoxin M1 and Aflatoxin M2. The quantitative assay showed, aflatoxin B1 (0.0862 µg/kg), aflatoxin B2 (4.1008 µg/kg), aflatoxin M1 (17.3250 µg/kg) and aflatoxin M2 (0.2726 µg/kg). Aflatoxin M1 which is found in diary product has the highest concentration 17.3250 µg/kg in this study and this value is higher than the recent maximum permissible level (0.05 µg/kg) of the European Union (EU). Aflatoxin B1, the most potent toxin among others, has the lowest aflatoxin concentration in this research and was in agreement with the permissible level (in the range of 1-20 µg/kg) of aflatoxin B1 in food as reported by Food and Agriculture Organization (FAO) in the recent years. The study confirms high aflatoxins status of groundnut sold in Anyigba market.

Keywords: Aflatoxins, fungi, groundnut seed, quantitative assay.

INTRODUCTION

Groundnut (*Arachis hypogea L*.) which is also known as peanut, earthnut, monkey-nut and goobers, is an annual legume. It is one of the world's most important oilseed crops ranking the 13th most important food crop and 4th most important oilseed crop of the world being cultivated in more than 100 countries in six continents (Dwivedi, *et al.* 2011; Surendranatha, *et al.* 2011). Groundnut kernels contain 40-50% fat, 20-50% protein and 10-20% carbohydrate and are rich in vitamin E, niacin, riboflavin, thiamine, falacin, calcium, phosphorus, magnesium, zinc, iron and potassium (United States Department of Agriculture, 2010).

Aflatoxins are a group of structurally related polyketide mycotoxins that contaminate many agricultural commodities, such as almond, coffee, corn, cottonseed (*Gossypium* spp.), groundnut, pistachio, rice (*Oryza sativa* L.), soybean, sunflower, wheat, milk and milk products can be contaminated as a result of cows being fed on aflatoxin-contaminated feed. Aflatoxin B1 (AFB1) is the most common of the six forms of aflatoxins, AFB1, AFB2, AFG1, AFG2, AFM1 and AFM2 (Eshetu, 2010). Aflatoxins are the major mycotoxins that are most commonly associated with groundnuts. Aflatoxin producing potentials of groundnut prevents groundnut producers from accessing bigger western markets, increases dependency on foreign food aid, stifles economic opportunities, and adversely affects consumer health. Aflatoxin producing potentials of groundnut could occur before harvest while the crop is maturing in the field particularly favored by drought stress and high soil temperature, in storage and during marketing (Dohlman, 2011).

Due to lack of proper storage of foodstuff, insect damage, high temperature, high humidity and poor farm management they are predisposed to fungal contamination. Hence, there is a need to evaluate the quality and levels of fungal contamination at post-harvest level and understand the problem before advising on implementing some control measures. When an effective strategy for managing fungal

infection is developed, it will in no small amount minimise fungal infection of groundnuts as well as reduce consumer exposure to aflatoxins.

MATERIALS AND METHODS

Collection of Samples

Groundnut seeds were collected from Anyigba market, Kogi State. The sample was collected in sterilized plastic bag and transported to micro-biology laboratory, Kogi State University for further analysis.

Microscopic Examination was carried out from pure culture obtained. A drop of water was placed in the centre of clean grease-free slide, then small portion of fungi culture was cut out with the aid of sterile inoculating needle. The cut piece was put directly in the water droplets and teased out. A drop of lactophenol cotton blue was added. A cover slip was then covered over the teased portion, then mounted on the microscopic stage and viewed under low magnification (X 10) and then higher magnification (X 40).

Aflatoxin Analysis quantitative and qualitative aflatoxin analyses in groundnut samples were done using HPLC (high performance liquid chromatography). A known mass (5 g) of the milled sample was weighed into labelled conical flask. The samples were pre-treated in 20 ml N-hexane : petroleum-ether (60:40) for 2 hours, with continuous shacking and then, about 20 ml mixture of methanol and water (70:30) were added to the samples under continuous stirring in a mechanical shaker for 2 hours. The reaction mixture was filtered through a Whatman No. 2 filter paper. A portion of the filtrate (about 5 ml) was cleaned in a microfilter (5 µm pore size), preconditioned with methanol and water in ratio 3:1 v/v. The extraction was injected into the HPLC machine and the determination was obtained using HPLC instruments (HPLC MODEL 1100 series - with water 501conponents).

Results

The chromatogram of total aflatoxins of groundnut sample sold in Anyigba market is shown in Fig. 1. It shows that there were other mycotoxins that the extraction method was able to isolate but they were not identified because of the focus of this work on aflatoxins. The results in Table 2 revealed four aflatoxins present in groundnut sample sold in Anyigba market, AFT M1, AFT B2, AFT M2, and AFT B1 were found to be present in 17.3250, 4.1008, 0.2726 and 0.0862 (µg/kg) concentrations, respectively and other unidentified mycotoxins

Sample: Groundnut

Date:2019-11-13,5:24:40 PM

Data File:c:\N2000\data\AFT20191113171939 File:C:\N2000\STD TOTAL.mtd
Quantification:Area/Index

Instrument:LC Gradient:High Pressure Detector:UV Column Temp.(¡æ)£º40 Wavelength(nm)£º365

Chromatogram (AFT20191113171939)

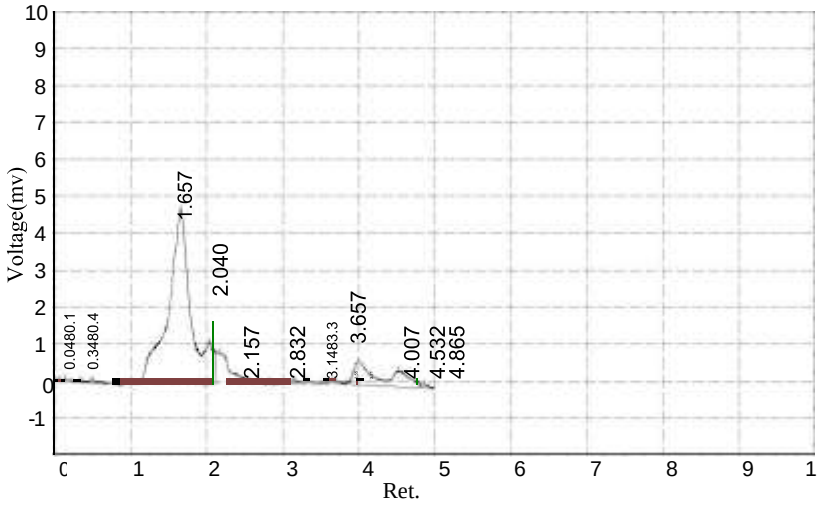


Figure 1: Chromatogram of total Aflatoxins of Groundnut Samples Sold in Anyigba Market

TABLE 1: Mycotoxin for Groundnut Sample Sold in Anyigba Market

Peak No.	Peak ID	Ret time	Height	Area	Con. ppb
1	Unidentified	0.048	64.216	226.478	0.0236
2	Unidentified	0.132	404.647	3521.294	0.1485
3	Unidentified	0.348	231.569	618.006	0.0850
4	Unidentified	0.490	541.902	7283.522	0.1988
5	AFT MI	1.657	47217.199	903072.492	17.3250
6	AFT B2	2.040	11176.292	104632.492	4.1008
7	Unidentified	2.157	8594.321	124013.102	3.1534
8	Unidentified	2.832	261.988	942.863	0.0961
9	AFT M2	3.148	743.062	11456.923	0.2726
10	Unidentified	3.323	215.477	945.177	0.0791
11	AFT B1	3.557	234.905	925.373	0.0862
12	Unidentified	3.657	404.263	2003.718	0.1483
13	Unidentified	3.715	462.804	3307.964	0.1698
14	Unidentified	4.007	6240.514	94742.371	2.2898
15	Unidentified	4.532	4179.391	64046.371	1.5335
16	Unidentified	4.865	788.916	5043.315	0.2895

Key: Unidentified – Unidentified Mycotoxins, AFTM1 – Aflatoxin M1, AFTB2 – Aflatoxin B2 AFTM2 – Aflatoxin M2, AFTB1 – Aflatoxin B1.

Table: 2Aflatoxins Present in Groundnut Sample Sold in Anyigba

Peak NO	Peak ID	Con ppb	Con µg/kg
1	AFTM1	17.3250	17.3250
2	AFTB2	4.1008	4.1008
3	AFTM2	0.2726	0.2726
4	AFTB1	0.0862	0.0862

Key: AFTM1 – Aflatoxin M1, AFTB2 – Aflatoxin B2, AFTM2 – Aflatoxin M2, AFTB1 – Aflatoxin B1.

Discussion

Groundnut (*Arachis hypogea L.*), is an annual legume, and it is one of the world's most important oil seed crops. In nature, crops are usually not in sterile form; these legumes come in contact with microorganisms right from the field, during field production. Groundnut is susceptible to aflatoxin contamination when the plant is stressed by drought and high temperature (Jordan *et al*., 2018) which can then developed rapidly during storage when conditions are suitable for producing "mycotoxin" (Turner *et al*., 2009). From the previous findings: Fagbohum and Faleye (2012) isolated *Aspergillus niger, Aspergillus flavus, Rhizopus sp., Mucor sp., and Aspergillus fumigatus* in sun-dried groundnut, Adebesin *et al*. (2009) isolated *Aspergillus flavus, Aspergillus niger, Aspergillus tamarii, Pinicillium citrinum, Rhizopus, stolonifer* and *Macrophmin phaseolina* in roasted groundnut sold in Bauchi State. Ibrahim (2014) has reported isolating *Mucor spp, Aspergillus, Penicillium sp., Fusariun sp. and Rhizopus sp.* in groundnut seed sold in Aliero central market, Ekiti State.

The aflatoxins producing fungi isolated from the groundnut sold in Anyigba were similar to those isolated by Akinibosun and Osawaru (2015), who isolated *Neurospora* sp., *Aspergillus niger*, Aspagillus *flavus*, *Mucor* sp., *Rhizopus sp., Penicillium sp., Trichoderma spp,* and *Fusarium sp.*. in peeled and unpeeled groundnut seed sold in Benin city. The presence of this toxigenic aflatoxin in groundnut may lead to economic losses (Okello *et al*., 2010).

From previous findings, analysis of hulls showed that, 6.7% of the samples were contaminated with aflatoxin B1 (mean level = 15-23.9 µg/kg) and aflatoxin B2 (Mean level =3.3-5.6 µg/kg), in Kernels, 33.3% of the samples were contaminated with aflatoxin B1 (Mean level = 7.0-11 µg/kg) and 28.3% were contaminated with aflatoxin B2 (Mean level =7.0-11µg/kg) and 28.3% were contaminated with aflatoxin B2 (mean level =3.3-45.5µg/kg) (Smith, *et al.*, 2014). But in the groundnut of this study before aflatoxin were found to be present aflatoxin B1, aflatoxin B2, Aflatoxin M1., aflatoxin M2 in the concentration of aflatoxin B1 which is (0.0862 µg/kg), aflatoxin B2 (4.1008 µg/kg), aflatoxin M1 (17.3250 µg/kg) and aflatoxin M2 in the concentration of (0.2726 µg/kg). Aflatoxin B1 which is the most potent toxin among others has the lowest aflatoxin concentration in this study (0.0862 µg/kg) which is in agreement with the permissible level of aflatoxin B1 according to the Food and Agriculture Organization (2006) in the range of 1-20 µg/kg in food.

Aflatoxin M1 which is associated with dairy products, in this research, Aflatoxin M1 observed to be in the highest concentration than others. The result obtained in this study could be compared with the findings of Atanda *et al*. (2007). These workers demonstrated that fresh milk produced in Ogun and Oyo states of Nigeria had aflatoxin M1 concentration range from 2.04-4.00 g/l. however, the aflatoxin M1 (17.3250 µg/kg) in this research were observed to be higher than those reported by Ogunbanwo *et al.* (2005) and Makun *et al*., (2010) who found aflatoxin M1 concentration in imported powdered milk at concentration below 0.5 µg/l. the maximum acceptable level of aflatoxin M1 in milk range between 0.05 µg/kg and 0.5 µg/kg as established respectively, by the European Union (EU) and the Food and drug Administration (2006). But in this research, the level of aflatoxin M1 is higher than the European Union, and the Food and Drug Administration (FDA).

CONCLUSION

The sample groundnut (*Arachis hypogea) sold in Anyigba* market analysed had aflatoxins: M1, B2, M2, and B1, in the concentrations 17.3250 µg/kg, 4.1008 µg/kg, 0.2726 µg/kg and 0.0862 µg/kg respectively. These concentrations exceed the permissible levels aflatoxins and hence it revealed that the groundnut sold in Anyigba market as the time of this study may pose health challenges to the consumers because of high exposure to aflatoxins. There in an urgent need to reduce the spread of *Aspergillus flavus* and other harmful fungi that produce mycotoxin (McDonald, 2012).

ACKNOWLEDGEMENT

We want to use this opportunity to appreciate Tertiary Education Trust Fund (TETFUND) in Nigeria for the full sponsorship of this work.

REFERENCES

Adebesin, A.A, Saromi O.D. Amosun N.A. and Fajade, S.O. (2009) Microbiological Quality of some Groundnut Produced Hawked in Bauchi a Nigeria City *The Journal of Food Technology in Africa*, 6(2): 53-55.

Akinnibosun, F.F and S. Osawave, E. (2015). Quality assessment of peeled & un-peeled roasted groundnut sold in Benin City, Nigeria *International Research Journal of Natural & Applied Science* 2(3): 18-32.

Atanda, O. Oguntobo A. Adejumo. O. Ikeorah J. and Akpan A. (2007). Aflatoxin M. concentration of Milk and Ice Cream in Abeokuta and Odede local government of Ogun State, Nigeria. *Chemosphere*. 68: 1455-1458.

Dickens, J.W., and Pattee, H.E., (2016). The effects of time, temperature and moisture on aflatoxin production in peanuts inoculated with a toxin strain of *Aspergillus flavus*. *Tropical Science* 81: 11 -22.

Diener, U.L., Davies, N.D., (2009). Aflatoxin production by isolation of *Aspergillus flavus*. *Phytopath*. 56:1390- 1393.

Dohlman, E., (2011). Mycotoxin Hazards and Regulations: Impacts on food and Animal feed crop trade, International Trade and Food Safety: Economic theory and case studies, Jean Buzby (ed.), Agricultural Economic Report 828. USDA, ERS.

Dwivedi, S.L., Crouch, J.H., Nigam, S.N., Ferguson, M.E. and Paterson, A.H., (2011). Molecular breeding of groundnut for enhanced productivity and food security in the semi-arid tropics: Opportunities and challenges. *Advanced Agronomy* 80: 153-221.

Eshetu, L., (2010). Aflatoxin content of peanut (*Arachis hypogaea* L.) in relation to shelling and storage practices in Ethiopian farmers. MSc Thesis, Addis Ababa University, Addis Ababa.

Fagbunhun, E.D., and Faleye, O.S., (2012). the nutritional and mycoflora change during storage of groundnut (Arachis Hypogaea) *International Journal of Agronomy and Agricultural Research* 2 (6): 15-22.

Ibrahim, A. (2014) isolation and identification of fungi associated with groundnut seeds Aliero central market, *International Journal of Biological Sciences* 1(15): 56-62.

Jordan, D. Hoisington, D.M Admnikari, Akromah, R. Apaw, Balota. (Payne, G. and Phoada, J. (2018). Preventing Mycotoxin contamination in Groundnut Cultification in Achieving sustainable Cultification.

Makun, H.A. Arijomin S.I Moronfoye B. Adejo F.O. Afolabi O.A. Fagbaibo G. (2010) Fungal and Aflatoxin Contamination of some Human Food Commodities in Nigeria *J. Food Sci.* 4: 127-135

McDonald, D., and Harkness, C., (2012). Growth of Aspergillus flavus and production of aflatoxin in groundnuts. Part V. *Tropical Science* VI (1): 12-27.

Ogunbanwo, B.F. Irhorhe, O.O. Ayoade, F.A Imafidon, T.F, Fashina F.A and Wden, E.N (2005). Incidence of Mycotoxin in Local and Processed Foods Marked in Nigeria.

Okello DK, Kaaya, AN, Bisikwa J, Were M, Oloka HK (2010). Management of aflatoxins in groundnuts: A manual for farmers, processors, traders and consumers in Uganda. National Agricultural Research Organisation, Entebbe, Uganda, pp. 978-970.

Smith, T. K., McMillan, E. G. and Castillo, J. B. (2014). Effect of feeding blends of *Fusarium* mycotoxin-contaminated grains containing deoxynivalenol and fusaric acid on growth and feed consumption of immature swine *Journal of Animal Science* 75: 2184-2191.

Surendranatha EC, Sudhakar C, Eswara NP (2011) Aflatoxin contamination in groundnut induced by Aspergillus flavus type fungi: a critical review. *Int J of App. Biol. Pharm. Tech.* 2:2.

United States Department of Agriculture-Foreign Agricultural Service, (2010). Peanut Area, Yield, and Production. Table 13. Source: www.fas.usda.gov (Accessed: 2/14/2010).

ANESTHESIA AND INTENSIVE CARE MANAGEMENT OF THE PATIENT WHO WAS TAKEN EMERGENCY CESAREAN SECTION DUE TO PREECLAMPSIA/ECLAMPSIA

Uzm. Dr. İlke TAMDOĞAN

ORCID: 0000-0002-8757-1046

GRÜ Kadın Doğum ve Çocuk Hastalıkları Eğitim Araştırma Hastanesi, Anestezi ve Reanimasyon, Giresun, Türkiye

Uzm. Dr. Esra TURUNÇ

ORCİD:0000-0003-0159-7403

Ondokuz Mayıs Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon, Samsun, Türkiye

ABSTRACT

Preeclampsia; It is a picture seen after the 20th gestational week, in which hypertension is accompanied by proteinuria. Eclampsia is a condition that requires emergency treatment, accompanied by generalized convulsions. The main treatment is delivery and prophylaxis is given with antihypertensive and magnesium sulfate (MgSO4). In this case, anesthesia and intensive care management of the patient who underwent emergency cesarean section due to preeclampsia/eclampsia is presented.

It is learned that the 32-year-old pregnant woman, who is in her 33rd gestational week, lost consciousness at home, hit her head and had seizure-like movements. When he was brought to the emergency room, he was conscious, his physical examination was normal, and there was no abnormal result in the laboratory except +3 proteinuria. Antihypertensive and MgSO4 treatment was started immediately. Since the patient had seizures again, she was unconscious and had an emergency cesarean section while her seizure was still ongoing. Heart rate was 110 beats/minute, non-invasive blood pressure was 180/100 mmHg, and peripheral oxygen saturation was 98%. General anesthesia with rapid serial induction was applied to keep the patient unconscious, to have aspiration risk, and to ensure airway safety. The 1st and 5st minute Apgar scores of a 2115 g female baby were 8 and 9. The patient was taken to the intubated intensive care unit. Cervical and brain CT performed due to a history of head trauma did not reveal any finding other than mild cerebral edema consistent with preeclampsia/eclampsia. He was extubated at the 4th postoperative hour. Neurological examination was normal. The patient was followed in the intensive care unit for 48 hours postoperatively, and his hemodynamics remained stable. No new hypertensive and convulsive attacks developed. MgSO4 infusion continued for 24 hours postoperatively. The patient was discharged from the hospital on the 6th postoperative day with good recovery.

As a result, preeclampsia and eclampsia are life-threatening conditions for both the baby and the mother, and prophylactic antihypertensive and MgSO4 treatment should be started without delay and delivery should not be delayed after optimal conditions are provided. In addition, patients should be followed up in the intensive care unit for at least 24 hours postoperatively, as a new hypertensive and convulsive attack may develop postoperatively.

Keywords: Preeclampsia, eclampsia, anesthesia, intensive care

INTRODUCTION

Preeclampsia; It is a pregnancy-specific disorder seen after the 20th gestational week and accompanied by hypertension and proteinuria (1, 2). Although its pathophysiology is not fully known, endothelial dysfunction and related decreased organ perfusion are blamed (3). Eclampsia ; Generalized convulsions and/or coma are accompanied by preeclampsia. Eclamptic seizures are typically of the grand mal type,

in a tonic-clonic fashion. It may develop following severe preeclampsia, or it may develop in cases with mild hypertension without accompanying proteinuria.

In severe preeclampsia and eclampsia, treatment should be planned by hospitalization. In treatment, prophylactic magnesium sulfate (MgSO4) and antihypertensives should be started for the purpose of preventing convulsions and controlling blood pressure. Its main treatment is delivery (4).

In this presentation, we aimed to present the anesthesia management and clinical course in the intensive care unit of the patient who underwent emergency cesarean section due to eclampsia.

CASE

In the history of the 32-year-old G2P1, 33rd gestational week patient, it is learned that she lost consciousness at home, fell, hit her head, and had seizure-like movements. The patient, who is conscious when brought to the emergency room, does not remember the events. In the emergency room, the patient's noninvasive blood pressure (NIBP) was 160/100 mmHg, heart rate (HR) was 69 beats/min, peripheral oxygen saturation (SpO2) was 99%, and fever was 36.2C. Neurological examination was normal. There was no abnormal finding other than +3 proteinuria in the urine in his laboratory. Cesarean section was planned because the patient had hypertension and proteinuria and this picture was accompanied by syncope and seizure-like movements. Intravenous (IV) 4 g MgSO4 loading was applied to the patient and then 2 g/s maintenance was started. During the preparation for the cesarean section, the patient had a generalized seizure again, and because of the difficulty in ensuring airway safety, emergency cesarean section was taken.

Standard monitoring (NIBP, HR, SpO2) was performed in the operating room. Blood pressure was 180/100 mm/Hg, HR was 110 beats/minute, SpO2 was 98%. Preoxygenation could not be performed because the patient was unconscious and having seizures. He was intubated with propofol 2 mg/kg, 1 mcg/kg fentanyl, 1 mg/kg rocuronium and cricoid compression and rapid serial induction. During the maintenance of anesthesia, sevoflurane was administered with a 50% O2/air mixture with a minimum alveolar concentration (MAC) of 1 until the baby came out, and sevoflurane was administered with a 50% O2/air mixture with a MAC of 0.5-0.8 after the baby was released. In order to provide analgesia, IV bolus of 1-2 mcg/kg fentanyl was administered. Apgar scores of a female baby born with a birth weight of 2115 g were evaluated as 8 and 9 at the 1st and 5th minutes, respectively. Surgery lasted 30 minutes, no intraoperative complication was encountered. The patient was taken to the intubated intensive care unit. Because of the patient's history of head trauma and cervical collar, brain and cervical computed tomography (CT) were performed. No cervical pathology was found. In brain CT, there was diffuse cerebral edema consistent with eclampsia, and no bleeding area was found. The patient was extubated at the 4th postoperative hour. He was conscious, oriented, cooperative, and his neurological examination was normal. The patient was followed up in the intensive care unit for 48 hours postoperatively, and his hemodynamics remained stable during the intensive care unit. No new hypertensive and convulsive attacks developed. Magnesium sulfate infusion continued for 24 hours postoperatively. The patient was discharged from the hospital with recovery on the 6th postoperative day.

DISCUSSION

Preeclampsia and eclampsia are life-threatening complications of pregnancy. It requires urgent treatment to minimize maternal and fetal morbidity and mortality. An 'airway' should be placed, aspiration should be prevented, and airway safety should be ensured so that the patient who has a convulsive attack does not bite his tongue. Continuity of maternal oxygenation should be ensured. Precautions should be taken to prevent head and body trauma. In addition, vascular access should be established immediately and a urinary catheter should be inserted (5). Prophylactic antihypertensive and magnesium sulfate treatment should be started without delay. In our case, the patient had seizures both at home and during labor. The patient, who had seizures in labor and bit his tongue, whose airway could

not be provided, was first aided in labor and taken to an emergency cesarean section. Antihypertensive and magnesium sulfate treatment was started without delay.

One of the important factors in terms of maternal mortality and morbidity in preeclampsia and eclampsia is the choice of anesthesia. General anesthesia has been reported to have a higher maternal mortality rate than regional anesthesia due to problems such as intubation difficulty due to upper airway edema, aspiration risk, triggering hypertension, and delays in the diagnosis of cerebral events (6). In cases with coagulopathy and/or thrombocytopenia in regional anesthesia, there is a risk of developing local hematoma and related paraplegia (7). In our case, general anesthesia was preferred to ensure the safety of the airway because of unconsciousness and the risk of aspiration.

Since there is a risk of recurrence of eclamptic convulsions after delivery, patients should be followed up in the intensive care unit for at least 24 hours. During this period, magnesium sulfate should be continued and vital functions should be followed closely (5). Our case was also followed up in the intensive care unit for 48 hours and received magnesium sulfate therapy for 24 hours postoperatively.

RESULT

As a result, preeclampsia and eclampsia are life-threatening conditions for both the baby and the mother, and prophylactic antihypertensive and MgSO4 treatment should be started without delay and delivery should not be delayed after optimal conditions are provided. In addition, patients should be followed up in the intensive care unit for at least 24 hours postoperatively, as a new hypertensive and convulsive attack may develop postoperatively.

REFERENCES

1. Roos NM, Wiegman MJ, Jansonius NM, Zeeman GG. Visual disturbances in (pre) eclampsia. Obstetrical & gynecological survey. 2012;67(4):242-50.
2. Steegers EA, Von Dadelszen P, Duvekot JJ, Pijnenborg R. Pre-eclampsia. The Lancet. 2010;376(9741):631-44.
3. Spong CY, Cunningham F, Leveno K, Bloom S, Hauth J, Rouse D. Williams obstetrics. New York: McGraw-Hill Education; 2009.
4. Zeeman GG, editor Neurologic complications of pre-eclampsia. Seminars in perinatology; 2009: Elsevier.
5. MADAZLI R, ŞEN C, OCAK V. Eklampsi'de Klinik Yönetim. Perinatoloji Dergisi. 1993;1:45-9.
6. Mhyre JM, Riesner MN, Polley LS, Naughton NN. A series of anesthesia-related maternal deaths in Michigan, 1985–2003. The Journal of the American Society of Anesthesiologists. 2007;106(6):1096-104.
7. Henke VG, Bateman BT, Leffert LR. Spinal anesthesia in severe preeclampsia. Anesthesia & Analgesia. 2013;117(3):686-93.

FARKLI KONUMLARDA SICAKLIĞIN FOTOVOLTAİK PANEL VERİMİNE ETKİSİ

THE EFFECT OF TEMPERATURE ON PHOTOVOLTAIC PANEL EFFICIENCY AT DIFFERENT LOCATIONS

Eda Feyza AKYÜREK

Erzurum Teknik Üniversitesi, Mühendislik ve Mimarlık Fakültesi, Makine Mühendisliği Bölümü, Erzurum, Türkiye.

ORCID ID: https:// orcid.org/ 0000-0003-4007-6846

ÖZET

Canlı hayatının devam edebilmesi için enerji mutlak gereksinim olarak bilinmektedir. Günümüzde en popüler olarak bilinen enerjilerin gün geçtikçe tüketim oranı artmakta ve bununla ters orantılı olarak dünyamızda bu enerji kaynakları azalmaktadır. Bu nedenlerle, sürdürülebilir enerji üretimi ve enerji tasarrufuna dünya çapında artan bir ilgi vardır. Buna önlem olarak daha çok yenilenebilir enerji kaynaklarına yönelmemiz gerekmektedir. Bilinen en büyük ve en güçlü yenilebilir enerji kaynağımız güneştir. Güneş fotovoltaik (PV) enerjisi, dünya çapında en yaygın kullanılan yenilenebilir enerji seçeneklerinden biridir. Bu enerji kaynağının kullanım alanını yaygınlaştırarak hem daha uzun süreli enerji üretimi hem de çevreye verilen zararı minimuma indirmek için bu alandaki çalışmaları artırmamız gerekmektedir. Ancak, artan PV modül sıcaklığı ile elektriksel verimliliği düşer, bu nedenle modülün yüksek sıcaklık koşullarında performansını iyileştirmenin uygun yollarını bulmak gerekir. Bu çalışmada paralel ve seri olarak bağlı iki panelin 3 farklı konum için sıcaklığa bağlı olarak verimlerinin nasıl değiştiği araştırılmıştır.

Anahtar kelimeler: fotovoltaik panel, fotovoltaik panel verimi, güç-sıcaklık karakteristiği

ABSTRACT

Energy is known as an absolute requirement for the continuation of life. Today, the consumption rate of the most popular energies is increasing day by day and inversely proportionally, these energy sources are decreasing in our world. For these reasons, there is a growing worldwide interest in sustainable energy production and energy conservation. As a precaution, we need to turn to more renewable energy sources. Our largest and most powerful renewable energy source known is the sun. Solar photovoltaic (PV) energy is one of the most widely used renewable energy options worldwide. We need to increase the work in this field in order to expand the usage area of this energy source, both for longer-term energy production and to minimize the damage to the environment. However, with increasing PV module temperature, its electrical efficiency decreases, so it is necessary to find appropriate ways to improve the module's performance under high temperature conditions. In this study, it has been investigated how the efficiency of two panels connected in parallel and in series changes depending on the temperature for 3 different positions.

Keywords: photovoltaic panel, photovoltaic panel efficiency, power-temperature characteristic

1. GİRİŞ

Bir fotovoltaik (PV) panel, güneş radyasyonunu fotovoltaik etki ile elektrik enerjisine dönüştürmek için tasarlanmış birkaç fotovoltaik hücreden oluşur. Fotovoltaik (PV) elektrik enerjisi üretimi, güneş ışınımından yenilenebilir enerji üretmek için umut verici bir teknolojidir. Güneş teknolojilerinin verimliliği ve maliyeti açısından sürekli iyileştirilmesi, kullanımının artmasına neden olmuştur(Ahmad, Ghenai, Hamid, Rejeb, & Bettayeb, 2021). Bununla birlikte, PV'nin çıktısı, çalışma koşullarına duyarlıdır, bu nedenle PV potansiyelini doğru bir şekilde tahmin etmek karmaşık bir

problemdir. Bir fotovoltaik panelin en önemli özelliği, belirli koşullarda elektrik enerjisine dönüştürülen güneş radyasyonu miktarını ifade eden dönüşüm verimliliğidir. Güneş enerjisi teknolojisi şu anda dünya genelinde yaygın olarak kullanılmasına rağmen, artan çalışma sıcaklığı ile verimliliğin düşmesi gibi bazı zayıf yönleri vardır(Skoplaki & Palyvos, 2009). Fotovoltaik hücrenin dönüştürme verimliliği ile sıcaklığı arasındaki ilişki araştırmacılar için önemli bir çalışma konusu olmuştur. Günümüzde çoğu fotovoltaik (PV) panel, gelen güneş ışınımının neredeyse %20'sini elektriğe dönüştürürken, geri kalanı ısıya dönüştürülerek PV hücrelerinin sıcaklığını yükseltir. PV hücre sıcaklığının, akım ve voltaj çıkışlarını etkilediğinden, güç dönüşüm verimliliğini belirlemede çok önemli bir rol oynadığı iyi bilinen bir gerçektir. Gelen ışınım seviyesindeki bir artış, akım çıkışını önemli ölçüde artırır, ancak aynı zamanda beraberinde taşıdığı ısı nedeniyle voltajı da azaltır(O'Donnell & Chen, 1991). Elektrik gücü, akım ve voltajın ürünü olduğundan, toplam güç çıkışı azalır. PV panelleri, birkaç PV hücresinin seri ve/veya paralel kombinasyonlarından oluştuğundan, aynı zamanda tek bir hücrenin davranışına benzer davranışlarla karşı karşıya kalırlar. Çalışma sıcaklığı, fotovoltaik dönüşüm sürecinde önemli bir rol oynar. Bir fotovoltaik (PV) modülün hem elektrik verimliliği hem de güç çıkışı, çalışma sıcaklığına doğrusal olarak bağlıdır(Dubey, Sarvaiya, & Seshadri, 2013). Çoğu çalışma da üretilen maksimum gücün çalışma sıcaklığı ile neredeyse doğrusal olarak değiştiğini iddia edilmiştir(Popovici, Hudişteanu, Mateescu, & Cherecheş, 2016). Mazón-Hernández et al., (2013) tarafından yapılan çalışmaya göre, PV panelin sıcaklığı 15 °C düşürülerek elektrik enerjisi veriminde %15'lik bir artış sağlandı. Krauter, (2004) yaptığı çalışmada, hücre yüzeyinde bir soğutma suyu filminin akmasının hücrenin sıcaklığını önemli ölçüde azalttığını ve bunun sonucunda veriminin yaklaşık %10 oranında artırılabileceğini öne sürmüştür.Hussien, Numan, & Abdulmunem, (2015) yaptıkları çalışmada, PV panelin aktif olarak soğutulmasının PV sıcaklığını 78 °C'den 70 °C'ye düşürdüğünü ve bunun da PV modülünün elektriksel verimliliğini %9,8 artırdığını belirtmişlerdir.

Bu çalışmada paralel ve seri olarak bağlı iki panelin 3 farklı konumu(0.75m, 1m, 1.25m) için sıcaklığın 25°C-65°C aralığındaki değerleri için güç ve verimin nasıl değiştiği araştırılmıştır.

2. MATERYAL ve YÖNTEM

Çalışmada deneyler solar simülatör kullanılarak gerçekleştirilmiştir. Deney seti fotovoltaik modüller, piranometre, sıcaklık sensörü, açı ayarlamak için sıkma bloğu, veri toplama ünitesi, reosta, dijital açı ölçeği, bağlantı kabloları, güç kablosu ve veri toplama ünitesi bağlantı kablosundan oluşmaktadır. Işık kaynağı 8 kW gücündedir. Panelin alt yüzeyindeki sıcaklık sensörleri panel sıcaklığını ve pinanometre yüzeye düşen ışınımın yoğunluğunu ölçmek için kullanılmıştır. Ölçüm ünitesinden akım, voltaj, sıcaklık, ışınım yoğunluğu verileri belirlenebilir. Deneylerde seri ve paralel bağlanabilen 2 adet panel kullanılmıştır. Fotovoltaik paneller 36 adet monokristal hücrelerden oluşmaktadır. Yapay ışık kaynağı ile panel arasında 0.75, 1 ve 1.25 m olacak şekilde 3 farklı mesafede çalışılmıştır. Sıcaklık değerinin 25°C, 30°C, 35°C,40°C,45°C,50°C,55°C, 60°C ve 65°C değerleri için güç ve panel verimi değerlendirilmiştir.

Gerilim (V) ve akım (I) değerlerinin ölçüm işlemlerinin sonunda sistemin gücünü (P) belirlemek için denklem 1 kullanılmıştır.

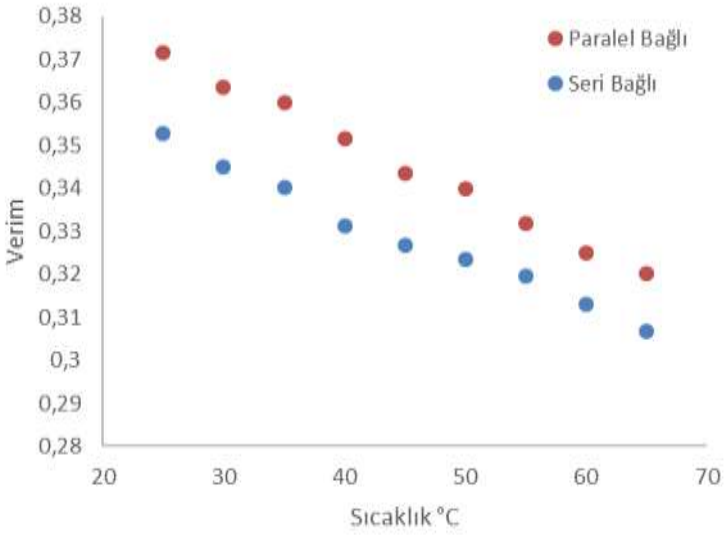
$$P = I * V \quad (1)$$

Piranometre ile ölçülen panel üzerine düşen ışınım değeri I_I (W/m^2), panel yüzey alanı A (m^2), gerilim ve akım değerleri kullanılarak sistemin verimi η denklem 2 kullanılarak belirlenmiştir.

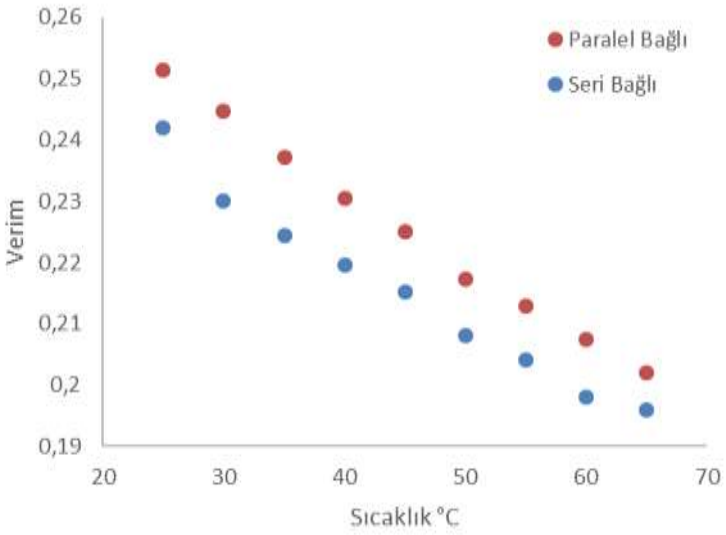
$$\eta = \frac{V*I}{I_I*A} \quad (2)$$

3. ARAŞTIRMA BULGULARI ve TARTIŞMA

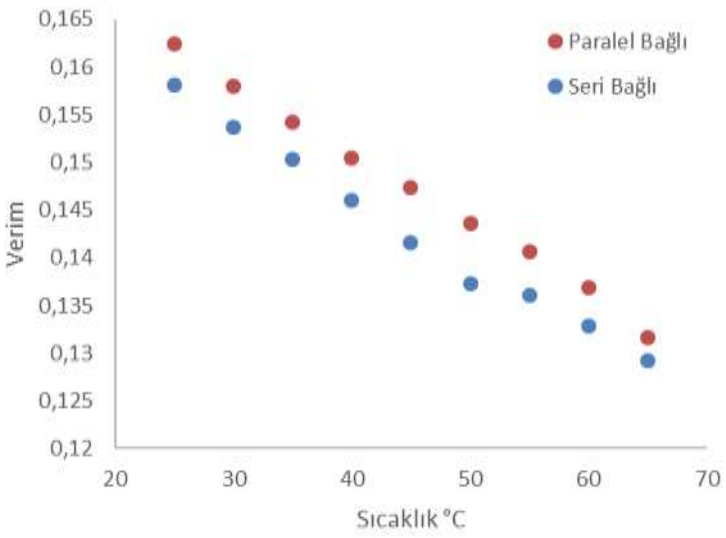
Yapılan çalışmada paralel veya seri bağlanan fotovoltaik panellerin yapay ışık kaynağı ile aralarındaki mesafenin 0,75m, 1m ve 1,25m olması durumlarında verim ve güç değerlerinin nasıl değiştiği araştırılmıştır. Şekil 1,2 ve 3'de yapay ışık kaynağından sırasıyla 0,75m, 1m ve 1,25m mesafe bulunan panellerin sıcaklık verim ilişkisi verilmiştir. Şekillerde de görüldüğü gibi sıcaklık arttıkça verim değerleri düşmüştür, paralel bağlanması durumunda elde edilen verim değerleri seri bağlanması durumundan daha fazladır. Mesafe attıkça seri bağlanması durumunda elde edilen verim paralel bağlanması durumunda elde edilen verim değerlerine yaklaşmıştır.



Şekil 1. 0,75 m mesafede panellerin palel ve seri bağlanması durumunda sıcaklık ile verimin değişimi

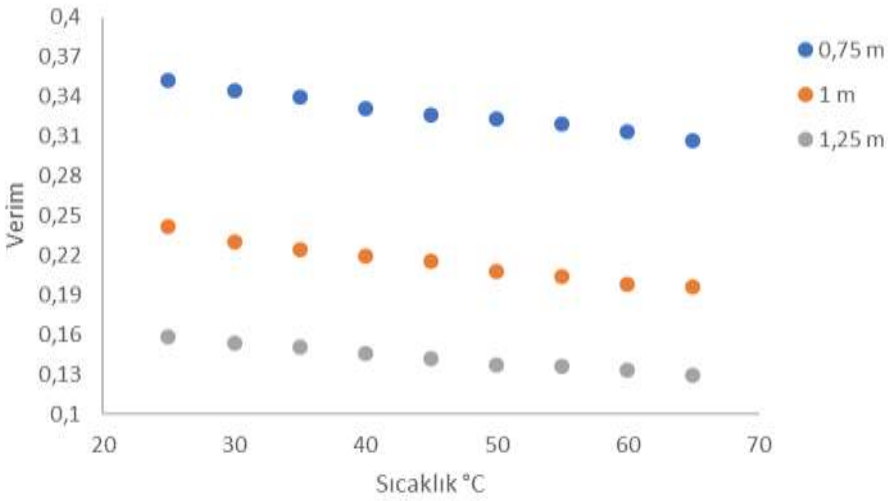


Şekil 2. 1 m mesafede panellerin palel ve seri bağlanması durumunda sıcaklık ile verimin değişimi

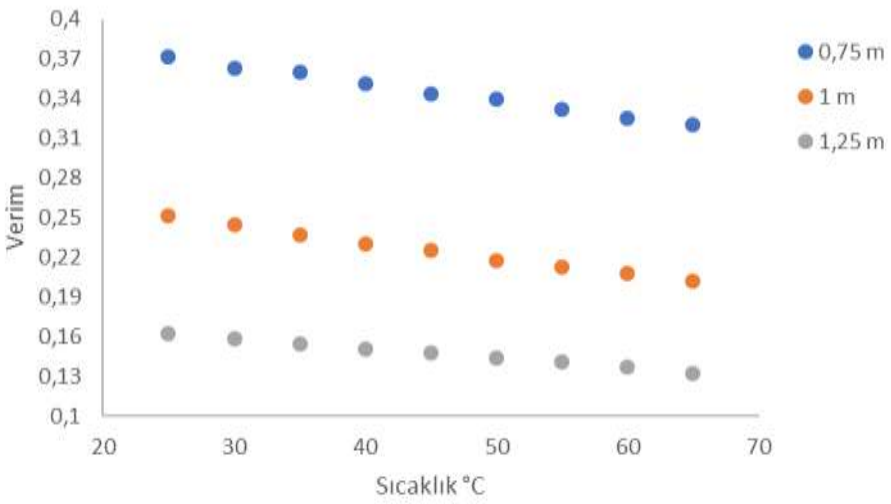


Şekil 3. 1,25 m mesafede panellerin palel ve seri bağlanması durumunda sıcaklık ile verimin değişimi

Şekil 4'de seri bağlı ve Şekil 5'de paralel bağlı panellerin ışık kaynağı ile aralarındaki mesafenin ve sıcaklığın artışı ile verimin nasıl değiştiği gösterilmektedir. Şekillerden de görülmektedir ki mesafe ve sıcaklık artıkça hem seri bağlı hem de paralel bağlı paneller için verim değerleri azalmıştır.

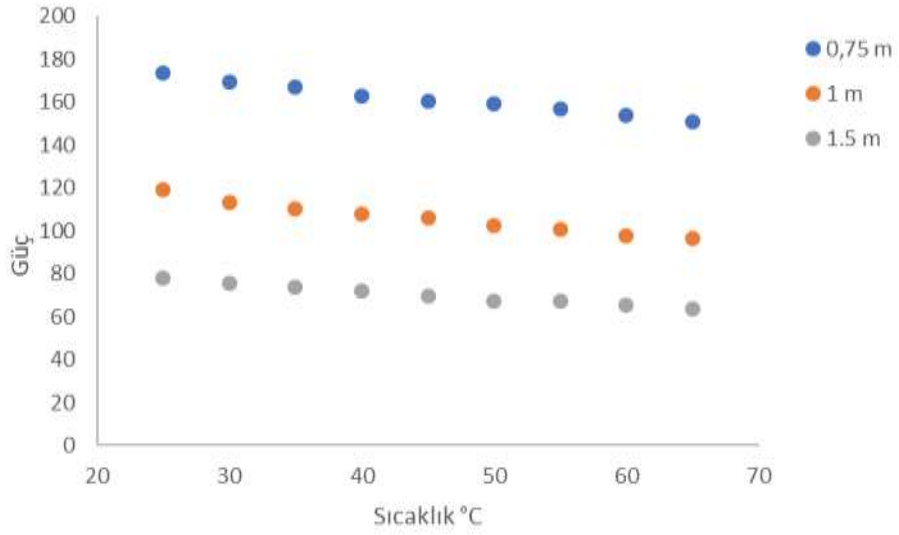


Şekil 4. Artan mesafe ile sıcaklık verim değişimi (paneller seri bağlı)

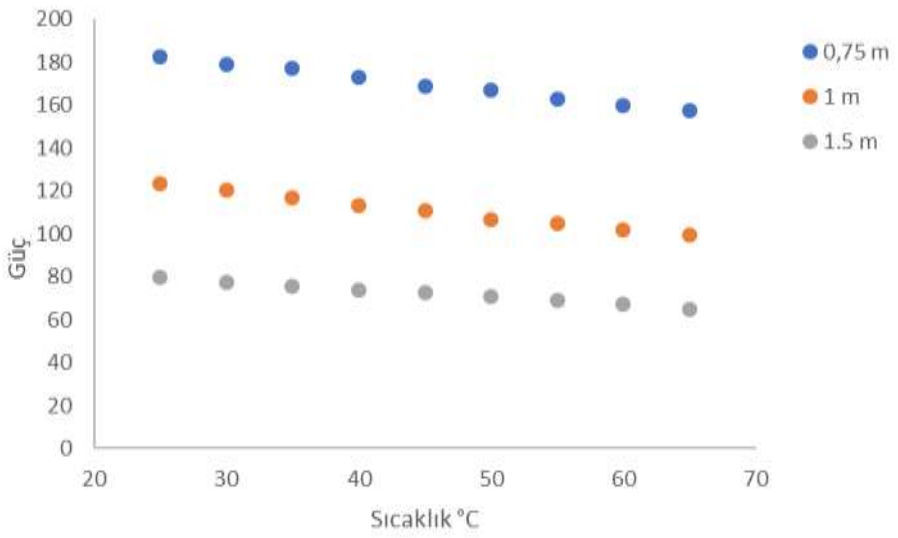


Şekil 5. Artan mesafe ile sıcaklık verim değişimi (paneller paralel bağlı)

Şekil 6 seri bağlı ve Şekil 7 paralel bağlı panellerin ışık kaynağı ile aralarımdaki mesafenin ve sıcaklığın artışı ile güç değerinin değişimini göstermektedir. Şekiller incelendiğinde panellerin paralel bağlanması durumu seri bağlanması durumu ile karşılaştırıldığında güç değerleri aynı sıcaklıklarda daha fazladır. Panellerin hem paralel hem de seri bağlanması durumlarında ışık kaynağı ile aralarındaki mesafe ve sıcaklık arttıkça güç azalmıştır.



Şekil 6. Artan mesafe ile sıcaklık güç değişimi (paneller seri bağlı)



Şekil 7. Artan mesafe ile sıcaklık güç değişimi (paneller paralel bağlı)

4. SONUÇ

- Paralel bağlı panellerden elde edilen verim değeri seri bağlı panellerden fazladır.
- Seri bağlı panellerden elde edilen verim panel ile ışık kaynağı arasındaki mesafe arttıkça paralel bağlı panellerden elde edilen verim değerine yaklaşmıştır.
- Sıcaklık arttıkça verim azalır.
- Işık kaynağı ile paneller arasındaki mesafe arttıkça verim azalır.
- Sıcaklık arttıkça güç azalır.
- Panellerin paralel bağlanması durumundaki güç seri bağlanması durumundan fazladır.

KAYNAKLAR

Ahmad, F. F., Ghenai, C., Hamid, A. K., Rejeb, O., & Bettayeb, M. (2021). Performance enhancement and infra-red (IR) thermography of solar photovoltaic panel using back cooling from the waste air of building centralized air conditioning system. *Case Studies in Thermal Engineering*, *24*(January), 1–12. https://doi.org/10.1016/j.csite.2021.100840

Dubey, S., Sarvaiya, J. N., & Seshadri, B. (2013). Temperature dependent photovoltaic (PV) efficiency and its effect on PV production in the world - A review. *Energy Procedia*, *33*, 311–321. https://doi.org/10.1016/j.egypro.2013.05.072

Hussien, H. A., Numan, A. H., & Abdulmunem, A. R. (2015). Improving of the photovoltaic / thermal system performance using water cooling technique. *IOP Conference Series: Materials Science and Engineering*, *78*(1). https://doi.org/10.1088/1757-899X/78/1/012020

Krauter, S. (2004). Increased electrical yield via water flow over the front of photovoltaic panels. *Solar Energy Materials and Solar Cells*, *82*(1–2), 131–137. https://doi.org/10.1016/j.solmat.2004.01.011

Mazón-Hernández, R., García-Cascales, J. R., Vera-García, F., Káiser, A. S., & Zamora, B. (2013). Improving the electrical parameters of a photovoltaic panel by means of an induced or forced air stream. *International Journal of Photoenergy*, *2013*. https://doi.org/10.1155/2013/830968

O'Donnell, K. P., & Chen, X. (1991). Temperature dependence of semiconductor band gaps. *Applied*

Physics Letters, *58*(25), 2924–2926. https://doi.org/10.1063/1.104723

Popovici, C. G., Hudişteanu, S. V., Mateescu, T. D., & Cherecheş, N. C. (2016). Efficiency Improvement of Photovoltaic Panels by Using Air Cooled Heat Sinks. *Energy Procedia*, *85*(November 2015), 425–432. https://doi.org/10.1016/j.egypro.2015.12.223

Skoplaki, E., & Palyvos, J. A. (2009). On the temperature dependence of photovoltaic module electrical performance: A review of efficiency/power correlations. *Solar Energy*, *83*(5), 614–624. https://doi.org/10.1016/j.solener.2008.10.008

KARBON TEKSTİLLE TAKVİYE EDİLMİŞ DÖŞEMELERİN ÇARPMA DAVRANIŞININ DENEYSEL OLARAK İNCELENMESİ

EXPERIMENTAL INVESTIGATION OF IMPACT LOAD BEHAVIOR OF SLABS REINFORCED WITH CARBON TEXTILE

Hasan Can GÜRDAL

Eskişehir Osmangazi Üniversitesi

ORCID ID: 0000-0001-9838-6148

Hasan Selim ŞENGEL

Eskişehir Osmangazi Üniversitesi

ORCID ID: 0000-0002-9103-8869

Hakan EROL

Eskişehir Osmangazi Üniversitesi

ORCID ID: 0000-0002-8677-4941

ÖZET

Taşıyıcı sistem elemanları kullanım süreleri içerisinde çeşitli yüklere maruz kalmaktadırlar. Bu yükler içerisinde sabit, hareketli, deprem, rüzgar, sıvı yükleri, toprak itkisi gibi yönetmelikte tanımlanan yükler bulunmaktadır. Ancak göz önüne alınması gerekli bir başka yük ise çarpma yüküdür. Çeşitli darbeler, patlama yükü gibi yükler yapının hasar görmesine neden olabileceğinden bu yükün taşıyıcı sistem elemanları üzerindeki etkisinin araştırılması gereği ortaya çıkmaktadır.

Bu doğrultuda betonarme döşemelerin çarpma etkisi altında gösterdikleri davranış ve güçlendirme malzemesinin performansı çalışmamızın amacını oluşturmuştur.

Bu kapsamda farklı doğrultu ve genişliklerde karbon tekstille takviye edilmiş sıva katmanı ile güçlendirilmiş döşemelerin çarpma etkisi altındaki davranışları ağırlık düşürme yöntemiyle test edilmiştir. Çalışmamızda 9 adet 1000x1000x80 mm boyutlarında betonarme döşeme hazırlanmıştır. Deney elemanlarının güçlendirilmesinde kullanılan karbon tekstiller için ortogonal ve diyagonal, çift doğrultulu ve tek doğrultulu, 100 mm ve 50 mm genişliğinde olmak üzere değişkenler oluşturulmuştur. Karbon tekstiller döşemelere tamir harcı kullanılarak yerleştirilmiştir. Düşü yüksekliği, düşürülen çekicin ağırlığı, donatı dizilimi ve beton dayanım sınıfı, mesnet şartları her bir deney elemanı için sabit tutulmuştur.

Çalışmada deney elemanlarının sahip olduğu ivme, deplasman, birim deformasyon ve çarpma yükü değerlerinin zaman tanım alanındaki değişimleri ölçülmüş ve sonuçta karbon tekstil şerit genişliğinin artması, uygulamanın çift yönlü ve diyagonal şekilde yapılması durumlarında döşemelerde meydana gelecek maksimum birim deformasyon değerinin azalacağı sonucuna varılmıştır.

Anahtar kelimeler: Betonarme döşeme, çarpma yükü, karbon tekstil.

ABSTRACT

Structural system elements are exposed to various loads during their lifetime. Among these loads, there are loads defined in the regulation such as dead, live, earthquake, wind, hydrostatic loads, soil pressure. However, another load to be considered is the impact load. Since loads such as various impacts and explosion loads may cause damage to the structure, it is necessary to investigate the effect of this load on the elements of the structural system.

In this direction, the behavior of reinforced concrete slabs under the impact load of and the performance of the reinforced concrete constituted the aim of our study.

In this context, the behavior of floors reinforced with mortar layer reinforced with carbon textile in different directions and widths under impact was tested by drop weight method. In our study, Nine reinforced concrete slabs with the dimensions 1000x1000x80 mm were manufactured. Variables such as orthogonal and diagonal, bidirectional and unidirectional, 100 mm and 50 mm wide were considered for the carbon textiles used in the reinforcement of the test elements. Carbon textiles were placed on the slabs using repair mortar. Drop height, drop weight of the hammer, reinforcement arrangement, concrete strength, support conditions were kept constant for each test element.

In the study, the changes in the acceleration, displacement, unit deformation and impact load values of the test elements in the time history were measured and it was concluded that the maximum unit deformation value that would occur in the slabs would decrease if the carbon textile strip width increased and the application was made in a bidirectional and diagonal manner.

Key words: Reinforced concrete slabs, impact load, Carbon textiles.

GİRİŞ

Çarpma yükü; çarpan nesnenin boyutu, tesir süresi, çarpan nesnenin fiziksel özelliklerine göre değişeceği için etkisi ve büyüklüğü net olarak belli olmayan bir yüktür. Bu nedenle yapıların çarpma yükü altındaki davranışlarının mümkün olan en iyi şekilde bilinmesi gerekir.

Geçmişte yapılan araştırmalarda çeşitli yapı elemanlarının çarpma etkisi altındaki davranışları incelenmiştir Sezer (2018). Bu çalışmalarda standart bir deney düzeneği olmamasına karşın büyük çoğunluğunda ağırlık düşürme yöntemi kullanılmıştır. Fakat çoğu çalışmada sadece hasar analizi yapılmış, güçlendirme önerileri ve deneyleri hakkında yeteri kadar çalışma bulunulmamıştır. Othman ve Marzouk (2016), yaptıkları araştırmada sadece donatı oranı ve donatı dağılımını değişken tutarak 5 adet numune üstünde çalışmalarını gerçekleştirmişlerdir. Hoşkal (2019), test edilen numunelerde gözlemlenen çatlak ve hasar dağılımına göre, çatlak deseninin donatı oranından ziyade donatı düzenine bağlı olduğu ortaya çıkmıştır. Hering vd. (2019), darbe yükü altında farklı kalınlıklardaki betonarme döşemelere farklı hızlarda darbe yükü uygulamıştır. Metwally (2013), yapılan çalışma sonuçlarına göre etki eden darbenin hızı arttıkça, tahribatın hasarının da arttığını gözlemlemek gayet kolaydır. Krauthammer (2008), deney esnasında döşemelerde artan darbe yükü hızı etkisi altında delinmeler gerçekleşirken kalınlığı 300 mm olan döşemelerde artan darbe hızı neticesinde var olan kinetik enerjinin döşemenin tamamen yıkımıyla sonuçlanmayacağı, bu enerjinin çoğunun plakada yüzey hasarına neden olacağı tahmini yapılmıştır. Hyrnk (2014), bu varsayıma destek olarak da farklı hızlarda darbe yüküne maruz kalan plakaların iç hasarının neredeyse aynı olması örnek gösterilmiştir.

Yapılan literatür taramasına göre, yapı elemanlarında güçlendirme çalışmalarıyla ilgili eksiklikler gözlemlenmiş ve deneysel kapsam güçlendirme üzerine yoğunlaştırılmıştır. Çalışmada, çarpma etkisi için diğer çalışmalarda da fazlaca tercih edilmiş olan ağırlık düşürücü deney düzeneği kullanılmıştır. Döşeme üzerine enerji aktarımı çekiç vasıtası ile gerçekleştirilmiştir. Çekiç ile döşemenin temas ettiği yüzeye, kuvvetin sağlıklı aktarılması amacıyla kauçuk ve plaka yerleştirilmiştir. Tüm numuneler üzerine 84 kg ağırlığındaki çekiç 1,5 m yükseklikten düşürülmüş ve 1,236 kJ çarpma enerjisi elde edilmiştir. Deney sonuçlarının en iyi şekilde yorumlanabilmesi amacıyla; deney elemanına etkiyen kuvvetin neden olduğu ivme değerinin tespiti için ivmeölçer, çarpmanın dinamik etkisinin tespiti için darbe kuvvet algılayıcısı, döşemelerde meydana gelen deplasman değerlerinin analizi için potansiyometrik konum algılayıcısı, tekstil şeritlerdeki birim deformasyonun tespiti için strain-gauge kullanılmış ve elde edilen bu değerler eş zamanlı olarak veri toplama aygıtında depolanmıştır.

Betonarme döşemelerin güçlendirilmesi amacıyla ticm markasına ait CR370 model karbon tekstil kullanılmıştır. Bu karbon tekstiller döşemeye yüksek dayanımlı tamir harcı vasıtası ile yerleştirilmiştir. Yerleştirme işleminden önce güçlendirme yapılacak döşeme kısımları aderansı arttırmak için pürüzlendirilmiştir. Pürüzlendirilen yüzeye önce tamir harcı uygulanmış, ardından karbon tekstil buraya sabitlenmiş ve karbon tekstil üstüne ikinci kat tamir harcı uygulaması yapılmıştır. Çarpma kuvveti

etkisinde tamir harcının ayrışmasını önlemek amacıyla harç katmanının gereğinden fazla olmamasına özen gösterilmiştir. Böylece Karbon tekstille takviye edilmiş sıva katmanı (KTTESK) uygulaması yapılmıştır.

Toplam 9 adet betonarme döşemeden 1 tanesi referans numune olarak belirlenmiş ve üzerinde herhangi bir güçlendirme uygulaması gerçekleştirilmemiştir. Geriye kalan 8 adet döşeme ise doğrultu, karbon tekstil şerit genişliği parametreleri değişken tutularak güçlendirilmiştir. Çizelge 1'de ise deney elemanlarının isimlendirilmesi ve değişken tutulan özellikleri gösterilmiştir.

Çizelge 1. Deney elemanlarının isimlendirilmesi ve değişken tutulan özellikleri

Deney elemanı	**Açıklaması**
Referans (S1)	Güçlendirme yapılmamış betonarme döşeme
C50sOr (S2)	50 mm şerit genişliğine sahip tek doğrultulu ortogonal karbon tekstil
C50dOr (S3)	50 mm şerit genişliğine sahip çift doğrultulu ortogonal karbon tekstil
C50sDi (S4)	50 mm şerit genişliğine sahip tek doğrultulu diyagonal karbon tekstil
C50dDi (S5)	50 mm şerit genişliğine sahip çift doğrultulu diyagonal karbon tekstil
C100sOr (S6)	100 mm şerit genişliğine sahip tek doğrultulu ortogonal karbon tekstil
C100dOr (S7)	100 mm şerit genişliğine sahip çift doğrultulu ortogonal karbon tekstil
C100sDi (S8)	100 mm şerit genişliğine sahip tek doğrultulu diyagonal karbon tekstil
C100dDi (S9)	100 mm şerit genişliğine sahip çift doğrultulu diyagonal karbon tekstil

ARAŞTIRMA VE BULGULAR

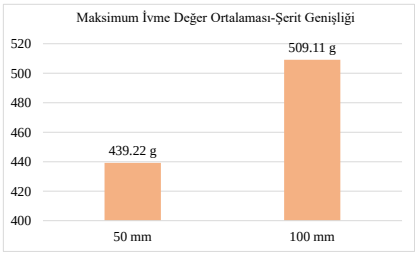
Yürütülen çalışma kapsamında elde edilen ivme-zaman, deplasman-zaman, gerilme-zaman ölçümleri tüm deney elemanları için incelenmiş ve Çizelge 2'de bu değerler verilmiştir.

Çizelge 2. Yürütülen deneysel çalışma sonrasında elde edilen sonuçlar

Deney Elemanı	Sol İvme (g)		Sağ İvme (g)		Deplasman(mm)		Max. Birim Deformasyon (mm/mm)
	Max.	Min.	Max.	Min.	Max.	Kalıcı	
Referans (S1)	218,64	-171,97	216,89	-96,10	2,939	1,09	-
C50sOr (S2)	351,66	-297,98	349,70	-204,92	2,520	0,53	0,01510
C50dOr (S3)	461,39	-200,09	459,36	-161,57	1,846	0,24	0,00843
C50sDi (S4)	409,49	-348,61	409,07	-245,42	1,564	0,25	0,00693
C50dDi (S5)	534,35	-384,28	532,51	-278,34	1,122	0,21	0,00550
C100sOr (S6)	411,09	-194,82	408,65	-145,38	1,512	0,38	0,00852
C100dOr (S7)	530,41	-289,67	527,88	-247,74	1,314	0,12	0,00479
C100sDi (S8)	468,75	-268,66	466,88	-337,46	1,287	0,21	0,00422
C100dDi (S9)	626,17	-286,34	623,69	-378,82	0,994	0,057	0,00328

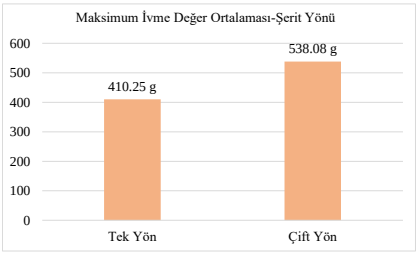
Deneysel çalışma kapsamında elde edilen verilere göre, güçlendirme çalışması yapılan döşemelerden elde edilen maksimum ivme değerlerinde referans numunesine kıyasla büyük bir artış gözlemlenmiştir. Değişken parametrelerine bağlı olarak bu artış oranlarında çeşitli farklılıklar mevcuttur. Bu da numunelerin rijitliğinin arttığının göstergesidir.

50 mm şerit genişliğine sahip deney elemanlarından elde edilen maksimum ivme değeri ortalaması 439,22 g ve 100 mm şerit genişliğine sahip deney elemanlarından elde edilen maksimum ivme değeri ortalaması 509,11 g olarak ölçülmüştür. Bu doğrultuda 100 mm şerit genişliğine sahip deney elemanlarının maksimum ivme değeri ortalamasının, 50 mm şerit genişliğine sahip deney elamanlarının maksimum ivme değeri ortalamasından %15,91 daha fazla olduğu görülmektedir. Şekil 1'de şerit genişliği ve maksimum ivme değeri ortalaması arasındaki ilişki gösterilmektedir.



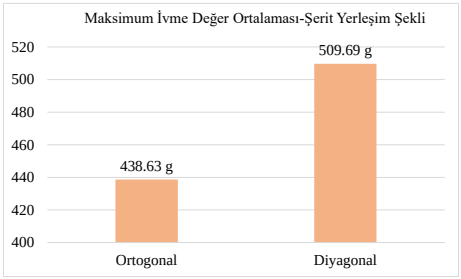
Şekil 1. Döşemelerin şerit genişliklerine göre maksimum ivme değer ortalamaları

Tek yönlü güçlendirilmesi yapılan S2, S4, S6, S8 döşemelerinde elde edilen maksimum ivme değer ortalaması 410,25 g; çift yönlü güçlendirilen S3, S5, S7, S9 elemanlarında gözlemlenen maksimum ivme değer ortalaması 538,08 g olarak ölçülmüştür. Çift yön güçlendirmede tek yöne göre %31,16 bir artış gözlemlenmiştir. Şekil 2'de şerit yönü ve maksimum ivme değeri ortalaması arasındaki ilişki gösterilmektedir.



Şekil 2. Döşemelerin şerit yönlerine göre maksimum ivme değer ortalamaları

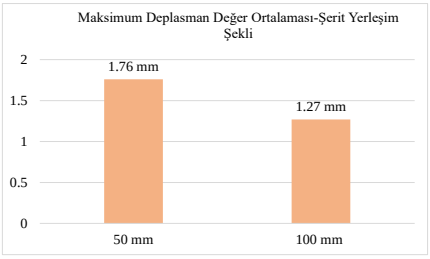
Karbon tekstil şeritlerin ortogonal olarak yerleştirildiği S2, S3, S6, S7 elemanlarında elde edilen maksimum ivme değer ortalaması 438,63 g; diyagonal olarak yerleştirildiği S4, S5, S8, S9 elemanlarında gözlemlenen maksimum ivme değer ortalaması 509,69 g'dir. Ortogonal ile diyagonal arasındaki artış oranı %16,2 olarak elde edilmiştir. Şekil 3'te şerit yerleşim şekli ve maksimum ivme değeri ortalaması arasındaki ilişki gösterilmektedir.



Şekil 3. Döşemelerin şerit yerleşimlerine göre maksimum ivme değer ortalamaları

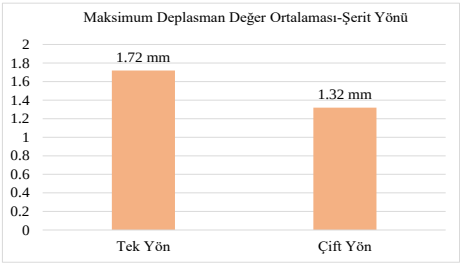
Deney elemanlarında gözlemlenen maksimum deplasman değerlerinde güçlendirme detaylarına bağlı olarak referans numunesine göre değişken oranlarda azalışlar tespit edilmiştir.

50 mm karbon tekstil şerit genişliğine sahip S2, S3, S4, S5 deney elemanlarında gözlemlenen maksimum deplasman değer ortalaması 1,76 mm; 100 mm karbon tekstil şerit genişliğine sahip S6, S7, S8, S9 elemanlarında tespit edilen maksimum deplasman değer ortalaması 1,27 mm olarak ölçülmüştür. Buna göre %27,58 oranında bir azalma söz konusudur. Şekil 4'te şerit genişliği ve maksimum deplasman değeri ortalaması arasındaki ilişki gösterilmektedir.



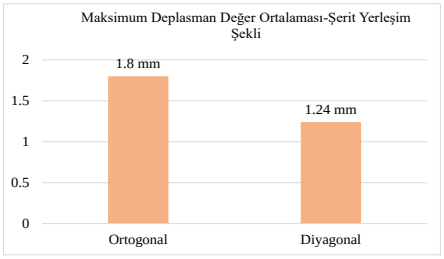
Şekil 4. Döşemelerin şerit genişliklerine göre maksimum deplasman değer ortalamaları

Tek yönlü güçlendirilmesi yapılan S2, S4, S6, S8 döşemelerinde elde edilen maksimum deplasman değer ortalaması 1,72 mm; çift yönlü güçlendirilen S3, S5, S7, S9 elemanlarında gözlemlenen maksimum deplasman değer ortalaması 1,32 mm olarak ölçülmüştür. Çift yön güçlendirmede tek yöne göre %23,35 azalma gözlemlenmiştir. Şekil 5'te şerit yönü ve maksimum deplasman değeri ortalaması arasındaki ilişki gösterilmektedir.



Şekil 5. Döşemelerin şerit yönlerine göre maksimum deplasman değer ortalamaları

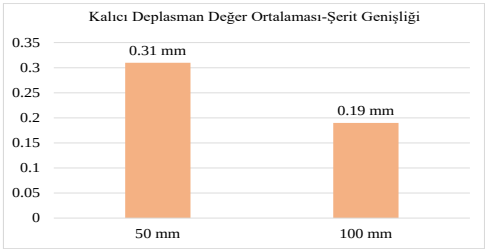
Karbon tekstil şeritlerin ortogonal olarak yerleştirildiği S2, S3, S6, S7 elemanlarında elde edilen maksimum deplasman değeri ortalaması 1,80 mm; diyagonal olarak yerleştirildiği S4, S5, S8, S9 elemanlarında gözlemlenen maksimum deplasman değeri ortalaması 1,24 mm'dir. Ortogonal ile diyagonal deplasman değerleri arasındaki azalma oranı %30,94 olarak elde edilmiştir. Şekil 6'da şerit yerleşim şekli ve maksimum deplasman değeri ortalaması arasındaki ilişki gösterilmektedir.



Şekil 6. Döşemelerin şerit yerleşimlerine göre maksimum deplasman değer ortalamaları

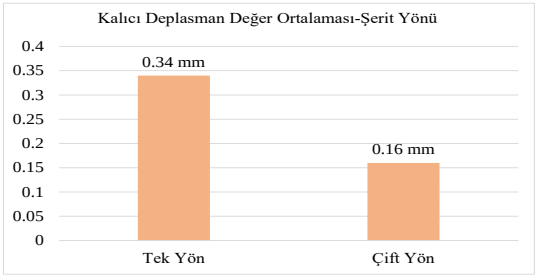
Deney elemanlarında gözlemlenen kalıcı deplasman değerlerinde de değişen güçlendirme detaylarına bağlı olarak farklılıklar ve referans numunesine göre çeşitli oranlarda azalışlar gözlemlenmiştir.

50 mm karbon tekstil şerit genişliğine sahip S2, S3, S4, S5 deney elemanlarında gözlemlenen kalıcı deplasman değer ortalaması 0,31 mm; 100 mm karbon tekstil şerit genişliğine sahip S6, S7, S8, S9 elemanlarında tespit edilen kalıcı deplasman değer ortalaması 0,19 mm olarak ölçülmüştür. %37,64 oranında bir azalma söz konusudur. Şekil 7'de şerit genişliği ve kalıcı deplasman değeri ortalaması arasındaki ilişki gösterilmektedir.



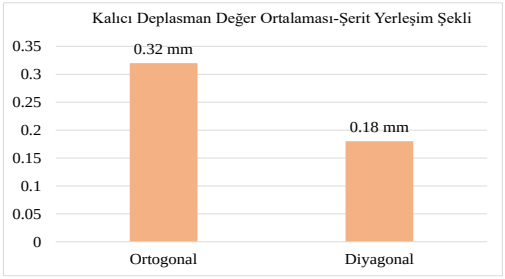
Şekil 7. Döşemelerin şerit genişliklerine göre kalıcı deplasman değer ortalamaları

Tek yönlü güçlendirilmesi yapılan S2, S4, S6, S8 döşemelerinde elde edilen kalıcı deplasman değer ortalaması 0,34 mm; çift yönlü güçlendirilen S3, S5, S7, S9 elemanlarında gözlemlenen kalıcı deplasman değer ortalaması 0,16 mm olarak ölçülmüştür. Çift yön güçlendirmede tek yöne göre %54,23 azalma gözlemlenmiştir. Şekil 8'de şerit yönü ve kalıcı deplasman değeri ortalaması arasındaki ilişki gösterilmektedir.



Şekil 8. Döşemelerin şerit yönüne göre kalıcı deplasman değer ortalamaları

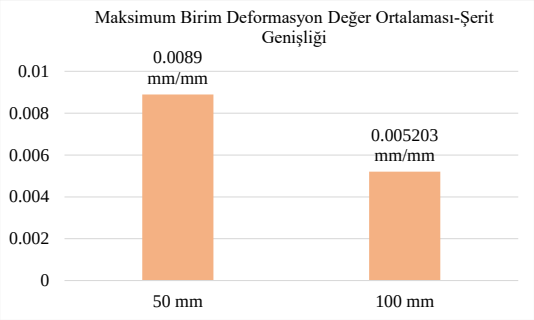
Karbon tekstil şeritlerin ortogonal olarak yerleştirildiği S2, S3, S6, S7 elemanlarında elde edilen kalıcı deplasman değeri ortalaması 0,32 mm; diyagonal olarak yerleştirildiği S4, S5, S8, S9 elemanlarında gözlemlenen kalıcı deplasman değeri ortalaması 0,18 mm'dir. Aralarındaki azalma oranı %42,76 olarak elde edilmiştir. Şekil 9'da şerit yerleşim ve kalıcı deplasman değeri ortalaması arasındaki ilişki gösterilmektedir.



Şekil 9. Döşemelerin şerit yerleşimlerine göre kalıcı deplasman değer ortalamaları

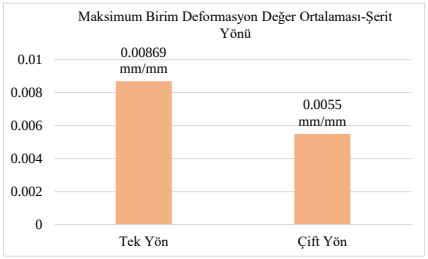
Deney elemanlarında gözlemlenen maksimum birim deformasyon değerlerinde de değişen güçlendirme detaylarına bağlı olarak farklılıklar gözlemlenmiştir.

50 mm karbon tekstil şerit genişliğine sahip S2, S3, S4, S5 deney elemanlarında gözlemlenen maksimum birim deformasyon değer ortalaması 0,0089 mm; 100 mm karbon tekstil şerit genişliğine sahip S6, S7, S8, S9 elemanlarında tespit edilen maksimum birim deformasyon değer ortalaması 0,005203 mm olarak ölçülmüştür. %72,8 oranında bir artış söz konusudur. Şekil 10'da şerit genişliği ve maksimum birim deformasyon değeri ortalaması arasındaki ilişki gösterilmektedir.



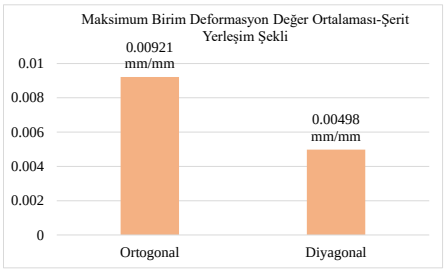
Şekil 10. Döşemelerin şerit genişliklerine göre maksimum birim deformasyon değer ortalamaları

Tek yönlü güçlendirilmesi yapılan S2, S4, S6, S8 döşemelerinde elde edilen maksimum birim deformasyon değer ortalaması 0,00869025 mm; çift yönlü güçlendirilen S3, S5, S7, S9 elemanlarında gözlemlenen maksimum birim deformasyon değer ortalaması 0,0055 mm olarak ölçülmüştür. Tek yön güçlendirmede çift yöne göre %58 artış gözlemlenmiştir. Şekil 11'de şerit yönü ve maksimum birim deformasyon değeri ortalaması arasındaki ilişki gösterilmektedir.



Şekil 11. Döşemelerin şerit yönüne göre maksimum birim deformasyon değer ortalamaları

Karbon tekstil şeritlerin ortogonal olarak yerleştirildiği S2, S3, S6, S7 elemanlarında elde edilen maksimum birim deformasyon değeri ortalaması 0,00921 mm; diyagonal olarak yerleştirildiği S4, S5, S8, S9 elemanlarında gözlemlenen maksimum birim deformasyon değeri ortalaması 0,0049825 mm'dir. Aralarındaki artış oranı %84,85 olarak elde edilmiştir. Şekil 12'de şerit yerleşim şekli ve maksimum birim deformasyon değeri ortalaması arasındaki ilişki gösterilmektedir.



Şekil 12. Döşemelerin şerit yerleşimlerine göre maksimum birim deformasyon değer ortalamaları

SONUÇ

Güçlendirme işlemi yapılan betonarme döşemelerde artış gösteren ivme değeri, deney elemanlarının rijitliklerinin arttığını ve mevcut çarpma etkisine karşı gösterdikleri direncin daha fazla olduğunu göstermektedir. Buradan hareketle enerji kapasitesi en çok artan deney elemanının 100 mm şerit genişliğine sahip çift doğrultulu diyagonal şekilde şerit yerleşim şekline sahip olan S9 elemanı olduğu görülmektedir. Şerit genişliğinin artması, güçlendirme doğrultusunun çift yönlü ve diyagonal şekilde yapılması ile ivme değerinin arttığı sonucuna varılmaktadır. Bu da elemanların rijitliğinin arttığını göstermektedir.

Karbon tekstil ile güçlendirilen döşemelerde meydana gelen maksimum deplasman ve kalıcı deplasman değerlerinde referans numunesine kıyasla ciddi oranlarda azalma gözlemlenmiştir. Araştırma

sonuçlarına göre en düşük deplasman değerlerine sahip olan deney elemanının 100 mm şerit genişliğine sahip çift doğrultulu diyagonal şekilde şerit yerleşim şekline sahip olan S9 numunesi olduğu görülmektedir. Buradan hareketle, şerit genişliğinin artması, güçlendirme doğrultusunun çift yönlü ve diyagonal şekilde yapılması ile maksimum ve kalıcı deplasman değerlerinin azaldığı sonucuna varılmaktadır.

Karbon tekstil şeritlerin üzerinden alınan maksimum birim deformasyon değerlerinde değişken parametrelerine göre farklı değerler gözlemlenmiştir. Araştırma sonuçlarına göre en düşük maksimum birim deformasyon değerine sahip olan deney elemanının 100 mm şerit genişliğine sahip çift doğrultulu diyagonal şekilde şerit yerleşim şekline sahip olan S9 numunesi olduğu görülmektedir. Bu verilere göre şerit genişliğinin artmasıyla, maksimum birim deformasyon değerlerinde büyük oranda azalma gerçekleşmiştir. Bu durum, karbon tekstil şeritlerin etkin bir biçimde çalıştığının ve kuvvet aldığının ispatı niteliğindedir. Karbon tekstil şeritlerin çift yönlü ve diyagonal şekilde yerleştirilmesi sonucunda da maksimum birim deformasyon değerlerinin azaldığı görülmüştür. Bu sonuçlara göre şerit genişliğinin artması, karbon tekstil yerleşimlerinin çift yönlü ve diyagonal şekilde yapılması ile maksimum birim deformasyon değerleri azalmış olduğu gözlemlenmiştir.

Sonuç olarak tüm veriler ele alındığında, en yüksek performans gösteren deney elemanının 100 mm şerit genişliğine sahip çift doğrultulu diyagonal şekilde şerit yerleşim şekline sahip olan S9 numunesi olduğu kanısına varılmıştır.

KAYNAKÇA

(Hering, 2019)

(Anonim, 2021)

(Marzouk & Othman, 2016)

(Türkiye Bina Deprem Yönetmeliği, 2018)

(Yılmaz, 2013)

(Sezer, 2018)

(Metwally, 2013)

(Krauthammer, 2008)

(Hyrnk, 2014)

(Hoşkal, 2019)

SPINAL ANESTHESIA FOR CESAREAN SECTION IN A MORBIDLY OBESE PARTURIENT: A case report

Uzm. Dr. İlke TAMDOĞAN

ORCID: 0000-0002-8757-1046

GRÜ Kadın Doğum ve Çocuk Hastalıkları Eğitim Araştırma Hastanesi, Anestezi ve Reanimasyon, Giresun, Türkiye

Uzm. Dr. Esra TURUNÇ

ORCİD:0000-0003-0159-7403

Ondokuz Mayıs Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon, Samsun, Türkiye

ABSTRACT

Obese pregnancies pose an important problem for anesthesiologists with the addition of obesity-related morbidities as well as the problems caused by physiological and anatomical changes related to pregnancy. Maternal obesity may cause problems such as endotracheal intubation difficulty, pulmonary aspiration, and hypoxia during general anesthesia. It is seen that peripartum maternal deaths decrease with the increase in regional anesthesia applications instead of general ones. If there is no contraindication in these patients, regional anesthesia should be preferred instead of general anesthesia.

Preoperative anesthetic evaluation of a 31-year-old (BMI 48.9 kg/m2) pregnant woman at 38 weeks of gestation had no systemic disease, normal physical examination, Mallampati score of 3, and laboratory findings were within normal limits. Anesthesia management was planned as spinal anesthesia due to morbid obesity. The patient underwent standard non-invasive blood pressure (NIBP), peripheral oxygen saturation (SpO2), heart rate (HR) and ECG monitoring in the operating room. 500 mL colloid infusion was administered for hypotension prophylaxis before spinal anesthesia. Spinal anesthesia was administered in the sitting position, using a 90 mm 25 G quincke spinal needle, with a midline approach through the L 3-4 interval. The third attempt was successful. 10 mg 0.5% hyperbaric bupivacaine and 20 mcg fentanyl were injected into the subarachnoid space. The patient was placed in the supine position and the block level was checked with the cold-hot test. Sensory block was at T4 level 3 minutes after intrathecal administration. Immediately after the intrathecal injection, NIBP was 142/87 mmHg and heart rate was measured as 80 beats/min. Seven minutes after the start of the operation, a baby girl weighing 3320 g was born; The baby's Apgar scores were 8 and 9 at 1 and 5 minutes, respectively. The patient's intraoperative NIBP ranged between 142/87 and 98/56 mmHg, and HR between 80 and 120 beats/min. The operation took 55 minutes. The patient, who was taken to the recovery unit after the operation and followed for half an hour, was transferred to the ward without any problem after his NIBP and HR were stable.

In conclusion, regional anesthesia should be preferred in morbidly obese pregnant women because of the mortality and morbidity associated with general anesthesia. In this case, we aimed to present our spinal anesthesia experience in a morbidly obese pregnant woman.

Key words: Cesarean section, Morbidly obese, spinal anesthesia

INTRODUCTION

Morbid obesity is defined as a body mass index (BMI) > 40 (1). Obese pregnancies pose an important problem for anesthesiologists with the addition of obesity-related morbidities as well as the problems caused by physiological and anatomical changes related to pregnancy. This increase in morbidity is also directly related to obesity itself, independent of secondary events caused by obesity (2,3).

Maternal obesity may cause problems such as difficulty in endotracheal intubation, pulmonary aspiration, and hypoxia during general anesthesia. It is seen that peripartum maternal deaths decrease with the increase in regional anesthesia applications instead of general ones. If there is no contraindication in these patients, regional anesthesia should be preferred instead of general anesthesia (2-3).

In this case, we aimed to present the anesthesia method we applied because morbid obesity is important in terms of maternal mortality and morbidity.

CASE

A 31-year-old (height 1.650 m, body weight 133kg, BMI 48.9 kg/m2) pregnant woman at 38 weeks of gestation applied to our hospital for elective cesarean section.

In the preoperative anesthetic evaluation, she had no systemic disease, her physical examination was normal, her Mallampati score was 3 and her laboratory findings were within normal limits. Due to the high probability of endotracheal intubation failure due to morbid obesity, we planned anesthesia management as spinal anesthesia. All risks were explained to the patient and an anesthesia consent form was signed.

Peripheral vascular access was established with an 18 G intravenous cannula preoperatively, and non-invasive blood pressure (NIBP), peripheral oxygen saturation (SpO2), heart rate (HR) and ECG monitoring were performed. Before spinal anesthesia, 500 mL colloid infusion was applied for hypotension prophylaxis. 1000 ml of ringer lactate was administered intraoperatively as a maintenance. Before the procedure, the patient's NIBP was 155/89 mmHg, HR 88 beats/min, and SpO2 was 100%.

After sterile conditions were provided, spinal anesthesia was administered in the sitting position, using a 90 mm 25 G quincke spinal needle, with a midline approach, and entering through the L 3-4 gap. The third attempt was successful due to difficulty in palpating the midline and spinous processes. Cerebrospinal fluid was confirmed after dural puncture, and 10 mg of 0.5% hyperbaric bupivacaine and 20 mcg of fentanyl were injected into the subarachnoid space. The patient was placed in the supine position and the block level was checked with the cold-hot test. Sensory block was at T4 level 3 minutes after intrathecal administration. Immediately after the intrathecal injection, NIBP was 142/87 mmHg and heart rate was measured as 80 beats/min. Seven minutes after the start of the operation, a baby girl weighing 3320 g was born; The baby's Apgar scores were 8 and 9 at 1 and 5 minutes, respectively. The patient's intraoperative NIBP ranged between 142/87 and 98/56 mmHg, and HR between 80 and 120 beats/min. The patient did not feel pain during the operation. The operation took 55 minutes. The patient, who was taken to the recovery unit after the operation and followed for half an hour, was transferred to the ward without any problem after his NIBP and HR were stable.

DISCUSSION

The rapid increase in the incidence of obesity in developed countries is also reflected in the obstetric patient population. The incidence of cesarean section in morbidly obese pregnants is two times higher than in normal pregnant women, and the risk of gestational hypertension, preeclampsia, gestational diabetes, and macrosomia increases (4). In addition, the failure rate of endotracheal intubation during general anesthesia and the risk of death due to pulmonary or cardiovascular complications are high in obese pregnants (5). Therefore, regional anesthesia is generally preferred for cesarean section due to the risks of general anesthesia (6).

With spinal anesthesia preferred in cesarean section, the risk of general anesthesia and related potential complications such as unsuccessful tracheal intubation and aspiration is reduced (7,8). However, the difficulty in determining the midline and palpation of the spinous processes in morbidly obese patients complicate the application of spinal anaesthesia. As the BMI increases, the increase in the subarachnoid distance from the skin necessitates the use of a longer spinal needle instead of the standard spinal needle in obese patients. However, it has been reported that a standard-size needle is sufficient for spinal

anesthesia in most cases (9). In our case, the third attempt was successful due to the difficulty in palpation of anatomical points.

While the rapid and intense neuraxial block for cesarean section is among the advantages of spinal anesthesia, rapid hypotension development and headache after dural puncture are among the disadvantages of spinal anesthesia. It has been reported that reducing the dose of local anesthetic and the type and amount of intravenous fluids administered before anesthesia are effective in preventing hypotension (10). In our case, there was no hypotension requiring treatment during the surgery.

In conclusion, regional anesthesia should be preferred in morbidly obese pregnant women because of the mortality and morbidity associated with general anesthesia. In this case, we wanted to share our spinal anesthesia experience in a morbidly obese pregnant woman.

REFERENCES

1- Dewan DD. Obesity. In: Chestnut DH (ed) Obstetric anesthesia. Mosby, St.Louis, 1999, 986–998

2- Şentürk Çataloğlu B, SaraçoĞlu A. Obez gebelerde anestezi yönetimi. Journal of Anesthesia - JARSS 2013; 21: 200-208.

3- Fidan H, Fenkçi V, Ye¤it M, Saylan A, Morbid Obez Sezaryen Olgusunda Anestezi, Kocatepe T›p Dergisi 2005; 6: 45-47.

4- Marshall NE, Guild C, Cheng YW, et al. Maternal superobesity and perinataloutcomes. Am J Obstet Gynecol 2012;206:417.e1–6.

5-Mhyre JM, Riesner MN, Polley LS, et al. A series of anesthesia-related maternal deaths in Michigan, 1985-2003. Anesthesiology 2007;106: 1096–104.

6- Hood DD, Dewan DM. Anesthetic and obstetric outcome in morbidly obese parturients. Anesthesiology 1993;79:1210–8.

7-Moir DD. Extradural analgesia for cesarean section. Br J Anaesth 1979;51:1093–4.

8-Hawkins JL, Koonin LM, Palmer SK, et al. Anesthesia-related deaths during obstetric delivery in the United States 1979–90. Anesthesiology 1997;86:277–84.

9-SoensMA,BirnbachDJ,RanasingheJS,etal.Obstetricanesthesiaforthe obese and morbidly obese patient: an ounce of prevention is worth more than a pound of treatment. Acta Anaesthesiol Scand 2008;52:6–19

10- Retes M, Pan PH. Very low-dose spinal anesthesia for cesarean section in a morbidly obese preeclamptic patient and its potential implications; Case Report. Int J Obstet Anesth 2004;13:99–102.

GLİKOKORTİKOİDLER VE CANİNE ATOPİK DERMATİTİS

GLUCOCORTICOIDS AND CANINE ATOPIC DERMATITIS

Vet. Hek. Muhittin USLU

Selçuk Üniversitesi, Veteriner Fakültesi, Farmakoloji ve Toksikoloji Anabilim Dalı, Konya

ORCID ID: 0000-0002-9027-4229

ÖZET

Glikokortikoidler geniş anti-inflamatuar etkinliği bulunan steroid yapıda hormonal bir ilaç grubudur. Geniş anti-inflamatuar etkinlikleri sebebiyle yangısal birçok hastalığın tedavisinde kullanılmaktadır. Yangısal hastalıklardan biri olan Köpek Atopik Dermatitis (KAD) hastalığının tedavisinde klinik belirtilerin şiddetine ve kapsamına göre sistemik (oral) ve lokal glikokortikoidler kullanılabilmektedir. Klinik belirtilerin şiddetli ve kapsamlı olduğu durumda kısa etki süresi bulunan oral glikokortikoidlerin kullanımı önerilmektedir. Oral glikokortikoidler ucuz ve KAD tedavisinde etkili olması yanı sıra birçok yan etkiye (poliüri, polifaji vb.) sebep olmaları uzun süreli kullanımlarını sınırlandırmaktadır. Uzun etki süresi bulunan ve/veya enjekte edilebilen glikokortikoidlerin yan etki riskinin daha fazla olması KAD tedavisinde kullanımlarını sınırlandırmaktadır. KAD hastalığında klinik belirtilerin kapsamlı ve şiddetli olmadığı durumlarda topikal glikokortikoidlerin kullanımı önerilmekle birlikte ve ciddi yan etki profiline sahip olmadıkları belirtilmektedir.

Anahtar kelimeler: Glikokortikoid, köpek, atopik, dermatitis

ABSTRACT

Glucocorticoids are a steroid group of hormonal drugs with broad anti-inflammatory activity. It is used in the treatment of many inflammatory diseases due to its broad anti-inflammatory activities. Systemic (oral) and local glucocorticoids can be used in the treatment of Canine Atopic Dermatitis (CAD), which is one of the inflammatory diseases, depending on the severity and extent of clinical symptoms. The use of oral glucocorticoids with a short duration of action is recommended in cases where the clinical manifestations are severe and extensive. Oral glucocorticoids are inexpensive and effective in the treatment of CAD, and they cause many side effects (polyuria, polyphagia, etc.), limiting their long-term use. Long-acting and/or injectable glucocorticoids have a higher risk of side effects, limiting their use in the treatment of CAD. Although the use of topical glucocorticoids is recommended in cases where the clinical symptoms are not extensive and severe in CAD, it is stated that they do not have a serious side-effect profile.

Keywords: Glucocorticoid, canine, atopic, dermatitis

1. GİRİŞ

Anti-inflamatuar, anti-alerjenik ve immunosupresif gibi birçok endikasyonu bulunan, vücutta adrenal bezlerden doğal olarak sentezlenebildiği gibi sentetik olarak da üretilebilen, birçok yan etkisi bulunan steroid yapıda hormonal bir ilaç grubu olduğu bildirilmiştir (Kaya 2007, Traş ve Elmas 2021). Glikokortikoidler, etkilerini hedef hücrelerin sitoplazmasında bulunan glikokortikoid reseptörlerine bağlanarak gösterir. İnaktif haldeki glikokortikoid reseptörleri ısı şok proteinleriyle bağlı halde bulundukları ve bu proteinlerin glikokortikoidlerin çekirdeğe doğru geçişini engellediği bildirilmiştir. Glikokortikoidler, glikokortikoid reseptörlerine bağlandığında ısı şok proteininin glikokortikoid reseptörlerinden ayrıldığı, glikokortikoid reseptörlerinin monomer hale geldiği ve bir başka monomer glikokortikoid reseptörüyle birleşerek dimerik yapıya geldiği bildirilmiştir. Böylece glikokortikoid-dimerik glikokortikoid reseptör kompleksi çekirdek içine geçişi sağlanarak DNA'nın glikokortikoid

yanıt elemanı bölgesine bağlandığı bildirilmiştir. Bu bağlanmanın ardından değişen transkripsiyon miktarıyla genin indüksiyonu ya da inhibisyonunun gerçekleştiği belirtilmiştir (Barnes 1998).

Glikokortikoidlerin anti-inflamatuar etkisini nasıl ortaya koydukları henüz netlik kazanmadığı, ancak anti-inflamatuar gen transkripsiyonunu arttırarak ve inflamatuar genlerin transkripsiyonunu azaltarak gösterebileceği ifade edilmiştir (Barnes 1998, De Bosscher ve ark 2000, Kaya 2007).

Glikokortikoidler:

- Anti-inflamatuar protein olan lipokortin sentezini arttırdığı, lipokortinin membran fosfolipidlerinden araşidonik asit metabolitlerinin oluşumuna katkı sağlayan fosfolipaz A2 enziminin etki göstermesini engelleyerek prostaglandin, prostasiklinler, lökotrien, tromboksan gibi yangıda önemli roller oynayan mediatörlerin oluşumunu engellediği,
- Fosfolipaz A2 enzimin transkripsiyonunu direk olarak azaltarak yukarıda bahsedilen mediatörlerin oluşumunu engellediği,
- Birçok sitokin ((İnterlökin)IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, IL-11, IL-12, IL-13, Tümör Nekroz Faktör Alfa (TNF-α), Granülosit- Makrofaj Stimüle Edici Faktör (GM-CSF)) ve kemokin (RANTES, MTP, eotaksin vb.) transkripsiyonunu azaltarak yangısal hücrelerin (T-lenfositler, eozinofiller, dendritik hücreler, makrofajlar, endotelyal ve epitel hücreleri vb.) yangısal bölgedeki aktivasyonunu önlediği,
- Lizozomal zarların dayanıklılığını arttırdığı dolayısıyla bu zarlardaki proteinleri parçalayan enzimlerin salıverilmesini engellediği,
- Nötrofillerden salınan plazminojeni plazmine çevrilmesini sağlayan maddelerin salgılanmasını önleyerek lökositlerin yangı alanına geçişini azalttıkları,
- Yangıda önemli rolleri olan siklooksijenaz enzimlerinden COX-2'nin inhibisyonuna neden olduğu,
- Bu etkilerinin yanı sıra IL-1 antagonisti etkinliği, yangısal hücrelerin yangı bölgesinden taşınmasında önemli rol oynayan adezyon moleküllerinin inhibisyonu gibi daha birçok etki mekanizmasıyla anti-inflamatuar etkinlik sağladıkları belirtilmiştir (Barnes 1998, De Bosscher ve ark 2000, Olivry ve Sousa 2001, Kaya 2007).

Glikokortikoidler birçok anti-inflamatuar olay dizelerinde rol oynaması sebebiyle geniş anti-inflamatuar etkinliği bulunmaktadır. Bu bölümün devamında glikokortikodilerin Köpek Atopik Dermatitis (KAD) hastalığında kullanımı hakkında bilgi verilecektir.

2. KÖPEK ATOPİK DERMATİTİS TEDAVİSİNDE KULLANILAN GLİKOKORTİKOİDLER

Glikokortikoidler geniş anti-inflamatuar etkinliğe sahip olması nedeniyle KAD hastalığı gibi yangıyla seyreden hastalıkların tedavisinde kullanım alanı bulmaktadır. Bu nedenle KAD tedavisinde lezyonların yayılım sıklığı ve şiddetine bağlı olarak glikokortikoidler sistemik (oral glikokortikoidler) ve topikal olarak kullanılabilen ilaç gruplarından olduğu belirtilmiştir (Olivry ve ark 2010a, Olivry ve Bäumer 2015, Olivry ve ark 2015, Traş ve Elmas 2021).

a- Oral Glikokortikoidler

KAD hastalığındaki klinik belirtileri şiddetli ve kapsamlı olduğu durumlarda sistemik etkili oral glikokortikoidlerin kullanılabildiği bildirilmiştir. Bu tür ilaçların kullanımı öncesinde KAD hastalığına sebep olan etkenin teşhis edilip ortadan kaldırılması gerektiği belirtilmiştir. Akut ve kronik KAD tedavisinde kısa süre etkili oral glikokortikoidler olan prednizon, prednizolon ve metilprednizolon ile günde bir veya iki kere 0.5 mg/kg dozunda tedaviye başlanılması, klinik belirtilerde hafifleme meydana geldiğinde klinik belirtilerin yeniden oluşumunu engelleyen en düşük dozaj ve sıklıkta kullanılmaya devam edilmesi gerektiği ifade edilmektedir. Oral glikokortikoidlerin, klinik belirtilerin şiddetli ve hafiflemediği durumda klinik belirtileri hafifletecek en düşük dozaj ve sıklıkta uzun

sürelerde kullanılabileceği bildirilmiştir. KAD hastalığının tedavisinde uzun etki süresi bulunan ve/veya enjekte edilebilen glikokortikoidlerin yan etki riskini arttırdığı, bu nedenle mümkün olduğunca kullanımından kaçınılması gerektiği ifade edilmiştir (Olivry ve ark 2010a, Olivry ve ark 2010b, Olivry ve ark 2015).

I. Farmakokinetikleri

Oral yolla alındıktan sonra gastrointestinal kanalda iyi emilim gösterdikleri, dağılım aşamasında %75 oranında kortizol bağlayıcı globüline bağlanarak taşındıkları, başlıca karaciğerde metabolize edildikleri ve eliminasyon yolunun %75 idrar ile %25 safra olduğu bildirilmiştir. Yukarıda bahsi geçen glikokortikoidlerin (prednizolon, prednizon, metilprednizolon) orta etki süresi (12-36 saat) yarattığı da ifade edilmiştir (Kaya 2007).

II. Etkinliği ve Güvenilirliği

Çift körlü randomize kontrol uygulanmış AD köpeklerde yapılan bir çalışmada, ilk hafta boyunca 0.5 mg/kg günde iki kez (BID), ikinci haftada 0.5 mg/kg günde bir kez (SID), sonraki iki hafta boyunca ise iki günde bir olmak üzere 0.5 mg/kg dozunda oral olarak prednizon uygulandığında lezyon ve kaşıntı skorlarında oldukça önemli düşüş yaşandığı, aynı uygulama sıklığında 0.25 mg/kg (PO) dozunda prednizon uygulamasının da benzer etkilere neden olduğu bildirilmiştir (Ferrer ve ark 1999).

Yapılan bir diğer çalışmada, 1 mg/kg (SID) dozunda bir hafta boyunca oral olarak prednizon uygulandığı ardından iki günde bir 1 mg/kg dozunda oral olarak prednizon uygulanmasının 42. güne kadar devam ettiğinde lezyon ve kaşıntı skorlarında önemli düşüşler yaşandığı rapor edilmiştir (Kovalik ve ark 2011).

Körlü randomize kontrollü AD köpeklerde yapılan bir çalışmada, ilk hafta 0.5-1 (0.75) mg/kg dozunda SID, sonraki üç hafta boyunca aynı dozda iki günde bir oral olarak metilprednizolon uygulandığı ve klinik bulgular azaldıkça dozlarında azalarak toplamda 16 hafta boyunca oral uygulanmaya devam edildiği bildirilmiştir. Lezyon ve kaşıntı skorlarında ilk dört haftalık metilprednizolon tedavisinde belirgin düşme saptandığı, sonraki 12 haftalık tedavi süresince bu düşüşte belirgin bir sapma gözlenmediği bildirilmiştir (Steffan ve ark 2003).

AD' li köpeklerde yapılan bir başka çalışmada, ilk beş günde 0.5 mg/kg (PO, SID) dozunda, sonrasında altı haftayı tamamlayacak şekilde iki günde bir aynı dozda metilprednizolon verildiği, altı hafta sonunda lezyon ve kaşıntı skorunda önemli düşüş yaşandığı ifade edilmiştir (Alja ve ark 2009).

Alerjik dermatitli köpeklerde prednizolonun (0.5-1 mg/kg, PO, SID altı gün sonrasında 28. güne kadar iki günde bir) etkinliği ve güvenliği değerlendirildiği bir çalışmada, kaşıntı ve dermatitte önemli iyileşmelere sebep olduğu bildirilmiştir (Gadeyne ve ark 2014).

AD köpeklerde yapılan bir başka çalışmada altı hafta boyunca 0.5 mg/kg (PO, SID) prednizolon verildiği, ortalama lezyon skorunda %81 ve ortalama kaşıntı skorunda ise %69 azalma tespit edildiği bildirilmiştir (Olivry ve ark 2002).

Yapılan bu çalışmalar neticesinde oral glikokortikodilerin şiddetli ve generalize KAD olgularında iyi bir etkinlik sağladığı bu sebeple KAD tedavisinde kısa etki süresi bulunan oral glikokortikoidlerin kullanılabileceği görülmektedir. Glikokortikoidler ucuz ve etkili ilaçlar olmasının yanında birçok yan etkilere sahip olması (polifaji, poliüri, polidipsi, bakteriyel ve fungal enfeksiyon, demodikozis, kas atrofisi, obezite, davranış değişikliği, iyatrojenik hiperadrenokortizim) bu ilaç grubunun kullanımını kısıtlamaktadır. Bu ilaçların yan etkileri ilacın gücüne, dozuna ve kullanım sıklığına bağlı olarak değişebilmektedir (Ferrer ve ark 1999, Olivry ve ark 2002, Steffan ve ark 2003, Olivry ve ark 2010a, Olivry ve ark 2010b, Saridomichelakis ve Olivry 2016).

b- Topikal glikokortikoidler

Topikal glikokortikoidler, KAD klinik belirtilerinin şiddetli olmadığı lokalize deri lezyonlarında kullanılmaktadır. Özellikle KAD tedavisinde oral glikokortikoidlerin kullanımı sırasında ortaya çıkabilecek olan sistemik yan etkileri azaltmak amacıyla tercih edilmektedir. Ancak topikal glikokortikoidlerin de uzun süreli kullanımı sonrasında kutanöz atrofi, komedonlar, yüzeysel foliküler kistlerin meydana geldiği ifade edilmiştir. Eski nesil topikal glikokortikoidlerin hidrokortizon,

betametazon, deksametazon, prednizolon ve triamsinolon asetonid olduğu, yeni nesillerin ise hidrokortizon aseponat, mometozan furoat ve prednikarbat gibi diesterler olduğu bildirilmiştir (Olivry ve Sousa 2001, Olivry ve ark 2010a, Olivry ve ark 2015, Santoro 2019).

I. Etkinliği ve Güvenilirliği

KAD tedavisinde % 0.0584 oranında hazırlanmış hidrokortizon aseponat içerikli spreyin plaseboya karşı etkinliğinin araştırıldığı çalışmada (ilk 42 gün her iki sprey SID şeklinde uygulanmış, 42. ve 56. günlerden sonra lezyonların değerlendirilmesine bağlı olarak uygulanma sıklığı revize edilmiş, 70. günde çalışma sonlandırılmıştır) lezyon ve kaşıntı skorlarında plasebo grubuna göre tedavinin 28. gününde %50'den daha fazla bir iyileşme saptandığı ifade edilmiştir (Nuttall ve ark 2009). Yapılan bir başka çalışmada klinik belirtilerin hafifletildiği KAD hastası köpeklerde %0.0584 oranında hazırlanmış hidrokortizon aseponat ve plasebo uygulanmış, hastalığın nüks etme süreleri değerlendirildiğinde hidrokortion aseponat uygulanan grup plaseboya göre anlamlı derece daha geç sürede nüks ettiği bildirilmiştir (Lourenço ve ark 2016). Hidrokortizon aseponat ve siklosporinin %0.0584 oranında hazırlandığında yapılan kaşıntı ve lezyonel skorlarının karşılaştırıldığı bir çalışmada, her iki ilaç grubunun da kaşıntı ve lezyonel skorlarda önemli düşüşler meydana geldiği ve meydana gelen düşüşler arasında önemli bir fark bulunamadığı rapor edilmiştir (Nuttall ve ark 2012). Bu çalışmada klinik belirtilerin bulunduğu deriye SID şeklinde (10 cm uzaklıktan) 100 cm^2 alana iki sprey tarzında uygulandığı belirtilmiştir. %0.0584 hidrokortizon aseponat kullanımı sonrasında yan etkiyle karşılaşılmadığı sadece bir çalışmada ishal, ateş ve kusmanın gözlendiği bunun tedaviye bağlı olmadığı bildirilmiştir (Nuttall ve ark 2009, Nuttall ve ark 2012, Lourenço ve ark 2016).

Bir başka çalışmada ise 83' ü KAD hastası olan (diğer köpeklerin kaşıntı ya da alerjik dermatitis sahip olduğu) 103 köpekte yapılan bir çalışmada, %0.015 triamsinolon solüsyonunun plaseboya karşı etkinliğinin denendiği, triamsinolon ile yapılan tedavinin başarılı olduğu, genel klinik belirtiler ve kaşıntıda anlamlı düşüşler yaşandığı ifade edilmiştir. İlaç kullanımına bağlı olarak küçük hematolojik yan etkilerin gözlendiği bildirilmiştir (DeBoer ve ark 2002).

KAD tedavisi amacıyla %0.025 oranında hazırlanmış budenosid içerikli krem ve plasebo köpeklere üç hafta boyunca haftada bir kere 1 g/kg dozunda uygulandığı, lezyon ve kaşıntı skorunun değerlendirildiği bir çalışmada lezyonel skorda önemli bir değişiklik yaşanmadığı, fakat budenosid uygulanan grupta lezyonların azaldığı, plasebo grubunda ise lezyonların arttığı bildirilmiştir. Kaşıntı skorunda ise budenosid uygulanan grupta plaseboya göre önemli bir düşüş yaşandığı belirtilmiştir (Ahlstrom ve ark 2010).

Yapılan bu çalışmalar neticesinde topikal glikokortikoidlerin (özellikle %0.0584 hidrokortizon aseponat) lezyonların kapsamlı ve şiddetli olmadığı durumlarda KAD tedavisinde sistemik yan etkilerin oluşmaması adına kullanıldıkları ve etkili oldukları görülmüştür.

3. SONUÇ VE ÖNERİLER

- Glikokortikoidler, anti-inflamatuar, antialerjenik, immunosupresif gibi birçok endikasyonu bulunan steroid yapıda hormonal bir ilaç grubudur.
- Anti-inflamatuar etkinlikleri nedeniyle birçok yangısal hastalıkların (KAD vb.) tedavisinde kullanılmaktadır.
- KAD hastalığının tedavisinde klinik belirtilerin şiddetine ve kapsamına göre sistemik (oral) ve lokal glikokortikoidler kullanılabilmektedir.
- Klinik belirtilerin şiddetli ve kapsamlı olduğu durumda kısa etki süresi bulunan oral glikokortikoidler(prednizolon, metilprednizolon, prednizon) ile günde bir veya iki kere 0.5 mg/kg dozunda tedaviye başlanılmalı, klinik belirtilerde hafifleme meydana geldiğinde klinik belirtilerin yeniden oluşumunu engelleyen en düşük dozaj ve sıklıkta kullanılmaya devam edilmesi önerilmektedir.

- Oral glikokortikoidler ucuz ve KAD tedavisinde etkili olması yanı sıra birçok yan etkiye (poliüri, polifaji vb.) sebep olmaları uzun süreli kullanımlarını sınırlandırmaktadır. Uzun etki süresi bulunan ve/veya enjekte edilebilen glikokortikoidlerin yan etki riskinin daha fazla olması KAD tedavisinde kullanımlarını sınırlandırmaktadır.

- KAD hastalığında klinik belirtilerin kapsamlı ve şiddetli olmadığı durumlarda topikal glikokortikoidlerin(hidrokortizon aseponat, budenosid, triamsinolon) kullanımı önerilmekle birlikte ve ciddi yan etki profiline sahip olmadıkları belirtilmektedir.

TEŞEKKÜR

Bilimsel katkılarından dolayı Prof. Dr. Enver Yazar'a teşekkür ederim.

KAYNAKÇA

1- Ahlstrom L, Mason K, Mills P, 2010. Barazone decreases skin lesions and pruritus and increases quality of life in dogs with atopic dermatitis: a randomized, blinded, placebo-controlled trial. Journal of veterinary pharmacology and therapeutics, 33, 6, 573-82.

2- Alja P, Silvestra K, Aleksandra D-P, Tina K, 2009. The efficacy of antihistamine fexofenadine versus methylprednisolone in the treatment of atopic dermatitis in dogs. Slovenian Veterinary Research, 46, 1

3- Barnes PJ, 1998. Anti-inflammatory actions of glucocorticoids: molecular mechanisms. Clinical science, 94, 6, 557-72

4- DeBoer DJ, Schafer JH, Salsbury CS, Blum JR, Beale KM, Vitale CB, Muse R, Moriello KA, Garfield RA, Keefe TJ, 2002. Multiple-center study of reduced-concentration triamcinolone topical solution for the treatment of dogs with known or suspected allergic pruritus. American Journal of Veterinary Research, 63, 3, 408-13.

5- De Bosscher K, Berghe WV, Haegeman G, 2000. Mechanisms of anti-inflammatory action and of immunosuppression by glucocorticoids: negative interference of activated glucocorticoid receptor with transcription factors. Journal of neuroimmunology, 109, 1, 16-22.

6- Ferrer L, Alberola J, Queralt M, Brazis P, Rabanal R, Llenas J, Puigdemont A, 1999. Clinical anti-inflammatory efficacy of arofylline, a new selective phosphodiesterase-4 inhibitor, in dogs with atopic dermatitis. Veterinary Record, 145, 7, 191-4.

7- Gadeyne C, Little P, King VL, Edwards N, Davis K, Stegemann MR, 2014. Efficacy of oclacitinib (Apoquel®) compared with prednisolone for the control of pruritus and clinical signs associated with allergic dermatitis in client-owned dogs in Australia. Veterinary dermatology, 25, 6, 512-e86.

8- Kaya S, 2007. Adrenal Steroidler, Steroid Türevleri ve Antagonistleri in: Veteriner Farmakoloji, Ed: Kaya S, Ankara, Türkiye, Medisan Yayınevi,cilt:2, baskı:4 p. 85-100.

9- Kovalik M, Taszkun I, Pomorski Z, Kozak M, Pomorska D, Szczepanik M, Wilkolek P, Palenik L, Shaw D, van den Broek A, 2011. Evaluation of a human generic formulation of ciclosporin in the treatment of canine atopic dermatitis with in vitro assessment of the functional capacity of phagocytic cells. Veterinary Record, 168, 20, 537-.

10- Lourenço AM, Schmidt V, Sao Braz B, Nobrega D, Nunes T, Duarte-Correia JH, Matias D, Maruhashi E, Reme CA, Nuttall T, 2016. Efficacy of proactive long-term maintenance therapy of canine atopic dermatitis with 0.0584% hydrocortisone aceponate spray: a double-blind placebo controlled pilot study. Veterinary dermatology, 27, 2, 88-e25.

11- Nuttall T, Mueller R, Bensignor E, Verde M, Noli C, Schmidt V, Rème C, 2009. Efficacy of a 0.0584% hydrocortisone aceponate spray in the management of canine atopic dermatitis: a randomised, double blind, placebo-controlled trial. Veterinary dermatology, 20, 3, 191-8.

12- Nuttall, T. J., McEwan, N. A., Bensignor, E., Cornegliani, L., Löwenstein, C., Rème, C. A. 2012. Comparable efficacy of a topical 0.0584% hydrocortisone aceponate spray and oral ciclosporin in treating canine atopic dermatitis. Veterinary Dermatology, 23,1, 4-e2.

13- Olivry T, Sousa CA, 2001. The ACVD task force on canine atopic dermatitis (XX): glucocorticoid pharmacotherapy. Veterinary immunology and immunopathology, 81, 3-4, 317-22.

14- Olivry T, Rivierre C, Jackson HA, Murphy KM, Davidson G, Sousa CA, 2002. Cyclosporine decreases skin lesions and pruritus in dogs with atopic dermatitis: a blinded randomized prednisolone-controlled trial. Veterinary dermatology, 13, 2, 77-87.

15- Olivry T, DeBoer DJ, Favrot C, Jackson HA, Mueller RS, Nuttall T, Prélaud P, Dermatitis ITFoCA, 2010a. Treatment of canine atopic dermatitis: 2010 clinical practice guidelines from the International Task Force on Canine Atopic Dermatitis. Veterinary dermatology, 21, 3, 233-48

16- Olivry T, Foster AP, Mueller RS, McEwan NA, Chesney C, Williams HC, 2010b. Interventions for atopic dermatitis in dogs: a systematic review of randomized controlled trials. Veterinary dermatology, 21, 1, 4-22

17- Olivry T, Bäumer W, 2015. Atopic itch in dogs: pharmacology and modeling. Pharmacology of Itch, 357-69.

18- Olivry T, DeBoer DJ, Favrot C, Jackson HA, Mueller RS, Nuttall T, Prélaud P, 2015. Treatment of canine atopic dermatitis: 2015 updated guidelines from the International Committee on Allergic Diseases of Animals (ICADA). BMC veterinary research, 11, 1, 1-15

19- Santoro D, 2019. Therapies in canine atopic dermatitis: an update. Veterinary Clinics: Small Animal Practice, 49,1, 9-26.

20- Saridomichelakis MN, Olivry T, 2016. An update on the treatment of canine atopic dermatitis. The Veterinary Journal, 207, 29-37.

21- Steffan J, Alexander D, Brovedani F, Fisch RD, 2003. Comparison of cyclosporine A with methylprednisolone for treatment of canine atopic dermatitis: a parallel, blinded, randomized controlled trial. Veterinary dermatology, 14, 1, 11-22

22- Traş B, Elmas M, 2021. Ağrı kesici, ateş düşürücü ve yangı giderici ilaçlar in:Veteriner İlaç Rehberi ve Tedavi El Kitabı, Ed: Yazar E, İstanbul, Türkiye, Nobel Tıp Yayınevi, p. 327-352.

KEDİLERDE ANTİVİRAL TEDAVİ

ANTIVIRAL TREATMENT IN CATS

Vet. Hek. Muhittin USLU

Selçuk Üniversitesi, Veteriner Fakültesi, Farmakoloji ve Toksikoloji Anabilim Dalı, Konya

ORCID ID: 0000-0002-9027-4229

ÖZET

Virüsler zorunlu hücre içi patojenlerdir. Hücre içi olmaları nedeni ile konakçıya zarar vermeden tedavileri oldukça güçtür. Beşeri hekimlikte olduğu gibi veteriner hekimlikte de hayvanlarda birçok farklı viral enfeksiyon gözlenebilmektedir. Bazı viral enfeksiyonlar ise hayvan türüne özgü olabilmektedir. Beşeri hekimlikte viral enfeksiyonların tedavisi için bazı antiviraller bulunmaktadır. Ancak veteriner hekimlikte antiviral amaçlı bir tane ruhsatlı ürün bulunmaktadır. Rekombinant feline interferon omega (rFeIFNΩ) kediler için kullanımı onaylanmış antiviral interferondur. Ancak kedilerde, köpeklere göre çok daha fazla farklı viral enfeksiyon gözlenebilmektedir. Kedilerin viral enfeksiyonlara karşı duyarlılığı oldukça yüksek olabilmektedir. Bu durum veteriner hekimleri, beşeri ilaçlara yönelmesine neden olmaktadır. Bu derlemede kedilerde gözlenen başlıca viral enfeksiyonlar ve tedavide kullanılan ilaçlar hakkında kısa bilgiler verilmeye çalışılmıştır.

Anahtar kelimeler: Kedi, antiviral, tedavi

ABSTRACT

Viruses are obligate intracellular pathogens. Because they are intracellular, they are very difficult to treat without harming the host. As in human medicine, many different viral infections can be observed in animals in veterinary field. Some viral infections may be specific to the animal species. There are some antivirals for the treatment of viral infections in human medicine. However, there is only one licensed product for antiviral in veterinary medicine. Recombinant feline interferon omega (rFeIFNΩ) is an antiviral interferon approved for use in cats. However, many different viral infections can be observed in cats than in dogs. Cats can show highly susceptible to viral infections. This situation causes veterinarians to turn to human drugs. In this review, brief information about the main viral infections observed in cats and the drugs used in the treatment has been tried to be given.

Keywords: Cat, antiviral, treatment

1.GİRİŞ

Virüsler zorunlu hücre içi patojenlerdir (**Dal Pozzo ve Thiry 2014**). Viral enfeksiyonlar bütün canlılarda olduğu gibi kedilerde de teşhisi ve tedavisi zor enfeksiyonlardır. Kedilerin ise genel anlamda enfeksiyonlara duyarlı olması nedeniyle viral enfeksiyonlarla tedavide alınan yanıt veteriner hekimleri ve hasta sahiplerini memnun etmemektedir. Kediler için antiviral amaçlı kullanımı onaylanan tek ürün rekombinant feline interferon omega (rFeIFNΩ) bulunmaktadır. Günümüzde bu ilacın Türkiye'de satışı ise ruhsatlı değildir (**Yazar 2018, Canbar ve Yazar 2020a**). Bu bölümün devamında kediler gözlenen bazı önemli viral enfeksiyonlar ve tedavileri hakkında bilgiler verilmeye çalışılacaktır.

2.ANTİVİRAL TEDAVİ

Beşeri hekimlikte kullanılan antivirallerin kedilerde güvenilirliği ile ilgili yeterince bilgi bulunmamaktadır. Lokal olarak birçok antiviral kullanımı önerilse de kedilerde sistemik olarak

trifluridin, sidofovir, idoksuridin, valasiklovir, asiklovir **(Horzinek ve ark 2013, Dal Pozzo ve Thiry 2014)** ve *lamivudin* (**Hartmann ve ark 2015)** kullanımı önerilmemektedir. Ayrıca *ribavirin, didanosin* ve *adefovir* kullanılan kedilerde ağır yan etkiler gözlendiği ve sistemik kullanımının önerilmediği ifade edilmiştir **(Hartmann ve ark 2015)**. Kedilerde sistemik olarak rFeIFNΩ (**Canbar ve Yazar 2020a**) ve rekombinant human interferon alfa (rHuIFNα) (**Canbar ve Yazar 2020b**) kullanılabilecek sistemik antivirallerdir. rFeIFNΩ'nın kedilere Feline leukemia virus (FLV) ile Feline immunodeficiency virus (FIV) enfeksiyonları için 0, 14 ve 60 günlerde 1 MU/kg (SC, SID) 5 gün şeklinde kullanımı önerilmektedir. Ancak ürün günümüz itibari ile Türkiye'de satışa sunulmamıştır (**Canbar ve Yazar 2020a**). Kedilerde rHuIFNα'nın dozu ile ilgili net bilgiler bulunmamakla birlikte, 10.000-100.000 U/kg (SC, SID) dozlarında, vakanın durumuna göre birkaç günden birkaç haftaya kadar kullanılabileceği ifade edilmiştir. Kedilerde bütün viral enfeksiyonlarda tedaviye destek amaçlı rHuIFNα kullanılabilir (**Canbar ve Yazar 2020b**). Viral enfeksiyonlarda kullanılabilecek sistemik antiviraller derlemenin devamında ilgili hastalıklarda belirtilmiştir.

2.1.Kedilerin Herpes Virus Enfeksiyonu

Etken Feline herpes virus (FHV) olarak tanımlanır ve kedilerde üst solunum yolu enfeksiyonuna neden olurlar. Bazı vakalarda enfeksiyona Feline calicivirus ve diğer bazı mikroorganizmalar ile kedilerde üst solunum yolu enfeksiyonuna neden olurlar. Akut FHV vakalarında rinitis, konjunktivitis ve kornael ülserler gözlenir. Korneal ülser kronik dönemde de gözlenir. Korneal ülserlerin temel nedenleri arasında FHV bulunduğu ifade edilmiştir (**Horzinek ve ark 2013**). *Chlamydia felis* kedilerde konjuktivitis yapan bir diğer dominant etkendir (**Eaton 2021**). FHV kaynaklı göz enfeksiyonlarının tedavisinde göze uygun lokal antiviral olarak Türkiye'de ruhsatlı gansiklovir (jel) kullanılabilir. Temin edilebildiği durumda göz mukozasına uygulanacak ticari formu olan lokal uygulama yönelik asiklovir, sidofovir ve idoksuridin içeren ilaçlar kullanılabilir (**Gould 2011**). Sekonder enfeksiyonları önlemek için lokal antibiyotik içeren pomad/damla tercih edilmeli, oluşan lokal yangıyı ve ateşi azaltmak için lokal nonsteroid antiinflamatuar içeren damla kullanılmalıdır. Etken viral olduğu için glikokortikoidler kullanılmamalıdır. FHV bağlı akut solunum sistemi enfeksiyonlarının tedavisinde vakanın durumuna göre sistemik etkili antimikrobiyal, nonsteroid antiinflamatuar, mukolitik ilaçlar ve sıvı tedavisi tercih edilmelidir (**Horzinek ve ark 2013**). Kedilerde sistemik antiviral olarak famsiklovir kullanımının etkili ve güvenli olduğu belirlenmiştir. FHV bağlı göz enfeksiyonlarında ilk tercih olabileceği bildirilmiştir. İlacın 90 mg/kg (PO, BID) dozunda kedilerde kullanılabileceği, belirgin yan etkilere neden olmadığı, nadiren kusma, ishal ve iştah kaybının gözlenebileceği ifade edilmiştir. *Chlamydia felis* kaynaklı göz enfeksiyonlarında azitromisin (10-15 mg/kg, PO, SID, üç gün uygulanmalı sonraki haftadan itibaren haftada iki kez uygulanmaya devam edilmeli) veya doksisiklin (10 mg/kg, PO, SID, 4 hafta) kullanılabilir. Kedilerde kullanılabilecek bir diğer ilacın ise pradofloksasin olduğu ifade edilmiştir (**Eaton 2021**). Pradofloksasinin, diğer florokinolonlardan farklı olarak kedilerde gözde belirgin toksik etkilere neden olmadığı ve 7.5 mg/kg (PO, SID) dozunda kullanılabileceği belirlenmiştir (**Coskun ve Yazar 2020**). Tedaviye destek amaçlı rHuIFNα uygulaması yapılabilir (**Canbar ve Yazar 2020b**). Kedi yavrularında 9. hafta ilk aşılama ve 12. hafta ikinci aşılama önerilir. Hastalığın korunmasında aşılamanın oldukça etkili olduğu ifade edilmiştir (**Thiry ve ark 2009**).

2.2.Kedilerde Panlökopeni

Enfeksiyon etkeni Feline parvo virus (FPV) olarak bilinir. Veteriner hekimlerce bilinen kedilerin en eski viral enfeksiyonudur. Virüs özellikle kemik iliği, lenfositler ve bağırsak epitellerinde replike olurlar (**Barrs 2019**). Hastalarda klinik olarak durgunluk, ateş, anoreksi, susuzluk, kusma, ishal, dehidratasyon ve lökopeni gözlenir (**Awad ve ark 2018**). Tedavi edilmediği durumlarda yavru kedilerde ölüm oranı %100 olarak gözlenebilirken, yetişkinlerde %85 oranında ölüm gözlenebilmektedir. Tedavi edildiğinde ölüm oranı düşürülebilmektedir. Tedavide vakalar bireysel olarak düşünülerek sıvı tedavisi, antiemetik (metoklopramid) (**Awad ve ark 2019**), antibiyotik veya antibiyotik kombinasyonları (florokinolonlar, koamoksilav, sefalosporinler, piperasilin + tazobaktam), özellikle B vitamini içeren vitamin kompleksleri (**Truyen ve ark 2009**) ve inaktive edilmiş Parapoxvirus ovis uygulamaları yapılabileceği ifade edilmiştir (**Awad ve ark 2019**). Sıvı-elektrolit dengenin sağlanmasının ölüm oranını düşürdüğü ifade edilmiştir (**Truyen ve ark 2009**). Özellikle

yavru kedilerde kan glikoz takibi yapılmalıdır ve gerektiğinde glikoz desteği uygulanmalıdır (**Barrs 2019**). Ayrıca genel antiviral tedavi olarak rHuIFNα (**Canbar ve Yazar 2020b**) ve Türkiye'de satışı bulunmayan nötralizan antikor (**Awad ve ark 2019**) uygulaması yapılabilir. Enfeksiyonun önlenmesinde aşı uygulamasının oldukça etkili olduğu ve yıllar süren bağışıklık sağlayabildiği belirlenmiştir. Yavru kedilerin ilk aşıyı hayatın 8.-9. haftasında ve ikinci aşıyı ilk aşıdan 3-4 hafta sonra yapılması önerilmektedir. Barınak gibi riskli ortamlarda olan yavrulara 16. hafta üçüncü uygulama önerilmektedir (**Horzinek ve ark 2013**).

2.3.Kedilerin Calici Virus Enfeksiyonu

Enfeksiyon etkeni olarak Feline calici virus (FCV) tanımlanır **(Radford ve ark 2007)**. Enfeksiyon özellikle 6 haftadan büyük kedi yavrularında yaygın gözlenir (**Anonim 2021a**). Enfeksiyonda ağız bölgesinde ülserler, kronik gingivitis/stomatitis, üst solunum sistemi enfeksiyonu ve geçici topallık gözlenir (**Radford ve ark 2009)**. Bazı vakalarda pnömoni ve artritisler gelişebilir (**Anonim 2021a**). Hastalık barınaklarda yaygın olarak gözlenebilmektedir. Enfeksiyonun doğrudan tedavisi bulunmamaktadır. Semptomatik tedaviler düşünülebilir (**Horzinek ve ark 2013**). Tedavide rFeIFNΩ önerilmektedir (**Caddy 2014**). Ancak ilacın satışı Türkiye'de onaylanmadığı için yerine rHuIFNα uygulaması yapılabilir (**Canbar ve Yazar 2020b**). Calicivirus ile enfekte bir kedide yapılan vaka raporunda tedavide oksimetazolin içeren damla, doksisiklin (5 mg, PO, BID) ve famsiklovir (15 mg, PO, BID) kombinasyonu ile tedaviye başlandığı, deri ülserleri için povidon iyot kullanıldığı ifade edilmiştir. Tedavide belirgin ilerleme sağlanamayınca doksisiklin yerine azitromisin (10 mg/kg, PO, SID) ile birlikte metronidazol (20 mg/kg, PO, BID) kullanıldığı ve famsiklovirin (60 mg, PO, BID) dozunun artırıldığı belirtilmiştir. Beslenmede ise kaliteli mama ve multivitamin uygulaması yapıldığı bildirilmiştir (**Park ve ark 2015**). Aşılamada ilk aşı 8.-9. hafta ve ikinci aşı 12. hafta yapılması ve yıllık tekrarlarının yapılması önerilmektedir **(Radford ve ark 2007)**.

2.4.Kedilerin Lökemi Virüsü Enfeksiyonu

Enfeksiyon etkeni olarak Feline leukaemia virus (FeLV) tanımlanır. Hasta kedilerle kurulacak herhangi bir yakın temas (dövüşme, ısırma, yem ve su kaplarının ortak olması vb.) duyarlı kedileri enfekte edebilir **(Hartmann ve Hofmann 2020)**. Etkenler salya, nazal akıntı, süt, idrar ve dışkı ile etrafa yayılır (**Little ve ark 2020**). Enfeksiyon ağız bölgesinde başlar, lenf yumruları ve kemik iliğine geçer. Kemik iliğine geçtikten sonra aplastik anemi, immundepresyon ve bazı vakalarda kanser gözlenir. Tedavide raltegravir (40 mg/kg, PO, SID) (**Horzinek ve ark 2013**) veya zidovudin (5 mg/kg, PO, BID) (**Hartmann 2015, Little ve ark 2020**) kullanılabilir. Ayrıca tedavide rFeIFNΩ kullanımı önerilmektedir. İlaç temin edilemediği durumlarda, tedavide rHuIFNα kullanımı düşünülebilir (**Canbar ve Yazar 2020a, Canbar ve Yazar 2020b**). Gelişen kanser vakalarına özellikle lenfomaya karşı vinkristin, siklofosfamid ve prednizolon kombinasyonu önerilmektedir. Ancak aplastik anemi ve immundepresyon gelişen vakalarda tedavi başarısı düşüktür (**Rollinson 1992**). Aşılamada ilk aşı hayatın 8.-9. haftası, ikinci aşı 12.-13. hafta ve üçüncü aşı 1 yıl sonra yapılabilir. Aşılamanın devamında ise 2-3 yılda bir aşı yapılabilir (**Horzinek ve ark 2013**).

2.5.Kedi İmmun Yetmezlik Virüsü Enfeksiyonu

Etken Feline immunodeficiency virus (FIV) olarak tanımlanır (**Hartmann 1998**). Hastalarda immun yetmezliğe neden olarak sekonder enfeksiyon, lenfoma, kanser ve nöropati oluşumuna öncülük ettiği belirtilmiştir (**Hartmann ve ark 2015**). Birçok vakada FIV belirgin klinik olumsuzluklara neden olmadan kedilerde uzun süre bulunabilir (**Hartmann ve ark 2015**). Hastalığın etkin bir tedavi şekli bulunmamaktadır (**Horzinek ve ark 2013**). Ancak sistemik antiviral olarak zidovudin (5–10 mg/kg, PO, BID), sekonder enfeksiyonları önlemek için antibiyotik (**Hartmann 2015**) ve rFeIFNΩ kullanılabilir (**Canbar ve Yazar 2020a**). rFeIFNΩ temin edilemediği durumda ise rHuIFNα kullanılabilir (**Canbar ve Yazar 2020b**). Ağır vakalarda pleriksafor (0.5 mg/kg, SC, BID) tek başına veya zidovudin (5–10 mg/kg, PO, BID) ile birlikte kullanılabilir (**Hartmann 2015, Hartmann ve ark 2015**). Pleriksafor kullanılan kedilerde virüs yükünün azaldığı ve yan etki olarak kan kalsiyum ile magnezyum düzeylerinde düşmelere neden olduğu ifade edilmiştir. Zidovudin kullanılan kedilerde de virüs yükünün azaldığı, stomatitisin iyileştiği, nörolojik bozuklukları düzeldiği, hayat kalitelerinin arttığı ve hayatta kalma süresinin uzadığı ifade edilmiştir. Ancak yan etki olarak kemik iliğine baskı

yaptığı için anemiye neden olabilmektedir. Tedavide zidovudin kullanılan kedilerde 3 hafta sonra hemotokrit değerin yarı yarıya düşebileceği, ancak daha sonrasında tedaviye ara verilmeksizin normale döndüğü ifade edilmiştir. Hemotokrit değer %20 altına düşerse tedaviye ara verilmesi gerektiği, hastaların birkaç gün içinde normal hemotokrit değerlere döndüğü belirlenmiştir. Nadir görülen yan etkiler ise kusma ve iştah kaybıdır (**Hartmann ve ark 2015**). Gelişen anemiye karşı human eritropoietin (100 IU/kg, SC, iki günde bir) kullanımının alyuvar ve akyuvar sayısını artırdığı belirlenmiştir (**Hosie ve ark 2009**).

2.6.Kedilerin Enfeksiyöz Peritonitisi

Etken olarak Feline infectious peritonitis virüs (Feline Corona Virüs, FIPV) tanımlanmaktadır (**Izes ve ark 2020**). Feline enfeksiyöz peritonitis (FIP) 3 yaş altı kedilerin önemli viral enfeksiyonları arasında sayılır ve ölüme neden olma oranı %0.3-1.3 olarak tahmin edilmektedir. Klinik olarak zayıflama, iştah kaybı, inatçı ateş, anemi ve durgunluk gözlenir. Hastalığın ıslak/effusive formunda karın veya göğüs boşluğunda sıvı birikimi, solunum güçlüğü ve abdominal gerginlik gözlenir. Kuru/noneffusive formunda lenf yumrularında büyüme, nörolojik bozukluklar, karaciğer ve böbreklerde hasatlıklar gözlenir (**Anonim 2021b**). Enfeksiyonun belirgin bir tedavi şekli bulunmamaktadır. Tedavide farklı yaklaşımlar bulunmaktadır. Bu amaçla antiviral ilaçlar (rHuIFNα), antibiyotikler (klindamisin, sefovesin, koamoksilav, metronidazol), nonsteroid antiinflamatuar ilaçlar (meloksikam) veya glikokortikoidler (prednizolon, deksametazon) uygulanabilmektedir (**Chang ve ark 2017, Addie 2018, Andrew 2000**). Bütün viral enfeksiyonlarda olduğu gibi genel olarak semptomatik tedavi (antibiyotik, vs) düşünülebilir (**Pedersen 2021**).

2.7.Kedilerde İnfluenza A Virüs Enfeksiyonu

Etken Influenza A virus olarak tanımlanır (**Horzinek ve ark 2013**). Kedilerde sıklıkla 5 alt tür (H3N8, H3N2, H7N2, H5N1, H1N1) etken olarak enfeksiyona neden olabilmektedir (**Borland ve ark 2020**). Etken kedilerde subklinik enfeksiyondan, ölüme kadar gidebilen sonuçlara neden olabilmektedir. Etken ağızdan veya enfekte kanatlıların yenmesi ile bulaşır (**Horzinek ve ark 2013**). Enfeksiyonun belirgin bir tedavi şekli bulunmamaktadır. Ancak geniş spektrumlu antibiyotikler ve destek tedaviler hastalığın şiddetini azaltabilmektedir (**Babatunde ve Oladimeji 2018**). rHuIFNα'nın kedilerde birçok viral enfeksiyonun tedavisinde kullanıldığı düşünüldüğünde (**Canbar ve Yazar 2020b**), doğrudan kullanımı ile ilgili kaynağa erişilememekle birlikte tedavide uygulanabilir.

3.SONUÇ VE ÖNERİLER

- Viral enfeksiyonlar bütün canlı türlerinde olduğu gibi kedilerde de sıklıkla gözlenmektedir. Kedilerin ise viral etkenlere karşı duyarlılığı oldukça fazladır.
- Veteriner hekimlikte ise kediler için ruhsatlı tek antiviral ticari ürün rFeIFNΩ'dır. Ürünün günümüzde Türkiye'de satışı ruhsatlandırılmamıştır. Sonraki dönemlerde ruhsatlanma ihtimali bulunmaktadır.
- Beşeri hekimlikte sistemik kullanıma uygun ruhsatlı birçok antiviral ilaç bulunmaktadır. Bu ilaçlar genellikle köpeklerde de uygulama alanı bulur. Ancak kedilerde bu ilaçların çoğunun sistemik kullanımı ölümcül yan etkilere neden olabilmektedir. Bu ilaçların lokal ticari formları ise kedilerde kullanılabilmektedir.
- Viral enfeksiyonların tedavisinde destek tedavilere çok daha fazla dikkat edilmelidir.
- İnsanlar ve diğer hayvan türlerinde de olduğu gibi viral enfeksiyonlarda tedaviden daha çok aşılamaya dikkat edilmelidir.

TEŞEKKÜR

Bilimsel katkılarından dolayı Prof. Dr. Enver Yazar'a teşekkür ederim.

KAYNAKLAR

1. Addie DD, 2018. Feline infectious peritonitis (FIP) treatment. https://d12geb6i3t2qxg.cloudfront.net/webinar_resources/1dbad80d-49af-4791-aab1-1291fd693745.pdf, Erişim tarihi:23.07.21.
2. Andrew SE, 2000. Feline infectious peritonitis. Vet Clin North Am Small Anim Pract, 30, 987-1000.
3. Anonim 2021a. Feline calicivirus infection, http://www.millikenanimalclinic.com/wp-content/uploads/2016/11/feline_calicivirus_infection.pdf, erişim tarihi:22.07.21.
4. Anonim 2021b. FIP cats treated with new antiviral drugs in clinical trials go into remission, https://www.purinaproclub.com/sites/g/files/auxxlc346/files/2019-02/CatUpdate_Spr2019.pdf, erişim tarihi:22.07.21.
5. Awad RA, Hassan SA, Martens B, 2019. Treatment of Feline panleukopenia virus infection in naturally infected cats and its assessment. J Biol Sci, 19, 155-160.
6. Awad RA, Khalil WKB, Attallah AG, 2018. Epidemiology and diagnosis of feline panleukopenia virus in Egypt: Clinical and molecular diagnosis in cats. Veterinary World, 11, 578-584.
7. Babatunde DO, Oladimeji OD, 2018. A review: canine and feline influenza. AJVS, 56, 25-32.
8. Barrs VR 2019. Feline Panleukopenia: A Re-emergent Disease. Vet Clin North Am Small Anim Pract, 49, 651-670.
9. Borland S, Gracieux P, Jones M, Mallet F, Yugueros-Marcos J, 2020. Influenza A virus infection in cats and dogs: a literature review in the light of the “one health” concept. Frontiers in Public Health, 8, 83.
10. Caddy S, 2014. Efficacy of veterinary antivirals in small animals. https://www.vettimes.co.uk/app/uploads/wp-post-to-pdf-enhanced-cache/1/efficacy-of-veterinary-antivirals-in-small-animals.pdf, erişim tarihi:23.07.21.
11. Canbar R, Yazar E, 2020a. Kedi ve köpeklerde recombinant feline interferon omega kullanımı. 2. Uluslararası Gıda, Tarım ve Veteriner Bilimleri Kongresi, 29 Şubat - 1 Mart, Konya, Türkiye.
12. Canbar R, Yazar E, 2020b. Kedi ve köpeklerde human interferon alfa kullanımı: Mini derleme. İzmir Demokrasi Üniversitesi, Uluslararası Sağlık Bilimleri Kongresi, 20-21 Haziran, İzmir, Türkiye.
13. Chang CY, Kuo SH, Peng YW, Lin CH, Lee YK, Chen YC, Chang HW, 2017. Diagnosis and treatments of feline infectious peritonitis: an update. Taiwan Vet J, 43, 1–9.
14. Coskun D, Yazar E, 2020. Kedi ve köpeklerde pradofloksasin kullanımı. Mas 13th International European Conference Mathematics, Engineering, Natural & Medicals Sciences, October 23 – 25, Faryap University, Afghanistan.
15. Dal Pozzo F, Thiry E, 2014. Antiviral chemotherapy in veterinary medicine: current applications and perspectives. Rev Sci Tech Off Int Epiz, 33, 791-801.
16. Eaton JS 2021. Focus on the feline: the idiosyncratic cat eye and how to deal with it. https://www.cuvs.org/sites/default/files/inline-files/1-2%20Eaton%20-%20The%20Idiosyncratic%20Cat%20Eye.pdf, erişim tarihi:11.07.21.
17. Gould D, 2011. Feline herpesvirus-1: Ocular manifestations, diagnosis and treatment options. J Feline Med Surg 13, 333–346.
18. Hartmann, K. 1998. Feline immunodeficiency virus infection: an overview. Vet J, 155, 2, 123-137.

19. Hartmann K, 2015. Efficacy of antiviral chemotherapy for retrovirus-infected cats: What does the current literature tell us? J Feline Med Surg, 17, 925–939.

20. Hartmann K, Wooding A, Bergmann M, 2015. Efficacy of antiviral drugs against feline immunodeficiency virus. Vet Sci, 2, 456-476.

21. Hartmann, K, Hofmann-Lehmann, R. 2020. What's new in feline leukemia virus infection. Veterinary Clinics: Small Anim Prac, 50, 5, 1013-1036.

22. Horzinek MC, Addie D, Belak S, Boucraut-Baralon C, Egberink H, Frymus T, Gruffydd-Jones T, Hartmann K, Hosie MJ, Lloret A, Lutz H, Marsilio F, Mostl K, Pennisi MG, Radford AD, Thiry E, Truyen U, 2013. Update of the 2009 guidelines on prevention and management of feline infectious diseases. J Feline Med Surg, 15, 530–539.

23. Hosie MJ, Addie D, Belak S, Boucraut-Baralon C, Egberink H, Frymus T, Gruffydd-Jones T, Hartmann K, Lloret K, Lutz H, Marsilio F, Pennisi MG, Radford AD, Thiry E, Truyen U, Horzinek MC, 2009. Feline immunodeficiency. ABCD guidelines on prevention and management. J Feline Med Surg, 11, 575-584.

24. Izes AM, Yu J, Norris JM, Govendir M, 2020. Current status on treatment options for feline infectious peritonitis and SARS-CoV-2 positive cats. Vet Q, 40, 322–330.

25. Little S, Levy J, Hartmann K, Hofmann-Lehmann R, Hosie M, Olah G, St Denis K, 2020. 2020 AAFP feline retrovirus testing and management guidelines. J Feline Med Surg, 22, 5–30.

26. Park J, Suh S, Hyun C, 2015. Virulent systemic feline calicivirus ınfection in a kitten. J Vet Clin, 32, 445-448.

27. Pedersen N, 2021. FIP treatment, https://ccah.vetmed.ucdavis.edu/sites/g/files/dgvnsk4586/files/inline-files/FIP%20Treatment.pdf, erişim tarihi:23.07.21.

28. Radford, A. D, Coyne, K. P, Dawson, S, Porter, C. J, Gaskell, R. M. 2007. Feline calicivirus. Vet Res, 38, 319-335.

29. Radford, A. D, Addie, D, Belák, S, Boucraut-Baralon C, Egberink, H, Frymus, Gruffydd-Jones T, Hartmann K, Hosie M. J, Lloret A, Lutz H, Marsilio F, Pennisi M.G, Thiry E, Truyen U, Horzinek, M. C 2009. Feline calicivirus infection: ABCD guidelines on prevention and management. J Feline Med Surg, 11, 7, 556-564.

30. Rollinson EA, 1992. Prospects for antiviral chemotherapy in veterinary medicine: 1. Feline virus diseases. Antiviral Chemistry& Chemotherapy, 3, 249-262.

31. Thiry, E, Addie, D, Belák, S, Boucraut-Baralon C, Egberink H, Frymus T, Gruffydd-Jones T, Hartmann K, Hosie M. J, Lloret A, Lutz H, Marsilio F, Pennisi M.G, Radford, A. D, Truyen U, Horzinek, M. C 2009. Feline herpesvirus infection. ABCD guidelines on prevention and management. J Feline Med Surg, 11, 7, 547-555.

32. Truyen U, Addie D, Belak S, Boucraut-Baralon C, Egberink H, Frymus T, Gruffydd-Jones T, Hartmann K, Hosie MJ, Lloret A, Lutz H, Marsilio F, Pennisi MG, Radford AD, Thiry E, Horzinek MC, 2009. Feline panleukopenia. ABCD guidelines on prevention and management. J Feline Med Surg, 11, 538-546.

33. Yazar E, 2018. Veteriner İlaç ve Aşı A'dan Z'ye. Nobel Tıp Kitabevleri, Istanbul, Türkiye.

OTİZM VE ALFA-SİNÜKLEİN İLİŞKİSİ

RELATIONSHIP BETWEEN AUTISM AND ALPHA-SYNUCLEIN

Mukaddes BADILLI

Erciyes Üniversitesi, Gevher Nesibe Genom ve Kök Hücre Enstitüsü, Moleküler Biyoloji ve Genetik Anabilim Dalı, Kayseri

ORCID NO: 0000-0002-6401-2727

Reyhan TAHTASAKAL

Erciyes Üniversitesi Tıp Fakültesi Tıbbi Biyoloji Anabilim Dalı, Kayseri

ORCID NO: 0000000213470939

Şeyda Nur PİRENCİOĞLU

Erciyes Üniversitesi, Gevher Nesibe Genom ve Kök Hücre Enstitüsü, Moleküler Biyoloji ve Genetik Anabilim Dalı, Kayseri

ORCID NO: 0000-0002-8606-4472

Mürşide ŞAHİN

Erciyes Üniversitesi Tıp Fakültesi Çocuk ve Ergen Ruh Sağlığı ve Hastalıkları Anabilim Dalı, Kayseri

ORCID NO: 0000-0002-9719-2920

Emre TUĞHAN

Erciyes Üniversitesi, Gevher Nesibe Genom ve Kök Hücre Enstitüsü, Moleküler Biyoloji ve Genetik Anabilim Dalı, Kayseri

ORCID NO: 0000-0003-1297-9167

Fatma DAL

Erciyes Üniversitesi Genom ve Kök Hücre Merkezi

ORCID NO: 000000032035398

Esra DEMİRCİ

Erciyes Üniversitesi Tıp Fakültesi Çocuk ve Ergen Ruh Sağlığı ve Hastalıkları Anabilim Dalı, Kayseri

ORCID NO: 0000-0002-8424-4947

Elif Funda ŞENER

Erciyes Üniversitesi Tıp Fakültesi Tıbbi Biyoloji Anabilim Dalı, Kayseri / Erciyes Üniversitesi Genom ve Kök Hücre Merkezi

ORCID NO: 0000-0002-5644-5442

ÖZET

Otistik Spektrum Bozukluğu (OSB), anormal davranışın gözlemlenmesi, sosyal iletişim ve etkileşimin bozulmasına odaklanan kriterler ve kısıtlı, tekrarlayan davranış biçimleri, ilgi alanları veya faaliyetlerle karakterize bir bozukluktur. Etiyolojisi çok karmaşık olmakla birlikte genetik ve çevresel faktörlerin rol oynadığı bilinmektedir. OSB'nin yaygınlığı, son yirmi yılda istikrarlı bir şekilde artmasına rağmen, günümüzde otizmin altında yatan patofizyolojik ve genetik mekanizmalar henüz tam olarak anlaşılamaması, konu ile ilgili bilinmeyenler, hastalığın tedavisini etkileyen ve zorlaştıran en önemli faktörler olmaktadır. Alfa Sinüklein geni (*SNCA*), insan kromozomu 4 üzerinde bulunur ve

alfa-sinüklein proteinini kodlar. Alfa-sinüklein, beyin presinaptik terminallerinde yüksek derecede eksprese olan bir proteindir ancak fonksiyonu pek bilinmemektedir. Yapılan bazı çalışmalar, dopaminerjik nöronların nörotransmiter salınımının, sinaptik fonksiyonunun ve plastisitesinin düzenlenmesinde alfa-sinükleinin anahtar rolü olduğunu göstermiştir. Alfa-sinükleinin hücre nükleusunda histonlar, transkripsiyon faktörleri gibi nükleer proteinler ve çeşitli promotorlar ile etkileşerek gen ekspresyonunu modüle edebileceği öne sürülmüştür. Alfa-sinüklein (*SNCA*) geni ve protein seviyesinin otizme olan etkisi ve bu hastalıktaki biyolojik rolü henüz tam olarak aydınlatılamamıştır. Bu çalışmanın amacı otizm tanılı hastalarda serum alfa sinüklein seviyesini belirleyerek sağlıklı kontrollere göre ekspresyon farklılığı olup olmadığını ortaya koymaktır.

Anahtar Kelimeler: Otizm, Otistik Spektrum Bozukluğu, Alfa Sinüklein, ELISA, *SNCA*

ABSTRACT

Autistic Spectrum Disorder (ASD) is a disorder characterized by observing abnormal behavior, criteria focusing on impaired social communication and interaction, and restricted, repetitive patterns of behavior, interests, or activities. Although its etiology is very complex, it is known that genetic and environmental factors play a role. Although the prevalence of ASD has increased steadily in the last two decades, the pathophysiological and genetic mechanisms underlying autism are not yet fully understood, and the unknowns are the most important factors affecting and complicating the treatment of the disease. The Alpha Synuclein gene (*SNCA*) is located on human chromosome 4 and encodes the alpha-synuclein protein. Alpha-synuclein is a protein highly expressed at brain presynaptic terminals, but its function is not well known. Some studies have shown that alpha-synuclein plays a key role in the regulation of neurotransmitter release, synaptic function and plasticity of dopaminergic neurons. It has been suggested that alpha-synuclein can modulate gene expression by interacting with histones, nuclear proteins such as transcription factors, and various promoters in the cell nucleus. The effect of alpha-synuclein (SNCA) gene and protein level on autism and its biological role in this disease have not been fully elucidated yet. The aim of this study is to determine the serum alpha-synuclein level in patients with autism and to reveal whether there is an expression difference compared to healthy controls.

Keywords: Autism, Autism Spectrum Disorder, Alpha Synuclein, ELISA, *SNCA*

1. GİRİŞ

Otizm spektrum bozukluğu (OSB), erken çocukluk döneminde başlayan ve yaşam boyu süren nörolojik ve gelişimsel bir durum olmaktadır [1]. Anormal davranışın gözlemlenmesi, sosyal iletişim ve etkileşimin bozulmasına odaklanan kriterler ve kısıtlı, tekrarlayan davranış biçimleri, ilgi alanları veya faaliyetlerle tanının temelini oluşturmaktadır [2]. Semptomların şiddeti çok fazla değişkenlik göstermektedir ve genellikle, epilepsi, anksiyete, uyku, gastrointestinal bozukluklar ve özellikle zihinsel engellilik ile birleşmektedir [3]. Etiyolojisi çok karmaşık olmakla birlikte genetik ve çevresel faktörlerin rol oynadığı bilinmektedir [4]. Otizmin genomdan güçlü bir şekilde etkilendiği bilinmektedir - daha önceki spekülasyonların aksine, genetik geçiş tahminleri genellikle ~%50 veya %55'tir [5]. OSB etiyolojisinde genetiğin katkısını destekleyen kanıtlar, etkilenen monozigotik ikiz çalışmalarından gelmektedir. Daha yakın tarihli araştırmalar, monozigotik ikizlerde %88, dizigotik ikizlerde %31 ve kardeşlerde %18.7 uyum oranları ile OSB'de yüksek bir nüks oranı göstermiştir [6]. Sonuç olarak OSB, çoklu ailesel kalıtım kalıpları ve potansiyel olarak dahil olan 1000'e kadar aday gen tahmini ile güçlü ve karmaşık bir genetik bileşene sahip olmaktadır [7].

OSB'ye katkıda bulunan genler, sinaptik yapı ve fonksiyon, hücre içi sinyalleşme, transkripsiyon regülasyonu ve kromatin yeniden şekillenmesi dahil olmak üzere beyin gelişimi ile ilgili çeşitli biyolojik fonksiyonlarda yer almaktadır [8]. Otizm spektrum bozukluğuna katkıda bulunan genlerin ve genomik bölgelerin tanımlanmasındaki son gelişmeler, bir dizi psikiyatrik bozukluk için genetik riskin doğasını ve OSB'nin biyolojisini anlamamız üzerinde geniş bir etkiye sahiptir [9]. Bugüne kadar yapılan epidemiyolojik çalışmalar OSB sıklığının dünya nüfusunun %1'in üzerinde olduğunu rapor etmiştir.

Ancak yakın dönemdeki epidemiyolojik çalışmaların sonucunda OSB prevalansının yaklaşık olarak 36 çocukta 1 olduğu tahmin edilmektedir [10]. α-Sinüklein (a-Syn, alfa-sinüklein), yaklaşık 30 yıl önce keşfedilen 140 amino asitli bir proteindir. Bu proteini kodlayan gen, insanlarda kromozom 4 üzerinde bulunur ve genomda yaklaşık 114 kb'lik bölgeyi kapsar [11].

SNCA geni tarafından kodlanan α-sinüklein, genel olarak üç alana ayrılan14 kDa'lık bir polipeptiddir [12]. α-sinüklein, beyin presinaptik terminallerinde yüksek derecede eksprese olan bir proteindir ancak fonksiyonu pek bilinmemektedir. Hücrede histonlar, transkripsiyon faktörleri gibi nükleer proteinler ile etkileşerek gen ekspresyonunu modüle edebileceği öne sürülmüştür [13]. α-sinüklein (α-Syn), üç alandan oluşan 140 amino asitli bir proteindir: N-terminal amfipatik alan, amiloidojenik olmayan bileşen (bir hidrofobik çekirdek içerir) ve C-terminal asidik alan. KTKEGV kusurlu tekrarları, amfipatik alan ve insan α-Syn'in amiloidojenik olmayan bileşeni boyunca uzanır. Bu tekrarlar, amiloidojenik olmayan bileşenle birlikte, lipidlerle etkileşime giren iki α-helis oluşumundan sorumludur. Parkinson hastalığı (PD) ile ilgili mutasyonların (A30P, E46K, H50Q, G51D, A53T ve A53E) tümü amfipatik alanda bulunmaktadır [14]. Son zamanlarda yapılan bir dizi çalışma, hücre dışı α-sinükleinin hücre yüzeyi reseptörleri için spesifik bir ligand görevi gördüğünü ileri sürmektedir.

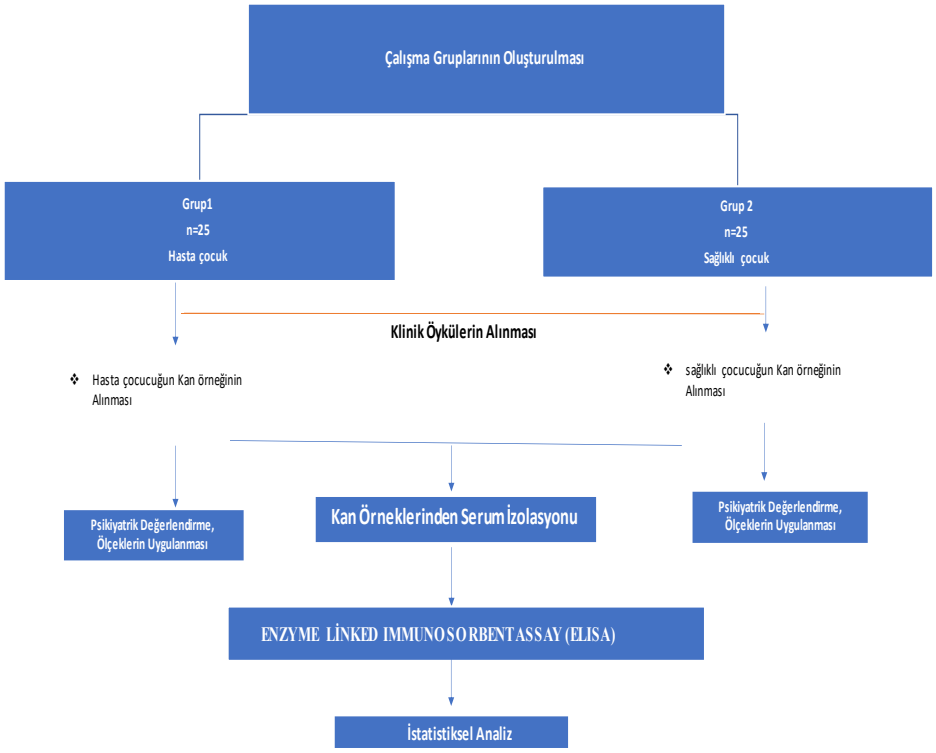
Hücre yüzeyi reseptörlerine bağlanan oligomerik α-sinüklein, sinyalin hücrelere iletilmesini indükler ve $Ca2^{+}$ düzensizliği, sinaptik işlev bozukluğu, nörodejenerasyon, bilişsel eksiklik vb. dahil olmak üzere çeşitli biyokimyasal ve fizyolojik reaksiyonlara neden olmaktadır [15]. Bu bulgular, α-sinüklein'in çoklu sinyal yollarına müdahale ederek nörodejenerasyondan sorumlu olduğunu göstermektedir. α-sinüklein genindeki (*SNCA*) tek nokta mutasyonları, duplikasyonları ve triplikasyonun otozomal dominant Parkinson hastalığı (PD) formlarıyla bağlantılı olması, tabloyu daha da karmaşıklaştırmaktadır [16]. Genetik kanıtlar, alfa sinüklein'in PD ve ilgili bozukluklarda nedensel bir rol oynayabileceği fikrini desteklemektedir. SNCA geninin nokta mutasyonları PD veya nörolojik bozukluklara yol açmaktadır [17]. Biyolojik sıvılarda (kan serumu veya plazma ve beyin omurilik sıvısı) α-sinüklein oligomerlerinin tespiti, PD'de bir biyobelirteç olarak kullanım potansiyeli nedeniyle özellikle ilgi çekmektedir [18]. α-sinüklein mutasyona uğradığında veya aşırı eksprese edildiğinde, ekzositoz, ER-Golgi taşınması, ER stresi, Golgi homeostazı, endositoz, otofaji, oksidatif stres ve diğerleri dahil olmak üzere çeşitli membran bozukluklarını ve stres yollarını etkilemektedir [19].

α-sinüklein (*SNCA*) geni ve protein seviyesinin otizme olan etkisi ve bu hastalıktaki biyolojik rolü henüz tam olarak aydınlatılamamıştır. Bu çalışmanın amacı; otizm tanılı hastalarda serum α-sinüklein seviyesini belirleyerek sağlıklı kontrollere göre ekspresyon farklılığı olup olmadığını ortaya koymaktır.

2. YÖNTEM

Hastaların toplanması

Bu çalışmada DSM-V tanı kriterlerine göre OSB tanısı konulan 25 hasta ve 25 sağlıklı kontrol üzerinde araştırma yapılmıştır. Erciyes Üniversitesi Tıp Fakültesi Dahili Tıp Bilimleri Çocuk ve Ergen Ruh Sağlığı ve Hastalıkları polikliniğine başvuran, yeni tanı almış, ilaç kullanmayan, psikiyatrik ek tanısı bulunmayan, bilinen nörolojik, endokrinolojik ya da metabolik rahatsızlığı olmayan, 2-12 yaşları aralığında her iki cinsiyetten DSM-5 kriterlerine göre OSB tanısı konulmuş 25 hasta dahil edildi. Kontrol grubu için de 2-12 yaşları arasında her iki cinsiyetten 25 çocuk dahil edildi. Tedaviye başlamadan önce rutin kontroller esnasında her katılımcıdan EDTA'lı tüplere 3 ml kan örneği alındı. Alınan kanlar hemen çalışılmak üzere Genom ve Kök Hücre Merkezi'ne transfer edildi. Çalışmaların tamamı Erciyes Üniversitesi Genom ve Kök Hücre Merkezi'nde (GENKÖK) yapıldı (Şekil 1).



Şekil 1. Çalışma planının oluşturulması.

Serum İzolasyonu ve ELISA

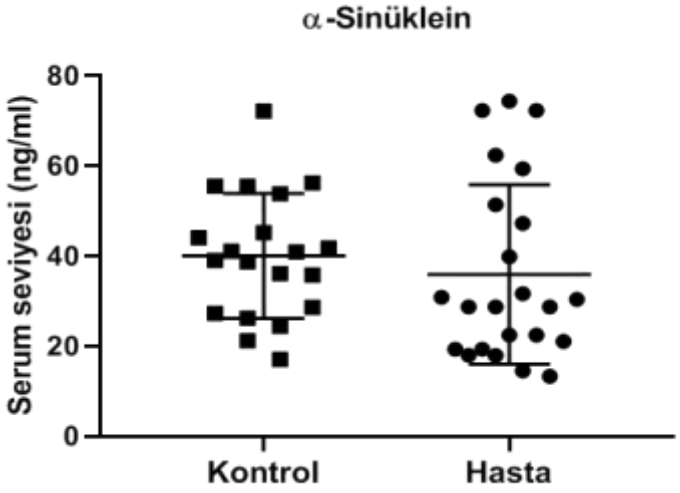
Hasta ve kontrollerden alınan kan örneklerinden serum izolasyonu yapıldı. İleri çalışmalar yapılana kadar tüm örnekler –80°C'de saklandı. Tüm katılımcılardan elde edilen serumlarından SNCA protein miktarını belirlemek için ELISA yöntemi kullanıldı.

İstatistiksel Analiz

Verilerin normal dağılıma uygunluğu histogram, q-q grafikleri ve Shapiro-Wilk testi ile değerlendirildi. İkili gruplar arası karşılaştırmalarda nicel değişkenler için bağımsız iki örneklem t testi kullanıldı. İstatistiksel anlamlılık için p değeri 0.05 altı kabul edildi. Grafiklerin hazırlanmasında Graphpad 8.0 programı kullanıldı.

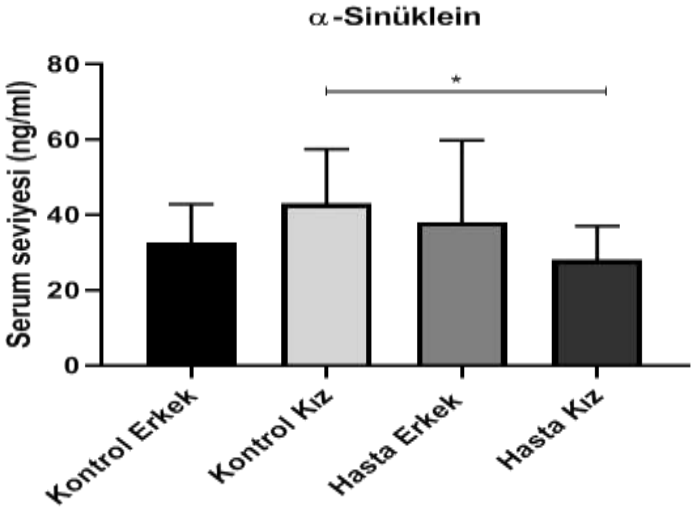
3. SONUÇ

OSB tanılı hastalarda serum α-sinüklein seviyesi sağlıklı kontrollerle karşılaştırıldığında hastalarda α-sinüklein azalsa da bu farklılık anlamlı değildir (n=25, p=0.4458) (Şekil 2).



Şekil 2. Hasta ve kontrollerde serum α-sinüklein seviyesi.

OSB tanılı erkek hastalarda serum α-sinüklein seviyesi sağlıklı erkek kontrollerle karşılaştırıldığında farklılık anlamlı değilse de hafif bir artış olduğu gözlenmiştir (p=0.5725). OSB tanılı kız hastalarda serum α-sinüklein seviyesi sağlıklı kız kontrollerle karşılaştırıldığında ise farklılık anlamlıdır ve azalış göstermektedir (p=0.0450) (Şekil 3).



Şekil 3. Cinsiyete göre serum α-sinüklein seviyesi.

4.TARTIŞMA

α-sinüklein çeşitli fonksiyonlara sahip sinaptik bir protein olarak görev yapmaktadır ve otizmdeki rolü net olarak ortaya konmamıştır. Literatürde OSB'li hastalarda α-sinüklein seviyesinin düşük olduğu çalışmalara ek olarak yüksek olduğunu bildiren çalışmalar da mevcuttur. Bu nedenle de bu noktayı aydınlatacak çalışmalar yapılması gerektiği düşünülmektedir.

Biz de çalışmamızda genel hasta populasyonunda düşük α-sinüklein seviyesi olduğunu bulduk. Ayrıca cinsiyetler arasındaki farklanmanın daha belirgin ve anlamlı farklılık gösterdiğini de belirledik. Bulgularımıza dayanarak, diğer çalışmalarda serum dışında plazma ve tükürük örneklerinin kullanıldığı araştırmalar da yapılmıştır. Bu nedenle alfa-sinükleinin otizmdeki rolünün net olarak belirlenebilmesi için daha geniş çapta yapılacak araştırmalara ihtiyaç vardır. Ek olarak alfa-sinüklein seviyesini etkileyen *SNCA* gen ekspresyonunun da bu araştırmalara dahil edilmesi ilgili proteinin

seviyesine açıklık getirmesi bakımından yararlı olacaktır. Otizmdeki erkek baskın görülme sıklığı nedeniyle çalışmalarda cinsiyet farklılığının da ele alınması gerektiği düşünülmektedir.

TEŞEKKÜR

Bu çalışma Erciyes Üniversitesi Bilimsel Araştırma Projeleri Birimi tarafından (TYL-2021-10996) desteklenmektedir.

KAYNAKLAR

1. Shen L, Zhao Y, Zhang H, et al. Advances in Biomarker Studies in Autism Spectrum Disorders. In: *Advances in Experimental Medicine and Biology*. Vol 1118. Springer New York LLC; 2019:207-233. doi:10.1007/978-3-030-05542-4_11
2. Masi A, DeMayo MM, Glozier N, Guastella AJ. An Overview of Autism Spectrum Disorder, Heterogeneity and Treatment Options. *Neurosci Bull*. 2017;33(2):183-193. doi:10.1007/s12264-017-0100-y
3. Cheroni C, Caporale N, Testa G. Autism spectrum disorder at the crossroad between genes and environment: Contributions, convergences, and interactions in ASD developmental pathophysiology. *Mol Autism*. 2020;11(1):1-18. doi:10.1186/s13229-020-00370-1
4. Wiśniowiecka-Kowalnik B, Nowakowska BA. Genetics and epigenetics of autism spectrum disorder—current evidence in the field. *J Appl Genet*. 2019;60(1):37-47. doi:10.1007/s13353-018-00480-w
5. Meltzer A, Van De Water J. The Role of the Immune System in Autism Spectrum Disorder. *Neuropsychopharmacology*. 2017;42(1):284-298. doi:10.1038/npp.2016.158
6. Fakhoury M. Imaging genetics in autism spectrum disorders: Linking genetics and brain imaging in the pursuit of the underlying neurobiological mechanisms. *Prog Neuro-Psychopharmacology Biol Psychiatry*. 2018;80:101-114. doi:10.1016/j.pnpbp.2017.02.026
7. Ramaswami G, Geschwind DH. *Genetics of Autism Spectrum Disorder*. Vol 147. 1st ed. Elsevier B.V.; 2018. doi:10.1016/B978-0-444-63233-3.00021-X
8. Hyman SL, Levy SE, Myers SM. CLINICAL REPORT Guidance for the Clinician in Rendering Pediatric Care Identification, Evaluation, and Management of Children With Autism Spectrum Disorder. doi:10.1542/peds.2019-3447
9. Freitag CM. Genetic findings in autism spectrum disorders. *Nervenarzt*. 2017;88(7):760-764. doi:10.1007/s00115-017-0351-x
10. Sharma SR, Gonda X, Tarazi FI. Autism Spectrum Disorder: Classification, diagnosis and therapy. *Pharmacol Ther*. 2018;190:91-104. doi:10.1016/j.pharmthera.2018.05.007
11. Guhathakurta S, Bok E, Evangelista BA, Kim YS. Deregulation of α-synuclein in Parkinson's disease: Insight from epigenetic structure and transcriptional regulation of SNCA. *Prog Neurobiol*. 2017;154:21-36. doi:10.1016/j.pneurobio.2017.04.004
12. D'onofrio M, Munari F, Assfalg M. Alpha-synuclein—nanoparticle interactions: Understanding, controlling and exploiting conformational plasticity. *Molecules*. 2020;25(23). doi:10.3390/molecules25235625
13. Dułak D, Gadzała M, Banach M, Konieczny L, Roterman I. Alternative structures of α-synuclein. *Molecules*. 2020;25(3):1-22. doi:10.3390/molecules25030600
14. Yeniçeri M. Mitokondriyal Disfonksiyon ve Otizm. *Sak Med J*. Published online 2020. doi:10.31832/smj.618624
15. Surguchev AA, Emamzadeh FN, Surguchov A. Cell responses to extracellular α-synuclein.

Molecules. 2019;24(2):1-8. doi:10.3390/molecules24020305

16. Ottolini D, Calí T, Szabò I, Brini M. Alpha-synuclein at the intracellular and the extracellular side: Functional and dysfunctional implications. *Biol Chem*. 2017;398(1):77-100. doi:10.1515/hsz-2016-0201

17. Brundin P, Dave KD, Kordower JH. Therapeutic approaches to target alpha-synuclein pathology. *Exp Neurol*. 2017;298(October):225-235. doi:10.1016/j.expneurol.2017.10.003

18. Bengoa-Vergniory N, Roberts RF, Wade-Martins R, Alegre-Abarrategui J. Alpha-synuclein oligomers: a new hope. *Acta Neuropathol*. 2017;134(6):819-838. doi:10.1007/s00401-017-1755-1

19. Wang T, Hay JC. Alpha-synuclein toxicity in the early secretory pathway: How it drives neurodegeneration in parkinsons disease. *Front Neurosci*. 2015;9(NOV):1-8. doi:10.3389/fnins.2015.00433

ANESTHESIA MANAGEMENT IN COVID 19 + PATIENT WITH GLUCOSE-6-PHOSPHATE DEHYDROGENASE DEFICIENCY: CASE REPORT

ESRA TURUNÇ
OndokuzMayis University, Faculty of Medicine, Department of Anesthesiology and Reanimation, Samsun, Turkey.

ORCID ID: https://orcid.org/0000-0003-0159-7403

İLKE TAMDOĞAN

GRU Kadın Doğum ve Çocuk Hastanesi, Department of Anesthesiology and Reanimation, Giresun, Turkey.

ORCID ID: 0000-0002-8757-1046

ABSTRACT

Glucose-6-phosphate dehydrogenase (G6PD) deficiency is a common enzyme deficiency and is the most common cause of hemolytic anemia triggered by drugs or infectious diseases. General anesthesia and drugs used in the treatment of perioperative pain can induce acute hemolysis in patients with G6PD deficiency. In this case report, general anesthesia management of a COVID-19 positive patient with Glucose-6-phosphate dehydrogenase (G6PD) deficiency in our clinic is discussed. Surgery was planned for a 16-year-old male patient with the diagnosis of acute appendicitis. The patient had a covid 19 infection at this time. Surgery was performed under general anesthesia using personal protective equipment. Surgery and postoperative period were uneventful. Hemolytic problems, malignant hyperthermia or methemoglobinemia were not observed. In cases with G6PD, anesthesia should be given carefully, taking into account the agents and conditions that will trigger hemolysis.

INTRODUCTION

The enzyme glucose-6-phosphate dehydrogenase (G6PD) plays a key role in the production of antioxidants that protect cells against oxidative damage. Therefore, patients with G6PD deficiency may be vulnerable to oxidative stress factors. G6PD deficiency is a common enzyme deficiency and is the most common cause of hemolytic anemia triggered by drugs or infectious diseases. Drugs used in general anesthesia and perioperative pain treatment can induce acute hemolysis in patients with G6PD deficiency. In this case report, general anesthesia management of a COVID-19 positive patient with Glucose-6-phosphate dehydrogenase (G6PD) deficiency in our clinic is discussed.

CASE REPORT

A 16-year-old 50 kg male patient who presented to the emergency department with abdominal pain was diagnosed with acute appendicitis and an emergency operation was planned. The patient had a history of G6PD deficiency and COVID-19 infection. There was no history of drug use. No hemolytic crisis was observed during this period. Preoperative values of the patient were Hb 13.2 g/dL, Htc 39%, total bilirubin 0.57 mg/dL, LDH 354 U/L, erythrocyte 4.800/mm3 platelet 251.000/mm3 reticulocyte 5%. Electrolyte values of the patient with an INR of 0.94 mm3 were within normal limits. Hemoglobin, erythrocyte, urobilinogen and bilirubin were not observed in the urine.

The fasting period was over 6 hours. Personal protective equipment (PPE) was prepared in the room specially reserved for COVID-19 patients in the operating room, and routine monitoring (electrocardiography, pulse oximetry, noninvasive blood pressure) was applied to the patient. Considering the drugs that will trigger hemolysis in G6PD deficiency, after induction of anesthesia with

propofol 2mg/kg, remifentanil 0.2mcg/kg/h inf, and rocuronium 0.6mg/kg, endotracheal intubation was performed with a number 7 tube. Anesthesia was maintained with 50% dry air + 50% O2, 6% desflurane.

The patient, who underwent laparoscopic surgery and lasted for 60 minutes, was awakened at the end of the case by administering sugammadex 2mg/kg. Postoperative analgesia, paracetamol 10mg/kg IV and Tramadol 30mg were administered to the patient. The patient was transferred to the service without any problem and was discharged on the 10th day. No acute hemolysis was observed during this period.

DISCUSSION

The Glucose-6-Phosphate Dehydrogenase (G6PD) enzyme plays a role in the antioxidant mechanism that protects cells against oxidative damage by catalyzing the first step in the pentose phosphate pathway, and in enzyme deficiency, erythrocytes lose their ability to protect against many oxidative stresses(1).

The highest prevalence of G6PD has been reported in Africa, southern Europe, the Middle East, Southeast Asia, and central and southern Pacific islands; however, G6PD deficiency has become a worldwide disease(2). Numerous drugs, infections, and metabolic conditions have been shown to cause acute hemolysis of red blood cells in the G6PD-deficient patient with the occasional need for blood transfusions(3).

In high-risk patients, hemolysis becomes evident after 1-3 days and anemia worsens for up to one week. Acute hemolysis is usually self-limited, in rare cases it can be severe enough to require blood transfusion(4). Symptoms of hemolysis include cyanosis, headache, lethargy, fatigue, tachycardia, dyspnea, lumbar/substernal pain, splenomegaly, abdominal pain, hemoglobinuria, and/or scleral icterus. RBC fragments such as schistocyte and reticulocytes and Heinz bodies can be seen on peripheral blood smear microscopy. The blood levels of lactate dehydrogenase and unconjugated bilirubin rise and the haptoglobin level falls. Hemosiderin and urobilinogen can be seen in the urine(5).

Intraoperative anesthesia management should focus on minimizing oxidative stress and monitoring and treating hemolysis. It was found that benzodiazepines, codeine/codeine derivatives, propofol, fentanyl, and ketamine did not cause hemolytic crises in the G6PD-deficient patient. The most effective management strategy is to prevent hemolysis by avoiding oxidative stress factors. Therefore, the treatment of pain and anxiety should include drugs that are safe and have not been shown to cause hemolytic crises, such as benzodiazepines, codeine/codeine derivatives, propofol, fentanyl and ketamine.

Our patient had a high risk of hemolytic crisis due to Covid 19 infection and surgical stress. In these patients, care should be taken in terms of reducing the stress caused by surgery and anesthesia, good pain control and the use of drugs that can cause hemolytic crisis. Patients should be followed under close observation against the risk of postoperative acute hemolytic crisis(6).

In the literature, it has been suggested that anesthetic agents such as halothane, ketamine, sevoflurane, prilocaine, diazem and midazolam have an effect on G6PD enzyme activity, and especially sevoflurane, isoflurane, diazem and midazolam have inhibitory effects. However, more studies on the subject are needed. In another study, it was shown that diazepam and midazolam have inhibitory effects on G6PD enzymatic activity in vitro, and isoflurane and sevoflurane increase the severity of hemolysis. Therefore, benzodiazepines were not administered in our patient during premedication and throughout the operation, and anesthesia was maintained with desflurane(7, 8).

The most effective management strategy in G6PD deficiency is to prevent hemolysis by avoiding oxidative stress factors. For this purpose, the use of antioxidant agents such as selenium or vitamin E in the preoperative period and the reduction of pain in the postoperative period are among the strategies to prevent oxidative stress. Codeine, codeine derivatives, propofol, fentanyl, and ketamine have been reported to be safe in the relief of pain and anxiety. In our case, we tried to provide good pain control in the postoperative period (8, 9).

In conclusion, inadequate management of patients with G6PD deficiency increases the risk of developing acute hemolytic anemia, which can cause various morbidity and mortality. Avoiding oxidative stress and detecting and monitoring hemolysis are key points for successful anesthetic management of such patients. In addition, there is no evidence-based consensus regarding the use of anesthetic agents in patients with G6PD deficiency.

Keywords: Glucose-6-Phosphate Dehydrogenase Deficiency, Anesthesia, Covid19

REFERENCES

1. Glader B, Lukens J. Glucose-6-phosphate dehydrogenase deficiency and related disorders of hexose monophosphate shunt and glutathione metabolism. Wintrobe's clinical hematology 10th ed Baltimore: Williams & Wilkins. 2008:1176-90.
2. Nikhoma E, Poole C, Vannappagari V, Hall S, Beutler E. The Global prevalence of glucose-6-phosphate dehydrogenase deficiency: A systemic review and meta-analysis. Blood Cells Mol Dis. 2009;42:267-78.
3. Cappellini MD, Fiorelli G. Glucose-6-phosphate dehydrogenase deficiency. The lancet. 2008;371(9606):64-74.
4. Quereshy FA, Gold ES, Powers MP. Hemolytic anemia in a glucose-6-phosphate dehydrogenase-deficient patient triggered by a maxillofacial infection. Journal of oral and maxillofacial surgery. 2000;58(7):805-7.
5. Elyassi CAR, Rowshan MHH. Perioperative management of the glucose-6-phosphate dehydrogenase deficient patient: a review of literature. Anesthesia progress. 2009;56(3):86-91.
6. Smith C, Snowdon S. Anaesthesia and glucose-6-phosphate dehydrogenase deficiency: A case report and review of the literature. Anaesthesia. 1987;42(3):281-8.
7. Altikat S, Çiftçi M, Buyukokuroglu M. In vitro effects of some anesthetic drugs on enzymatic activity of human red blood cell glucose 6-phosphate dehydrogenase. Polish journal of pharmacology. 2002;54(1):67-72.
8. Valiaveedan S, Mahajan C, Rath GP, Bindra A, Marda MK. Anaesthetic management in patients with glucose-6-phosphate dehydrogenase deficiency undergoing neurosurgical procedures. Indian journal of anaesthesia. 2011;55(1):68.
9. Youngster I, Arcavi L, Schechmaster R, Akayzen Y, Popliski H, Shimonov J, et al. Medications and glucose-6-phosphate dehydrogenase deficiency. Drug safety. 2010;33(9):713-26.

SUDDEN DEATHS DUE TO STAPHYLOCOCCUS IN POST-PARTUM SHEEP

POST-PARTUM DÖNEMİ KOYUNLARDA STAPHYLOCOCCUS KAYNAKLI ANİ ÖLÜMLER

Ali USLU

Selcuk University, Faculty of Veterinary Medicine, Department of Microbiology, Konya, TURKEY

ORCID ID: https://orcid.org/ 0000-0002-8319-831X

Oğuzhan DENİZLİ

Selcuk University, Faculty of Veterinary Medicine, Department of Microbiology, Konya, TURKEY

ORCID ID: https://orcid.org/0000-0001-6217-619X

Tuncay ÇÖKÜLGEN

Pendik Veterinary Control Institute, Department of Microbiology, Istanbul, TURKEY

ORCID ID: https://orcid.org/ 0000-0002-0455-9958

Aslı SAKMANOĞLU

Selcuk University, Faculty of Veterinary Medicine, Department of Microbiology, Konya, TURKEY

ORCID ID: https://orcid.org/ 0000-0002-7266-1049

Zafer SAYIN

Selcuk University, Faculty of Veterinary Medicine, Department of Microbiology, Konya, TURKEY

ORCID ID: https://orcid.org/0000-0001-6096-4440

ÖZET

Staphlyoccous enfeksiyonları deri enfeksiyonları ve mastitislere sebep olan enfeksiyonlar olarak görülürler. Özellikle koyunlarda gangrenöz mastitis etkeni olarak ciddi problemlere yol açmaktadırlar. Doğum sonrası anne ve yavru arasında süt emmeyle birlikte bir enfeksiyon siklusu başlamaktadır. Çalışmada ani ölümler sonrası farklı padoklarda yetiştirilen 300 koyunun bulunduğu bir işletmede ölen koyunlar mikrobiyolojik açıdan farklı zamanlarda Mycoplasma, Gram- negatif ve Gram pozitif kültür yönünden incelendi. Çiftlikte bulunan iki ahırda, sekiz farklı padok arasından koyunların ve kuzularının doğdukları ahırda bulunan iki padokta ölümler görülürken, gebe koyun ve koçların padoklarının bulunduğu ahırda ise herhangi bir ölüm yaşanmadı. Çalışma sırasında, sürüde ani ölümler ilk olarak beş hayvanda görüldü, 44 gün içinde kademeli olarak 50 koyuna (sürüde %16,6) çıktı. Tüm analizler sonucunda altı farklı dönemde ölen koyunlardan farklı organlarda (akciğer, karaciğer ve meme dokusu) tek etken olarak saf *Staphylococcus aureus* izole edildi. İzole edilen etken, PZR ve biyokimyasal olarak patogeneze yol açan çeşitli yönlerden identifiye edildi. Etkenin antibiyogramı ile uygun tedavi protokolünü belirlendi. Kuzuların annelerini emzirirken sağımlarında biyogüvenlik kurallarına en üst düzeyde uyularak kurum içi salgın önlendi. Staphycoloccus'lar işletme içerisinde uygun korunma-kontrol ve dezenfeksiyon işlemleri aksatıldığında ciddi problemlere sebep olabileceğini ortadadır. Bu çalışma, postpartum dönemi koyunlarda şekillenen Staphylococcal mastitislerin septisemi ve toksemiyle birlikte ani ölüme sebep olacağını göstermiştir.

Anahtar Kelimeler: *Staphylococcus aureus,* Ani Ölüm, Toksemi, Koyun Sürüsü

ABSTRACT

Staphylococcus infections are mostly seen infections that cause skin infections and mastitis. Especially in sheep, they cause severe problems as gangrenous mastitis agents. A cycle begins between the sheep

and the lamb with milk sucking with the birth. In the study, the sheep that died on a farm with 300 reared in different paddocks where sudden deaths were seen were examined in Mycoplasma, and gram negative-positive bacterial culture at different times microbiologically. In the two barns on the farm, among eight different paddocks, deaths were observed in the two paddocks located in the barn where the sheep and their lambs were born, while there was no death in the barn where the pregnant sheep and rams paddocks were located. Throughout the study, sudden deaths in the herd were first seen in 5 animals, gradually increasing to 50 sheep (16.6% in the herd) within 44 days. As a result of all analyzes, pure *Staphylococcus aureus* was isolated as a single agent in different organs (lung, liver, and mammary tissue) from sheep with deaths in six different periods. The isolated agent was identified by PCR and biochemically from various aspects leading to pathogenesis. The antibiogram of the agent determined the appropriate treatment protocol. An in-house epidemic was prevented by complying with the biosecurity rules at the highest level while milking the lambs while they suckle their mothers. Even though *Staphylococcus spp.* are seen as simple infections, it is obvious that they can cause serious problems when proper protection-control and disinfection processes are disrupted in the farm. This study showed that sudden death could be seen after toxemia due to septicemia of Staphylococcus mastitis in postpartum sheep.

Keywords: *Staphylococcus aureus*, Sudden Death, Toxemia, Sheep Herd

GİRİŞ

Staphylococcus aureus (*S. aureus*), deri ve yumuşak doku enfeksiyonlarının yanı sıra insanlarda hastane enfeksiyonlarına ve gıda zehirlenmelerine sebep olur (Turner et al., 2019). Sığır ve koyunlarda mastitislerin en önemli etkenleri arasındadır (Sayın et al., 2016; Vasileiou et al., 2019). Staphyloccocus'lar antibiyotik direnci kazanma, fagositozdan kaçma, biofilm özellikleri ve süperantijen yapısında olan ekzotoksin genleriyle birlikte organizmayı savunmasız bırakır ve patojenitelerini artırarak ölümlere sebep olur (Idrees, Sawant, Karodia, & Rahman, 2021; Xu & Mccormick, 2012). Koyunlarda gangrenöz mastitis etkeni olarak ciddi problemlere yol açmaktadırlar (Åvall-Jääskeläinen, Koort, Simojoki, & Taponen, 2021). Doğum sonrası anne ve yavru arasında süt emmeyle birlikte bir enfeksiyon döngüsü başlamaktadır. Çoğu zaman fark edilmese de etkileyen suşa bağlı olarak annelerde ciddi mastitisler, yavrularda ise kronik inatçı pneumoni tabloları şekillenmektedir (Mavrogianni et al., 2005). Kuzularda *S. aureus'*un ani ölümlere sebep olduğu bilinmektedir (Grinberg & Kosak, 1994). Ancak koyunlarda pnemoni ve mastit gibi enfeksiyonlara bağlı süreç içerisinde ölümlere sebep olsa da ani ölümlere sebep olduğuna dair çalışma bulunmamaktadır (Glendinning et al., 2016). Bu çalışmada, ani ölümlerin görüldüğü 300 koyunun bulunduğu bir çiftlikte farklı zamanlarda ölen koyunlar mikrobiyolojik açıdan Mycoplasma, Gram-negatif ve Gram-pozitif kültür yönünden incelendi. Ani ölümlerden izole edilen tek bakteriyel etken olan *S. aureus* izolatlarının, antibiyotik duyarlıkları, mecA, nuc, icaA ve icaD gen varlığının araştırılması amaçlandı.

MATERYAL METOD

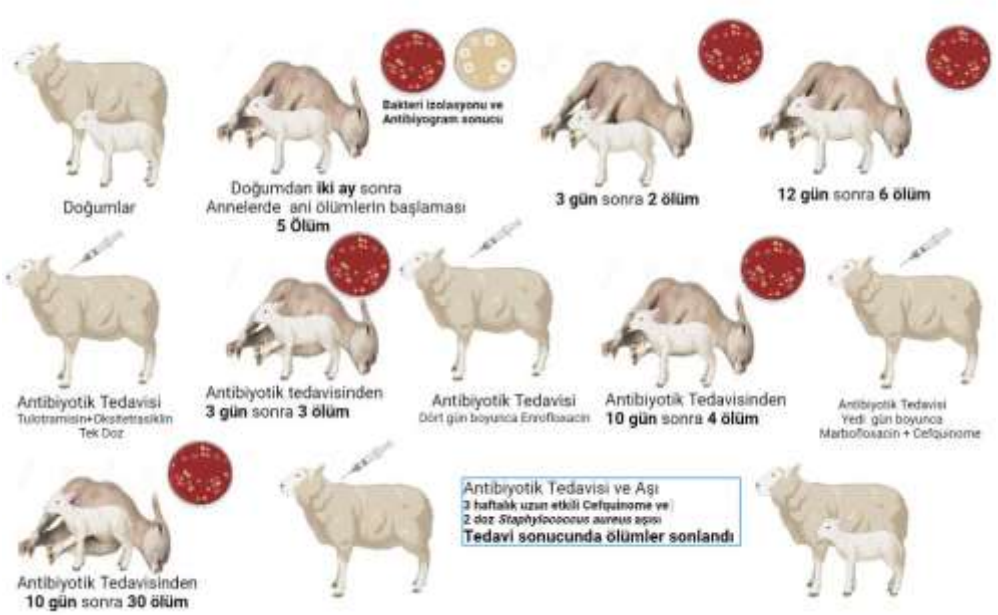
Otopsi sonucu laboratuvara ulaşan şüpheli organların (akciğer, karaciğer ve meme dokusu) kültürü, %5 defibrine koyun kanı eklenen, kanlı agarda (Oxoid, UK), 37 °C'de oksijenli ortamda 24 saat, Mycoplasma selektif agarda (SR0059 Oxoid, UK) 96 saat inkübasyonla gerçekleştirildi**.** Klasik mikrobiyolojik metotlar olan Gram boyama, koloni morfolojisi, hemoliz, katalaz, tüp koagulaz ve Mannitol Salt agar (LabM, UK) ile *S. aureus* izolatları identifiye edildi (Procop, Church, Hall, & Janda, 2020). Ayrıca izolatlar, *Staphylococcus spp.* selektif olan Braid Parker Agar'a (LabM, UK), deoksiribonuklease (DNase) enzim aktivitelerinin belirlenmesi için DNase Agar'a (LabM, UK) ve in vitro slime oluşturma özelliklerinin tespiti için Kongo Kırmızısı Agar'a (KKA) (BHI agar %5 sükroz ve 0,8 g/L Kongo Kırmızısı içeren) ekimleri yapıldı (ARSLAN, AÇIK, & UÇAN, 2005; TEL & KESKİN, 2011).

Mc Farland standart no 0.5 göre hazırlanan *S. aureus* izolatlarının, antibiyotik duyarlılıkları, The European Committee on Antimicrobial Susceptibility Testing – EUCAST)'nin *Staphylococcus spp.* için önerdiği sınır değerler kullanılarak yorumlandı (EUCAST, 2022).

S. aureus izolatlarının DNA'sı, etkenin 1,5 ml bir gecelik kültüründen, Wizard Genomic DNA purification kit (Promega, USA) ile üretici firma talimatına göre izole edildi. mecA gen amplifikasyonu PZR ile gen üzerindeki 310 bp fragmenti kodlayan primerler (MecA- F-5'-GTAGAAATGACTGAACGTCCGATAA-3', MecA-R-5'-CCAATTCCACATTGTTTCGGTCTAA-3') kullanılarak gerçekleştirildi (Zhang et al., 2004). Nuc gen amplifikasyonu PZR ile gen üzerindeki 270 bp fragmenti kodlayan primerler (nuc- F-5'-GCGATTGATGGTGATACGGTT-3', nuc-R-5'-AGCCAAGCCTTGACGAACTAAAGC-3') kullanılarak gerçekleştirildi (Kim et al., 2001). icaA gen amplifikasyonu PZR ile gen üzerindeki 188 bp fragmenti kodlayan primerler (icaA-F-5'-TCTCTTGCAGGAGCAATCAA -3', icaA -R-5'- TCAGGCACTAACATCCAGCA -3') kullanılarak gerçekleştirildi. icaD gen amplifikasyonu PZR ile gen üzerindeki 198 bp fragmenti kodlayan primerler (icaD-F-5'- ATGGTCAAGCCCAGACAGAG -3', icaD -R-5'- CGTGTTTTAACATTTAATGCAA -3') kullanılarak gerçekleştirildi (Petrelli et al., 2006). Amplifikasyonlar, 94 °C 7 dk ön denatürasyon ve 35 döngü 94 °C 45 sn, 58 °C 45 sn, 72 °C 45 sn ve 72 °C 10 dk son zincir uzaması ile gerçekleştirildi.

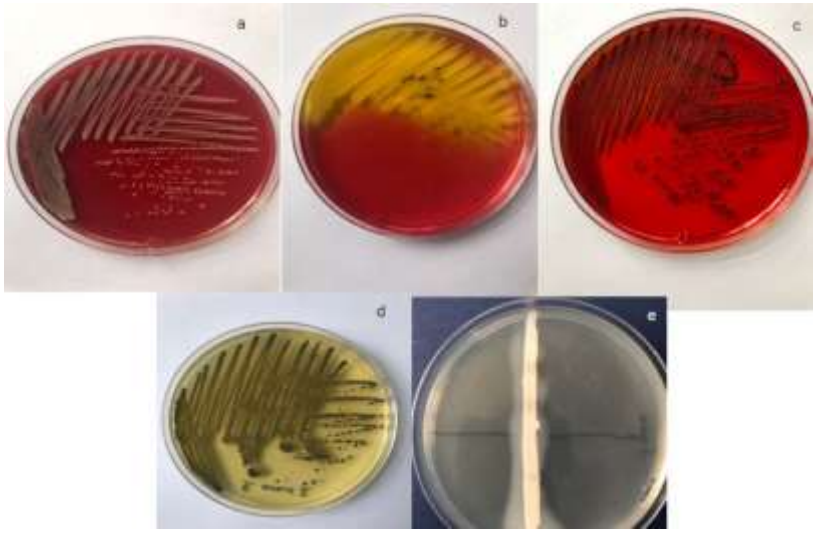
SONUÇ

Sürüde 300 anaç koyun, 170 kuzudan sadece doğum yapan laktasyonunun ikinci ayındaki koyunlarda ölüm gözlendi. Sürüdeki damızlık koçlarda, gebe koyunlarda ve kuzularda ölüm gözlenmedi. Ayrıca çiftlikte tüm koşulları aynı olan iki ağıldan sadece birinde ölümler gözlendi Farklı zaman dilimlerinde 44 gün içinde süt veren toplam 50 koyunda ani ölüm (sürüde %16,6) vakaları görüldü. Ölen koyunların kuzularında (toplam 100 kuzuda) herhangi bir problem gözlenmedi **Şekil 1**.



Şekil 1. Ani ölümlerin zaman çizelgesi

Farklı zamanlarda laboratuvara ulaşan tüm organlardan izole edilen bakteriler β hemoliz, Gram özellikleri, katalaz ve koagulaz testi pozitif bulundu ve *Staphylococcus spp.* olarak identifiye edildi **Şekil 2.a**. Tüm analiz sonuçlarında başka bir bakteri izole edilmedi. Şüpheli *Staphylococcus spp.* izolatları Mannitol Salt agarda mannitolu fermante ederek sarı renk oluşturdu ve izolatlar *S. aureus* olarak identifiye edildi **Şekil 2.b**. Örnekler *S. epidermidis* ve *S. aureus* ayırımı için Baird Parker agara pasajlandı siyah zonlu koloniler *S. aureus* olarak tekrar doğrulandı **Şekil 2.d**. DNase agarda, 1 normal HCL ile berrak zon oluşması, *S.aureus* izolatlarının DNase enzimi bulundurduğunu doğruladı **Şekil 2.e**. *S. aureus* izolatlarındaki biofilm varlığı Kongo Kırmızısı agarda siyah koloni oluşturması ile doğrulandı **Şekil 2.c**.



Şekil 2. *S. aureus* izolatlarının besi yerlerindeki görüntüsü; **a.** Kanlı agar, **b.** Mannitol Salt agar, **c.** Kongo Kırmızı agar, **d.** Baird Parker agar, **e**. DNase agar

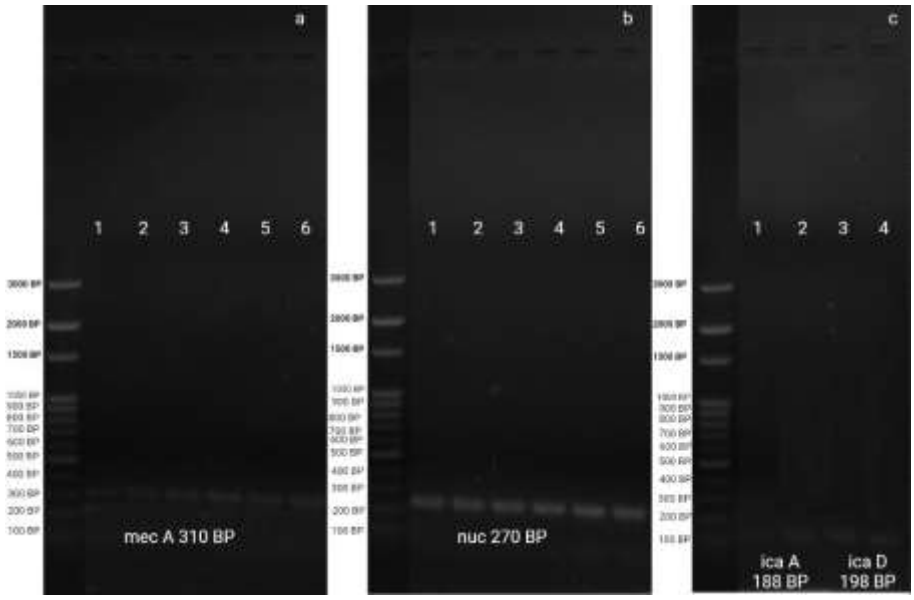
Antibiyotik duyarlılık test sonuçlarına göre tüm izolatlar, aynı derecede; cefquinome, penisilin, makrolid ve florokinolonlara duyarlı bulundu **Tablo 1**. Kullanılan antibiyotiklerle ani ölümler durdu. Böylece ani ölümlerin asıl sebebinin enterotoksemi veya viral değil bakteriyel etken olan *S. aureus* olduğu tespit edildi.

Tablo 1. *S. aureus* suşunun antibiyotik duyarlılıkları

Antibiyotik Diski	Zone Çapı	EUCAST Zone Aralığı	Sonuç
Penisilin (P 10 ug)	28 mm	26 mm≥ <26mm	Duyarlı-S
Oxacillin	10 mm	20mm≥ < 20mm	Dirençli-R
Ceftiofur (Fur 30 ug)	24 mm	27 mm≥ <27mm	Dirençli-R
Cefquinom (Ceq 30 ug)	28mm	27 mm≥ <27mm	Duyarlı-S
Tetrasiklin (TE 30 ug)	18 mm	22 mm≥ <22mm	Dirençli-R
Trimetoprim-sulfametoksazol (SXT 25 ug)	25 mm	17 mm≥ <14mm	Duyarlı-S
Enrofloksasin (ENR 5 ug)	31 mm	28 mm≥ < 28mm	Duyarlı-S
Marbofloksasin (MAR 5 ug)	29 mm	28 mm≥ < 28mm	Duyarlı-S
Gamitromisin (GAM 15 ug)	24 mm	22 mm≥ < 22mm	Duyarlı-S
Tilmikosin (TIL 15 ug)	23 mm	22 mm≥ <22mm	Duyarlı-S

PZR analizinde, klasik mikrobiyolojik metotlar ile identifiye edilen *S. aureus* izolatların tamamında (n=6) etken için penisilin bağlayıcı proteinlerin üretiminde (*PBP2*) görev alan mecA geninin 310 bp büyüklüğünde DNA bantları gözlendi **Şekil 3.a.** *S. aureus* izolatların tamamında thermonuclease enzimini sentezleyen nuc geni için spesifik 270 bp büyüklüğünde DNA bantları görüldü **Şekil 3.b**. Slime faktör yani biofilm oluşumundan sorumlu icaA geninin 188 bp büyüklüğünde DNA bandları ve icaD

geninin 198 bp büyüklüğünde DNA bandları *S. aureus* izolatlarının tamamında (n=6) tespit edildi **Şekil 3.c**.



Şekil 3. PZR ürünlerinin jel elektroforez görüntüleri, Marker 100 bp, 1, 2, 3, 4, 5, 6 ile izole edilen *S. aureus* izolatlarının sıralamasını tanımlamaktadır; **a.** band 310 bp büyüklüğünde mecA geni varlığı pozitif *S. aureus* izolatları, **b.** band 270 bp büyüklüğünde nuc geni varlığı pozitif *S. aureus* izolatları, **c.** band 188 bp büyüklüğünde icaA geni ve 198 bp büyüklüğündeki band icaD geni varlığı pozitif *S. aureus* izolatları

TARTIŞMA

Koyunlarda ani ölüm deyince akla ilk olarak enterotoksemi gelmektedir (Salvarani et al., 2019). Ancak çiftlik çift doz enterotoksemi aşılarını tamamlamıştır ve ölümler tek bir ağılda sadece doğum yapan koyunlarda görülmüştür. Tüm organlarda aynı etkenin görülmesi ölümün septisemi sonucu gerçekleştiğini göstermektedir (Enkhbaatar et al., 2008). İzole edilen tüm *S. aureus* izolatları aynı biyokimsal özellikleri göstermekte ve test edilen antibiyotiklere ayını derecede duyarlılık ile direnç göstermektedir **Tablo 1**. Tüm testler, aynı *S. aureus* suşunun çiftlik içi salgınını göstermektedir.

S. aureus ekzotoksinleri, süper-antijen yapısı, antibiyotik direnç mekanizması, fagositozdan kaçabilme ve biofilm faktörü gibi virulans faktörleri ile enfeksiyon geliştirmektedir (Zecconi & Scali, 2013). Süt veren koyunlarda *S. aureus* enfeksiyonları subklinik mastislerden-doku kayıplı olan ölümle sonuçlanan ganrenöz mastitlere kadar geniş bir aralıkta enfeksiyon tablosu oluşturur (Vautor et al., 2009). Kuzularda *S. aureus*'un ani ölümlere sebep olduğu bildirilmiştir (Grinberg & Kosak, 1994). Koyunlarda pnemoni, mastistis gibi enfeksiyonlar sonucunda *S. aureus* izole edilse de ani ölümlerle seyrettiğine dair bildirim bulunmamaktadır (Vasileiou et al., 2019).

Slim faktörü ve ekzotoksinlerin birleşiminde artan patojenite biyokimyasal testler ve PZR ile ortaya konmuştur. Mikro apselerde biyofilm ile dokulara saklanan etkenlerin, tedavi kesilince tekrar artan ölüm oluşturmaması için duyarlı bulunan cefquinome ile inatçı bir antibiyotik tedavi protokolü belirlenmiştir **Şekil 1.** Bu sırada inaktif *S. aureus* aşısı uygulanmıştır. Rapel doz uygulanana kadar antibiyotik tedavisine devam edilerek koyunlarda antikor oluşması sağlanmıştır.

İşletme içerisinde özellikle doğumla sonrası bağışıklık sisteminin düşmesiyle beraber Staphycoloccus'lar uygun korunma-kontrol ve dezenfeksiyon işlemleri aksatıldığında ciddi problemlere sebep olabileceğini ortadadır. Bu çalışma, postpartum dönemi koyunlarda şekillenen Staphylococcal mastitislerin septisemi ve toksemiyle birlikte ani ölüme sebep olacağını göstermiştir.

KAYNAKÇA

ARSLAN, E., AÇIK, L., & UÇAN, U. S. (2005). Mastitisli ineklerden izole edilen S. aureus ve S. intermedius suşlarının RAPD-PCR ile akrabalık derecelerinin belirlenmesi. *Veteriner Bilimleri Dergisi. Eurasian Journal of Veterinary Sciences, 21*(1-2), 65-69.

Åvall-Jääskeläinen, S., Koort, J., Simojoki, H., & Taponen, S. (2021). Genomic Analysis of Staphylococcus aureus Isolates Associated With Peracute Non-gangrenous or Gangrenous Mastitis and Comparison With Other Mastitis-Associated Staphylococcus aureus Isolates. *Frontiers in microbiology, 12*.

Enkhbaatar, P., Joncam, C., Traber, L., Nakano, Y., Wang, J., Lange, M., . . . Huda, R. (2008). Novel ovine model of methicillin-resistant Staphylococcus aureus-induced pneumonia and sepsis. *Shock, 29*(5), 642-649.

EUCAST, T. (2022). European Committee on Antimicrobial Susceptibility Testing, Breakpoint tables for interpretation of MICs and zone diameters. In: European Society of Clinical Microbiology and Infectious Diseases Basel ….

Glendinning, L., Wright, S., Pollock, J., Tennant, P., Collie, D., & McLachlan, G. (2016). Variability of the sheep lung microbiota. *Applied and Environmental Microbiology, 82*(11), 3225-3238.

Grinberg, A., & Kosak, A. (1994). Staphylococcus aureus and sudden death in lambs. *The Veterinary record, 135*(6), 144-144.

Idrees, M., Sawant, S., Karodia, N., & Rahman, A. (2021). Staphylococcus aureus biofilm: Morphology, genetics, pathogenesis and treatment strategies. *International Journal of Environmental Research and Public Health, 18*(14), 7602.

Kim, C.-H., Khan, M., Morin, D., Hurley, W., Tripathy, D., Kehrli Jr, M., . . . Kakoma, I. (2001). Optimization of the PCR for detection of Staphylococcus aureus nuc gene in bovine milk. *Journal of dairy science, 84*(1), 74-83.

Mavrogianni, V. S., Fthenakis, G. C., Brooks, H., Papaioannou, N., Cripps, P. J., Taitzoglou, I., . . . Saratsis, P. (2005). The effects of inoculation of Mannheimia haemolytica into the teat of lactating ewes. *Veterinary research, 36*(1), 13-25.

Petrelli, D., Zampaloni, C., D'ercole, S., Prenna, M., Ballarini, P., Ripa, S., & Vitali, L. (2006). Analysis of different genetic traits and their association with biofilm formation in Staphylococcus epidermidis isolates from central venous catheter infections. *European Journal of Clinical Microbiology and Infectious Diseases, 25*(12), 773-781.

Procop, G. W., Church, D. L., Hall, G. S., & Janda, W. M. (2020). *Koneman's color atlas and textbook of diagnostic microbiology*: Jones & Bartlett Publishers.

Salvarani, F. M., Faccin, M., Freitas, N. F. d. Q. R., de Matos, M. R., Garcia, E. C., Pagliosa, G. M., . . . de Marco Viott, A. (2019). Outbreak of Clostridium perfringens type D enterotoxemia in sheep. *Semina: Ciências Agrárias, 40*(6), 2593-2602.

Sayın, Z., Sakmanoğlu, A., Uçan, U. S., Pınarkara, Y., Uslu, A., Aras, Z., & Erganiş, O. (2016). Türkiye'de mastitisli inek sütlerinde mecC geni taşıyan metisilin dirençli Staphylococcus aureus varlığının belirlenmesi.

TEL, O. Y., & KESKİN, O. (2011). Subklinik mastitisli ineklerden izole edilen stafilokok suşlarının bazı virulens faktörleri ve antibiyotik direnci. *Yüzüncü Yıl Üniversitesi Veteriner Fakültesi Dergisi, 22*(1), 17-21.

Turner, N. A., Sharma-Kuinkel, B. K., Maskarinec, S. A., Eichenberger, E. M., Shah, P. P., Carugati, M., . . . Fowler, V. G. (2019). Methicillin-resistant Staphylococcus aureus: an overview of basic and clinical research. *Nature Reviews Microbiology, 17*(4), 203-218.

Vasileiou, N. G., Chatzopoulos, D. C., Sarrou, S., Fragkou, I. A., Katsafadou, A. I., Mavrogianni, V. S., . . . Fthenakis, G. C. (2019). Role of staphylococci in mastitis in sheep. *Journal of Dairy Research*, *86*(3), 254-266.

Vautor, E., Cockfield, J., Le Marechal, C., Le Loir, Y., Chevalier, M., Robinson, D. A., . . . Lindsay, J. (2009). Difference in virulence between Staphylococcus aureus isolates causing gangrenous mastitis versus subclinical mastitis in a dairy sheep flock. *Veterinary research*, *40*(6), 1-11.

Xu, S. X., & Mccormick, J. (2012). Staphylococcal superantigens in colonization and disease. *Frontiers in cellular and infection microbiology*, *2*, 52.

Zecconi, A., & Scali, F. (2013). Staphylococcus aureus virulence factors in evasion from innate immune defenses in human and animal diseases. *Immunology letters*, *150*(1-2), 12-22.

Zhang, K., Sparling, J., Chow, B. L., Elsayed, S., Hussain, Z., Church, D. L., . . . Conly, J. M. (2004). New quadriplex PCR assay for detection of methicillin and mupirocin resistance and simultaneous discrimination of Staphylococcus aureus from coagulase-negative staphylococci. *Journal of clinical microbiology*, *42*(11), 4947-4955.

OPTOGENETIC APPROACHES in ZEBRAFISH NEUROBİOLOGY

Emine TORAMAN

Atatürk University, Science Faculty, Department of Molecular Biology and Genetics, Erzurum, Turkey

ORCID ID: 0000-0001-7732-6189

Ekrem SULUKAN

Atatürk University, Fisheries Faculty, Aquaculture Department, Erzurum, Turkey

ORCID ID: 0000-0002-4414-9873

ABSTRACT

Optogenetics involves the application of light to observe and manipulate cell activity using genetically encoded tools. The term was originally used as approaches combining "genetic targeting of specific neurons or proteins with optical technology for the imaging or control of targets within living neural circuits". It was later defined as “the branch of biotechnology that combines genetic engineering with optics to observe and control the function of genetically targeted groups of cells with light, usually in intact animals.” Fundamental questions that neuroscientists previously approached with classical biochemical and electrophysiological techniques can now be addressed using optogenetics. Optogenetics, which aims to combine optical and genetic techniques, has had an important area of use in the last few years. The optogenetic revolution has enabled neuroscientists to silence and activate neuronal circuits when observing neuronal activity or the behavior of living animals. A good model organism for optogenetics should have easy access to light and be amenable to transgenesis. Therefore, zebrafish has been an important platform for early optogenetic experiments and has enormous potential for future brain function research. The zebrafish (*Danio rerio*) is a popular vertebrate model organism for investigating the molecular mechanisms that drive development and disease. Due to its transparency in embryonic and larval stages, it is possible to conduct research in living organisms with subcellular resolution using intravital microscopy. The beneficial optical properties of zebrafish allow not only passive observation, but also active manipulation of proteins and cells with light using optogenetic tools. The application of optogenetics to zebrafish neurobiology also made it possible to functionally test the role of the identified neurons in behavior for the first time. In this review, we present an overview of optogenetic approaches that have been successfully applied in zebrafish.

Keywords: Optogenetic, zebrafish, neurobiology.

INTRODUCTION

Optogenetic

Optogenetics is a method that uses a combination of optics and genetics to control biological events in living animal tissue cells. Unlike previously developed methods of experimental light control, optogenetics allows researchers to use light to turn cells on and off with remarkable precision and resolution in living, freely moving animals (Deisseroth 2011). Optogenetics began to be developed in the period from 2004 to 2009. In the following years, researchers in thousands of laboratories around the world began using the optogenetic technique. With this method, thousands of scientific findings have been published in other fields, especially in neuroscience. Optogenetics has been used to study not only the brain, but also heart tissue, stem cells, and the development of organisms (Deisseroth 2011). Optogenetics, which enables the use of light-based protein tools, is a revolution for biological research. This technique has been found to be very useful in the nervous system, where light is used to both detect and manipulate activity in targeted neurons. Optogenetic tools are used in many biological

systems ranging from cultured cells to primates, each offering a particular combination of advantages and disadvantages (Simmich *et al.* 2012a). Many questions that neuroscientists tried to answer using classical biochemical and electrophysiological techniques in previous years can now be addressed using optogenetics. The term optogenetics aims to combine optical and genetic techniques. With the successful application of light-operated actuator proteins such as microbial opsins to interact with intact neural circuits, optogenetics has become an important technology in the last few years (Dugue *et al.* 2012).

Rhodopsins

Rhodopsins are the first light-sensitive proteins used in optogenetics. The word "rhodopsin" comes from the Greek words "rhodo" and "opsis" meaning rose and sight, respectively. While the classical meaning of rhodopsin is the red colored pigment in our eyes, the modern meaning of rhodopsin includes photoactive proteins containing retinal chromophores in animals and microbes. Rhodopsins found in all areas of life are divided into two groups. Simple organisms use the microbial rhodopsin family for various functions, including the light-driven ion pump and light-gated ion channel, while animals use the photosensor functions of a different rhodopsin family (animal rhodopsin), a special subset of G-protein coupled receptors (GPCR) (Yawo *et al.* 2020). Many optogenetic approaches have been described in recent years, but great progress has been made in optogenetics with the characterization of the microbial, light-gated cation channel channelrhodopsin-2 (ChR2) and the photosensitive chloride pump halorhodopsin as tools (Nagel *et al.* 2003). Since the first descriptions of optogenetic tools that allow to depolarize or hyperpolarize neuronal membranes through illumination, various variants of photosensitive microbial opsins designed with genetic modifications that alter or improve the biophysical parameters of molecules have been developed. Since in relatively small animals a fairly complete illumination of brain tissue can be achieved without gross physical surgeries, behavioral observations can be made simultaneously with optogenetic manipulation of neuronal activity in intact organisms. For larger animals such as rodents, devices have been designed that allow light to be delivered to the brain without restricting the animal (Aravanis *et al.* 2007; Royer *et al.* 2010).

Optogenetic approaches in behavioral neuroscience

Discovering the principles of how sensory stimuli, intrinsically generated motivations, and learned experiences are integrated to produce behavioral actions in animals and humans is one of the core challenges of neuroscience. It relies on the structural and functional identification of neuronal circuits to reveal causal determinants of a particular behavior. In recent years, transgenic methods have often been used to manipulate individual elements of neuronal circuits to observe the effects of interaction on behavior (Luo *et al.* 2008). The optogenetic and thermogenetic tools used to functionally study neuronal circuits have received considerable attention and have contributed significantly to this field of research. One of the advantages of this technique is that, unlike classical electrophysiological or pharmacological techniques, the investigated neurons can be selected and targeted based on a common genetic identity and potentially shared function. Another advantage is that the freely moving neurons under investigation can be simply manipulated through illumination, which facilitates studies on animals (Bernstein *et al.* 2012).

Optogenetics in zebrafish

Zebrafish (Danio rerio), a member of the carp family, is a small fish that lives in freshwater. The zebrafish was introduced as a model system in the 1980s, as it is an externally evolving vertebrate that is transparent in its early life stages (Simmich *et al.* 2012b). The zebrafish has become a preferred model for neurobiology studies due to its transparent brain and susceptibility to genetic manipulation. The zebrafish model has entered the field of neurobiology because of its suitability for genetic manipulations and optical accessibility in larval stages for in vivo imaging studies. Because of its small size, all neurons in a defined circuit can be viewed simultaneously under a laser scanning microscope. For example, it is possible to monitor neurons from each layer of processing while visually stimulating the animal, including the retina, tectum, and hindbrain in the visual motor response pathway. In order to use these applications, the "optogenetic field" has been revealed by

producing genetically coded optical instruments, fluorescent sensors and light-gated channels (Del Bene and Wyart 2012). With the advent of advanced genetic screening and the use of morpholinos for gene disruption, zebrafish-specific traits have aided studies of gene function (Simmich *et al.* 2012b). The zebrafish nervous system is fundamentally similar to that of other vertebrates, particularly somatosensory neurons, olfactory bulb, retina, cerebellum, and spinal cord. While these systems are often simpler than in mammals, their general structure is similar, allowing many discoveries in zebrafish to be generalized to other vertebrates, including mammals. Despite these advantages, there are also some limitations. Zebrafish lack a prominent cerebral cortex, hippocampus, and amygdala and do not exhibit all the behaviors of mammalian model organisms. Thus, studies of the zebrafish nervous system can be easily generalized for some circuits, but have less impact on mammalian circuits in other regions. The larval zebrafish lacks social behavior and complex behavior. Although adult fish display most of these behaviors, they are less amenable to high-throughput analysis (Simmich *et al.* 2012b).

Using transgenic zebrafish generated by promoter-specific or enhancer/gene trap techniques, it is possible to express optogenetic sensors or actuators in genetically identifiable cell types. The larval zebrafish exhibit a rich repertoire of behaviors, including basic sensory functions such as vision, auditory senses, and somatosensation. These features make larval zebrafish highly suitable for optogenetic approaches (Nevin *et al.* 2010). Optogenetic studies require targeting effector proteins to genetically identifiable populations of neurons. This targeting can be achieved by generating transgenic elements using a gene-specific promoter/enhancer element or recombinant bacterial artificial chromosome (BAC) that can be efficiently integrated into the zebrafish genome by Tol2 transposition (Asakawa and Kawakami 2009). Apart from these, two-component expression systems such as Gal4/UAS, Cre/loxP and Tet systems have also been adapted to zebrafish. The most widely used of these systems is the Gal4/UAS system (Scott *et al.* 2007; Asakawa *et al.* 2008). One of the major challenges in transgene expression systems is that Gal4 expression patterns in transgenic zebrafish are often less specific than desired and contain multiple neuron types. Intercepting strategies, such as the combination of Gal4 with the Gal80 suppressor or cleaved Gal4, are promising approaches for labeling more specific subpopulations of neurons. The combination of different bicomponent systems can effectively improve the expression patterns of optogenetic effectors. More advanced genetic techniques need to be applied to expand the possibilities for precise targeting in zebrafish (Hegemann and Sigrist 2013).

CONCLUSION

Optogenetics makes the operation of circuits more traceable, especially for causally investigating what a neuron means to a circuit. Because neural activation and silencing allow to test the adequacy and necessity of certain cell populations in the generation. Optogenetics has also greatly helped link mechanisms to phenomena that occur at the circuit and system level (Boyden 2015). These advances allow optogenetic applications to a variety of behavioral conditions in larval and adult zebrafish. However, there are still limitations to optogenetic approaches. For example, the specificity of expression patterns of optogenetic probes often depends on the availability of suitable promoter/enhancer sequences. Much information has been gained about the regulatory sequences of various genes, the collection of enhancer trap lines, and the use of optics to fully elucidate specific neuronal populations. These data will further facilitate optogenetic control and detection of neuronal activity in genetically defined populations of neurons.

REFERENCES

Aravanis, A. M., et al., 2007. "An optical neural interface: in vivo control of rodent motor cortex with integrated fiberoptic and optogenetic technology", Journal of Neural Engineering, 4 (3), S143-S156.

Asakawa, K. and Kawakami, K., 2009. "The Tol2-mediated Gal4-UAS method for gene and enhancer trapping in zebrafish", Methods, 49 (3), 275-281.

Asakawa, K., et al., 2008. "Genetic dissection of neural circuits by Tol2 transposon-mediated Gal4 gene and enhancer trapping in zebrafish", Proceedings of the National Academy of Sciences of the United States of America, 105 (4), 1255-1260.

Bernstein, J. G., Garrity, P. A. and Boyden, E. S., 2012. "Optogenetics and thermogenetics: technologies for controlling the activity of targeted cells within intact neural circuits", Current Opinion in Neurobiology, 22 (1), 61-71.

Boyden, E. S., 2015. "Optogenetics and the future of neuroscience", Nature neuroscience, 18(9) 1200-1201.

Deisseroth, K., 2011. "Optogenetics", Nature methods, 8(1) 26-29.

Del Bene, F. and Wyart, C., 2012. "Optogenetics: A new enlightenment age for zebrafish neurobiology", Developmental Neurobiology, 72 (3), 404-414.

Dugue, G. P., Akemann, W. and Knopfel, T., 2012. "A comprehensive concept of optogenetics", Optogenetics: Tools for Controlling and Monitoring Neuronal Activity, 196 1-28.

Hegemann, P. and Sigrist, S., 2013. "Optogenetics", Dahlem Workshop Reports,

Luo, L., Callaway, E. M. and Svoboda, K., 2008. "Genetic dissection of neural circuits", Neuron, 57(5) 634-660.

Nagel, G., et al., 2003. "Channelrhodopsin-2, a directly light-gated cation-selective membrane channel", Proceedings of the National Academy of Sciences of the United States of America, 100 (24), 13940-13945.

Nevin, L. M., Robles, E., Baier, H. and Scott, E. K., 2010. "Focusing on optic tectum circuitry through the lens of genetics", Bmc Biology, 8

Royer, S., et al., 2010. "Multi-array silicon probes with integrated optical fibers: light-assisted perturbation and recording of local neural circuits in the behaving animal", European Journal of Neuroscience, 31 (12), 2279-2291.

Scott, E. K., et al., 2007. "Targeting neural circuitry in zebrafish using GAL4 enhancer trapping", Nature Methods, 4 (4), 323-326.

Simmich, J., Staykov, E. and Scott, E., 2012a. "Zebrafish as an appealing model for optogenetic studies", Progress in brain research, 196 145-162.

Simmich, J., Staykov, E. and Scott, E., 2012b. "Zebrafish as an appealing model for optogenetic studies", Optogenetics: Tools for Controlling and Monitoring Neuronal Activity, 196 145-162.

Yawo, H., Kandori, H. and Koizumi, A., 2020. "Optogenetics Light-Sensing Proteins and Their Applications", Springer, 1293

ANTISENSE OLIGONUCLEOTIDE APPROACH IN INHIBITION OF *Staphylococcus aureus* GROWTH

Melike KARAMAN

Atatürk University, Science Faculty, Department of Molecular Biology and Genetics, Erzurum, Turkey.

ORCID ID: 0000-0002-0973-2561

ABSTRACT

Staphylococcus aureus is a facultative anaerobic Gram-positive sphere-shaped (coccal) bacteria. This bacteria is an opportunistic pathogen that significantly affects human health. In addition to usually causing skin infections, it can cause serious infections such as pneumonia, bloodstream, musculoskeletal, bone and joint infections. Methicillin-resistant strain of *S. aureus* (MRSA) is a major cause of hospital and community infections. The widespread use of conventional antibiotics has led to the emergence of multidrug-resistant pathogenic bacteria. Therefore, it is necessary to develop alternative therapeutic strategies against these pathogenic strains.

Antisense oligonucleotides (ASOs) are short single-stranded nucleic acids and are modified to form stable oligomers. ASOs bind to specific, complementary RNA in a target organism through Watson-Crick base pairing and cause degradation of the targeted mRNA or inhibition of translation. Therefore, the use of chemical analogues of nucleic acid sequences to target important genes in pathogenic bacteria is being investigated as a form of antibiotic therapy. Hovewer, several problems must be overcome for successful antisense implementation: 1) antisense agents should be protected against nucleases, 2) accessible regions of target RNA for oligonucleotide binding should be identified, and 3) their cellular uptake and correct intracellular localization should be ensured. Chemically modified nucleotides such as analogues with unnatural bases, modified sugars and modified phosphate backbones have been used in antisense research to minimize these problems and ensure stability. The need for a suitable carrier for cellular uptake is a major barrier at the use of antisense oligonucleotides as antibacterial therapeutics. Covalent conjugation of cell-penetrating peptides to ASO oligomers was performed to improve uptake into the bacterial cell. In addition, nanomaterials including lipids, inorganic compounds and polymers have been used in the delivery of ASOs.

This paper focuses on antisense oligonucleotides used to inhibit the growth of a critical pathogen, *S. aureus*. Positive results have been obtained in studies using modified antisense nucleic acids targeting essential genes such as mecA, fmhB, agrA, gyrA, ftsZ and hmrB for the inhibition of *S. aureus*. The antisense therapeutics emerges as a promising approach to design new control and prevention strategies against this pathogen.

Keywords: Antibacterial, Antisense, Staphylococcus aureus.

INTRODUCTION

Staphylococcus aureus is a gram-positive bacteria characterized by a round shape (coccal). When examined microscopically, they appear similar to bunches of grapes (Tracey, 2021). *S. aureus* is found in the skin and mucous membranes and colonizes in the normal human flora. Some individuals such as hospital staff, hospital patients, and immunocompromised individuals have a higher *S. aureus* colonization interval. *S. aureus* can be transmitted from person to person through direct contact (Ondusko & Nolt, 2018; Tracey, 2021). The infection of *S. aureus* is one of the most common bacterial infections in humans. In addition, *S. aureus* causes different clinical diseases including toxic shock syndrome, infective endocarditis, meningitis, gastroenteritis, skin and soft tissue infections, pulmonary infections, osteomyelitis and septic arthritis (Otto, 2014; Tong et al., 2015).

Methicillin-resistant *S. aureus* (MRSA) strains are resistant to many antibiotics (Tracey, 2021). Over the years, the widespread usage of different antibiotics has caused to the appearance of multi-resistant MRSA strains through mutations in genes encoding target proteins and acquisition of antibiotic resistance genes (Stapleton & Taylor, 2002). The duration and form of treatment for *S. aureus* infections vary depending on the type of infection and the presence of antibiotic-resistant strains. Also, in some cases, other therapy may be required to treat the infection (Tong et al., 2015).

Antisense oligonucleotides (ASOs) are short single-stranded DNA or RNA and cause specific gene silencing by binding to complementary RNA sequence in a target organism (Kumar et al., 2016). ASOs inhibit target mRNA expression either by suppression of translation or by degradation of mRNA (Sully & Geller, 2016). This has led to the use of ASOs as antisense therapeutics targeting disease-associated proteins. In addition, ASOs are being investigated as antimicrobial agents to inhibit proteins that have important roles in the growth of microorganisms (Jani et al., 2021). Although the experimental efficacy of ASOs has been demonstrated, several problems occur in the use of ASOs, such as poor cellular uptake and low stability in body fluids. Thus, many ASOs structurally similar to nucleic acids have been artificially synthesized to improve pharmaceutical properties, off-target effects, cytotoxicity and biological stability. Phosphorothioates (PS), locked nucleic acids (LNA), peptide nucleic acids (PNA), and phosphorodiamidate morpholino oligomers (PMO) are major examples of modified ASOs (Nielsen, 2001; Sully & Geller, 2016).

The widespread and uncontrolled usage of traditional antibiotics has led to the emergence of multidrug-resistant pathogenic bacteria. Especially multidrug-resistant MRSA strains have become a serious problem in hospital infections. Therefore, there is a need for the discovery and development of effective antibacterial agents against antibiotic-resistant bacteria. ASOs are used as alternative strategies in the search for antibacterial agents (Hegarty & Stewart, 2018; Xue et al., 2018). This review highlights antisense strategies in the development of antibacterial agents. It also focuses on antisense oligonucleotides and target genes used to inhibit the growth of critical pathogen *S. aureus*.

ANTISENSE NUCLEIC ACIDS AS ANTIBACTERIAL AGENTS

Although there are many antisense therapeutic agents, such as fomivirsen, Nusinersen, Patisiran, Eteplirsen and Inotersen, approved by the Food and Drug Administration (FDA) for use in clinics or clinical trials, the application of antisense technologies to pathogens is still under investigation (Jani et al., 2021). Various antisense compounds are designed for use in the treatment of bacterial infections. These antisense agents target genes that cause the death or weakening of pathogens. In addition, antisense compounds are designed to inhibit the expression of resistance genes in pathogens (Pifer & Greenberg, 2020).

Antisense agents are designed to inhibit translation of the gyrase gene of gram-positive and gram-negative bacteria (Pifer & Greenberg, 2020). DNA polymerase III catalytic subunit has been targeted by antisense agents to inhibit *Clostridium difficile* growth (Hegarty et al., 2016). In addition, some studies have designed antisense agents to deplete the enzymes responsible for the synthesis of the lipid A component of the outer membrane lipopolysaccharide and the enzymes required for cell wall assembly. Also, the proteins involved in cell division have been used as targets of ASOs for inhibition of bacteria (Pifer & Greenberg, 2020).

Phosphorothioate linkages were used to improve the stability of ASO against nucleases. Antisense phosphorothioate oligodeoxyribonucleotides has been designed to combat *Mycobacterium tuberculosis*, which is one of the important pathogens. This modified antisense oligodeoxyribonucleotides targeting the pathogenesis-related glutamine synthetase enzyme was found to be effective against *M. tuberculosis* (Harth et al., 2000). However, due to the relatively low binding affinity of PSs, they have been combined with modified sugar backbones (Pifer & Greenberg, 2020).

Peptide nucleic acid (PNA) is an oligonucleotide analog in which the sugar backbone of nucleic acids has been changed for resistance to proteases and nucleases. PNAs were designed to target the beta-lactamase gene of *Escherichia coli* and were found to reduce expression of the gene (Good & Nielsen, 1998). Since the entry of PNAs into the cell is restricted by the bacterial outer membrane, they have

been chemically conjugated with cell-penetrating peptides (CPPs) to increase cellular delivery (Hansen et al., 2016; Hegarty et al., 2016). Locked nucleic acids (LNAs) are also RNA molecules in which the sugar ring has been modified. In addition to being resistant to nucleases, LNAs increase target specificity and provide stable pairing in hybridization to DNAs or RNAs (Adachi et al., 2021). LNAs conjugated with the permeabilizing peptide inhibited the growth of *Acinetobacter baumannii* strain when used in combination with amikacin (Lopez et al., 2015).

Another modified oligomer is phosphorodiamidate morpholino oligomers (PMO) engineered using a morpholine ring to be resistant to nuclease digestion and improve binding property. Similar to PNA, PMOs have also been conjugated with CPPs to increase cellular uptake. PMOs modified with bacterium-permeating peptides to target the AcpP gene (a gene essential for viability) have been shown to inhibit the growth of *E. coli* and *Salmonella enterica* strain (Tilley et al., 2006). Peptide-conjugated phosphorodiamidate morpholino oligomers (PPMOs) targeting essential genes (acpP, lpxC, and rpsJ) in *Pseudomonas aeruginosa* showed synergistic inhibition in the growth of *P. aeruginosa* when used in combination with tobramycin (Howard et al., 2017).

ANTISENSE STRATEGIES IN TREATMENT OF *Staphylococcus aureus* INFECTION

The emergence of antibiotic-resistant strains of the opportunistic pathogen *S. aureus* has led to the search for new treatment strategies in addition to antibiotic therapy. Antisense technology is being investigated as different strategies for the inhibition of pathogens.

Carrier peptides (KFFKFFKFFK) are added to antisense peptide nucleic acids (PNAs) to increase the effectiveness of antisense inhibition. Usage of peptide-PNAs were found to cause the inhibition of the endogenous phoB gene in *S. aureus* (Nekhotiaeva et al., 2004). Strategies targeting virulence or quorum sensing systems are being developed to combat MRSA infections. In a study, it was reported that (KFF)3K peptide-conjugated locked nucleic acids suppressed MRSA pathogenicity by targetting the virulence regulator agr (the accessory gene regulator) gene (Da et al., 2017). In another study, peptide conjugate-peptide nucleic acid (PPNA) was used to target the gyrA gene. The results showed that PPNA significantly inhibited the growth of *S. aureus* isolates. In addition, the combination of PPNA with ciprofloxacin increased the inhibition level (Tavakoli et al., 2019). In addition, antisense PPNAs were used to inhibit the growth of MRSA by targeting the fts Z gene, which is required for bacterial cell division. The results showed that antisense PPNAs suppressed ftsZ mRNA expression in a dose-dependent manner (Liang et al., 2015).

One of the ways to inhibit bacterial growth is to block the expression of conserved bacterial genes. Meng et al. (2015) targeted the mecA gene, which is highly conserved among Staphylococcal species. For this purpose, Phosphorothioate oligodeoxynucleotides (PS-ODN) was used encapsulated with anionic liposome. The usage of PS-ODN inhibited the expression of mecA gene in methicillin-resistant *S. epidermidis* (MRSE) and *S. aureus* (MRSA) strains. In addition, it has been reported that strains treated with PS-ODN became susceptible to β-lactam antibiotics (Meng et al., 2015). Bai et al. (2012) showed that RNA polymerase primary σ^{70} gene (rpoD) which is the highly conserved and required for transcription initiation, can be a target for antisense inhibition using peptide-PNA conjugates to inhibit the growth of *S. aureus*.

The limited uptake of antisense oligonucleotides in bacteria has prompted the search for suitable delivery systems. Zhang et al. (2018) developed a non-cytotoxic and controllable tetrahedral DNA nanostructure as the delivery vehicle of antisense oligonucleotides. Antisense peptide nucleic acids targeting the highly conserved ftsZ gene which plays a role in bacterial cell division, were transferred to MRSA cells using these nanostructures. As a result, ftsZ expression was suppressed depending on the concentration (Zhang et al., 2018). After transfer of ASO-bearing gold nanoparticles to MRSA, it was observed that the expression of mecA gene was suppressed in a dose-dependent manner and increased susceptibility to the antibiotic oxacillin (Beha et al., 2021). In another study, antisense PNAs targeting the mecA and ftsZ genes were used to sensitize MRSA and methicillin-resistant *S. pseudintermedius* (MRSP) strains to oxacillin. Anti-mecA PNA was found to reduce the mRNA level of mecA and increase susceptibility to oxacillin in both strains. Similarly, anti-ftsZ PNA has been

reported to cause growth inhibition, decrease in mRNA level of ftsZ and sensitivity to oxacillin (Goh et al., 2015).

CONCLUSION

The widespread and uncontrolled use of traditional antibiotics has led to the emergence of multi-drug resistant pathogenic bacterial strains. Therefore, there is a need to develop alternative or adjunct treatment strategies against these pathogenic strains. Modified antisense oligomers such as PNA, PS-ASO, PMO and LNA have promising potential to inhibit the growth of target pathogens. However, one of the major barriers to the use of antisense oligonucleotides as antibacterial therapeutics is poor cellular uptake. To overcome this problem, ASOs are conjugated with cell-penetrating peptides. In addition, new and effective delivery strategies are being developed by researching suitable carrier vehicles. The design of ASOs with chemical modifications and the development of delivery systems have the potential to increase the application efficiency of antisense technology.

REFERENCES

Adachi, H., Hengesbach, M., Yu, Y. T., & Morais, P. (2021). From Antisense RNA to RNA Modification: Therapeutic Potential of RNA-Based Technologies. *Biomedicines*, *9*(5).

Bai, H., Sang, G. J., You, Y., Xue, X. Y., Zhou, Y., Hou, Z., . . . Luo, X. X. (2012). Targeting RNA Polymerase Primary sigma(70) as a Therapeutic Strategy against Methicillin-Resistant Staphylococcus aureus by Antisense Peptide Nucleic Acid. *Plos One*, *7*(1), 196-205.

Beha, M. J., Ryu, J. S., Kim, Y. S., & Chung, H. J. (2021). Delivery of antisense oligonucleotides using multi-layer coated gold nanoparticles to methicillin-resistant S. aureus for combinatorial treatment. *Materials Science & Engineering C-Materials for Biological Applications*, *126*.

Da, F., Yao, L., Su, Z., Hou, Z., Li, Z., Xue, X., . . . Luo, X. (2017). Antisense locked nucleic acids targeting agrA inhibit quorum sensing and pathogenesis of community-associated methicillin-resistant Staphylococcus aureus. *Journal of Applied Microbiology*, *122*(1), 257-267.

Goh, S., Loeffler, A., Lloyd, D. H., Nair, S. P., & Good, L. (2015). Oxacillin sensitization of methicillin-resistant Staphylococcus aureus and methicillin-resistant Staphylococcus pseudintermedius by antisense peptide nucleic acids in vitro. *Bmc Microbiology*, *15*.

Good, L., & Nielsen, P. E. (1998). Antisense inhibition of gene expression in bacteria by PNA targeted to mRNA. *Nature Biotechnology*, *16*(4), 355-358.

Hansen, A. M., Bonke, G., Larsen, C. J., Yavari, N., Nielsen, P. E., & Franzyk, H. (2016). Antibacterial Peptide Nucleic Acid-Antimicrobial Peptide (PNA-AMP) Conjugates: Antisense Targeting of Fatty Acid Biosynthesis. *Bioconjugate Chemistry*, *27*(4), 863-867.

Harth, G., Zamecnik, P. C., Tang, J. Y., Tabatadze, D., & Horwitz, M. A. (2000). Treatment of Mycobacterium tuberculosis with antisense oligonucleotides to glutamine synthetase mRNA inhibits glutamine synthetase activity, formation of the poly-L-glutamate/glutamine cell wall structure, and bacterial replication. *Proceedings of the National Academy of Sciences of the United States of America*, *97*(1), 418-423.

Hegarty, J. P., Krzeminski, J., Sharma, A. K., Guzman-Villanueva, D., Weissig, V., & Stewart, D. B. (2016). Bolaamphiphile-based nanocomplex delivery of phosphorothioate gapmer antisense oligonucleotides as a treatment for Clostridium difficile. *International Journal of Nanomedicine*, *11*, 3607-3619.

Hegarty, J. P., & Stewart, D. B. (2018). Advances in therapeutic bacterial antisense biotechnology. *Applied Microbiology and Biotechnology*, *102*(3), 1055-1065.

Howard, J. J., Sturge, C. R., Moustafa, D. A., Daly, S. M., Marshall-Batty, K. R., Felder, C. F., . . . Greenberg, D. E. (2017). Inhibition of Pseudomonas aeruginosa by Peptide-Conjugated Phosphorodiamidate Morpholino Oligomers. *Antimicrobial Agents and Chemotherapy*, *61*(4).

Jani, S., Ramirez, M. S., & Tolmasky, M. E. (2021). Silencing Antibiotic Resistance with Antisense Oligonucleotides. *Biomedicines*, *9*(4).

Kumar, M., DeVaux, R. S., & Herschkowitz, J. I. (2016). Molecular and Cellular Changes in Breast Cancer and New Roles of lncRNAs in Breast Cancer Initiation and Progression. *Molecular and Cellular Changes in the Cancer Cell*, *144*, 563-586.

Liang, S. M., He, Y. Y., Xia, Y., Wang, H. J., Wang, L. P., Gao, R., & Zhang, M. L. (2015). Inhibiting the growth of methicillin-resistant Staphylococcus aureus in vitro with antisense peptide nucleic acid conjugates targeting the ftsZ gene. *International Journal of Infectious Diseases*, *30*, 1-6.

Lopez, C., Arivett, B. A., Actis, L. A., & Tolmasky, M. E. (2015). Inhibition of AAC(6 ')-Ib-Mediated Resistance to Amikacin in Acinetobacter baumannii by an Antisense Peptide-Conjugated 2 ',4 '-Bridged Nucleic Acid-NC-DNA Hybrid Oligomer. *Antimicrobial Agents and Chemotherapy*, *59*(9), 5798-5803.

Meng, J., He, G. H., Wang, H., Jia, M., Ma, X., Da, F., . . . Luo, X. X. (2015). Reversion of antibiotic resistance by inhibiting mecA in clinical methicillin-resistant Staphylococci by antisense phosphorothioate oligonucleotide. *Journal of Antibiotics*, *68*(3), 158-164.

Nekhotiaeva, N., Awasthi, S. K., Nielsen, P. E., & Good, L. (2004). Inhibition of Staphylococcus aureus gene expression and growth using antisense peptide nucleic acids. *Molecular Therapy*, *10*(4), 652-659.

Nielsen, P. E. (2001). Peptide nucleic acids as antibacterial agents via the antisense principle. *Expert Opinion on Investigational Drugs*, *10*(2), 331-341.

Ondusko, D. S., & Nolt, D. (2018). Staphylococcus aureus. *Pediatrics in Review*, *39*(6), 287-298.

Otto, M. (2014). Staphylococcus aureus toxins. *Current Opinion in Microbiology*, *17*, 32-37.

Pifer, R., & Greenberg, D. E. (2020). Antisense antibacterial compounds. *Translational Research*, *223*, 89-106.

Stapleton, P. D., & Taylor, P. W. (2002). Methicillin resistance in Staphylococcus aureus: mechanisms and modulation. *Sci Prog*, *85*(Pt 1), 57-72.

Sully, E. K., & Geller, B. L. (2016). Antisense antimicrobial therapeutics. *Current Opinion in Microbiology*, *33*, 47-55.

Tavakoli, M., Hashemi, A., Vaezjalali, M., Mohammadzadeh, M., & Goudarzi, H. (2019). Inhibition of growth and gene expression in Staphylococcus aureus by anti-gyrA peptide nucleic acid. *Future Microbiology*, *14*(13), 1123-1132.

Tilley, L. D., Hine, O. S., Kellogg, J. A., Hassinger, J. N., Weller, D. D., Iversen, P. L., & Geller, B. L. (2006). Gene-specific effects of antisense phosphorodiamidate morpholino oligomer-peptide conjugates on Escherichia coli and Salmonella enterica serovar typhimurium in pure culture and in tissue culture. *Antimicrobial Agents and Chemotherapy*, *50*(8), 2789-2796.

Tong, S. Y., Davis, J. S., Eichenberger, E., Holland, T. L., & Fowler, V. G., Jr. (2015). Staphylococcus aureus infections: epidemiology, pathophysiology, clinical manifestations, and management. *Clin Microbiol Rev*, *28*(3), 603-661.

Tracey, A. (2021, Updated 2021 Jul 21). *Staphylococcus Aureus*. Treasure Island (FL): StatPearls Publishing. Retrieved 18.01.2022 from https://www.ncbi.nlm.nih.gov/books/NBK441868/

Xue, X. Y., Mao, X. G., Zhou, Y., Chen, Z., Hu, Y., Hou, Z., . . . Luo, X. X. (2018). Advances in the delivery of antisense oligonucleotides for combating bacterial infectious diseases'. *Nanomedicine-Nanotechnology Biology and Medicine*, *14*(3), 745-758.

Zhang, Y. X., Ma, W. J., Zhu, Y., Shi, S. R., Li, Q. S., Mao, C. C., . . . Lin, Y. F. (2018). Inhibiting Methicillin-Resistant Staphylococcus aureus by Tetrahedral DNA Nanostructure-Enabled Antisense Peptide Nucleic Acid Delivery. *Nano Letters*, *18*(9), 5652-5659.

CONSIDER EXTUBATION WHILE INTUBATING - CASE REPORT

ESRA TURUNÇ
Ondokuz Mayis University, Faculty of Medicine, Department of Anesthesiology and Reanimation, Samsun, Turkey

ORCID ID: https://orcid.org/0000-0003-0159-7403

İLKE TAMDOĞAN

GRU Kadın Doğum ve Çocuk Hastanesi, Department of Anesthesiology and Reanimation, Giresun, Turkey

ORCID ID: 0000-0002-8757-1046

ABSTRACT

Cervical hematoma seen after thyroid surgery is a life-threatening condition. Although bleeding usually occurs within 4-6 hours after surgery, it can occur after 24 hours. In this article, an airway approach is presented in a case who developed life-threatening bleeding in the late period after thyroidectomy.

A 45-year-old male patient underwent total thyroidectomy. The patient who developed a sudden onset of cervical hematoma at the 24th hour after thyroidectomy was evaluated as a difficult airway, and awake fiberoptic intubation was performed. Extubation was delayed due to airway edema. The patient who received antiedema treatment was successfully extubated with an airway exchange catheter under dexmedetomidine infusion under operating room conditions.

INTRODUCTION

Patients requiring thyroid surgery are at risk of airway distress before, during, and after surgery. A cervical hematoma, especially in the postoperative period, is a rare but potentially life-threatening complication of thyroid surgery. The incidence of hematoma reported after thyroid and parathyroid surgery is 0.19-2.10% (1). Expanding hematoma requires immediate evacuation. In this case, in surgical patients with predicted or unpredictable difficult airways, the risk of preoperative and intraoperative airway obstruction can be reduced by multiple strategies. In this case, we presented our airway approach in case of complications during and after thyroid surgery.

CASE REPORT

Total thyroidectomy was planned for a 45-year-old male patient, 90 kg and 165 cm tall, with the suspicion of thyroid malignancy. The patient had known systemic diseases hypertension and diabetes mellitus (type 2) and was receiving medical treatments for these diseases.

In the preoperative airway examination, short muscular neck, mallampati class 2, thyromental distance 6.5 cm and neck movements were comfortable. In the direct laryngoscopy performed after the induction, the patient whose cormack-lehhan classification was grade 3 was intubated endotracheally with a size 8 tube with the help of a stylet and cricoidal compression, and at the end of the case, the patient was extubated with sugammadex 2mg/kg and transferred to the service without any problem.

The patient, who developed cervical hematoma at the postoperative 24th hour, was taken back to the case under emergency conditions. Awake fiberoptic intubation was planned due to the patient's current condition (as mask ventilation is difficult and cricoidal pressure cannot be applied due to hematoma). It was observed that the airway was highly edematous during fiberoptic intubation. General anesthesia was given to the patient who underwent awake intubation. Cervical hematoma was evacuated. Since the

airway was observed to be edematous during fiberoptic intubation, extubation was not considered and the patient was transferred to the intubated intensive care unit, and steroid treatment was administered.

Extubation was planned for the patient 2 days later in operating room conditions. Dexmedetomidine 0.5mcg/kg/h infusion was started 1 hour before the procedure for soft extubation to the patient whose spontaneous respiration was quite good. The patient's tube was removed using an airway exchange catheter for safe extubation in the patient with Ramsey SEdation Scale 2. The catheter of the patient who did not have any respiratory distress was removed and transferred to the service without any problem.

DISCUSSION

Patients requiring thyroid surgery are at risk of preoperative, intraoperative, and postoperative airway distress. In surgical patients with predicted or unpredictable difficult airways, the risk of preoperative and intraoperative airway obstruction can be reduced by multiple strategies. The nature of the anatomical structures in the neck puts patients at risk of rapid clinical deterioration, even in the case of a minor hemorrhage, especially in the context of laryngeal edema(2). In this situation, rapid assessment and management is required, sometimes requiring bedside hematoma evacuation with or without emergency tracheal intubation to prevent morbidity and mortality(3).

In the event of a suspected hematoma following thyroid surgery, treatment should begin with simultaneous oxygenation and hematoma evacuation and clinical evaluation progressing to tracheal intubation if necessary. Evaluation of airway patency should be synchronized with immediate management steps. Signs of airway deterioration (arterial oxygen desaturation; difficulty breathing, stridor, tachypnea) should be carefully evaluated. rapidly expanding hematoma will lead to progressive worsening of respiration. In case of further deterioration and unresolved airway incompatibility, emergency tracheal intubation should be considered regardless of the patient's position(4). If necessary, trained and experienced anesthetists should attempt tracheal intubation according to DAS guidelines(5). If the clinical picture is appropriate, awake tracheal intubation should be considered and performed by experienced anesthesiologists. Tracheal intubation may be more successful with the use of a smaller tracheal tube and/or the use of attachments such as a bougie. The success of tracheal intubation should be confirmed by capnography(6).

Although care is always taken in terms of intubation in airway management, the extubation procedure should also be considered with the same sensitivity. The airway exchange catheter is a valuable tool when reintubating an airway is difficult. The Difficult Airway Society (DAS) guide recommends the use of tube-exchange catheters in the extubation of patients who are difficult to intubate(7, 8).

Dexmedetomidine provides sedation, analgesia and anxiolysis in which patients can be aroused and in a cooperative state without disturbing their compliance with the procedure and without respiratory depression. Dexmedetomidine can be used for a soft extubation procedure with its additional sympatholytic properties such as less anxiety, hemodynamic stability, and blunting of the stress-hormone response(9)

In summary; Although care is always taken in terms of intubation in airway management, the extubation procedure should also be considered with the same sensitivity. The airway exchange catheter is a valuable tool when reintubating an airway is difficult. Dexmedetomidine, an agent that provides sedation, analgesia and anxiolysis, can be used for a soft extubation procedure without disturbing the compliance of patients with the procedure and without respiratory depression.

Keywords: servical hematoma, airway exchange catheter, dexmedetomidine

1. Chadwick D, Kinsman R, Walton PKH. The British Association of Endocrine & Thyroid Surgeons: Fifth National Audit Report 2017: Dendrite Clinical Systems Limited; 2017.
2. Doran H, Wiseman S, Palazzo F, Chadwick D, Aspinall S. Post-thyroidectomy bleeding: analysis of risk factors from a national registry. British Journal of Surgery. 2021;108(7):851-7.

3. Lee HS, Lee BJ, Kim SW, Cha YW, Choi YS, Park YH, et al. Patterns of post-thyroidectomy hemorrhage. Clinical and experimental otorhinolaryngology. 2009;2(2):72.

4. Ahmad I, El-Boghdadly K, Bhagrath R, Hodzovic I, McNarry A, Mir F, et al. Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. Anaesthesia. 2020;75(4):509-28.

5. Higgs A, McGrath B, Goddard C, Rangasami J, Suntharalingam G, Gale R, et al. Guidelines for the management of tracheal intubation in critically ill adults. British journal of anaesthesia. 2018;120(2):323-52.

6. Popat MotDASEGGM, Mitchell V, Dravid R, Patel A, Swampillai C, Higgs A. Difficult Airway Society Guidelines for the management of tracheal extubation. Anaesthesia. 2012;67(3):318-40.

7. Standards UbtCo, Parameters P, Apfelbaum JL, Hagberg CA, Caplan RA, Blitt CD, et al. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiology. 2013;118(2):251-70.

8. El-Boghdadly K, Onwochei DN, Cuddihy J, Ahmad I. A prospective cohort study of awake fibreoptic intubation practice at a tertiary centre. Anaesthesia. 2017;72(6):694-703.

9. Afonso J, Reis F. Dexmedetomidine: current role in anesthesia and intensive care. Rev Bras Anestesiol. 2012;62(1):118-33.

MOBILE APPLICATIONS DEVELOPMENT USING MACHINE LEARNING ALGORITHMS

Assoc. Prof. Volodymyr PAVLENKO

Kyiv National University of Technologies and Design, Faculty of Mechatronics and Computer Technologies, Kyiv, Ukraine.

ORCID ID: https://orcid.org/0000-0003-2163-8508

Assoc. Prof. Ihor PONOMARENKO

Kyiv National University of Technologies and Design, Faculty of Mechatronics and Computer Technologies, Department of Information and Computer technologies, Kyiv, Ukraine.

ORCID ID: https://orcid.org/0000-0003-3532-8332

ABSTRACT

Digitization processes lead to the creation of a large number of different applications that are used by the population in most countries of the world in everyday life. Due to the growing number of users of mobile gadgets (smartphones, tablets, smart watches, etc.), companies have the opportunity to create specialized software for direct monetization and promotion of certain products. Paid applications allow customers to directly meet their own leisure, training, job, and more needs through certain unique features. Free applications are used by companies in the process of promoting certain goods and services to the target audience. Due to the development of technology and significant competition between companies in the global application market, a large number of specialized software products appear every day. One of the directions of application evolution is the integration of machine learning algorithms into applications and bringing digital products to a qualitatively new level. Prerequisites for the introduction of various mathematical methods is the development of cloud services that allow companies to accumulate large arrays of disparate information and quickly process it through the use of specialized machine learning algorithms. Accordingly, the application installed on the user's mobile device only serves as a means to obtain a thematic request from the user and display the corresponding result, and complex mathematical models are implemented in a cloud service used by the company to service the software. Three main types of machine learning algorithms are used to create applications:

1. Supervised learning. The implementation of models based on prior training is envisaged, which includes the marking of units from the training sample (for example, the indication of the object class or tag). Based on the selected data of the training sample, the machine learning algorithm with a high level of probability correctly identifies new objects.

2. Unsupervised learning. These algorithms try to identify hidden relationships based on available comprehensive information. When solving classification problems, the presented group of algorithms divides the studied sets into groups according to the identified interdependencies.

3. Reinforcement learning. The presented machine learning algorithms involve learning a certain system in the process of interaction with the appropriate environment. By collecting relevant information about the environment, it is possible to find the optimal solution.

The development of technology leads not only to the improvement of machine learning algorithms, but also to the active introduction of artificial intelligence in various applications. Thanks to artificial intelligence, software products allow users to feel the interaction with people, although there is an imitation of human behavior through the use of appropriate algorithms. Areas of use of machine learning algorithms in the creation of mobile applications are constantly expanding. At the present stage of development, mobile applications with integrated machine learning algorithms are very popular in the following areas: fitness trainers, financial assistants, health monitoring, logistics optimizers, recommendation systems in e-commerce, etc.

Keywords: algorithms, applications, artificial intelligence, information systems, machine learning, optimization.

INTRODUCTION

The intensive development of the modern market of mobile applications is explained by the processes of digitalization, which leads to the launch of a large number of innovative mobile gadgets (smartphones, tablets, smart watches, etc.). The promotion of innovative mobile devices among users is causing a steady increase in relevant technologies. To meet the diverse needs of users, a large number of mobile applications are constantly being launched. It should be noted that the existence of strong competition between mobile application manufacturers in the global device and the introduction of innovation on an ongoing basis leads to a relatively short life cycle of a single application as a product. Under these conditions, users have the opportunity to choose from a large number of specialized mobile applications and quickly switch to innovative products. To ensure a high level of loyalty of the target audience during an economically justified period of time, companies must create and market innovative mobile applications that meet customer expectations and are characterized by a certain unique functionality. To achieve this goal in modern conditions, machine learning algorithms are often used, which allow to optimize a large number of processes in the middle of mobile applications and provide users with access to functionality of a qualitatively new level.

MATERIALS AND METHODS

In modern conditions, the concepts of Data science are becoming widespread, which are used in various fields to process large amounts of information and optimize existing processes. An important area is machine learning approaches, which involve the use of automated technologies for the processing of available data and the formation of optimal solutions. Machine learning algorithms can be integrated into mobile applications and used to process data that is actually stored on the appropriate servers. Various information can be used as data processed by machine learning algorithms as part of mobile applications: data, textual information, audio materials, images, video content. It should be noted that images and videos require significant computing power to process and build specialized mathematical models, respectively, it is necessary to provide support for the operation of a mobile application based on cloud computing.

Machine learning involves the use of the following algorithms:

1. Supervised learning. It is envisaged to use typical algorithms to use typical data examples and their markup in accordance with certain characteristics. Presented test population units must contain numeric values or string labels, such as classes or tags. The studied model in the process of processing new objects with a high level of probability assumes the correct answer.

2. Unsupervised learning. These algorithms learn from existing examples without any answers and try to identify hidden relationships. Due to the use of appropriate methods, templates for data are formed.

3. Reinforcement Learning. This approach involves learning a specific system in interaction with the environment of the process. The optimal solution is formed in the process of collecting and analyzing relevant information [2].

Figure 1 shows the stages of creating a mobile application and determines the time of integration of machine learning algorithms into a digital product.

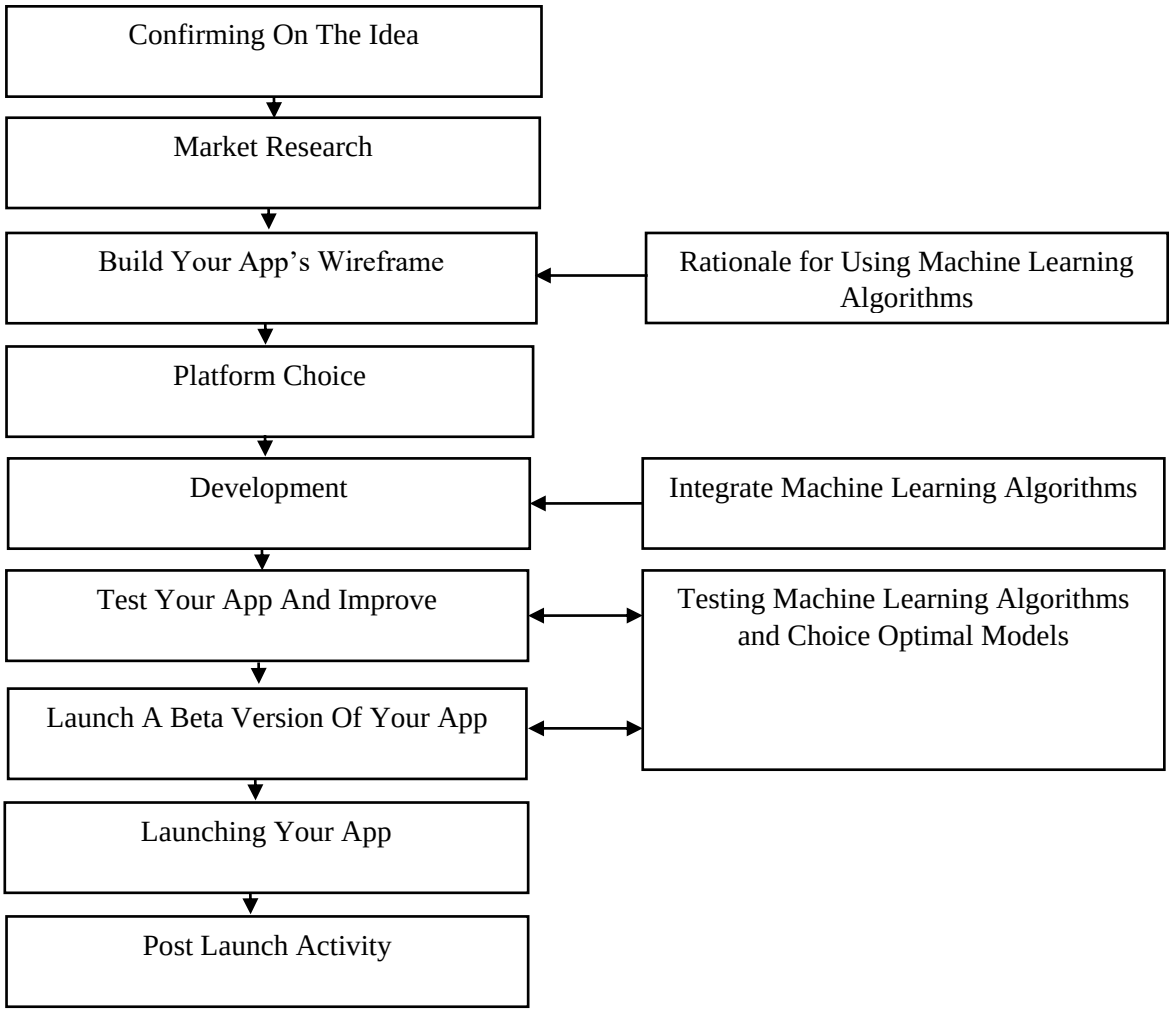


Figure 1. Stages of mobile application development and integration of machine learning algorithms into a digital product [3, 4].

RESULTS

Companies create a variety of applications to attract target audiences and maximize profits through digital products launched on the market. It should be noted that the profit is expected both through paid access to the functionality of applications, and through the promotion of goods and services that receive unique properties for users through the use of specialized applications. The following are examples of using machine learning algorithms to meet the needs of modern users of mobile applications.

1. AI-powered financial assistant. Modern banking institutions offer customers innovative digital products that allow a variety of financial transactions using a smartphone and application 24/7. Thanks to machine learning algorithms, a large number of tasks are solved, primarily the security of access to banking information through the use of a mobile application. The use of neural networks of different architectures within the face identification system provides access only to the owner of the bank account. Thanks to the modern analytics system, the client has the opportunity to receive a variety of information about transactions and account status online. It is possible to use services such as advice on spending money and investing money, there is also access to cost forecasting [5].

2. Fitness mobile apps with ML. Thanks to the use of various devices, primarily fitness trackers, it is possible to collect a variety of information about human activity and monitor the state of certain health

indicators. Algorithms integrated into a specialized mobile application based on personal data determine individual advice on physical activity and a set of exercises [6].

3. Healthcare mobile applications with ML. The development of the healthcare industry has helped to bring to market specialized equipment with mobile applications that monitor individual indicators and identify health threats. Among the diseases that can be tracked through mobile devices: diabetes, epilepsy, heart disease. Machine learning algorithms based on current information about the user's condition can make decisions about calling doctors, changing the diet or exercise [7].

4. Transportation mobile applications. Building an efficient logistics system allows the company to optimize transportation costs and maximize profits in specific space-time conditions. Collection and processing of large amounts of information about the state of traffic and the existing fleet allows integrated in a specialized mobile application machine learning algorithms to avoid congestion, optimize time and fuel costs through the best tracing of traffic [8].

5. E-commerce. The reorientation of large numbers of users to the digital environment and the limited mobility due to the COVID pandemic have contributed to the growth of the e-commerce market. Companies have been able to use mobile applications to communicate with their target audience and increase conversions. Machine learning algorithms are used to identify users and create personalized recommendations for goods and services in accordance with a set of socio-economic characteristics of a particular potential customer [9].

DISCUSSION AND CONCLUSION

Further increasing competition in the mobile applications market and increasing server computing power creates the preconditions for integrating more high-performance machine learning algorithms into relevant digital products. Gradually, the market for mobile applications will move towards the use of artificial intelligence technologies on mobile devices. Automated data collection and processing by machine learning methods will minimize the human impact on the functioning of mobile applications and will help bring the relationship with the target audience to a qualitatively new level. The areas of mobile applications use with integrated machine learning algorithms will be gradually expanded in accordance with the areas of transformation of specialized markets and the needs of potential customers.

REFERENCES

1. Applications of Machine Learning in Mobile Apps. URL: https://blog.vsoftconsulting.com/blog/applications-of-machine-learning-in-mobile-apps (04.02.2022).

2. Supervised vs Unsupervised vs Reinforcement. URL: https://www.aitude.com/supervised-vs-unsupervised-vs-reinforcement/ (04.02.2022).

3. A Step-By-Step Guide To Mobile App Development. URL: https://www.mindbowser.com/a-step-by-step-guide-to-mobile-app-development/ (04.02.2022).

4. Machine Learning App Development: Benefits, MVP & Tech Stack. URL: https://addevice.io/blog/machine-learning-app-development/ (04.02.2022).

5. MACHINE LEARNING IN MOBILE APPLICATIONS: BEST EXAMPLES. URL: https://theappsolutions.com/blog/development/machine-learning-in-mobile-app/ (04.02.2022).

6. Artificial Intelligence and Machine Learning in Health and Fitness. URL: https://riseapps.co/machine-learning-and-ai-for-fitness/ (04.02.2022).

7. Deep Learning and Machine Learning in Healthcare: Use Cases, Examples. URL: https://topflightapps.com/ideas/machine-learning-in-healthcare-use-cases/ (04.02.2022).

8. Machine Learning In Mobile Applications: The Next Wave Of Enterprise Mobility. URL: https://mobisoftinfotech.com/resources/blog/machine-learning-in-mobile-applications/ (04.02.2022).
9. E-commerce Mobile App- Machine Learning. URL: https://mobikul.com/features/e-commerce-mobile-app-machine-learning/ (04.02.2022).

VANTİLATÖRLERDE ENERJİ VERİMLİLİĞİNİN ANALİZİ

ANALYSIS OF ENERGY SAVINGS IN FANS

Hayriye Sevil Ergür

Eskişehir Osmangazi University, Engineering and Architectural Faculty, Mechanical Engineering Department, Batı Meşelik-Eskişehir, Turkey.

ORCID ID: 0000-0003-1679-1137

ÖZET

Günümüzde enerji tasarrufu ve enerjinin optimum kullanımı düşünüldüğünde, endüstride, ticari binalarda, hastanelerde ve benzeri birçok uygulama alanı bulunan vantilatörler, önemli miktarda enerji tüketirler. Bu nedenle, vantilatörün uygunsuz kullanımı ve bakım ihtiyacı, aşırı enerji kayıplarına neden olacaktır. Bu çalışmada, vantilatörlerde enerji kayıp faktörleri ele alınarak doğru seçim, kurulum ve servisin enerji kaybını azaltabileceği gösterilmiştir. Vantilatörler ve pompalar, endüstriyel elektrik üretiminin yaklaşık % 25'ini kullanmaktadırlar. Kimyasal üretim, petrol ve kömür ürünleri, madencilik, gıda üretimi ile metal ve kâğıt üretiminde, pompa ve vantilatörler, yaklaşık % 85 paya sahip olduklarından bu konuda yapılacak iyileştirmelerin % 20−% 50'ye kadar tasarruf sağlayacağı planlanmaktadır.

Çalışma aralığına uygun bir sistemle, vantilatörlerde verim artışı sağlamak mümkündür. Mevcut sonuçların yanısıra enerji ihtiyacının çevirici motor gücünün küpüyle orantılı olarak değişmesi nedeniyle üretimde gerekli istekleri karşılamak şartıyla, debi ve enerji kullanım değerinin düşük olması amaçlanır. Mühendislik uygulamalarında üretim ve vantilatör sistemini tasarım becerisi gerektiren bu durumun sağlanması için farklı yaklaşımlar tercih edilebilir. Ürün ihtiyaçları, vantilatör debisinin belirlenmesinde en önemli faktör olmakta ve bu nedenle birçok iyileştirme projeleri, sistem maliyetinin üzerine çıkabilmektedir. Kabul edilebilir iyileştirme projesindeki ortalama geri dönüş yaklaşık 1-2 yıl kabul edildiğinde, öngörülen tasarruf miktarı 0.045 TL/kWh olacaktır. Mühendislik alanında, son yarım asırdır vantilatör sistem verimliliğinin önemi çok iyi anlaşıldığından, enerji verimliliğini artıran tasarıma yönelik çalışmalar artmaktadır.

Anahtar kelimeler: Enerji tasarrufu, Vantilatör, Giriş ve Çıkış Damperi, Statik ve Dinamik Basınç.

ABSTRACT

In these days, considering energy saving and optimum use of energy, ventilators, which have many application areas in industry, commercial buildings, hospitals and so on, consume a significant amount of energy. Therefore, improper use and maintenance of the ventilator will cause excessive energy losses. In this study, it has been shown that the right choice, installation and service can reduce energy loss by considering the energy loss factors in ventilators. Ventilators and pumps use about 25% of industrial electricity generation. Since pumps and ventilators have a share of approximately 85% in chemical production, petroleum and coal products, mining, food production, metal and paper production, it is planned that improvements to be made in this subject will save up to 20%−50%.

It is possible to increase efficiency in ventilators with a system suitable for the working range. In addition to the current results, since the energy requirement changes proportionally with the cube of the converter motor power, it is aimed to keep the flow rate and energy usage in low rates, provided that the required demands in production are encountered. In engineering applications, different approaches can be preferred to ensure this situation, which requires production and abilities in ventilator system design. Product needs are the most important factor in determining the ventilator flow rate and therefore many improvement projects can exceed the system cost. In the acceptable improvement project, the average return is around 1-2 years, while the estimated savings is 0.045 TL/kWh. In the field of engineering,

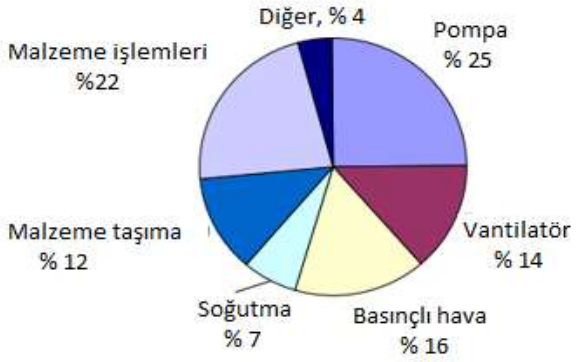
since the importance of ventilator system efficiency has been completely realized for the last half century, emphasis is placed on design studies that increase energy efficiency.

Keywords: Energy saving, Ventilator, Inlet and Outlet Damper, Static and Dynamic Pressure.

1. GİRİŞ

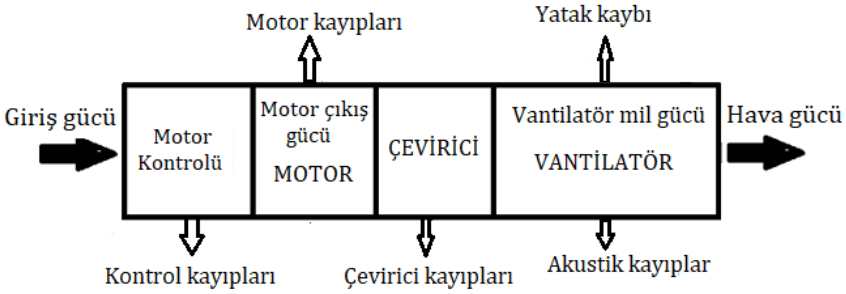
Vantilatörler, belli basınca karşı hava aktaran ve havanın genellikle sıkışamaz olduğu kabul edilerek tasarımı yapılan makinalardır. Bu makinalar, hava ya da gaz şeklindeki herhangi bir akışkanın hareketini sağlayan ve mekanik enerji tüketen veya basınç farkı oluşturarak havanın akışını sağlayan cihazlardır. Sıkışma söz konusu ise düzeltme katsayısı dikkate alınmalıdır. Ayrıca, basınç farkının küçük olduğu durumlarda, hacim ve sıcaklık değişimi ihmal edileceğinden tasarım kolaylaşır. Vantilatör basıncı, aktarılan havada ulaşılan basınç artışı cinsinden ifade edilir. Vantilatördeki hareketli eleman olan çark, havaya karşı iş yaparken statik ve kinetik enerji kazandırır. Havaya kazandırılan bu enerjilerin birbirine oranı vantilatörün tipine göre değişkendir.

Çalışma odaları, maden ocakları, kuyular, tüneller ve gemi ambarlarında, hava değişimi ile zararlı gazlar ve egzost gazlarının atılmasında ayrıca, kurutma, serinletme ve klima tesislerinde genelde büyük debi ve hızlara ihtiyaç duyulur. Vantilatörler, endüstriyel ve ticari uygulamalarda, havalandırma, malzeme taşınmasında insan sağlığı için mutlaka kullanılması gereken ünitelerdir.



Şekil 1. Enerjinin Endüstriyel Kullanım Dağılımı (Cory, 2005)

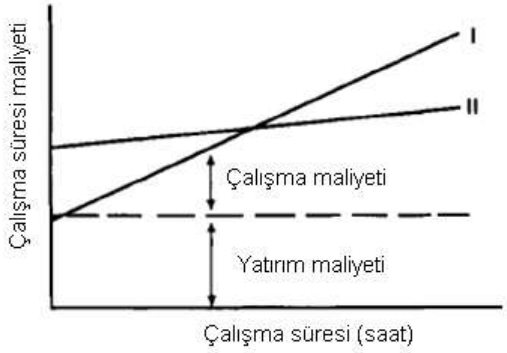
Malzeme taşınması sırasındaki hava kesintisinin tüm sistemde tıkanmalara yol açacağı ve arızanın giderilmesinin çok zor olacağı unutulmamalıdır. Şekil 1'de gösterildiği gibi enerjinin endüstriyel kullanımında yaklaşık % 14'lük paya sahip olan vantilatörler için enerji tasarrufu kaçınılmazdır (Cory, 2005; Hughes, 2010). Şekil 2' de enerji akışının şematik olarak gösterildiği vantilatör sisteminde motor, motor kontrolü, mekanik çevirici ve vantilatör bulunur. Güç soldan sağa doğru aktarılırken, verimsizlikten dolayı bir miktar giriş gücü dışarı atılır. Her elemana ait enerji verimliliği çıkış gücünün giriş gücüne oranı şeklindedir. Giriş gücünün bir kısmı aerodinamik, mekanik ve benzeri kayıplardan dolayı kullanılmayacağı için vantilatör genel verimi hava gücünün mil gücüne oranı ile hesaplanır. Uygulamadaki vantilatör performans testleri için havanın debisi, ulaşılan basınç, vantilatördeki sıcaklık ve çevirici güç değerleri ölçülmelidir (Brelih, 2012).



Şekil 2. Enerji Akışının Şematik Gösterimi (Hughes, 2010)

Ekonomik optimizasyonun amacı, hava taşımacılığının mümkün olan en düşük maliyetle gerçekleştirilmesini sağlamaktır. Geriye kalan maliyetlerden etkilenilmediği durumlarda doğru sonuçlar veren kısmi optimizasyonlar, genel sürecin değerlendirilmesini kolaylaştıracağından belirli hata riskine rağmen kapsamlı bir şekilde uygulanabilir. En aza indirilmesi gereken maliyet, tesisin tüm yaşam maliyetidir, yani tesisin ekonomik ömrü boyunca meydana gelen tüm maliyetlerin toplamıdır. Yatırım ve işletme maliyetleri olarak ikliye ayrılan vantilatör maliyeti, planlama, tasarım ve kullanım sürecindeki harcamalardır. Yatırım maliyetleri, planlama, tasarım ve çizim, teçhizat, kurulum ve devreye alma, proses, adaptasyonu ile personelin eğitiminden oluşurken, işletme maliyetleri ise bakım, satın alınan parça, işçilik ve tüketilen enerjiyi içerir.

Vantilatör tesisinin işletiminde sorun söz konusu ise ve kapasite artışı mümkün değilse üretim kaybı maliyeti işletme maliyeti olarak kabul edilebilir. Yatırım maliyetleri genelde sabit iken işletme maliyetleri çalışma saatlerinin sayısı ile artar. Ayrıca, üretim tesisine yapılan yatırım, işletmenin kapasitesi ve maliyeti karşılama yeteneğinden etkilenir. Farklı iki tesisin tüm kullanım maliyetleri açısından çalışma sürelerinin etkisi, Şekil 3' de gösterilmiştir.



Şekil 3. Tüm Yaşam Maliyetlerinin Grafiksel Gösterimi (Brelih, 2012)

Tesisin genel yapısı ile karakterize edilen düşük yatırım maliyetleri açısından değerlendirildiğinde, işletme maliyeti yüksek olan Tesis I için toplam maliyet en düşük değeri verirken toplam işletme süresi düşük olduğunda sistem verimi azalacaktır. Bununla birlikte, daha uzun çalışma süreleri için yüksek maliyetli tesis II, yüksek verim ve en düşük kullanım maliyeti gösterir. Tesis yaşlandıkça, verim düşecek, bakım maliyetleri ve yedek parça kullanımı artacağından işletme maliyetleriyle kullanım süresi arasındaki ilişki doğrusal olmayacaktır. Tüm tesis bileşenleri birbirinden bağımsız olarak seçilebildiğinden, yeni tesis koşulları toplam optimizasyon için daha uygundur.

Ekonomik optimizasyona göre uygun alternatifler belirlendiği için seçilen ve taşıma şartlarını sağlayan hava, kullanım maliyetini azaltan bir çözüm olarak kabul edilebilir. Mevcut tesisin optimizasyonunda, proses adaptasyonu maliyetleri de dikkate alınmalıdır. Ancak, ilave bir yatırımın işletmeyi daha ekonomik hale getirmesi için maliyetlerin üzerindeki etkisi araştırılmalıdır. Enerji kaynaklarının tükenme eğiliminde olması, maliyeti artıracağı için günümüzde yüksek kazanç sağlayan endüstrilerin birçoğu, dünya piyasası ile rekabet etme gücünü azaltma eğilimindedirler. Enerji verimliliği, gelişen teknolojileri kullanma ve bazı yöntemler ile kaliteyi değiştirmeden daha az enerji ile aynı üretimi yapabilme yeteneğidir.

2. ARAŞTIRMA VE BULGULAR

2.1. VANTİLATÖRLERDE TASARIM PARAMETRELERİ

Vantilatörler tasarımına ilişkin gerekli parametreler sırasıyla, hava debisinin ölçülmesi, dinamik basıncın, hava hızının ve hava yoğunluğunun hesaplanmasından sonra vantilatör veriminin belirlenmesidir. Bunların yanısıra, statik ve dinamik basınçların mutlaka hassas olarak ölçülmesi gerekir. Statik basınç, vantilatörün sisteme aktardığı potansiyel enerjidir. Hızdaki değişim ile düşü olarak ifade edilen basınç, menfez ve giriş noktalarındaki sürtünme kaybıdır. Menfez içindeki statik

basınç, düşük basınçlı alan yaratır. Dinamik basınç ise menfezden geçen hava akımına neden olan akış hattı boyunca oluşan basınçtır (Cunha vd., 2008).

2.1.1. Hava Debisinin Ölçülmesi

Cidarlara yakın noktalarda sürtünmeden dolayı akış hızı azalacağından merkez akış hattındaki hız en büyük değerine ulaşır. Ancak, dirsek gibi yapısal değişimlerden etkilenen akış hızına bağlı olarak en uygun debi ölçümü, dirseklerden, bağlantı noktalarından veya menfezdeki boyutun değişim noktalarından olmak üzere boru çapının yaklaşık 3 ile 5 katı kadar ileri mesafede yapılmalıdır. Ortalama hız tayininde, menfez kesit alanı içinde farklı noktalardan çok sayıda değer alınmalıdır.

Dinamik basınç değişimine karşı hesaplanan hız için ortalama değer kullanılır. Dinamik basınçların ortalaması alınmaz. Kare kesitli menfezlerde, 16 adet eşit aralıkta ölçüm alınması ve debi katsayısının 0,9 kabul edilmesi tavsiye edilir. Ancak, şartlar uygun değil ise sadece merkezden ölçülen tek dinamik basınç ile hız hesaplanabilir. Havanın ivmelenerek farklı boyutlardaki menfezlerden geçmesi sağlandığında, dinamik ve statik basınç değişimlerine rağmen statik ve dinamik basınç toplamı sabit kalacaktır. Vantilatörlerdeki ölçümlerin pitot tüpü ve manometre, akış sensörü, hassas anenometre veya dijital cihazlar ile yapılması tavsiye edilir (Sarac & Sensogut, 2000).

2.1.2. Dinamik Basınç, Hava Hızı, Hava Yoğunluğu ve Vantilatör Veriminin Hesaplanması

Havanın hızı ve hacmini hesaplamak için gerekli dinamik basınç ölçümünde, menfez çapının veya boru çapına ait çevre kullanılmalıdır. Birçok durumda, basınç düşüsü aynı sistem içinde farklı noktalarda ölçülebilir. Hız ve hacmin hesaplanması için hava yoğunluğunun bilinmesi şarttır. Yoğunluk, deniz seviyesine göre yükseklik ve sıcaklık ile değişir.

$$Yoğunluk\ (\rho) = \{P_{ortam}(mmss)/[29.3\ (273 + T(^0C)]\}\ (kg/m^3) \quad (1)$$

Pitot tüpü sabiti, Cpitot = 0.85 veya imalatçıdan alınacak değere bağlı olmak üzere, pitot tüpüyle ölçülen ortalama basınç farkı Δp ise denklem (1)' den hesaplanan hava yoğunluğu ve dinamik basınç değerlerine göre havanın hızı (2) aşağıdaki bağıntı ile hesaplanabilir.

$$Hız\ (m/s) = C_{pitot}\left(\sqrt{2x9.81x\Delta px\rho}\right)/\rho \quad (2)$$

$$\eta_{mekanik} = Debi(m^3/s)\ x\ toplam\ basınç\ (mmss)/[102xMilgücü\ (kW)]x100 \quad (3)$$

$$\eta_{statik} = Debi(m^3/s)\ x\ statik\ basınç\ (mmss)/[102xMilgücü\ (kW)]x100 \quad (4)$$

İmalatçılar, vantilatör verimini mekanik ve statik verim olmak üzere iki ifade ile tanımlamaktadırlar. Her iki verimde, vantilatör giriş gücünün, debi ve basınca en uygun şekilde dönüşümü gerekir. Mekanik ve statik verim hesabındaki mil gücü için çevirici motor gücü, yük (potansiyel farkı, akım şiddeti ve cosφ) analizi ile ölçülür. Bulunan bu değer, motor verimi ile çarpılarak mil gücü hesaplanabilir.

2.2. Vantilatörlerde Enerji Kazanımı

Vantilatör sistemlerindeki enerji stratejisinde, sistem karakteristik eğrisinde, en iyi çalışma aralığı seçilerek bu aralıktaki maksimum verim noktası ile çakışan yüksek verimli vantilatör belirlenmelidir. Enerji tasarrufu için uygun çözüm önerileri Çizelge 1' de özetlenmiştir (Nadel vd., 2002;).

Çizelge 1. Enerji Kazanımında Çözüm Önerileri

Enerji kazanımında uygulanması önerilen çözümler	Enerji kazanımı (%)
Vantilatör sürekli ya da periyodik olarak çalıştığında kullanımın gerekmediği aralıklarda durdurulmalı.	10-50
Gerçek vantilatör debisi belirli ise büyük hacimli vantilatörler tercih edilmemelidir.	10-50
Vantilatörün yeri değiştiğinde ortam basıncı ve tesisat direnci değişeceğinden vantilatör konumu doğru seçilmelidir.	5-30
Debi kontrollü veya değişken ise değişken hatveli çarka sahip eksenel vantilatör veya yüksek hızlı çevirici kullanılmalıdır.	5-30
İstenilen karakteristiğe uygun bir vantilatör tipi seçilerek çark dönüş yönü belirlenmelidir. Hava debisi yüksek olduğunda çark çapı düşürülür, debi küçük ise çapı büyütülmüş çark kullanılarak enerji ihtiyacı optimize edilir.	–
Basınç-debi ihtiyacını karşılayacak uygun vantilatör seçimi yapılmalıdır.	5-30
Eksenel vantilatör çark kanadının ters yönde dönmesi motor aşırı yükleyeceğinden dönüş yönü kontrol edilmelidir. Vantilatör girişinde keskin dirsek üzerinde oluşan direnci azaltmak için akış hattına çevirici kanat eklenmelidir. Vantilatör girişteki hava debisini kontrol etmek için uygun boyutta ara parça eklenmeli veya çıkarılmalıdır. Vantilatör girişine akışı düzelten sabit kanatlar eklenebilir.	5-15
Eksenel vantilatör girişindeki bağlantı noktalarında oluşan gevşeklik giderilmelidir.	5-30
Aşırı büyük motor yerine istenilen karakteristik değerlerine ulaşmak için büyük boyutlu motor yerine çoklu motor-vantilatör grubu tercih edilmelidir.	5-10
Trifaze veya monofaze enerji dağıtımında, hatalı bağlantı ve emniyetsiz sigorta kullanımına izin verilmemelidir.	0-15
Yüksek verimli çevirici motor seçilmelidir	2-5
ac motor ile beklenen dönüş hızına ulaşılamıyor ise elektrik sargıları veya motor başlatıcı kontrol edilmelidir.	0-10
Hava aktarımında düşük hız, kayıp ve basınç düşümü için dairesel kesitli hava kanalı tercih edilmelidir.	0-7
Sistem kanalında kullanılan damperdeki basınç düşümü tasarım aşamasında planlanan basınç kaybı ile eşdeğer olmalıdır.	0-7

2.3. Vantilatörlerde Debi Kontrol Stratejileri ve Enerji Dönüşümü

Tasarlanan sistemdeki vantilatör, sabit dönüş hızında çalışacaktır. Sisteme, ilave edilen yeni üniteler, debi artışına dolayısıyla hızın değişmesine neden olacağından seçilen vantilatör karakteristik değerleri bir miktar düşebilir. Debi değişimi için kasnak değişikliği, damper ile kontrol, girişteki kılavuz kanatların kontrolü, değişken hızlı çeviricilerin kullanımı ile birlikte vantilatörlerin seri veya paralel bağlanması da mümkündür (Ozigis, Dandakouta & Egbo, 2015).

2.3.1. Damper ve Kayış-Kasnak ile Kontrol

Damper, vantilatör giriş veya çıkışına monte edilebilir. Bazı vantilatörler, sadece damper kontrolü dikkate alınarak tasarlanır ve imal edilirler. Ayrıca damperler, dirençlerin eklenmesi veya kaldırılması ile debi değişiminde kullanılırlar. Bu direnç ile vantilatörü, karakteristik eğrinin altında veya üzerinde çalışmaya zorlayacağından dönüş hızı değiştirilmeden daha az veya daha fazla debi kontrol edilebilir. Damperlerdeki ayar, sınırlı aralıkta kontrol edilebildiği için bu ünitelerin kullanımı çok verimli değildir.

Vantilatör kapasitesinin istenilen debiyi karşılayabildiği ve debinin sürekli değiştiği durumlarda, dönüş hızı değiştirilerek debi kontrolü yapılabilir. Vantilatörün V-kayış ile hareketin iletimi şartıyla dönüş hızının en basit ve en ekonomik şekilde değişimi için kayış-kasnak mekanizması kullanılabilir. Bu durumda, çevirici kasnak çapı değişimi ile mevcut dönüş hızı değiştirilebilir. Vantilatörün aşırı yüklenmesi ve damper sisteminin sürekli kontrolü durumlarında, kayış-kasnak ile kontrol tercih edilir.

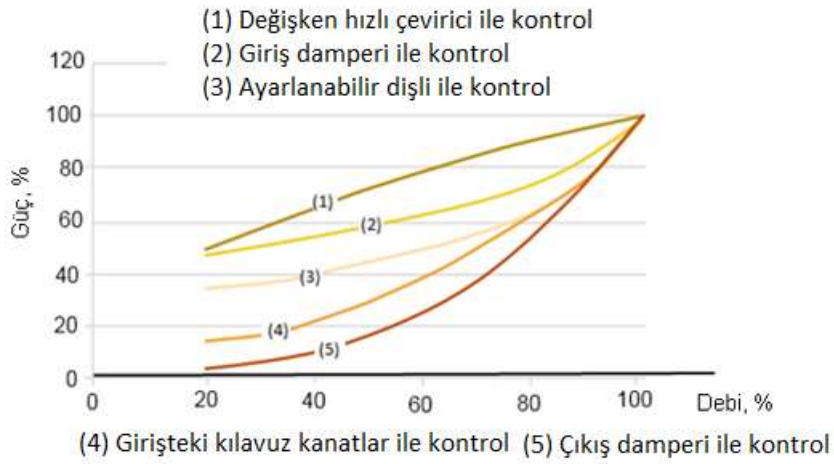
2.3.2. Girişteki Kılavuz Kanatlarla ve Değişken Hızlı Çeviricilerle Kontrol

Değişken debi için önerilen bir diğer metot ise girişte, kılavuz kanatlarının kullanıldığı düzenlemedir. Açık veya kapalı tutulabilen bu kanatlar, girişteki hava debisini kontrol edebilen ve girişe yerleştirilmiş ilave sabit kanatlardır. Kanatlar kapalı iken havanın geri dönmesi durumu ile karşılaşılır. Kılavuz kanat kontrolü ile debi değişiminde başarı % 80 ila % 100 arasındadır. Debi kontrolünün bu aralıkta yapılmadığı durumlarda enerji verimliliği hızla düşebilir. Radyal ve dik akımlı vantilatörlerde debi kontrolü kolaydır. Ancak, eksenel vantilatörlerde kılavuz kanatların kontrolünde yüksek kuvvet gerektiği için hidrolik veya pnömatik düzenekler kullanılır (Vedavarz, Kumar & Hussain, 2007).

Yüksek maliyetli ve hızın kolaylıkla değiştirildiği bu tür çeviriciler ile debi kontrolü son derece başarıyla yapılır. Vantilatör giriş gücü, debinin küpüyle değiştiğinden bu yöntemde debi, en iyi şekilde kontrol edilmektedir. Ancak, güç ihtiyacının analizi için kontrol sisteminin verimi dikkate alınmalıdır.

2.4. Debi Kontrol Yöntemlerinin Değerlendirilmesi

Enerji verimliliği için en doğru debi kontrol metodu belirlenmelidir. Yukarıda bahsedilen tüm metodlar, kontrol elemanlarındaki kaçaklara bağlı olarak maksimum ve minimum değerler arasında geçerlidir. Örneğin, damper tam kapalı olsa bile kaçaktan dolayı debi sıfır olmayabilir. Damper ile yapılan kontrol, basit, kolay kullanım ve düşük maliyetli özelliklerden dolayı debi kontrolünde tercih edilir. Ancak, küçük ve değişken debilerde uygun olduğundan, en verimsiz kontrol yöntemidir (Wallis, 2014; Lee vd., 2011). Değişken hızlı çeviricilerde, geri dönüş debisi sınırlı tutulmaktadır. Vantilatör karakteristiğinin kararsız olduğu eğrilerde, pozitif veya negatif eğimli bölgelerde çalışılabilir. Çalışma aralığı ve çalışma noktası, uygun debi kontrol sisteminin seçimine yardımcı olacaktır. Belirli zaman aralığı içinde vantilatörün farklı çalışma noktalarında çalışıyor olması ve debideki değişim sıklığı, bir metodun diğerine göre tercih edilmesinde belirleyici faktörlerdir (Wallis, 2014; Lee vd., 2011). Şekil 4' de görüleceği üzere değişken hızlı çevirici ve çıkış damperi ile yapılan kontrol arasında oldukça geniş bir kontrol aralığı bulunmaktadır. Bu aralık için maliyet ve kullanım kolaylığı dikkate alındığında, kolaylıkla seçim yapılabilir.



Şekil 4. Farklı ünitelerle debinin kontrolü (Wallis, 2014)

Debi ve düşü üzerindeki yük azaltıldığında, vantilatör ve vantilatör sistemlerindeki enerji tasarrufu azalacağı için uygun olmayan debi kontrol yöntemleri kullanılmamalıdır. Enerji tasarrufunu etkileyen öneriler, yanma sistemlerinde, fazla debinin azaltılarak güç ihtiyacının düşürülmesi, ısı kazanları ve fırınlardaki vantilatör yükünü düşürmek için hava kaçaklarının azaltılması ve klima sistemlerindeki kaçakların önlenmesi şeklinde özetlenebilir (Morello, 2011; Kohneshahri vd., 2017).

2.5. Vantilatörlerde Performans Analizi

Vantilatör performansının değerlendirilmesinde, en önemli etkenler sırasıyla,

1) Çarkın yüksek verimli bir başka çark ile değiştirilmesi,

2) Vantilatör ünitesinin yüksek verimli üniteyle değiştirilmesi,

3) Çark çapının düşürülmesi,

4) Eksenel vantilatörlerde, metalik veya takviyeli plastik çarkın aerofil tasarımlı çark ile değişimi,

5) Kasnak çapı değişimiyle vantilatör hızının düşürülmesi,

6) Değişken çalışma şartlarında çift hızlı veya değişken hızlı çeviricilerin tercih edilmesi,

7) İletim kayıplarını azaltmak için V-kayışlı sistem yerine düz kayış (verim,% 90-97) veya dişli kayış (verim % 94-98) kullanan sistemlerin tercih edilmesi,

8) Çıkıştaki damper kullanımı yerine girişte kılavuz kanat kullanılması, sistem direncinin ve basınç düşümünün azaltılması, vantilatör girişlerinde pürüzsüz ve yuvarlatılmış yüzeylerin kullanılması ile vantilatör giriş ve çıkışındaki tıkanmaların azaltılması şeklinde özetlenebilir (Guyer, 2009).

Enerji verimliliğinde etkili, çalışma ve bakım uygulamaları için belirli zaman aralıklarında, bağlama elemanlarının sıkılıkları kontrol edilmesi, vantilatörün temizliği, temiz filtre kullanımı ile çeviricilerde ve vantilatörlerde yağlanma ihtiyaçlarının kontrol edilmesi gereklidir. Ayrıca, kayış ve motorlarda salgı kontrolü ihmal edilmemeli, menfezlerdeki süzgeç ve koruyucular temiz tutulmalı ve tıkanmalara izin verilmemelidir (Burgess, Ellenbecker & Treitman, 2004). Vantilatörlerde, enerjinin ekonomik kullanımı için yapılması gerekenler sırasıyla,

a) Vantilatör girişlerinde pürüzsüz ve iyi yuvarlatılmış giriş hunisinin kullanımı,

b) Vantilatör girişinde yetersiz hava dağıtımının önlenmesi,

c) Vantilatör giriş ve çıkışlardaki tıkanmaların azaltılması,

d) Filtre ve çark kanatlarının düzenli olarak temizlenmesi,

e) Vantilatör hızının düşürülmesi,

f) Kayış-kasnak mekanizmasında kayma sorunun önlenmesi veya düz kayış kullanımı,

g) Kayış gerginliğinin sürekli kontrol edilmesi, değişken çaplı kasnak kullanımı,

h) Değişken vantilatör yükleri için değişken hızlı çevirici kullanımı,

i) Sürekli ve yarı sürekli çalışmalar için enerji verimliliği yüksek motor kullanımı,

j) Hava kanallarındaki kaçakların azaltılması,

k) Dirseklerin iyileştirilmesi ve sadece ihtiyacın gerekli olduğu durumlarda vantilatör kullanımı olarak özetlenebilir.

3. SONUÇLAR

Vantilatörlerde kullanım verimliliği konusunda yapılacak Ar-Ge çalışmaları için yatırımlardan kaçınmamak gerekir. Bir vantilatör sisteminin ekonomik açıdan önemi, verimlilik faktörü, yani kullanılan ekektrik enerjisinin hava gücüne dönüştürülme kapasitesidir. Bu kapasitenin belirlenmesinde etkili ikincil maliyetler grubundaki tesis tasarlama, proses adaptasyonu ve mevcut kapasite gibi faktörler dikkate alınmalıdır.

Vantilatör tasarımı ve uygun kanat özelliklerinin belirlenmesi (kanat sayısı, kanat açısı, kanat tipi, kanat eni gibi) verim–güç gereksinimlerini önemli ölçüde etkilediği için başarılı tasarımın anahtarı, uygun vantilatör seçimidir. Büyük boyutta vantilatör kullanımının sistem verimini %1–%1,5 oranında azaltacağı bilinmelidir. Enerji maliyetlerinin azaltılmasında, ortam direncinin karşılanması için

üretilmesi gereken basınç değeri oldukça etkilidir. Vantilatör sistemlerinde, ayarlanabilir hız sürücüleri kullanılarak yaklaşık % 14 ile % 49 enerji tasarrufu sağlanabilir.

Ayrıca kayışlar, birçok tesiste vantilatör sisteminin değişken, ancak önemli bir bölümünü oluşturduğundan standart V kayışlarının, verim kaybına yol açan esneme, kayma, bükülme ve sıkıştırma eğilimi gösterdiği bilgisi, tasarımcı tarafından mutlaka değerlendirilmelidir.

KAYNAKLAR

Burgess, W.A., Ellenbecker, M.J. & Treitman, R.D. (2004). Ventilation for Control of the Work Environment, 2nd Ed., Wiley-Interscience, Wiley & Sons, Inc., Pub., New Jersey, U.S.A.

Brelih, N. (2012). How to improve energy efficiency of fans for air handling units. The REHVA European HVAC Journal, Federation of European Heating, Ventilation and Air-conditioning Associations, 49 (2), 5-10, February.

Cory, T.W. (2005). Fans and Ventilation: A Practical Guide, Elsevier Science, London, England.

Cunha, P. Eng., Strack, T. P. Eng. & Stricker, S. P. Eng. (2008). Fans & Blowers, Energy Efficiency Reference Guide, CEATI International Inc. Ontario, USA.

Hughes, R. T. (2010). Industrial Ventilation: A Manual of Recommended Practice for Design, 27th Ed., Signature Publications, Cincinnati, Ohio, U.S.A.

Guyer, J. P. (2009). An Introduction to Design of Industrial Ventilation Systems, CED; Continuing Education and Development, Inc., Stonewall Ct, NJ, U.S.A.

Kohneshahri, M.H., Mohammadyan, M., Khani, H.M., Pourhossein, M. & Dastakzan, B. (2017). Designing a local exhaust ventilation system to control toluene diisocyanate and dust in woodworking industries, International Journal of Occupational Hygiene, 8 (1), 223-229.

Lee, Yu-T., Ahuja, V., Hosangadi, A., Slipper, M.E., Mulvihill, L.P., Birbeck, R. & Coleman, R.M. (2011). Impeller design of a centrifugal fan with blade optimization. International Journal of Rotating Machinery, 2011(ID 537824), 1-17. doi:10.1155/2011/537824.

Morello, G.M. (2011). Influence of Fan Operation on Fan Assessment Numeration System (Fans) Test Results, Master'sTheses, The Graduate School University of Kentucky, Lexington, Kentucky.

Nadel, S., Elliot, R.N., Shepard, M., Greenberg, S., Katz, G. & Almeida, A. T. (2002). Energy–Efficient Motor Systems: A handbook on Technology, Program and Policy Opportunities, 2nd Ed. American Council for an Energy-Efficient Economy, Washington DC, U.S.A.

Ozigis, I.I., Dandakouta, H. & Egbo, G. (2015). Design and construction of centrifugal fan for a fluidized bed combustor. *Nigerian Journal of Tropical Engineering*, December, 8 (1&2), 1–9.

Sarac, S. & Sensogut, C. (2000). Mathematical solutions to the multiple-fan ventilation systems. *The Journal of the South African Institute of Mining and Metallurgy*, May/June, 205-210.

Vedavarz, A., Kumar, S. & Hussain, M. (2007). HVAC: Heating, Ventilation Air Conditioning Handbook for Design Implementation. Industrial Press, South Norwalk, USA.

Wallis, R.A. (2014). Axial Flow Fans, Design and Practice, Elsevier Science Pub., New York.

INVERSION OF SELF-POTENTIAL ANOMALIES USING CULTURAL ALGORITHM

Çağlayan Balkaya

Süleyman Demirel University, Engineering Faculty, Department of Geophysical Engineering, Isparta, Turkey.

ORCID ID: https://orcid.org/0000-0002-0191-8564

Nevbahar Ekin

Süleyman Demirel University, Engineering Faculty, Department of Geophysical Engineering, Isparta, Turkey.

ORCID ID: https://orcid.org/0000-0003-4959-8077

ABSTRACT

Many metaheuristic algorithms inspired by various natural or social phenomena such as swarm intelligence, physical, biological or chemical systems have been presented for global optimization. CA, the cultural algorithm has been used in this study to invert self-potential (SP) anomalies caused by an inclined sheet lying infinite horizontal extent. The SP method on the basis of measurement of natural electric fields is mainly used for mining and environmental research in geophysics. CA is a branch of the evolutionary algorithm inspired by human social evolution and mainly simulates the social interaction between people and their beliefs in the belief space. The algorithm has been applied to theoretical and field anomalies to estimate model parameters of an SP anomaly, including polarization parameter (k), sheet centre location (x_a) and depth (h), half sheet width, and counter-clockwise dip angle (θ) from the measurement direction. Optimal CA control parameters have also been determined for the geophysical optimization problem to obtain better parameter estimates. Theoretical anomalies with and without noise and an SP field anomaly measured over Bavarian (Germany) have been evaluated by the proposed algorithm to demonstrate its performance. Since the results of these studies have shown that the algorithm provides successful estimates for model parameters, we can conclude that it is a promising alternative algorithm to other metaheuristics such as simulated annealing, genetic algorithm, particle swarm optimization and differential evolution, which are usually used for inversion of geophysical anomalies.

Keywords: Metaheuristic, Optimization, Cultural Algorithm, Geophysics, SP anomalies, Inversion

INTRODUCTION

Geophysics is based on the application of physical principles to study the Earth. Geophysical methods used for this aim essentially comprise two groups as active and passive methods. Active methods such as seismic, electric and electromagnetic conduct various forms of energy underground and then measure the returning signals or resulting fields in suitable locations. Passive methods, however, include the measurement and determination of various variations of the naturally occurring earth's gravitational, magnetic and electric fields to locate and delineate their properties (McDowell et al., 2002). In this context, the Self-Potential (SP) method is based on the investigation of naturally occurring electric fields along the earth's surface, which are due to various mechanisms such as electrochemical, thermoelectric coupling and streaming potential (Corwin, 1990). The method is primarily used in the exploration of minerals for the detection of massive ore bodies. As it is one of the most cost-effective geophysical methods due to its reduced equipment and ease of use, it is increasingly used in engineering and environmental applications, groundwater and geothermal explorations like geological mapping, leachate maps, the delineation of shear zones and near-surface faults (e.g., Panthulu et al., 2001; Goldie, 2002; Yasukawa et al., 2005, Göktürkler et al., 2008).

The inversion of SP anomalies can be achieved through traditional local or nature-inspired global optimization approaches, which have some advantages and shortcomings relative to each other (Balkaya, 2013). Conventional methods can provide essentially successful parameter estimates with fast convergence characteristics, especially in the presence of a good initial model (Menke, 1989). Computationally expensive evolutionary metaheuristics, on the other hand, do not react sensitively to the selection of the initial model as a sampler in the parameter space (Başokur et al., 2007; Göktürkler & Balkaya, 2012), so they can escape the local minima compared to local search optimization algorithms (Ekinci et al., 2016). The Particle Swarm Optimization (PSO; Kennedy and Eberhart, 1995), Genetic Algorithm (GA; Holland, 1975), Simulated Annealing (SA; Kirkpatrick et al., 1983) and Differential Evolution (DE; Storn and Price, 1995) are the most commonly used metaheuristics to invert an SP anomaly originated from simple-geometry bodies (e.g., Göktürkler & Balkaya, 2012; Balkaya, 2013) and inclined sheet-type structures; (e.g., Biswas & Sharma, 2014; Ekinci et al., 2020; Sungkono, 2020).

In this study, the Cultural Algorithm (CA) proposed and developed by Reynolds (1994) was used to invert SP anomalies resulting from an inclined sheet of infinite horizontal extent. CA mainly simulates the cultural evolution of human society through a dual inheritance process that simultaneously covers the micro and macro-evolutionary levels (i.e., population and belief spaces). Theoretical and real data sets were taken into account in test studies to demonstrate the effectiveness of CA in the current optimization problem. The theoretical example includes both noise-free and noisy anomalies, while an SP anomaly measured over the ore body in Germany is evaluated in the field data case.

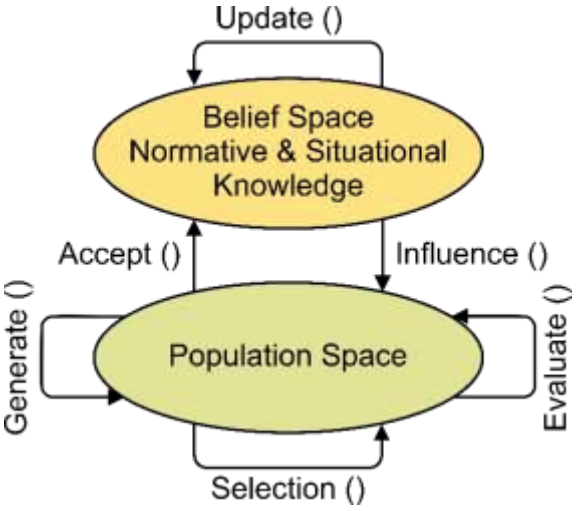
CULTURAL ALGORITHM

CA is a population-based evolutionary algorithm that is essentially inspired by the cultural evolution of some sociological and archaeological theories. Based on these theories, it can be considered an inheritance process that corresponds to the genetic material inherited from the descendants of their parents and the knowledge that the individual has acquired over generations guiding the individual's behaviour. The algorithm is performed in population and belief spaces, as shown in the left panel of Fig. 1. Each individual in the population space has a number of independent traits that are used to calculate their fitness and the knowledge gained by individuals over generations is stored in the belief space. In each generation (t) of CA, individuals of the population can be modified by some of their offspring that are preserved in the population through the application of some operators and may be affected or guided from the belief space. The belief space should therefore be updated for each population through communication with the population (Liu and Lin, 2015).

The pseudo-code of the basic CA is given in the right panel of Fig. 1. Here, t denotes iteration, $\boldsymbol{P}$ and $\boldsymbol{B}$ represent population and belief spaces, respectively. In this study, the evaluation cycle is terminated when the iteration corresponds to the maximum number of iterations (*MaxIt*) or the following cost function, which measures misfit (φ) between the observed and calculated SP anomalies, is below a predefined threshold (i.e., tol = 1e-8).

$$\varphi = \frac{1}{N}\sum_{i=1}^{N}(d_i^o - d_i^c)^2 \quad (1)$$

where N denotes the number of data, d^o and d^c stand for the ith observed and calculated data.




```
CULTURAL ALGORITHM()
Begin
    t = 0;
    Initialize P(t) and B(t)
    repeat
        Evaluate P(t) using Obj()
        Update B(t) using Accept()
        Generate P(t) using Influence()
        t = t + 1;
        Select P(t) from P(t-1)
    until termination criteria
End
```

Figure 1. The framework of the CA (left panel) and a simplified pseudo-code of CA (right panel)

FORWARD PROBLEM

At any observation point $P(x)$ of a surface measurement profile, the general mathematical expression of an SP anomaly over a 2D inclined sheet-type structure (Fig. 2) is given below (Murthy and Haricharan, 1985).

$$V(x) = kln\left\{\frac{[(x-x_a) - a\cos\theta]^2 + (h - a\sin\theta)^2}{[(x-x_a) + a\cos\theta]^2 + (h + a\sin\theta)^2}\right\} \quad (2)$$

where k denotes the polarization parameter ($\rho I/2\pi$, ρ is the resistivity of the sheet and I is the current density of the medium), x_a and h are the x coordinates and the depth of the sheet centre, respectively, a is the half-width of the sheet and θ is the inclination angle in an anticlockwise direction from the positive x-axis. The parameters shown in Table 1 were used to calculate the theoretical SP anomaly and optimized during the inversion process taking into account the given search spaces (Biswas & Sharma, 2014).

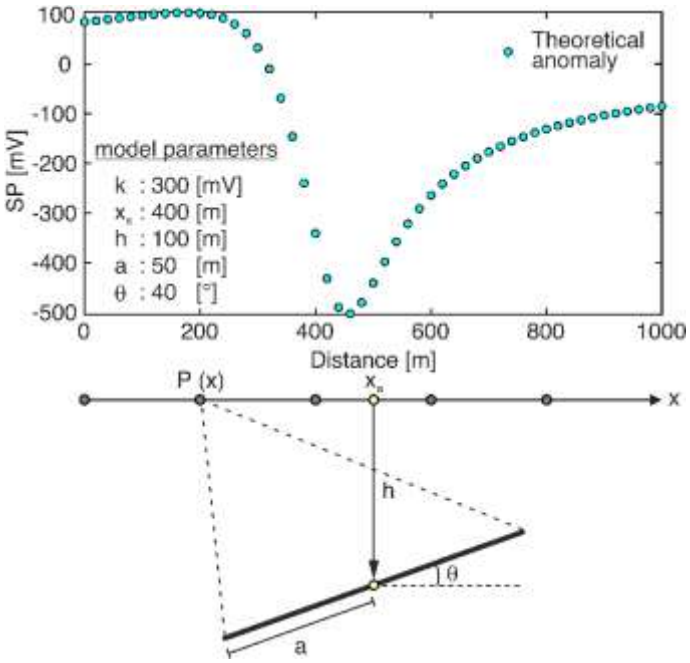


Figure 2. Theoretical anomaly caused by an inclined sheet lying infinite horizontal extent

Table 1. Theoretical model parameters and related search spaces

Model parameters	k **[mV]**	x_a **[m]**	h **[m]**	a **[m]**	θ **[°]**
True val. | Search spaces	300 | 100–400	400 | 300–500	100 | 10–200	50 | 10–200	40 | 0–90

RESULTS AND DISCUSSIONS

Before such a 1-D geophysical inversion study, it is very important to understand the relationship between the model parameters (Balkaya, 2013). To this purpose, topography maps of cost-function are commonly calculated (Fernández-Martínez et al., 2012). Based on the research study by Ekinci et al. (2020) on the current problem, the estimation of three model parameter pairs including $k - a$, $h - a$ and $k - h$ can include some uncertainties. The second important point is that the control parameters of the CA should be tuned to increase its efficiency for the inversion problem under consideration. The algorithm has three important parameters, the acceptance rate of the solution, which is achieved with each iteration (*pAccept*), a value (α) that provides updates of the solutions and the maximum number of population (*nPop*). The acceptance rate of 35% and the α value of 0.3 are the most commonly used in the community. In this study, the effective *nPop* value is investigated using these values. The tuning was achieved using some multiple of the unknown parameter numbers (i.e., *nVar* = 5) changing between 25 and 250. This study shows that CA provides the best results when the population consist of 255 individuals (*nVar* × 45).

We performed 30 independent runs of the algorithm via the above control parameters in both theoretical and field case studies. Fig. 3a presents a comparison between the theoretical anomaly and the model response determined by CA at the end of the 26th run. The convergence characteristic of the algorithm using Eq. 1 is also shown in Fig. 3b. According to this graph, CA provides an effective solution before *MaxIt*, taking into account the threshold used. Theoretical anomaly is also contaminated by normally distributed zero-mean pseudo-random numbers having a standard deviation (SD) of ± 20 mV, and the evaluations are terminated by 200 iterations. Based on the results presented in Fig. 3c and 3d, we can conclude that CA yields solutions with the RMS, square root of Eq.1, close to the SD of the noise level. In the field case, an SP anomaly measured above the ore body in the southern Bavarian woods, Germany (Meiser, 1962) was considered. We have obtained very close

estimates for k and x_a while the remaining parameters (h, a, θ) had two sets of solutions among all 30 derived solutions. Sharma & Biswas (2013) is also reported and discussed this uncertainty for their estimated values achieved with very fast SA. In their opinion, the solutions with $h < a \sin\theta$ are not geologically relevant models. Table 2 shows the-best estimated model parameters for all of the above case applications, and our results for the Bavarian anomaly provide a geologically correct solution. A comparison of the observed anomaly with the computed using the best-fitting model parameters determined by CA is presented in Fig. 3e, while the change in misfit is shown in Fig. 3f for each iteration.

Table 2. The best model parameter estimates with CA for both theoretical and field cases

Anomaly		**Model parameters**					**RMS [mV]**
		k **[mV]**	x_a **[m]**	h **[m]**	a **[m]**	θ **[°]**	
Theoretical	Noise-free	300.003	400	100	49.999	40	9.72e-5
	Noisy	234.805	393.883	98.140	63.882	38.938	19.81
Bavarian		240.562	276.320	47.814	29.228	133.287	9.15

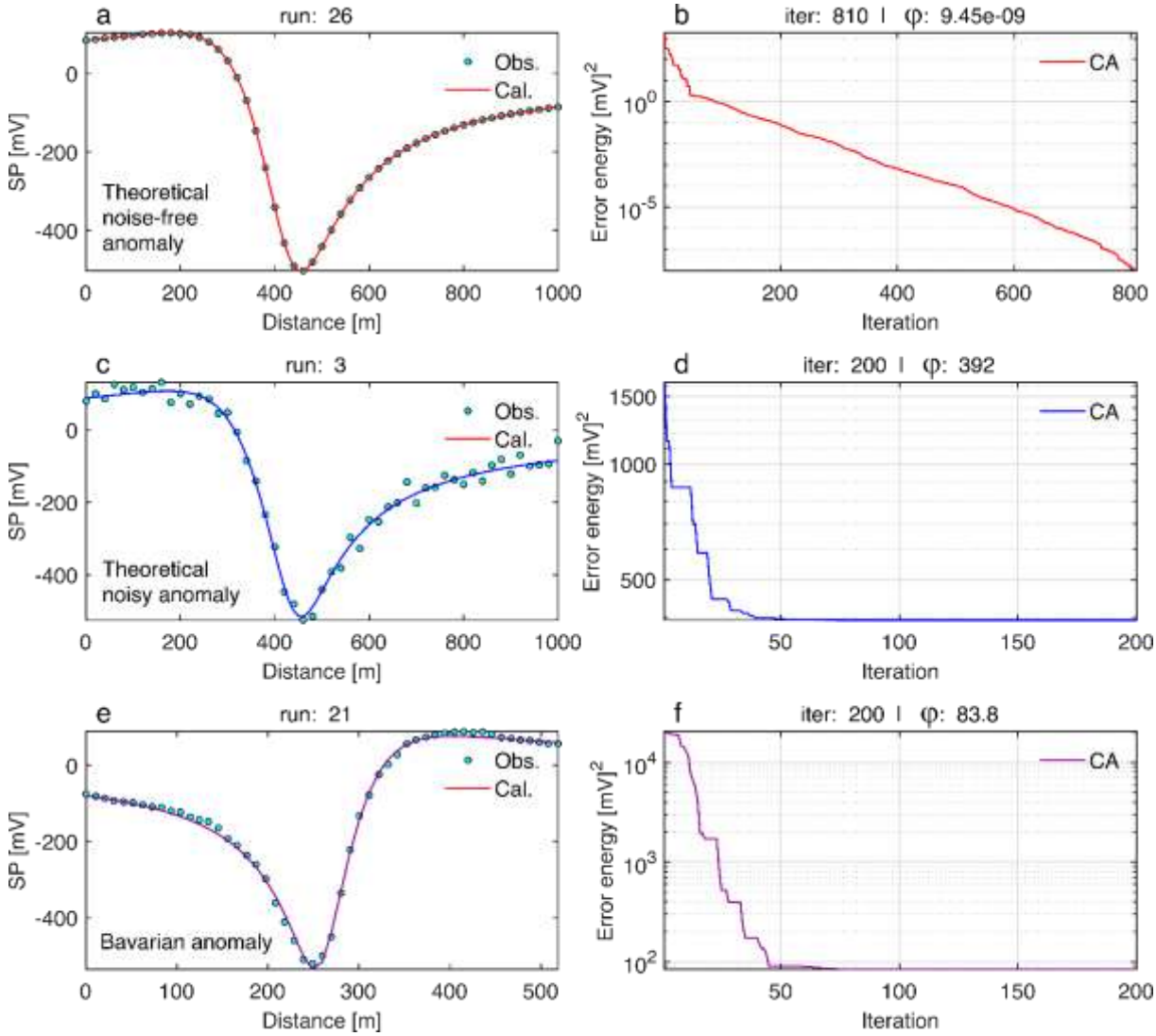


Figure 3. Theoretical/observed and calculated noise-free (a), noisy (c) and Bavarian (e) SP anomalies and the change in error energies (φ) versus iteration in each corresponding CA application

CONCLUSIONS

Since metaheuristics can search global minima in a relatively large model space without having to make the good initial model estimates required for deterministic local optimization approaches, they recently attracted attention in geophysical inversion problems. In this study, we proposed CA for the inversion of both theoretical and real SP anomalies obtained over 2D- inclined sheet-type structures with infinite horizontal extension. Estimated model parameters in theoretical noise-free and noisy cases demonstrated the algorithm's efficiency. In real-world data, CA provided results that are well in line with published studies. It is therefore a promising alternative algorithm to other metaheuristics such as SA, GA, PSO and DE, which are commonly used to invert geophysical anomalies.

ACKNOWLEDGMENTS

This study was funded by Süleyman Demirel University (Isparta, Turkey) Scientific Research Projects (BAP) Coordination Unit (Project No: 4246-YL1-15).

REFERENCES

Balkaya, A. (2013). An implementation of differential evolution algorithm for inversion of geoelectrical data. *Journal of Applied Geophysics*, 98, 160–175. https://doi.org/10.1016/j.jappgeo.2013.08.019

Başokur, A. T., Akça, I., & Siyam, N. W. (2007). Hybrid genetic algorithms in view of the evolution theories with application for the electrical sounding method. *Geophysical Prospecting*, 55(3), 393–406. https://doi.org/10.1111/j.1365-2478.2007.00588.x

Biswas, A., & Sharma, S. (2014). Optimization of self-potential interpretation of 2-D inclined sheet-type structures based on very fast simulated annealing and analysis of ambiguity. *Journal of Applied Geophysics*, 105, 235–247. https://doi.org/10.1016/j.jappgeo.2014.03.023

Corwin, R. F. (1990). The Self-Potential Method for Environmental and Engineering Applications. *Geotechnical and Environmental Geophysics*, 127–146. https://doi.org/10.1190/1.9781560802785.ch5

Ekinci, Y. L., Balkaya, A., Göktürkler, G., & Turan, S. (2016). Model parameter estimations from residual gravity anomalies due to simple-shaped sources using Differential Evolution Algorithm. *Journal of Applied Geophysics*, 129, 133–147. https://doi.org/10.1016/j.jappgeo.2016.03.040

Ekinci, Y. L., Balkaya, Ç., Göktürkler, G., (2020). Global optimization of near-surface potential field anomalies through metaheuristics. In Biswas, A., & Sharma, S.P. (Eds.). *Advances in Modeling and Interpretation in Near Surface Geophysics* (pp. 155–188). Cham, Switzerland: Springer Geophysics.

Fernández Martínez, J. L., Fernández Muñiz, M. Z., & Tompkins, M. J. (2012). On the topography of the cost functional in linear and nonlinear inverse problems. *Geophysics*, 77(1), W1–W15. https://doi.org/10.1190/geo2011-0341.1

Göktürkler, G., & Balkaya, Ç. (2012). Inversion of self-potential anomalies caused by simple-geometry bodies using global optimization algorithms. *Journal of Geophysics and Engineering*, 9(5), 498–507. https://doi.org/10.1088/1742-2132/9/5/498

Göktürkler, G., Balkaya, A., Erhan, Z., & Yurdakul, A. (2008). Investigation of a shallow alluvial aquifer using geoelectrical methods: a case from Turkey. *Environmental Geology*, 54(6), 1283–1290. https://doi.org/10.1007/s00254-007-0911-7

Goldie, M. (2002). Self-potentials associated with the Yanacocha high-sulfidation gold deposit in Peru. *Geophysics*, 67(3), 684–689. https://doi.org/10.1190/1.1484511

Holland, J. H. (1992). *Adaptation in Natural and Artificial Systems*. Amsterdam University Press.

Kennedy, J., & Eberhart, R. (1995). Particle swarm optimization. *Proceedings of ICNN'95 - International Conference on Neural Networks*. https://doi.org/10.1109/icnn.1995.488968

Kirkpatrick, S., Gelatt, C. D., & Vecchi, M. P. (1983). Optimization by Simulated Annealing. *Science*, 220(4598), 671–680. https://doi.org/10.1126/science.220.4598.671

Liu, W. Y., & Lin, C. C. (2015). Spatial forest resource planning using a cultural algorithm with problem-specific information. *Environmental Modelling & Software*, 71, 126–137. https://doi.org/10.1016/j.envsoft.2015.06.002

McDowell, P. W., Barker, R. D., Butcher, A. P., Culshaw, M. G., Jackson, P. D., McCann, D. M., Skipp, B. O., Matthews, S. L., & Arthur, J. C. R. (2002). *Geophysics in Engineering Investigations*. London: Geological Society of London.

Meiser, P. (1962). A method for quantitative interpretation of selfpotential measurements. *Geophysical Prospecting*, 10(2), 203–218. https://doi.org/10.1111/j.1365-2478.1962.tb02009.x

Menke, W. (1989). *Geophysical Data Analysis: Discrete Inverse Theory (Volume 45) (International Geophysics, Volume 45)* (1st ed.). Academic Press.

Murty, B. V. S., & Haricharan, P. (1985). Nomogram for the complete interpretation of spontaneous potential profiles over sheet-like and cylindrical two-dimensional sources. *Geophysics*, 50(7), 1127–1135. https://doi.org/10.1190/1.1441986

Panthulu, T., Krishnaiah, C., & Shirke, J. (2001). Detection of seepage paths in earth dams using self-potential and electrical resistivity methods. *Engineering Geology*, 59(3–4), 281–295. https://doi.org/10.1016/s0013-7952(00)00082-x

Reynolds, R. (1994). An introduction to cultural algorithms. In Sebald, A., & Fogel, D. (Eds). *Proceedings of the 3rd Annual Conference on Evolutionary Programming* (pp. 131–139). River Edge, NJ: World Scientific Publishing.

Sharma, S. P., & Biswas, A. (2013). Interpretation of self-potential anomaly over a 2D inclined structure using very fast simulated-annealing global optimization — An insight about ambiguity. *Geophysics*, 78(3), WB3–WB15. https://doi.org/10.1190/geo2012-0233.1

Storn, R., & Price, K. (1995) Differential Evolution—A simple and efficient adaptive scheme for global optimization over continuous spaces. International Computer Science Institute, Berkeley, CA, Technical Report TR-95-012.

Sungkono. (2020). An efficient global optimization method for self-potential data inversion using micro-differential evolution. *Journal of Earth System Science*, 129(1). https://doi.org/10.1007/s12040-020-01430-z

Yasukawa, K., Ishido, T., & Suzuki, I. (2005). Geothermal reservoir monitoring by continuous self-potential measurements, Mori geothermal field, Japan. *Geothermics*, 34(5), 551–567. https://doi.org/10.1016/j.geothermics.2005.04.005

ARCHAEO-GEOPHYSICAL INVESTIGATIONS AROUND THE AEDICULUS BASILICA OF THE PISIDIA ANTIOCHEIA ANCIENT CITY (YALVAÇ, ISPARTA)

Çağlayan Balkaya

Süleyman Demirel University, Engineering Faculty, Department of Geophysical Engineering, Isparta, Turkey.

ORCID ID: https://orcid.org/0000-0002-0191-8564

Mehmet Metin Ünyay

Süleyman Demirel University, Graduate School of Natural and Applied Sciences, Isparta, Turkey.

ORCID ID: https://orcid.org/0000-0002-6338-262X

ABSTRACT

Non-destructive and non-invasive geophysical methods have often been used at ancient sites to identify shallow archaeological structures hidden beneath the surface. In this context, an archaeo-geophysical survey has been carried out in a relatively small area around the newly discovered Aediculus Basilica of Antiocheia. Ancient Antiocheia is located in the north of Yalvaç district in Isparta and on the southern slopes of the Sultan Mountains. Due to the existence of 16 cities in Anatolia founded by the Seleucid kings, called Antiocheia, the city was mainly referred to by ancient writers as Pisidian Antioch. An archaeo-geophysical investigation was carried out using the ground-penetrating radar (GPR) method and the electrical resistivity tomography (ERT) technique commonly used at ancient sites. Several basic data processing steps were applied to GPR scans collected with a 500 MHz shielded antenna along 90 profiles. Two-dimensional ERT data sets were collected along 25 profiles with a dipole-dipole array at an electrode spacing of 1 m, and the data sets were evaluated using two- and three-dimensional inversion techniques. The results of GPR and ERT imaging clearly show the presence of various regular structures indicating man-made archaeological remains in the subsurface. Therefore, archaeological trial trenches were proposed in the investigation area to identify the source of geophysical results and to show the success of this integrated archaeo-geophysical investigation.

Keywords: Archaeological geophysics, GPR, ERT, Pisidia Antiocheia

INTRODUCTION

Ancient Pisidia, now known as the Lake District, comprises the entire provinces of Isparta and Burdur, the northern parts of Antalya province and the western part of Konya province (Fig. 1a). The ancient city is located approximately 1 km northeast of Yalvaç, a modern town of Isparta Province in the SW Anatolian region, and was founded on a high hill overlooking the Anthios Valley of the Sultan Mountains, which extends to SW-NE (Fig. 1b).

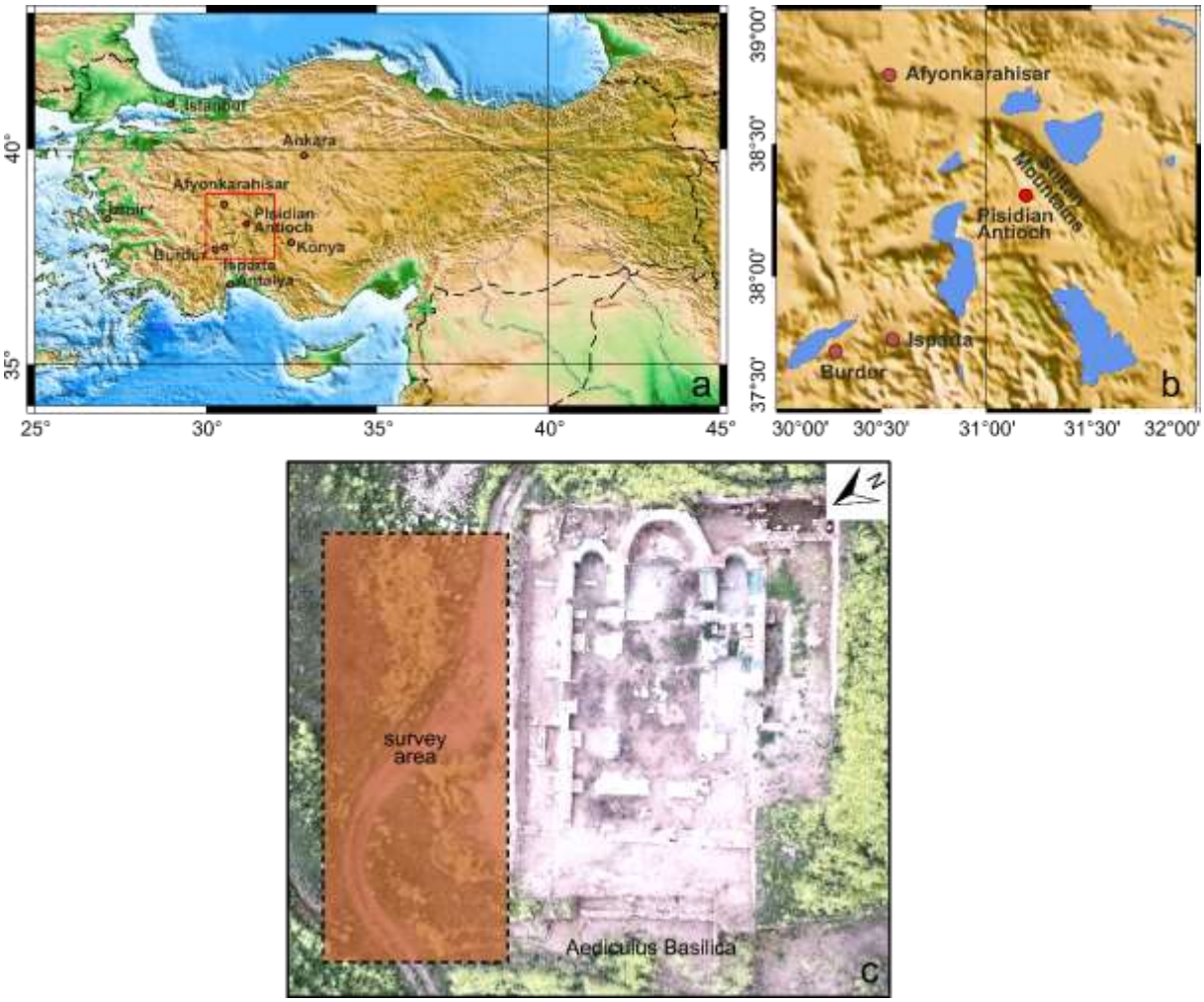


Figure 1. Location map of Pisidian Antioch and environs (a, b) and archaeo-geophysical survey area (c), air photo is from the Pisidian Antioch project.

Pisidian Antioch was one of the most developed cities in Anatolia throughout history, with a unique temple carved into the bedrock, a theatre covering the hillside, a stadium for 15,000 people, a parliament building, squares, monumental entrance gates, street fountains, a perfect sewer system and churches (Özhanlı, 2012). Due to its important role in the early Christian era, the city is also one of the most important cities in Anatolia. Despite this historical importance of the city, only a small part of the 67-hectare area has been uncovered by archaeological excavations. For this reason, the geophysical surveys carried out in the city are very important to direct the economically costly excavations. The first geophysical study in the ancient city of Pisidia Antiocheia was carried out by Kaya et al. (1997) using the electrical resistivity method between the Palaestra and Roman bath of the city. During the magnetic survey carried out on the Acropolis in 2001, a basilica structure was identified between Nymphaeum and the Roman bath (Smekalova et al., 2005). In the following years, ground-penetrating radar (GPR) and electrical resistivity tomography (ERT) investigations were carried out in various areas of the ancient city (Öztürk Akca, 2011; Erek, 2011; Üstol, 2013; Ünyay, 2019).

In 2018, an integrated archaeo-geophysical study involving GPR and ERT investigations was conducted in an area in the northwest of the newly discovered Aediculus Basilica in the ancient city of Pisidia Antiocheia. The successful examples of the integration of GPR and ERT can be found in the literature (e.g., Balkaya et al., 2018 & 2021; Akca et al., 2019; Yilmaz et al., 2019). The study area is shown in Figure 1c. While GPR measurements were performed with a shielded antenna having a center frequency of 500 MHz on 90 profiles, ERT data sets were collected with a dipole-dipole array on 25 profiles with 1 m electrode spacing and 1 m spacing. The results of the GPR and ERT imaging

techniques clearly indicate the existence of various regular structures that can be attributed to man-made archaeological remains with regular geometries underground. Therefore, archaeological trial trenches have been proposed in the research areas to confirm the results of this integrated geophysical investigation.

METHODOLOGY

GPR and ERT methods were applied in the 45 m × 23 m survey area, which is located approximately northwest of the Aedicilus Basilica and Cardo Maximus Street. GPR is one of the most commonly used methods together with magnetic prospection in archaeological sites. It is based on the transmission of a high-frequency radio wave from a transmitting antenna to the ground and the recording of the signal reflected/scattered by the layer boundaries and/or hidden objects, by the receiving antenna depending on the arrival time (Balkaya and Göktürkler, 2016). The GPR measurements were performed using a shielded antenna system with a center frequency of 500 MHz in 90 profiles in the SW-NE direction; the distance between the profiles was 50 cm, the track spacing was 5 cm and the time window was 80 ns. Basic data processing techniques such as gain, band-pass filtering (200-830 MHz) and background removal were applied in the evaluation (GPR-SLICE v7.0; Goodman, 2016).

ERT is a technique developed by the combination of sounding and profile measurement techniques, which are widely used in the electrical resistivity method, and thus enable the monitoring of changes in both the lateral and vertical direction of the subsurface. ERT study was carried out on 25 NW-SE oriented profiles with the dipole-dipole electrode array. In practice, the distance between the electrodes and the profiles was selected to 1 m. The collected data sets were evaluated using two- and three-dimensional inversion techniques, taking into account the L1 norm (robust) (Geotomo software 2006a, b).

RESULTS AND DISCUSSIONS

As a result of the GPR data evaluation, subsurface images were generated from the surface to a depth of 2.4 m. The results for 130-160 cm depth levels are presented in Figure 2. Noteworthy anomalies can be seen within the red dashed rectangular areas marked A and B on the map. Area A measures about 45 m × 10 m. In this area, which is located right next to the Aediculus Basilica, regular and strong reflections of a certain geometry indicate the existence of possible archaeological remains (room, wall, etc.). Here, the apse structure is also clearly visible between 10-20 m in the x-direction. Moreover, the anomaly outside this area, between area B (11.8 m-22.7 m, in x-direction; 10 m-17.3 m in the y-direction), which covers an area of about 77 m^2, is also noteworthy.

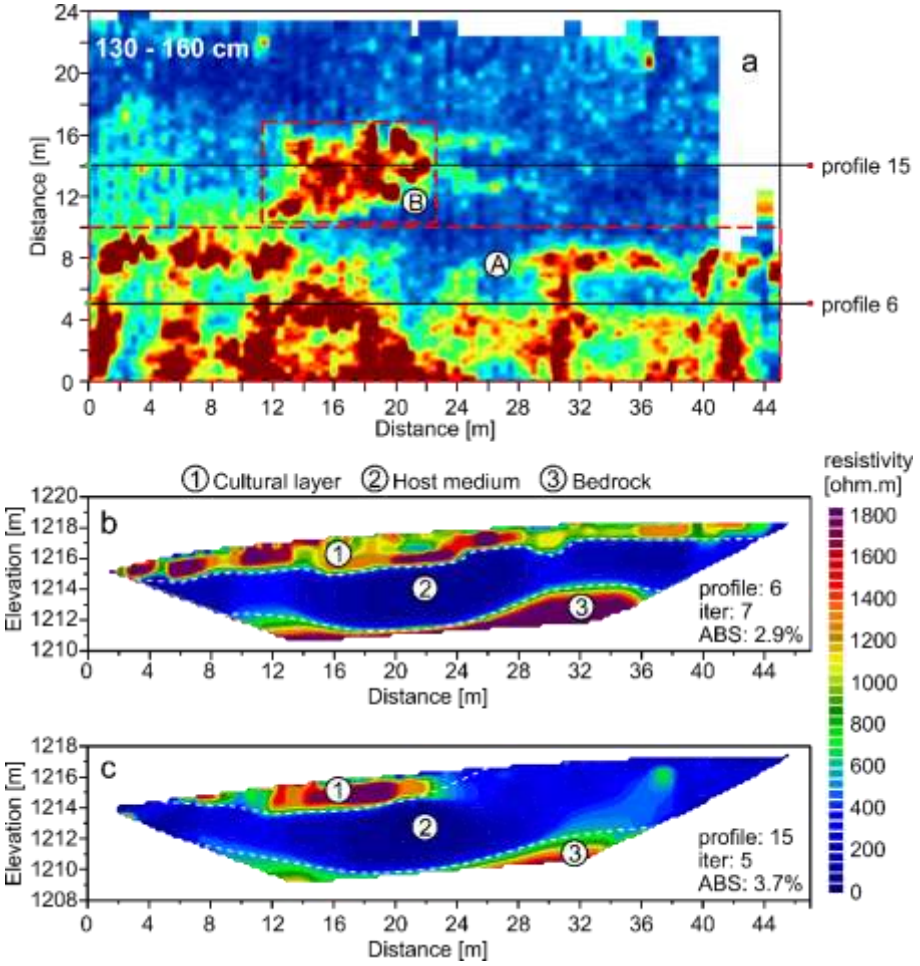


Figure 2. GPR depth slice map of 130-160 cm (a). The extensions of ERT profiles 6 and 15, which cut through the observed anomalies, are also shown on the map. ERT depth sections for profile 6 (b) and profile 15 (c).

Figures 2b and 2c show geo-electrical cross-sections of ERT profiles 6 and 15 which intersect through the observed anomalies in the A and B areas. In general, we have defined three zones with markings 1, 2 and 3 in both sections. The first zone demonstrates the cultural layer including the remains of human activities. It is characterized by high resistivity values of >1500 ohm.m down to depths of 2-2.5 m and supports the GPR results from Fig. 2a. The second zone under this layer represents the host medium of the surveyed area and has resistivities <400 ohm.m. The last zone shows the bedrock with the undulated topography.

CONCLUSIONS

We have presented the successful results of archaeo-geophysical surveys carried out in the ancient city of Pisidia Antiocheia via GPR and ERT applications. Based on these results, we can conclude that the area studied includes the hidden archaeological structures associated with the Aediculus Basilica. The remains of the structures observed in areas A and B of the GPR depth slice are clearly traced in ERT cross-sections with designations 1 representing the cultural layer of the investigated area. In the light of all these findings, the trial excavations to be carried out by archaeologists in the aforementioned areas of the study area, which point to the ruins of regular man-made archaeological structures in the research area, will ensure that these structures are associated with the existing Aediculus Basilica.

ACKNOWLEDGMENTS

This study was funded by Süleyman Demirel University (Isparta, Turkey) Scientific Research Projects (BAP) Coordination Unit (Project No: FYL-2019-6959). This study contains a part of the master thesis of M. Metin Ünyay. We thank Prof. Dr. Mehmet Özhanlı Head of the excavations in Pisidia Antiocheia and his surveying team for their friendly hospitality, Lecturer Olcay Çakmak for his help in data collection and processing and Bessam Kadı for his help in data collection. We graciously commemorate Prof. Dr. Ü. Yalçın Kalyoncuoğlu, Director of the Earthquake and Geotechnical Research Center of Süleyman Demirel University. The center provided geophysical instruments for this survey.

REFERENCES

Akca, R., Balkaya, A., Pülz, A., Alanyalı, H. S., & Kaya, M. A. (2019). Integrated geophysical investigations to reconstruct the archaeological features in the episcopal district of Side (Antalya, Southern Turkey). *Journal of Applied Geophysics*, 163, 22–30. https://doi.org/10.1016/j.jappgeo.2019.02.006

Balkaya, A., Kalyoncuoğlu, M. Y., Özhanlı, M., Merter, G., Çakmak, O., & Talih Güven, İ. (2018). Ground-penetrating radar and electrical resistivity tomography studies in the biblical Pisidian Antioch city, southwest Anatolia. *Archaeological Prospection*, 25(4), 285–300. https://doi.org/10.1002/arp.1708

Balkaya, A., Ekinci, Y. L., Çakmak, O., Blömer, M., Arnkens, J., & Kaya, M. A. (2021). A challenging archaeo-geophysical exploration through GPR and ERT surveys on the Keber Tepe, City Hill of Doliche, Commagene (Gaziantep, SE Turkey). *Journal of Applied Geophysics*, 186, 104272. https://doi.org/10.1016/j.jappgeo.2021.104272

Goodman, D. (2016). *GPR-Slice v7 User's Manual*, pp. 15– 270, Geophysical Archaeometry Laboratory Inc., Woodland Hills, Calif.

Erek, Y. (2011). *Geophysical studies in archeological areas: In example Pisidia Antiocheia* (MSc thesis). Isparta, Turkey: Süleyman Demirel University, Graduate School of Natural and Applied Sciences (in Turkish).

Özhanlı, M. (2012). Roman City planning specifically for Pisidia Antiokheia. In Hürmüzlü, B., & Fırat, M. (Eds.). *Pisidia Investigations I, Symposium Proceedings Book* (pp. 155-176). Isparta, SDÜ Arkeoloji Uygulama ve Araştırma Merkezi (in Turkish).

Kaya, M. A., Keçeli, D. A., Özyalın, Ş., Uyanık, O., Çınar, K., & Kalyoncuoğlu, Ü. Y. (1997). Archaeogeophysics and an application example: Pisidia Antiocheia. In *Proceedings of the 1st Pisidia Antiocheia Symposium* (pp. 51– 68). Turkey: Yalvaç (in Turkish).

Öztürk Akca, C. (2011). *Geoarcheological and new archaeogeopyhsical methods applied at ancient settlements: Psidia Antiocheia example* (PhD thesis). Isparta, Turkey: Süleyman Demirel University, Graduate School of Natural and Applied Sciences (in Turkish).

Smekalova, T. N., Voss, O., & Smekalov, S. L. (2005). Antioch – Roman capital of Pisidia and a biblical town. In T. N. Smekalova, O. Voss, & S. L. Smekalov (Eds.), *Magnetic surveying in archaeology. More than 10 years of using the Overhauser GSM-19 gradiometer* (pp. 37– 39). Saint Petersburg, Russia: Polytechnic University.

Üstol, G. (2013). *The archaeogeophysical (ground penetrating radar and electrical resistivity) research of watchtower in ancient city of Pisidia Antiokheia* (MSc thesis). Isparta, Turkey: Süleyman Demirel University, Graduate School of Natural and Applied Sciences (in Turkish).

Ünyay, M. (2019). *Archaeo-geophysical survey of Aediculus Basilica and its vicinity in the Pisidia Antiokheia Ancient City* (MSc thesis). Isparta, Turkey: Süleyman Demirel University, Graduate School of Natural and Applied Sciences (in Turkish).

Yilmaz, S., Balkaya, A., Çakmak, O., & Oksum, E. (2019). GPR and ERT explorations at the archaeological site of Kılıç village (Isparta, SW Turkey). *Journal of Applied Geophysics*, 170, 103859. https://doi.org/10.1016/j.jappgeo.2019.103859

NANOMATERIALS USED FOR PERSONAL PROTECTIVE MEDICAL EQUIPMENTS

Hacer Kandemir

Dokuz Eylül University, The Graduate School of Natural and Applied Sciences, Department of Biotechnology, İzmir, Türkiye

ORCID ID: https://orcid.org/0000-0001-9220-1317

Levent Cavas

Dokuz Eylül University, Faculty of Sciences, Department of Chemistry, İzmir, Türkiye

ORCID ID: https://orcid.org/0000-0003-2136-6928

ABSTRACT

Personal protective medical equipments (PPMEs) are materials that protect or isolate users from biological, chemical, radioactive and nuclear threats. Masks, gloves, aprons and visors are the most basic groups among the PPMEs that have increased usage rates and awareness of use with the COVID-19 pandemic. PPMEs can be obtained through various production processes using natural or synthetic materials. However, PPMEs that are available in the current market have some disadvantages such as being disposable, low performance, allergenic effects for the user and creating environmental waste. Designing multifunctional PPMEs by overcoming these limitations is the most basic target to prevent new health threats. For this purpose, scientific researchers have carried out many studies related to the inclusion of nanomaterials on the surface of PPMEs in recent years. Nanomaterials can be used as a coating or filler for the surface of PPMEs. Nanomaterials are preferred for the development of antimicrobial, biocompatible, eco-friendly and economical products due to their unique properties. In addition, PPMEs developed with nanomaterials show higher performance by providing user comfort. The incorporation of nanomaterials into PPMEs surfaces and examining their effects for multifunctional product design are important topics globally. In this study, recent scientific researches on the development of nanomaterial-based PPMEs with their limitations are reviewed and presented.

Keywords: Personal protective medical equipment, PPME, nanotechnology, nanomaterials

INTRODUCTION

The 21st century has been called the age of global health threats by the World Health Organization (WHO). These threats are classified under 4 main headings as biological, chemical, radioactive and nuclear. COVID-19 is the last biological threat witnessed in human history and has caused the 6th major health crisis (Rajendran et al., 2021). While the effects of the COVID-19 pandemic and the possibility of the emergence of new threats continue, the measures to be taken to protect public health are being increased (Su et al., 2021). At the beginning of these measures, the most important equipments are the use of personal protective medical equipments (PPMEs) (Ruskin et al., 2021). PPMEs are developed according to certain standards in order to protect the respiratory and body systems and they are generally medical textile products (Uddin et al., 2022). Medical textile products such as masks, gloves and aprons form the main class of PPMEs. The most accessible and most basic protection material groups are the face masks. (Kasloff et al., 2021). It has been reported by WHO that 89 million masks and 76 million gloves should be used each month for effective protection from COVID-19 (Uddin et al., 2022). Considering this rate of effective use of PPMEs, it should be underlined that the design, production, supply and effective use of PPMEs for full protection are very important (Dugdale et al., 2020). However, the traditional PPMEs have some disadvantages. The most important disadvantages are that they are produced from disposable and plastic-sourced (Ammendolia et al., 2021). More innovative and multifunctional product design is needed to overcome the limitations caused by PPMEs (Araújo et al., 2021).

Nanomaterials are valued as antimicrobial agents due to their unique physical and chemical properties and they are used as a coating or filler for the surface of PPMEs (Andra et al., 2021). Especially, after the COVID-19 pandemic, many nanomaterials have been used in the scientific literature to develop multifunctional PPMEs and successful results have been obtained (Shukla et al., 2021). With the inclusion of nanomaterials in PPMEs, it is essential to develop the most suitable and innovative products in order to be protected from possible health threats. The studies in this field are very valuable for the history of humanity and are processes that need to be supported (Vazquez-Munoz and Lopez-Ribot, 2020).

In this review, traditional and modern PPMEs are reviewed with their pros and cons and a special focus on the reasons for the need for nanomaterial-based PPMEs explained is also given.

DESIGN OF TRADIONAL PPMEs

PPMEs are obtained from medical textile fabrics and the source of these fabrics is natural or synthetic fibers. Natural resources are basically 3 groups; plant (such as cotton and linen), animal (such as wool and silk and mineral origin (such as asbestos). However, since the processing of natural resources creates additional costs, synthetic resources are generally preferred in the production of PPMEs. Synthetic resources mainly consist of polymer resources (polyester, polypropylene, polyurethane, etc.). The latter can also be used in composite synthetic materials (Uddin et al., 2022). Synthetic fabrics provide ease of production and low cost in order to give the desired properties to the target product. Synthetic fibers are designed as 3-layer structures to obtain PPMEs. The outer layer should be hydrophobic, the middle layer should be to ensure filtration effect and the inner layer should be non-allergenic (Shashina et al., 2021; Sureka et al., 2021). These properties are gained to PPMEs fabrics by meltblown and spunbond production methods. In addition, fabrics produced with these techniques are designed as non-woven fabrics. Non-woven fabrics are very cheap and filtration effective fabric types. Therefore, it is preferred in all 3 layers of PPMEs (Mallakpour et al., 2021). PPMEs should be subjected to certain quality standards on the current market. These quality standards are the main parameters that determine the quality and effectiveness of PPMEs. It is recommended not to use PPMEs that do not comply with these developed standards (Otrisal et al., 2021).

LIMITATIONS OF TRADITIONAL PPMEs

PPMEs are disposable plastic-based materials. Considering that approximately 129 billion masks and 65 billion gloves used in a month throughout COVID-19 pandemic, it becomes even more difficult to supply PPMEs and to manage the waste generated by these products in the worldwide (Prata et al., 2020). It is estimated that PPMEs generate an average of 1.6 million tons of plastic waste per day. This waste rate carries the unavoidable plastic waste pollution to even more serious dimensions (Benson et al., 2020). PPMEs produced from plastic-based products remain in nature for a long time due to their low biodegradability. Moreover, the degradation products of plastic waste (microplastics) contaminate with water and soil, threatening human health and harming the ecosystem (Peng et al., 2021). Another important problem caused by plastic-based PPMEs is that they show an allergenic effect for the user in long-term use. Skin problems such as redness, irritation and blistering have been reported in hospital personnel who had to use PPME for a long time during the COVID-19 pandemic (Sureka et al., 2021). In addition to all these limitations, the correct and effective use of PPMEs affects the protective performance. For effective protection, the instructions for use of PPME must be followed (Uddin et al., 2022).

DESIGN OF NANOMATERIAL-BASED PPMEs

Nanomaterials are multifunctional materials ranging in size from 1 to 100 nm and used in many application areas. As a result of the COVID-19 pandemic, there has been a great improvement in the approach of nanomaterial-based product due to the proven antimicrobial efficacy of nanomaterials. Among these innovative approaches, incorporating nanomaterials into PPMEs surfaces is an influential

vision (Idumah, 2021). In the field of nanomaterial-based PPMEs have been carried out many scientific studies until today, especially on the multi-functionalization of face masks with nanomaterials. Apart from face masks, there are products such as gloves and aprons developed with nanomaterials (Jadoun et al., 2020).

There are many methods such as immersion, sonication, microwave or pad-dry-cure applied to the incorporation of nanomaterials into PPMEs surfaces. The immersion and pad-dry-cure techniques are the simplest and most effective (Saleem and Zaidi, 2020). Nanomaterials are incorporated into the surface of PPMEs contributing to the hydrophobicity, filtration, durability, breathability and antimicrobial properties of these products (Jadoun et al., 2020; Saleem and Zaidi, 2020). In addition, the durability of PPME fabrics developed with nanomaterials increases and improves washing resistance. This can add up to limit the disposable nature of conventional PPMEs (Galante et al., 2020).

Nanoparticles are the most used group in nanomaterial-based PPMEs design. Nanoparticles are preferred more frequently due to their effective antimicrobial properties and easy production methods (Yocupicio-Gaxiola et al. 2021). It has been reported that effective anti-SARS-CoV-2 activity was obtained in scientific studies involving metal and metal oxide nanoparticles such as silver, copper/copper oxide, zinc/zinc oxide and titanium/titanium oxide used for nanomaterial-based face masks. (Carvalho and Conte-Junior, 2021; Grozdanov and Paunovic et al., 2021; Pemmada et al., 2020). In addition, 2-dimensional nanomaterial groups such as graphene and graphene oxide are very suitable materials for PPMEs (De Maio et al., 2021).

Although nanomaterial-based face masks and gloves are developed and introduced to the current market, nanomaterial-based PPMEs are still a developing field. The studies in this field are of critical importance.

CONCLUSION

The effects of the COVID-19 pandemic continue to grow all over the world and the potential for the emergence of new epidemics are quite evident. For this reason, the need for the effective and correct use of PPMEs are increasing. It has become a necessity to develop PPMEs together with nano-technological products in order to increase their performance. PPMEs developed with nanomaterials will be the most effective method for the protection of public health.

REFERENCES

Ammendolia, J., Saturno, J., Brooks, A. L., Jacobs, S. and Jambeck, J. R. (2021). An emerging source of plastic pollution: environmental presence of plastic personal protective equipment (PPE) debris related to COVID-19 in a metropolitan city. *Environmental Pollution*, *269*, 116160.

Andra, S., Jeevanandam, J. and Muthalagu, M. (2021). Emerging nanomaterials for antibacterial textile fabrication. *Naunyn-Schmiedeberg's Archives of Pharmacology*, *394*(7), 1355-1382.

Araújo, J. C., Fangueiro, R. and Ferreira, D. P. (2021). Protective multifunctional fibrous systems based on natural fibers and metal oxide nanoparticles. *Polymers*, *13*(16), 2654.

Carvalho, A. P. A., and Conte-Junior, C. A. (2021). Recent advances on nanomaterials to COVID-19 management: a systematic review on antiviral/virucidal agents and mechanisms of SARS-CoV-2 inhibition/inactivation. *Global Challenges*, *5*(5), 2000115.

De Maio, F., Palmieri, V., Babini, G., Augello, A., Palucci, I., Perini, G. et al. (2021). Graphene nanoplatelet and Graphene oxide functionalization of face mask materials inhibits infectivity of trapped SARS-CoV-2. *Iscience*, *24*(7), 102788.

Dugdale, C. M., and Walensky, R. P. (2020). Filtration efficiency, effectiveness, and availability of N95 face masks for COVID-19 prevention. *JAMA Internal Medicine*, *180*(12), 1612-1613.

Grozdanov, A., and Paunovic, P. (2021). Functionalized nanoparticles in facemasks for protection of Covid 19. *Material Sci and Eng*, *5*(5), 142-146.

Idumah, C. I. (2021). Influence of nanotechnology in polymeric textiles, applications, and fight against COVID-19. *The Journal of the Textile Institute*, *112*(12), 2056-2076.

Jadoun, S., Verma, A. and Arif, R. (2020). Modification of Textiles via Nanomaterials and Their Applications. *Frontiers of Textile Materials:* Polymers, Nanomaterials, Enzymes, and Advanced Modification Techniques, 135-152.

Kasloff, S. B., Leung, A., Strong, J. E., Funk, D. and Cutts, T. (2021). Stability of SARS-CoV-2 on critical personal protective equipment. *Scientific reports*, *11*(1), 1-7.

Mallakpour, S., Azadi, E. and Hussain, C. M. (2021). Protection, disinfection, and immunization for healthcare during the COVID-19 pandemic: Role of natural and synthetic macromolecules. *Science of The Total Environment*, *776*, 145989.

Otrisal, P., Bungau, C., Obsel, V., Melicharik, Z. and Tont, G. (2021). Selected respiratory protective devices: Respirators and significance of some markings. *Sustainability*, *13*(9), 4988.

Pemmada, R., Zhu, X., Dash, M., Zhou, Y., Ramakrishna, S., Peng, X. et al. (2020). Science-based strategies of antiviral coatings with viricidal properties for the COVID-19 like pandemics. *Materials*, *13*(18), 4041.

Peng, Y., Wu, P., Schartup, A. T. and Zhang, Y. (2021). Plastic waste release caused by COVID-19 and its fate in the global ocean. *Proceedings of the National Academy of Sciences*, *118*(47).

Prata, J. C., Silva, A. L., Walker, T. R., Duarte, A. C. and Rocha-Santos, T. (2020). COVID-19 pandemic repercussions on the use and management of plastics. *Environmental science and technology*, *54*(13), 7760-7765.

Rajendran, K. P., Adaikalam, J. M., Govindarajulu, S., Murali, A., Subramaniyam, D. et al. (2021). Covid-19, A Litmus Test On Travel Medicine, Global Surveillance And International Health Regulations? A Critical Review. *Nveo-Natural Volatıles and Essentıal Oıls Journal| NVEO*, 8(4): 6942-6951.

Ruskin, K. J., Ruskin, A. C., Musselman, B. T., Harvey, J. R., Nesthus, T. E. and O'Connor, M. (2021). COVID-19, personal protective equipment, and human performance. *Anesthesiology*, *134*(4), 518-525.

Saleem, H. and Zaidi, S. J. (2020). Sustainable Use of Nanomaterials in Textiles and Their Environmental Impact. *Materials*, *13*(22), 5134.

Shashina, E. A., Isiutina-Fedotkova, T. S., Makarova, V. V., Gruzdeva, O. A., and Mitrokhin, O. V. (2021). Approaches to analyzing efficiency of respiratory protective equipment as a way to reduce health risks during COVID-19 pandemic. *Health Risk Analysis*, (1), 151-158.

Shukla, B. K., Tyagi, H., Bhandari, H. and Garg, S. (2021). Nanotechnology-Based Approach to Combat Pandemic COVID 19: A Review. In *Macromolecular Symposia* 397(1); 2000336.

Su, Z., Wen, J., McDonnell, D., Goh, E., Li, X., Šegalo, S. et al. (2021). Vaccines are not yet a silver bullet: The imperative of continued communication about the importance of COVID-19 safety measures. *Brain, behavior, and immunity-health*, *12*, 100204.

Sureka, B., Nag, V. L., Garg, M. K., Tak, V., Banerjee, M., Bishnoi, A. and Misra, S. (2021). Rational use of PPE and preventing PPE related skin damage. *Journal of Family Medicine and Primary Care*, *10*(4), 1547.

Uddin, M. A., Afroj, S., Hasan, T., Carr, C., Novoselov, K. S. and Karim, N. (2022). Environmental Impacts of Personal Protective Clothing Used to Combat COVID-19. *Advanced Sustainable Systems*, *6*(1), 2100176.

Uddin, M. A., Afroj, S., Hasan, T., Carr, C., Novoselov, K. S. and Karim, N. (2022). Environmental Impacts of Personal Protective Clothing Used to Combat COVID-19. *Advanced Sustainable Systems*, *6*(1), 2100176.

Yocupicio-Gaxiola, R. I., Petranovskii, V., Sanchez, P., Antunez-Garcia, J., Alonso-Nunez, G., Galvan, D. H. and Murrieta-Rico, F. N. (2021). Prospects for Further Development of Face Masks to Minimize Pandemics Functionalization of Textile Materials with Biocide Inorganic Nanoparticles: A Review. *IEEE Latin America Transactions*, *19*(6), 1010-1023.

AN EVALUATION ON SUSTAINABILITY OF SHEEP BREEDING IN TURKEY

Turgay TAŞKIN

Ege University Faculty of Agriculture Department of Animal Science, Bornova-Izmir/Turkey

ORCID ID: https://orcid.org/0000-0001-8528-9760

Çağrı KANDEMİR

Ege University Faculty of Agriculture Department of Animal Science, Bornova-Izmir/Turkey

ORCID ID: https://orcid.org/0000-0001-7378-6962

Sait ENGİNDENİZ

Ege University Faculty of Agriculture Department of Agricultural Economics, Bornova-Izmir/Turkey

ORCID ID: https://orcid.org/0000-0002-7371-3330

ABSTRACT

Animal production, and especially sheep breeding, has an important place in our country's animal husbandry. Sheep breeding contributes directly or indirectly to the country's economy in many areas from raw material supply to employment. The sheep population, which decreased to 25 million heads in 2002, has kept its place on the agenda and gained a significant momentum with the projects "Breeding in the Hands of the Breeder and Conservation of Native Gene Resources" initiated by the Ministry of Agriculture and Forestry. In other words, the population of sheep reached 45.182.280 heads and a share of 78.69% in the total of number of sheep and goats. However, the yield averages obtained in terms of the number of dairy animals (19.836.985 heads), sheep milk production (1.521.455 tons), the number of slaughtered sheep (5.057.026 heads) and sheep meat production (109.382 tons), generally differed from culture breeds and crosses and lower than. Some important problems such as technical organization, marketing, long chain between producer and consumer, food safety, epidemic diseases and related animal deaths are also effective on the yields obtained.

As it is known, a sustainable animal production has three important components such as economy, environment and social structure. In this sense, each component should be handled separately and a separate evaluation should be made. When a permanent change in the farm is necessary, it needs to be carefully planned and implemented. Otherwise, a more profitable production may not be possible with a healthy soil, water, animals and air.

In this study; emphasizing the importance of sustainable sheep breeding in Turkey, the factors limiting it are emphasized and some technical and economic suggestions are presented for its improvement. In the study, previous studies on the subject were used, and various data were compiled from institutions such as TURKSTAT and FAO. In the data analysis, percentage and index calculations were made, and the results were summarized in tables.

Key words: animal production, small ruminant, sheep breeding, sustainability.

INTRODUCTION

Small ruminant and especially sheep husbandry has a special place in Turkey. This is because; It is the ability of sheep to turn into yield by utilizing unproductive pastures and areas that are not suitable for fallow, stubble and crop production, and where other farm animal species cannot benefit (Durmuş et al., 2019). Although Turkey is one of the leading countries in the world in terms of sheep stock, it is not at the level of developed countries in terms of productivity (Díez-Unquera et al., 2012).

However, the geographical conditions of our country, being suitable for sheep breeding and small ruminant production; It is a known issue that the competitiveness of animal products is important in different market conditions, especially in the European Union countries, the Middle East and the Turkish Republics (Ergün and Bayram, 2021). Although climate change is perceived as a concept today, there is a very important negative aspect in terms of sheep breeding, especially in rural areas, as well as in developing countries. This is because; Animal husbandry in the above-mentioned regions is entirely based on vegetation in pasture or other grazing areas (Sarıözkan and Oflaz, 2020). For this reason, sustainable sheep breeding will also take an important share from this negativity (Köknaroğlu and Akünal, 2010).

Another important issue is that due to the stress experienced in animals due to adverse climatic conditions together with global warming, some reductions in milk production and related milk production occur (Kandemir et al., 2019). It can also make the production of quality roughage even more difficult. This is an undesirable situation for a sustainable sheep breeding (Taşkın et al., 2020).

In this study; after giving place to the numerical structural features of sheep breeding in Turkey, the problems experienced, the support and incentives are discussed. Finally, some technical and economic suggestions about the future of sustainable sheep breeding for our country are given.

MATERIAL AND METHOD

In the study, previous studies on the subject were used, and various data were compiled from institutions such as TURKSTAT and FAO. In the analysis of the data, percentage and index calculations were made and the results were summarized in tables.

RESULTS

Sheep Stock

The change of sheep population in Turkey by years is given in Table 1. While the number of sheep in Turkey was approximately 32 million (31953800 heads) in 2002, this number decreased to 23974591 heads in 2010. However, there has been an increase in the number of sheep with the national projects of the Ministry of Agriculture and Forestry called "Breeding in the Hands of the People" and "Conservation of Native Gene Resources". According to TURKSTAT data for the first six months of 2021, this number has increased to 45182280 heads. The share of sheep in the total small ruminant (sheep and goat) stock has been 78.69% in recent years.

Table 1. Change in the number of sheep in Turkey for years

Year	Number of sheep (head)	Index (2002=100)	Total small ruminant (head)	The share of sheep in the total number of small ruminant (%)
2002	25173706	100.00	31953800	78.78
2005	25304325	100.51	31821789	79.52
2010	23974591	95.23	26877793	89.20
2015	31507934	125.16	41924100	75.15
2016	30983933	123.08	41329232	74.97
2017	33677636	133.78	44312308	76.00
2018	35194972	139.80	46117399	76.32
2019	37276050	148.07	48481479	76.89
2020	42126781	167.34	54112626	77.85
2021*	45182280	179.48	57417349	78.69

*: 1st period data of the year

Source: TURKSTAT, 2021

Animal Production

Sheep milk production, number of dairy sheep, number of slaughtered sheep, changes in sheep meat and fleece production in Turkey are given in Table 2. Sheep milk production, which was 657388 tons in 2002 in our country, increased depending on the years and this value increased to 152455 tons in 2019. The increase in sheep milk production was not parallel to the number of dairy sheep and even showed a decreasing value. In 2016, the number of dairy animals increased and reached 15149414 heads. Later, this number increased over the years and reached 19836985 heads in 2019. Milk production per sheep, which was 48.20 kg on average in 2002, tends to increase over the years and reached 76.69 kg/head in 2019. The number of slaughtered sheep also fluctuated greatly over the years. For example, while this number was 3395393 heads in 2002, it increased to 6873626 heads in 2010 and decreased to 4083620 heads in 2016 with a sudden decrease. In 2019, it increased again and reached 5057026 heads (TURKSTAT, 2021). When the sheep meat production is examined depending on the number of slaughtered sheep, while it was 75828 tons in 2002, this value increased to 109382 tons in 2019. Wool production was 68829 tons in 2019, from 36043 tons (for 2002).

Table 2. Changes in milk, meat and wool production from sheep in Turkey

Year	Sheep milk production (ton)	Number of milking sheep (head)	Milk production per milking head (kg)	Number of slaughtered sheep (head)	Mutton production (ton)	Number of sheared sheep (head)	Wool production (ton)
2002	657388	13637193	48.20	3395393	75828	24473826	36043
2005	789878	10166091	77.69	4145343	73743	24551972	43801
2010	816832	10583608	77.18	6873626	135687	22003299	39390
2015	1117228	15362927	72.72	5008411	100021	29302358	52357
2016	1160413	15149414	76.59	4083620	82485	28832669	51523
2017	1344779	17503414	76.82	5134338	100058	31257408	55911
2018	1446271	18819287	76.85	4652525	100831	32513293	58202
2019	1521455	19836985	76.69	5057026	109382	34199467	61134
2020	-	-	-	-	-	38579748	68829

Note: Since 2010, red meat production includes slaughterhouses and non-slaughterhouses.

Source: TURKSTAT, 2021

Animal Production Value

In the study, animal production values for sheep production were calculated according to TURKSTAT data and are given in Table 3. Sheep and lambs constitute 25.44% of the livestock value in Turkey (TIGEM, 2019; TURKSTAT, 2021). Domestic sheep constitute 91.42% of the live sheep value. The total production value obtained from sheep in the same year is 9.15% of the total animal production value obtained in Turkey. Sheep milk constitutes 59.61% of the animal production value obtained from milked sheep (Table 3)

Table 3. Production value of sheep farming (2020)

Production Value	**Total Value (1000 TL)**
Live Animal Value	
Sheep amd lamb (Merino)	4461514
Sheep and lamb (Domestic)	45203197
Total sheep and lamb value	49664711
Total live animal value	195238955
Rate of sheep and lamb (%)	25.44
Value of Animal Products	
Sheep milk	5920686
Mutton	3863567
Sheep hide	28818
Wool	119591
Total value of sheep products	9932662
Total value of animal products	108598173
Rate of sheep (%)	9.15

Source: TURKSTAT, 2021

Live Animal and Animal Products Export

Data on the export of live sheep and sheep products by Turkey in 2020 are given in Table 4. As can be seen from the table, Turkey exported 235544 head of livestock and 209 tons of sheep meat in 2020.

Table 4. Turkey's live sheep and sheep products export (2020)

Live animal and animal products	**Export quantity**	**Export value (1000 $)**
Live animal	235544 head	28892
Meat	209 tons	1987
Skin (dry salted)	438 tons	1900
Wool	10 tons	8

Source: FAO, 2021

Supports Given to Small Ruminants

In Turkey, especially after the 1980s, important problems began to be experienced in animal husbandry. Animal husbandry has declined, and after the 1980s, Turkey's import of animal products has gradually increased (Ertuğrul et al., 2010; Cedden et al., 2020). The problems of Turkey's animal husbandry have been tried to be solved with different measures and policies, but they have not been successful enough and the problems have become chronic (Yılmaz, 2007). In 2000, the "Decree on Supporting Livestock Breeding" was put into practice in order to solve the problems of Turkey's animal husbandry and to develop the livestock sector. In order to improve animal husbandry and increase production, to close the qualified roughage gap, forage crops production was encouraged. In addition, a support program consisting of subjects such as milk support premium, rootstock support, breeder support, milk, offspring support, keeping pedigree records and encouraging the use of certified breeders in order to make genetic breeding more effective and widespread has also been implemented (Anonymous, 2014). Especially

after 2005, livestock supports diversified, feed crops, milk incentive premium, artificial insemination and calf supports became the most important support tools (Demir and Yavuz, 2010). With the start of the negotiations with the European Union, the Turkish livestock sector was handled with a strategic approach and the 2005-2013 Livestock Master Plan and Strategy were prepared in order to bring the sector to a level that could compete with the EU and to provide it with a strong structure (Ünal et al., 2017). In recent years, some of the supports applied in ovine animals in Turkey are given in Table 5.

Table 5. Support given to sheep husbandry in Turkey

Support type	**2020 year supports**
Support to the ewe sheep for breeding	25 TL/head
Sheep milk production	0.25 TL/liter
Animal Breeding in Public Hands (Elite Herd)	**Ewe** 90 TL/head **Lamb** 70 TL/head
Animal Breeding in Public Hands (Base Herd)	**Ewe** 70 TL/head **Lamb** 40 TL/head
Organic sheep production	10 TL/head
Shepherd (Herd Manager) Employment Support	Farm manager employment support, which has 200 heads and more sheepe and more (sheep-goat) breeding, is paid as 5000 TL/farm
Animal Gene Resources **Small ruminant**	90 TL
Breeding Male Material (Ram and Male Goat) Support	225 TL/head
Abort Support Small ruminant abort (After vaccination))	150 TL/head

Source: The Ministry of Agriculture and Forestry (MAF), 2021

Problems of Sheep Breeding

The main problem of sheep breeding in Turkey is the supply of breeding animals. This in order; live or carcass imports, bacterial and viral diseases, lamb deaths, quality roughage problem, inadequacy in technical and economic organization, high marketing input costs and inability to find a shepherd (Koşum et al., 2012; Kandemir et al., 2015; Kandemir et al., 2019). The problems of sheep breeding arise from the general problems of agriculture. In other words, some of the problems mentioned are related to breeding and health, while others are very closely related to animal nutrition and feeding**.** To summarize, when the problems related to the feeding of sheep and lambs are examined, the inadequacy in the production of high quality roughage comes to the fore (Yavuz et al., 2020). The support given for small cattle breeding is not sufficient and the breeder cannot benefit from it sufficiently. For this reason, it is necessary to increase the supports and shift them to the right areas. There are many diseases that can be transmitted from small ruminant in Turkey, and these diseases threaten human health. Therefore, in order to prevent animal diseases and their spread, the Ministry of Agriculture and Forestry should not delay regular maintenance control and vaccination studies (Taşkın et al., 2013). The SWOT analysis of sheep breeding, one of the small ruminnat, is given in Table 6.

Table 6. SWOT analysis of sheep breeding

Advantages	**Disadvantages**
It is easier to obtain than cattle Converts to easy cash Their products are sold at a higher price than cattle Working capital is less than cattle Easily consumes small-sized grasses Presence of disease and parasite resistant breeds	Must be grazed More theft cases Most of them is consist of domestic breeds. Breeds have low productivity levels Milking is usually done by hand. The concept of animal welfare is not well known Barn or shelters are not suitable for animal welfare
Opportunities More than EU countries There are products that can receive geographical indication An important element in rural development Having the market potential to meet the red meat needs of the Middle East and Turkish Republics Organic sheep farming	**Threats** Presence of misperception because it smells of mutton The widespread misconception that red meat increases cholesterol Inadequate food safety practices Insufficient record keeping and efficiency controls Frequent import of livestock Lack of quality roughage production due to the increase in the number of enterprises Young people are not interested in this field

CONCLUSION

In our country, there are many problems in sheep breeding in various fields, from providing breeding stock to combating bacterial-viral diseases, from breeding techniques to marketing of products. Some suggestions for solving these problems are given respectively. These are; the support given to sheep breeding in Turkey should be increased to the level of developed countries. In this context, the share of animal husbandry supports among agricultural supports should continue to increase as it has been in recent years. Organization problem in small cattle breeding is becoming more important day by day. For this purpose, coordination is required to organize the breeders of the Ministry of Agriculture and Forestry, universities, Chambers of Agriculture and Sheep and Goat Breeders' Unions. In particular, the lack of quality roughage production should also be taken into account, and finally, the continuity of pasture improvement studies should be ensured at an increasing rate.

REFERENCES

Anonymous, 2014. Süt Konsey Raporu. Dünya ve Türkiye'de Süt Sektör İstatistikleri. http://www.ulusalsutkonseyi.org.tr/an a/rapor.asp?uid=54. (Erişim Tarihi:07.05.2014).

Cedden F., Cemal İ., Daşkıran İ., Esenbuğa N., Gül S., Kandemir Ç., Karaca O., Keskin M., Koluman N., Koyuncu M. , Savaş T., Taşkın T., Tölü C., Ulutaş Z., Yılmaz O., Yurtman İ. Y. 2020. Türkiye Ziraat Mühendisliği IX. Teknik Kongresi, Türkiye, 13 - 17 Ocak 2020, ss.133-152.

Demir, N. ve Yavuz, F. 2010. Hayvancılık Destekleme Politikalarına Çiftçilerin Yaklaşımlarının Bölgelerarası Karşılaştırmalı Analizi. Ankara Üniversitesi, Ziraat Fakültesi Dergisi, 41(2):113-121.

Díez-Unquera, B., Ripoll-Bosch, R., Ruiz1, R., Villalba, D., Molina, E., Joy, M. et al. 2012. Indicators of Sustainability in Pasture-based Livestock Systems. *EAAP Scientific Series* 131 (1): 129-138.

Durmuş, M., Agossu, DJ., Koluman, N. 2019. Sustainability of Small Ruminant Production in Mediterranean Region. Journal of Environmental Science and Engineering B 8: 241-248

Ergün, O.F., Bayram, B. 2021. Changes in The Livestock Sector in Turkey. III International and XII National Animal Science Conference 27-28 November 2021, Bursa, Turkey.

Ertuğrul, M., Savaş, T., Dellal, G., Taşkin, T., Koyuncu, M., Cengiz, F., Dağ, B., Koncagül, S., Pehlivan, E. 2010. Türkiye Küçükbaş Hayvancılığının İyileştirilmesi. Türkiye Ziraat Mühendisliği VII. Teknik Kongresi Bildiriler, 11-15 Ocak s:667-685, Ankara.

FAO, 2021. Data of Live Animals and Livestock Products, https://www.fao.org/faostat/en/#data/TCL, (Erişim Tarihi: 15.12.2021).

Kandemir, Ç., Adanacioğlu, H., Taşkin, T., Koşum, N. 2019. Türkiye'de Koyun ve Koyun Eti Fiyatlarının Bölgelere Göre Çok Boyutlu Ölçekleme Analizi ile Karşılaştırılması. Tekirdağ Ziraat Fakültesi Dergisi, Eylül/September 2019, 16(2):315-327.

Kandemir, Ç., Alkan, İ., Yilmaz, H.İ., Ünal, H.B., Taşkın, T., Koşum, N., Alçiçek, A. 2015. İzmir Yöresinde Küçükbaş Hayvancılık İşletmelerinin Coğrafik Konumlarına Göre Genel Durumu ve Geliştirilme Olanakları. Hayvansal Üretim 56(1): 1-8.

Koşum, N., Taşkın, T., Kandemir, Ç., Karadağ, E. 2012. Son Yıllarda Hayvancılık Kredileri ve Yapılan Yatırımların Teknik Analizi. T.C. Gıda, Tarım ve Hayvancılık Bakanlığı, Hayvancılık Grubu Bölge Bilgi Alışveriş Toplantısı Bildirileri. Sf:41-51, Salihli-İzmir. T.C. Gıda, Tarım ve Hayvancılık Bakanlığı, Hayvancılık Grubu Bölge Bilgi Alışveriş Toplantısı Bildirileri. sf:57-63, Salihli-İzmir.

Köknaroğlu H, Akünal T. Küresel Isınmada Hayvancı-Lığın Payı ve Zooteknist Olarak Bizim Rolümüz. SDÜ Ziraat Fakültesi Dergisi 2010; 5 (1): 67-75.

Sarıözkan, S., Küçükoflaz, M. 2020. İklim mi Hayvancılığı Yoksa Hayvancılık mı İklimi Etkiliyor?. Erciyes Üniv Vet Fak Derg 2020; 17(3): 255-259

Taşkın, T., Engindeniz, S., Gbadamonsi, A., Kandemir, Ç., Koşum, N. 2020. Gençlerin Kırmızı Et Tüketim Tercihlerinin Analizi: Ege Üniversitesi Öğrencileri Örneği , Ege Üniversitesi Ziraat Fakültesi Dergisi. 57(1): 63-72.

Taşkın, T., Özder, M., Dellal, G. 2013. Türkiye'de Küçükbaş Hayvancılığının Mevcut Durumu ve Geleceği. 2. Ulusal Süt Zirvesi, 20-121 Mayıs, İzmir.

The Ministry of Agriculture and Forestry (MAF). 2021. Hayvancılık Destekleri-2020, https://www.tarimorman.gov.tr/Konular/Tarimsal-Destekler/Hayvancilik-Desteklemeleri, (Erişim Tarihi: 07.12.2021).

TİGEM, 2019. Hayvancılık Sektör Raporu-2019. Tarim İşletmeleri Genel Müdürlüğü, Ankara.

TURKSTAT, 2021. Hayvancılık istatistikleri. http://www.tuik.gov.tr/PreTablo.do?alt_id=1002, (Erişim Tarihi:12.12.2021).

Ünal, H.B., Taşkin, T.; Alkan, İ., Yilmaz, H.İ., Kandemir, Ç. 2017. Küçükbaş Hayvancılık İşletmelerinde Performansın Belirlenmesine İlişkin Bir Uygulama Örneği: İzmir İli Örneği. Tekirdağ Ziraat Fakültesi Dergisi, 14(3):9-18.

Yavuz, T., Kır, H., Gül, V. 2020. Türkiye'de Kaba Yem Üretim Potansiyelinin Değerlendirilmesi: Kırşehir İli Örneği. Turkish Journal of Agricultural Research 7(3): 345-352.

Yılmaz, H., Köknaroğlu, H. 2007. Avrupa Birliği Ortak Tarım Politikasına Uyum Sürecinde Türkiye'de İzlenen Hayvancılık Politikalarının Değerlendirilmesi. V. Zootekni Bilim Kongresi, 5-8 Eylül 2007, Van.

THE IMPORTANCE OF THE GROUP PROCESS IN GROUP THERAPY

GRUP TERAPİSİNDE GRUP SÜRECİNİN ÖNEMİ

Assoc. Prof. Dr. Nilgun ULUTASDEMIR

Gümüşhane University, Faculty of Health Science

ORCID NO: 000-002-2231-5236

Research Asist. Sevda UZUN

Gümüşhane University, Faculty of Health Science

ORCID NO: 0000-0002-5954-717X

ABSTRACT

The group process is very important in mental health in order to develop the action of learning and teaching resources in the group. The purpose of the group process is to ensure productivity by making the group effective and to be able to achieve things that cannot be achieved alone with the group. The group process has many benefits in terms of productivity and audit. These are increasing the morale and motivation of individuals, providing opportunities for their individual development, etc. During the group process, individuals make discussions and realize and revise their own opinions in accordance with these discussions. The opinions of individuals are respected and full participation is ensured in the discussions held during the group process. In such an environment, every individual in the group contributes to its development. The positive effects and comments gained are analyzed in terms of their relationship with the topic under discussion. The group process contributes to problem solving and helps individuals to increase their skills in problem solving. The group process provides a more comprehensive understanding of the basics of the problem at hand and the decision made in solving the problem Before the group process begins, the therapist or group leader must determine the needs, functionalities, interpersonal skills and shortcomings of the group leader at the planning stage. In addition, the therapist should determine the needs of the group, make a planning taking into account the demographic variables of the group. Planning time and space is also very important in the group process, and the therapist should plan this effectively as well. Group leaders or therapists should support the productivity of the group and inform the group members about the conceptual and theoretical roadmap and purpose of the group. The group process consists of five stages. These are the initial stage, logon, transition stage, action stage, termination stage. The conditions for an effective group work include the presence of a meaningful problem, the importance of the problem is felt by all members of the group, the decency of the physical atmosphere, ensuring a moderate climate, sharing leadership, formulating the goal, unanimity, being aware of the process, constant evaluation.

Keywords: Mental Health, Group Process, Group Leader

ÖZET

Grupta kaynakları öğrenme ve öğretme eylemini geliştirme amacıyla noktasında grup süreci ruh sağlığında oldukça önemlidir. Grup sürecinin amacı grubu etkin kılarak üretkenliği sağlamak ve tek başına başarılamayacak işleri grupla birlikte başarabilmektir**.** Grup sürecinin üretkenlik ve denetim açısından oldukça yararları vardır. Bunlar bireylerin moral ve motivasyonlarını artırma, bireysel gelişimlerine imkan sağlama vb'dir. Grup sürecinde bireyler tartışmalar yapar ve bu tartışmalar doğrultusunda kendi görüşlerini fark edip gözden geçirir. Grup sürecinde yapılan tartışmalarda bireylerin görüşlerine saygı gösterilir ve tam katılım sağlanır. Böyle bir ortamda gruptaki her birey gelişimine katkı sağlamaktadır. Kazanılan pozitif etkiler ve yorumlar tartışılan konu ile ilişkisi yönünden analiz edilir. Grup süreci problem çözümlerine katkı sağlar ve bireylerin problem çözme konusunda becerilerinin artmasına yardımcı olur. Grup süreci problem çözmede eldeki problemin ve alınan kararın

temellerinin daha kapsamlı olarak anlaşılmasını sağlar. Grup süreci başlamadan önce, terapist ya da grup lideri planlama aşamasında, grup lideri bireylerin gereksinimlerini, işlevselliklerini, kişilerarası beceri ve eksikliklerini belirlemelidir. Ayrıca terapist grubun gereksinimlerini belirlemeli, grubun demografik değişkenlerini göz önünde bulundurarak bir planlama yapmalıdır. Grup sürecinde zaman ve mekan planlaması da oldukça önemlidir ve terapist bunu da etkili şekilde planlamalıdır. Grup liderleri ya da terapistler grubun üretkenliğini desteklemeli, grubun kavramsal ve kuramsal yol haritası ve amacı hakkında grup üyelerine bilgi vermelidir. Grup süreci beş evreden oluşmaktadır. Bunlar; başlangıç evresi, oturumu açma, geçiş evresi, eylem evresi, sonlandırma evresidir. Etkili bir grup çalışmasının koşulları arasında, anlamlı bir problemin varlığı, problemin önemi grubun üyelerinin tümü tarafından hissedilmesi, fiziksel atmosferin uygunluğu, ılımlı bir iklimin sağlanması, liderliğin paylaşılması, amacı formüle etme, oy birliği, süreçten haberdar olma, sürekli değerlendirme yer almaktadır.

Anahtar Kelimeler: Ruh Sağlığı, Grup Süreci, Grup Lideri

GİRİŞ

Bireylerin oluşturduğu bir grubun ortak bir sorununa yönelik problem çözme girişiminde bulunulması olarak tanımlanmaktadır (Campbell ve Champe, 2017). Ruh sağlığında oldukça sık kullanılan grup terapisi doğru bir grup kurulmasıyla başlar. Grup sürecinin amacı grubu etkin kılarak üretkenliği sağlamak ve tek başına başarılamayacak işleri grupla birlikte başarabilmektir (Pierre, 2014). Grup süreci kaynakları öğrenme ve öğretme eylemini geliştirme amacıyla noktasında ruh sağlığında oldukça önemlidir. Bireylerin doyumunu artırır (Daşçı ve Yalçın, 2018).

GRUP SÜRECİNİN YARARLARI

Grup sürecinin üretkenlik ve denetim açısından oldukça yararları vardır. Bunlar bireylerin moral ve motivasyonlarını artırma, bireysel gelişimlerine imkan sağlamavb'dir (Luke ve Goodrich., 2013).

BİREYLERİN GELİŞİMİNİ SAĞLAMA

Grup sürecinde bireyler tartışmalar yapar ve bu tartışmalar doğrultusunda kendi görüşlerini fark edip gözden geçirir. Grup sürecinde yapılan tartışmalarda bireylerin görüşlerine saygı gösterilir ve tam katılım sağlanır (Daşçı ve Yalçın, 2018; Yılmaz ve Acar, 2015).

Grup sürecinde yapılan tartışmalarda bireylerin görüşlerine saygı gösterilir ve tam katılım sağlanır. Böyle bir ortamda gruptaki her birey gelişimine katkı sağlamaktadır (Yılmaz ve Acar, 2015).

ORTAK KARAR VERME

Grup süreci problem çözmede eldeki problemin ve alınan kararın temellerinin daha kapsamlı olarak anlaşılmasını sağlar (Daşçı ve Yalçın, 2018).

MORALİ YÜKSELTME

Grup sürecinde bireylerin planlamaya ve karar vermeye katılımları bireylerin moral ve motivasyonlarını artırmaktadır. Bu durum gruptaki bireylerin birbirleriyle olan etkileşimlerini olumlu yönde etkilerken birbirlerine olan bağlılıklarını güçlendirmektedir (Pehlivan, 2014).

KARARLARIN UYGULANMASI

Grup sürecinde problemin araştırılması ve çözümünde bireylerin tam katılımı sağlandığında alınan kararların uygulanmasına da genellikle tam katılım sağlanır (Coleman ve ark., 2009).

GRUP SÜRECİNİ PLANLAMA

Grup süreci başlamadan önce, terapist ya da grup lideri planlama aşamasında, grup lideri bireylerin gereksinimlerini, işlevselliklerini, kişilerarası beceri ve eksikliklerini belirlemelidir. Ayrıca terapist grubun gereksinimlerini belirlemeli, grubun demografik değişkenlerini göz önünde bulundurarak bir planlama yapmalıdır. Grup sürecinde zaman ve mekan planlaması da oldukça önemlidir ve terapist bunu da etkili şekilde planlamalıdır. Grup liderleri ya da terapistler grubun üretkenliğini desteklemeli, grubun

kavramsal ve kuramsal yol haritası ve amacı hakkında grup üyelerine bilgi vermelidir (Daşçı ve Yalçın., 2018; Karaca ve Özaltın, 2010; Conyne ve Bemak, 2004; Bemak ve Chung, 2004)

GRUP SÜRECİNİ YÜRÜTME VE DEĞERLENDİRME

Grup süreci beş evreden oluşmaktadır. Bunlar; başlangıç evresi, oturumu açma, geçiş evresi, eylem evresi, sonlandırma evresidir. Etkili bir grup çalışmasının koşulları arasında, anlamlı bir problemin varlığı, problemin önemi grubun üyelerinin tümü tarafından hissedilmesi, fiziksel atmosferin uygunluğu, ılımlı bir iklimin sağlanması, liderliğin paylaşılması, amacı formüle etme, oy birliği, süreçten haberdar olma, sürekli değerlendirme yer almaktadır (Yılmaz ve Acar, 2015; Bemak ve Chung, 2004; Conyne ve Bemak, 2004).

GRUP SÜRECİNİN EVRELERİ

1. Başlangıç Evresi
2. Oturumu Açma
3. Geçiş Evresi
4. Eylem Evresi
5. Sonlandırma Evresi

BAŞLANGIÇ EVRESİ

Bu evrede üyeler birbirlerini tanıma sürecini yaşarlar. Grup içinde gerçekleşmesi düşünülen beklentiler ve bireysel davranışsal amaçlar üzerinde durulur. Gruplar içindeki kurallar öne sürülür ve üyeler kurallara uyacakları konusunda söz verirler. Üyelerin birbirleriyle olan etkileşim süreci henüz gerçekleşmemiştir (Topses ve Bulut Serin, 2017).

OTURUMU AÇMA

Oturumları da açmayla ilgili yaklaşımlar liderin kuramsal görüşleriyle, grubun yapısı ve daha önceki grup oturumlardaki konuşulanlarla ilgili verilere bağlıdır. Oturumları açmada çeşitli yollar denenebilir. Örneğin lider;

1. Oturumu başlatmak isteyen kimse var mı? Kim başlatmak ister diye sorabilir.
2. Lider daha önceki grup yaşantısını anımsatabilir.
3. Herhangi bir ödev verilmişse onu değerlendirebilir.
4. Bitmemiş işleri sorgulayabilir.
5. Son oturumdan bu yana kendilerinde nasıl bir değişim hissettiklerini sorgulayabilir.

GEÇİŞ EVRESİ

Sorunlu fırtınalı bir dönem olarak kabul edilir. Üyeler birbirlerini sınamaya denetimli olmaya eğilimli durumdadırlar. Liderin de denetimli olma durumu baskındır. Danışman güven ve bizlik duygularını yerleşmesi için ısınma ve güven geliştirici teknikler alıştırmalar uygulayabilir (Topses ve Bulut Serin, 2017).

EYLEM EVRESİ

Bu evre grupla psikolojik danışmanın amaçlarına ulaşmak yönünde ileri bir aşamaya varıldığı evredir. Grup sürecinin en olgun dönemi olarak da kabul edilir. Bu evrede üyeler;

1. Bireysel ayrılıklarının farkına varırlar. Her üye kendi biricikliğini kendi özgünlüğünü algılamaya başlar.
2. Üyeler birbirlerinin olumu ya da olumsuz özelliklerini kabul ederler.
3. Savunucu davranışlarından giderek arınırlar.
4. Grupta belirgin bir güven ortamı ve bizlik duygusu gelişmiş olur.

5. Grup çalışmaya başlamıştır.

SONLANDIRMA EVRESİ

Grubun sonlandırma süreci yaşaması kimi üyelerde daha önce atlatamadıkları, ketledikleri sorunların ortaya çıkmasına ve bu ölçüde geriye dönüşlerin yaşanmasına neden olur. Daha önce dışa vurulmamış sorunlar anlatılmaya çalışılır. Grup sürecinin sona yaklaşması kimi üyelerde hüzün ve ayrılma kaygısı oluşturur.

Bu evrede üyelerin grup sürecinin başlangıcında belirledikleri davranışsal amaçlara ulaşıp ulaşmadıkları ya da bunu ne ölçüde başarabildikleri ortaya konmaya çalışılır. Ayrıca liderin grup etkileşimi ve iletişimine kattığı katkı, grup birliğini sağlamadaki başarısı üyelerin kendilerini ifade etmelerine kolaylaştırıcı etki yapıp yapmadığı grup ortamına getirilir ve yorumlanır (Topses ve Bulut Serin, 2017).

Grupla psikolojik danışmanın son evresinde üyeler arasında sevgi alışverişinin yanında her üyenin grubu oluşturan üyelerin özellikle grup içi davranışlarıyla değerlendirip yorumlamaları üyelerin kendilerini algılamalarıyla başkalarının onları algılamaları arasındaki yakınlı ve uzaklığın ortaya çıkmasında önemli bir rol oynar.

ETKİLİ BİR GRUP ÇALIŞMASININ KOŞULLARI

Grup oluşturma süreci için bireylerin bir gereksiniminin olması gerekmektedir. Grup süreci kavramı, bireyler arasında bir bağımlılık ve bütünlük oluşturma esasına dayanmaktadır (Büyükgöze ve Kavas, 2011).

Grup süreci oluşturmak için aşağıdaki durumların olması gerekmektedir;

- Anlamlı bir problemin varlığı,
- Problemin önemi grubun üyelerinin tümü tarafından hissedilmesi,
- Fiziksel atmosferin uygunluğu,
- Ilımlı bir iklimin sağlanması,
- Liderliğin paylaşılması,
- Amacı formüle etme,
- Oy birliği,
- Süreçten haberdar olma,
- Sürekli değerlendirme.

Anlamlı bir problemin varlığı: Grup sürecinin işleyişi bu süreçle çözülebilecek anlamlı bir problemin varlığına bağlı olmakla birlikte grup üyelerince hissedilen bir problem olmalıdır (Büyükgöze ve Kavas, 2011; Aladağ ve ark., 2012).

Problemin önemi grubun üyelerinin tümü tarafından hissedilmesi: Bireylerin tamamının bütünleştirilmesi hedefleniyorsa problem herkesi ilgilendirir nitelikte olmalıdır (Büyükgöze ve Kavas, 2011; Aladağ ve ark., 2012).

Fiziksel atmosferin uygunluğu: Etkili bir grup süreci için uygun bir fiziksel ortam olması gerekmektedir (Büyükgöze ve Kavas, 2011; Aladağ ve ark., 2012;Berge ve ark., 2010; Yurtsever ve ark., 2007; Anderson ve Prison, 2008).

IIımlı bir iklimin sağlanması: Özgürce görüş alış verişi yapılan bir iklim, etkili bir grup süreci için önkoşuldur. Demokratik bir ortamda birey fikirlerini görüşlerini çekinmeden ifade edebilir (Yılmaz ve Acar, 2015; Daşçı ve Yalçın, 2018; Pamukçu ve Kağnıcı, 2017a; Pamukçu ve Kağnıcı 2017b).

Liderliğin paylaşılması: Grup sürecinde gelişmeyi sağlayan her bireye liderlik verilebilir (Daşçı ve Yalçın, 2018).

Amacı formüle etme: Grup sürecinde grup tarafından sorun formüle edilirse sorunlar daha iyi kavranır ve çözümlenir (Daşçı ve Yalçın., 2018; Pamukçu ve Kağnıcı, 2017a; Pamukçu ve Kağnıcı, 2017b).

Oybirliği: Grup sürecinin amacı, oybirliğine dayalı bir kararın verilmesidir (Daşçı ve Yalçın, 2018; Pamukçu ve Kağnıcı 2017a; Pamukçu ve Kağnıcı, 2017b).

Süreçten haberdar olma: Etkili bir grup çalışması için bireylerin grup sürecinin kendisinden haberdar olmaları gerekmektedir (Daşçı ve Yalçın., 2018; Pamukçu ve Kağnıcı 2017a; Pamukçu ve Kağnıcı 2017b;Caroll and Wiggins., 2014).

Sürekli değerlendirme: Değerlendirme etkili bir grup süreci için oldukça önemlidir ve değerli bir durumdur grubun üretkenliğine katkı sağlar (Daşçı ve Yalçın, 2018; Pamukçu ve Kağnıcı, 2017a; Pamukçu ve Kağnıcı, 2017b).

GRUP SÜRECİNDE DENETMENİN ROLÜ

Grup sürecinde denetmen üstün bilgi ve deneyimi grubun amacının gerçekleştirilmesine katkıda bulunur. Grupta işbirliği, demokrasi ve karşılıklı destek için gerekli atmosferi yaratır ve gruba olan içten bağlılığı ile grubu ayakta tutar (Yalom, 2012).

SONUÇ VE ÖNERİLER

Grup süreci grubun kaynaklarını ve gücünü öğrenmede oldukça önemlidir ve her birey gruba değer ve anlam katar. Gruptaki bireylerin moral ve motivasyonunu artırmada, problem çözmede grup süreci oldukça önemlidir.

KAYNAKÇA

1. Aladağ M, Kağnıcı D.Y, Çankaya Z.C, Özeke Kocabaş E, Yaka B. Psikolojik danışman eğitiminde grupla çalışma yeterliklerinin kazandırılması: Ege Üniversitesi Örneği. Ege Eğitim Dergisi. 2011;2(12):22-43.
2. Anderson RD, Price GE. Experiantial groups in counselor education: Student attitudes and instructor participation. Counselor Education and Supervision. 2001;41(2):111-119.
3. Bemak F, Chung RC. Teaching multicultural group counseling: Perspectives for new era. The Journal for Specialists in Group Work. 2004;29(1):31-41.
4. Berge JM, Law DD, Johnson J, Wells MG. Effectiveness of a psychoeducational parenting group on child, parent, and family behavior: A pilot study in a family practice clinic with an underserved population. Families, Systems, & Health. 2010;28(3):224-235.
5. Büyükgöze Kavas A. Bireysel ve grupla psikolojik danışma uygulamalarına yönelik bir değerlendirme. Türk Eğitim Bilimleri Dergisi. 2011;9(2):411-432.
6. Caroll MR, Wiggins JD. Grupla psikolojik danışmanın öğeleri (Çeviren Editör: S. Doğan). Pegem Akademi, Ankara, 2014.
7. Coleman MN, Kivlighan DM, Roehlke HJA taxonomy of the feedback given in the group supervision of group counselor trainees. Group Dynamics: Theory, Research, and Practice. 2009;13(4):300-315.
8. Conyne RK, Bemak F. Teaching group work from an ecological perspective. The Journal for Specialists in Group Work. 2004;29(1):7-18.
9. Conyne RK, Mazza J. Ecological group work applied to schools. The Journal for Specialists in Group Work. 2006;32(1):19-29.

10. Campbell A, Champe BJ, Pimpleton-Gray A. A career exploration and decision-making psychoeducational group: Supporting undergraduate students and training graduate students. Journal of Counseling in Illinois. 2017;4(1):8-23.

11. Daşçı E, Yalçın İ. Grupla Psikolojik Danışma ve Grup Liderlerine Yönelik Süpervizyon Modelleri Üzerine Bir İnceleme. Türk Psikolojik Danışma ve Rehberlik Dergisi. 2018;8(49):19-43.

12. Karaca S, Özaltın G. Görme engelli ergenlerle yürütülen yapılandırılmış bir grup eğitiminin etkinliği. Maltepe Üniversitesi Hemşirelik Bilim ve Sanatı Dergisi. 2010;3:3-14.

13. Luke M, Goodrich, KM. Investigating the lgbtq responsive model for supervision of group work. The Journal for Specialist in Group Work. 2013;38(2):121-145.

14. Pamukçu B, Kağnıcı DY. Turkish counselor trainees' experiences regarding experiential groups: A qualitative study. Journal of Human Sciences. 2017a;14(1):560-570.

15. Pamukçu B, Kağnıcı DY. Beceriye dayalı grupla psikolojik danışma eğitiminin grupla psikolojik danışma becerilerine etkisinin incelenmesi. Elektronik Sosyal Bilimler Dergisi. 2017b;16(61): 448-465.

16. Pehlivan H. Bilişsel davranışçı yaklaşım temelli psiko-eğitim programının anneler üzerindeki etkililiğinin incelenmesi. Ege Eğitim Dergisi. 2014;15(1):338-357.

17. Pierre BK. Student attitudes and instructor participation in experiential groups. The Journal for Specialists in Group Work. 2014;39(3):194-211.

18. Bulut Serin N, Gürsen Topses. Lise Öğrencilerinde Görülen Psikolojik Belirtilerin Cinsiyet ve Akademik Başarı Açısından İncelenmesi. Turkish Studies. 2014;1:157-172.

19. Yalom I. Grup psikoterapisinin teori ve pratiği (Çeviren: A. Tangör ve Ö. Karaçam) Kabalcı Yayınevi, İstanbul, 2012.

20. Yılmaz O, Voltan Acar N. Psikolojik danışman eğitiminde süpervizyonun önemi ve grupla psikolojik danışmadaki rolü. Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi. 2015;15(1):342-356.

HEMŞİRELİKTE DEĞERLER VE ÖNEMİ

VALUES AND IMPORTANCE IN NURSING

Assoc. Prof. Dr. Nilgun ULUTASDEMIR

Gümüşhane University, Faculty of Health Science

ORCID NO: 000-002-2231-5236

Instructor Nursen KULAKAC

Gümüşhane University, Faculty of Health Science

ORCID NO: 0000-0002-5427-1063

ABSTRACT

The main purpose of nursing care is to provide quality care by respecting human dignity and individuality. The values that the nurse has along with her professional knowledge significantly affect the quality of patient care. In our age, it is very important for nurses to be aware of their professional professionalism in order to provide quality care. Nurses, who are aware of their values, can transfer this to their professional lives and determine the conflict situations that arise during care while providing a quality care. Knowing and accepting her own value system helps the nurse understand how she reacts during the decision process. In addition, it facilitates the acceptance of similar and different aspects of their values during interaction with people, enabling more effective communication and providing better quality care. Value is defined in the dictionary of Turkish Language Institution as "an abstract measure that helps to determine the importance of something, the value that something is worth". The main function of the nursing profession is to help the healthy/sick individual. This assistance includes practices aimed at protecting, maintaining and improving the health of a healthy individual and, in case of deviation from health, helping the individual to regain his health or to cope with his inadequacies. The source of nursing values are universal ethical principles. The American Association of Colleges of Nursing (AACN) in 1988, the basic values that a nurse should have; human dignity, autonomy, competence/integrity, justice, altruism/altruism, equality, aesthetics, loyalty and realism. Nurses encounter many situations that require them to make decisions while providing health care services. Every decision about the healthy/sick individual should be made with respect for the individual's life, dignity and individuality. These decisions that determine, direct and shape care practices are affected by the beliefs and values of both nurses and healthy/sick individuals. As healthcare professionals, nurses should determine their decisions according to professional values, and professional values should form the basis of the attitudes and behaviors of nurses and nursing students.

Keywords: Nursing, Patient Care, Values

ÖZET

Hemşirelikte bakımın temel amacı insanın onuruna, bireyselliğine saygı duyarak ona kaliteli bakım vermektir. Hemşirenin mesleki bilgisi ile birlikte sahip olduğu değerlerde kaliteli hasta bakımını önemli şekilde etkilemektedir. Çağımızda hemşirelerin kaliteli bir bakım sağlayabilmeleri için mesleki profesyonelliklerinin farkında olmaları oldukça önemlidir. Sahip olduğu değerlerin bilincinde olan hemşireler bunu profesyonel yaşantılarına aktararak kaliteli bir bakım sunarken bakım sırasında ortaya çıkan çatışma durumlarını da belirleyebilirler. Hemşirenin kendi değer sistemini bilmesi ve bunu kabullenmesi, karar aşamasında nasıl tepki verdiğini anlamasına yardımcı olmaktadır. Ayrıca kişilerle etkileşimi sırasında değerlerindeki benzer ve farklı yönleri kabullenmeyi kolaylaştırarak daha etkili iletişim kurmayı ve daha kaliteli bakım vermeyi sağlamaktadır. Değer Türk Dil Kurumu sözlüğünde “bir şeyin önemini belirlemeye yarayan soyut ölçü, bir şeyin değdiği karşılık, kıymet” olarak tanımlanmaktadır. Hemşirelik mesleğinin temel işlevi, sağlıklı/hasta bireye yardım etmektir. Bu yardım,

sağlıklı bireyin sağlığını koruma, sürdürme, geliştirme ve sağlıktan sapma durumunda ise, bireyi yeniden sağlığına kavuşmasına yardım etme ya da yetersizlikleri ile baş edebilmesine yönelik uygulamaları içerir. Hemşirelik değerlerinin kaynağı, evrensel etik ilkelerdir. American Association of Colleges of Nursing (AACN) 1988 yılında, bir hemşirenin sahip olması gereken temel değerleri; insan onuru, otonomi, yetkinlik/bütünlük, adalet, alturizm/özgecilik, eşitlik, estetik, sadakat ve gerçekçilik olarak sıralamıştır. Hemşireler, sağlık bakım hizmeti sunarken, karar vermelerini gerektiren birçok durumla karşılaşırlar. Sağlıklı/hasta birey hakkındaki kararların her biri, bireyin yaşamına, onuruna ve bireyselliğine saygı gösterilerek alınmalıdır. Bakım uygulamalarını belirleyen, yönlendiren ve biçimlendiren bu kararlar, hem hemşirelerin hem de sağlıklı/hasta bireylerin sahip olduğu inanç ve değerlerden etkilenir. Sağlık hizmetini sunan profesyoneller olarak hemşireler, kararlarını mesleki değerlere göre belirlemeli ve mesleki değerler, hemşirelerin ve hemşirelik öğrencilerinin tutum ve davranışlarının temelini oluşturmalıdır.

Anahtar Kelimeler: Hemşirelik, Hasta Bakımı, Değer

GİRİŞ

Hemşirelikte bakımın temel amacı insanın onuruna, bireyselliğine saygı duyarak ona kaliteli bakım vermektir. Hemşirenin mesleki bilgisi ve değerleri kaliteli hasta bakımında önemli bir yere sahiptir (Adıgüzel ve ark., 2011). Günümüzde hemşirelerin kaliteli bir bakım sağlayabilmeleri için mesleki profesyonelliklerinin farkında olmaları gerekmektedir. Bireysel değerlerin bilincinde olan hemşireler bunu profesyonel yaşantılarına aktararak kaliteli bir bakım sunarken bakım sırasında ortaya çıkan çatışma durumları belirlemelerine ve durumlar karşısında nasıl davranmaları gerektiğine yardımcı olmaktadır. (Keskin ve Yıldırım, 2006; Poorchangizi ve ark., 2017).

Değer Kavramı

Değer Türk Dil Kurumu sözlüğünde "bir şeyin önemini belirlemeye yarayan soyut ölçü, bir şeyin değdiği karşılık, kıymet" olarak tanımlanmaktadır"(http://www.tdk.gov.tr 01 Ocak 2019). Toplumun değer yargıları, yerleşik inançlarıyla gelişen yaşamsal tecrübeleri, kişinin bireysel değerlerini oluşturmakta ve ona göre şekillendirmektedir (Weis ve Schank, 2002). Değerler, bireylerin dünya görüşünü belirleyen ve onların beğenilerini ve hoşlanmadıklarını, bakış açılarını, gereksinimleri, eğilimleri, gerçekçi ve gerçekçi olmayan yargıları ve önyargıları içeren bir kavramlar kümesidir (Boozaripour ve ark., 2018) . Bireylerin, toplum içerisinde birliktelikle yaşamalarını sağlayan en önemli unsurlardan biri paylaşılan değerlerdir. Toplumun çoğunluğu tarafından kabul edilen ve benimsenen değerler, toplumu oluşturan ve geliştiren önemli unsurlardır (Can, 2013). Toplumsal yaşamda değerler, soyut bir şekilde bulunmaktadır. İyilik, dürüstlük, başarı gibi değerler toplum içerisinde bireyler tarafından hissedilir. Bu değerler, toplum için nelerin önemli olduğunu, nelerin doğru ve yanlış olduğunu, kısaca nasıl yaşanılması gerektiğine rehberlik eder (Baysal, 2013). Sosyal/toplumsal değerler, bireylerin üstlendiği sosyal roller aracılığı ile ifade edilir. Toplum içerisinde iyi ve kötünün, doğru ve yanlışın belirlenmesi, arzu edilen davranış biçiminin tanımlanması değerler tarafından gerçekleştirilir. Toplumda var olan sosyal kontrol mekanizmaları ve ödüllendirme sistemlerinin kaynağının değerler olduğu görülmektedir (Özensel, 2003).

Sosyal/Toplumsal Değerler

Değerlere bağlılık gelenekleri oluşturan bir unsurdur. Her toplumda, değerlerin oluşturduğu bir kültür vardır. Toplum içinde oluşan bu kültür ise, sevgi, saygı, yardımseverlik, adalet, özgürlük, birliktelik ve bütünlük gibi evrensel değerlere dayanmaktadır (Coşkun ve Yıldırım, 2009).

Mesleki/Profesyonel Değerler

Mesleki değerler, meslek grupları tarafından kabul gören ve meslek üyesinin davranışlarını etkileyen tutum ve inançlar için standart bir yapı oluşturan bir düşünce sistemidir (Dönmez ve Özsoy, 2016). Hemşirelik mesleğinin etik kodlarında şekillenen mesleki değerler hemşireliğin birçok alanında önemli bir yere sahip olduğu için onların kendi değer sistemlerini bilmeleri ve kabullenmeleri, karar aşamasında neden ve nasıl tepki vermeleri gerektiğini anlamada yardımcı olmaktadır (Karabacak, 2013; Altun, 2017). Hemşirelerin mesleki değerlerini bilmeleri, hem diğer sağlık profesyonelleri hem de hastalarla

etkileşimleri sırasında değerlerindeki benzerlikleri ve farklılıkları kabullenmelerini kolaylaştırmakta, böylece daha etkili bir iletişim kurularak kaliteli bakım verilmesi sağlanmaktadır (Altun 2017; Karabacak, 2013). Hemşirelik mesleğinin temel işlevi, sağlıklı/hasta bireye yardım etmektir. Bu yardım, sağlıklı bireyin sağlığını koruma, sürdürme ve geliştirme ve sağlıktan sapma durumunda ise, bireyi yeniden sağlığına kavuşmasına yardım etme ya da yetersizlikleri ile baş edebilmesine yönelik uygulamaları içerir (Babadağ, 2010; Can ve Acaroğlu, 2015). Hemşirelik değerlerinin kaynağı, evrensel etik ilkelerdir (Kantek ve Kaya, 2017). American Association of Colleges of Nursing (AACN) 1988 yılında, bir hemşirenin sahip olması gereken temel değerleri; insan onuru, otonomi, yetkinlik/bütünlük, adalet, alturizm/özgecilik, eşitlik, estetik, sadakat ve gerçekçilik olarak sıralamıştır (Can, 2013).

İnsan Onuru

İnsanın doğasında varolan değerliliğine, yeganeliğine ve eşsizliğine duyulan inanç ve saygıdır (Fahrenwald ve ark. 2005). Etik kodlarda insan onuruna duyulan saygı öncelikli ilkedir (Can, 2013). Mesleki davranışlarda; bireyin gizliliğini korumak, her uygulamada bireyin tercihlerini dikkate almak, yaşam tarzına bakılmaksızın saygı göstermek gibi tutumlar örnek olarak verilebilir (Orak, 2005; Can, 2013).

Otonomi

Zorluklar ve engeller karşısında kendi kaderini tayin hakkını ifade eder (Fahrenwald ve ark. 2005). Başka bir deyişle, bireyin karar verme ve kendini yönetme hakkıdır (Can, 2013). Mesleki ve bireysel otonomi kavramlarını karşılaştırdığımızda; bireysel otonominin; bireyin kendisi ile ilgili kararları verebilme yetki ve yetisi, mesleki otonomi ise bakım uygulamalarında bağımsız karar verebilme ve verdiği kararın sorumluluğunu alabilmedir (Baykara ve Şahinoğlu, 2013).

Yeterlik/Bütünlük

Bireyin kendisini geliştirmesini sağlamak amacıyla üst düzeyde kişisel ve profesyonel becerilerle donanıma sahip olması anlamına gelmektedir. Bütünlük ile ilgili mesleki davranışlar; hasta/sağlıklı bireye doğru bilgi sunma, hemşirelik uygulamalarını eksiksiz bir şekilde kayıt altına alma ve yapılan hataları düzeltmeye çalışmak olarak sayılabilir (Can, 2013; https://www.aacnnursing.org).

Adalet

Ahlaki, yasal ve hümanistik ilkeleri destekleyerek birey ve toplumu korumaktır (Fahrenwald ve ark. 2005). Mesleki davranışlarda; sağlık bakımı ile ilgili konularda savunuculuk rolünü üstlenme, kaynakları adil bir şekilde dağıtma ve yasal olmayan konuları rapor etme gibi tutumlarla yansıtılır (Orak, 2005; Can, 2013).

Alturism/Özgecilik

Başkalarının refah ve esenliği için endişe duymadır (Fahrenwald ve ark., 2005). İyilikseverlik, şefkatlilik ve cömertlik gibi karakter özellikleri ile ilişkilidir. Tüm dikkatini bakım uygulamaları sırasında bireye vermek, gerektiğinde başlarına yardımcı olmak ve sağlık bakımı ile ilişkili toplumsal konular üzerinde çözüm üretmek mesleki davranışlara örnek olarak verilebilir (Orak, 2005).

Eşitlik

Birey/toplumu yasal ve ahlaki ilkeler çerçevesinde korumak, kaynakların adil bir şekilde dağıtımı sağlamak ve ayrıca yasal olmayan durumları raporlamak olarak tanımlanmaktadır (Çulha ve Acaroğlu, 2018).

Estetik

Düzenli, yaratıcı ve hayal gücü gelişmiş olma gibi karakter özellikleri ile ilişkilidir. Bakım uygulamalarını ve ortamı bireysel özellikler doğrultusunda planlama, uygun bir çalışma ortamı yaratma ve hemşirelik imajını olumlu yönde geliştirecek girişimlerde bulunma vb. tutumlar mesleki davranışlara örnek olarak verilebilir (Can, 2013).

Gerçekçilik

Bilgili, mantıklı, sorumluluk alma, kendine güvenme ve araştırmacı gibi karakter özellikleri ile ilişkilidir. Bakım uygulamalarını doğru kayıt etme ve belgeleme profesyonel davranışlara örnek olarak verilebilir (Can, 2013).

Hemşirelik Değerlerinin Önemi

Sağlıklı/hasta birey hakkındaki her karar ve yapılan her uygulama, insan onuruna saygı gösterilerek uygulanmalıdır. İyi gelişmiş bir mesleki değer sistemi, hemşirelerin karar verme sürecinde, etik ikilemlere çözüm bulmasına yardımcı olur (Donmez ve Ozsoy, 2016). Hemşirelik değerlerinin benimsenmesi ile iyi mesleki davranışlar arasında pozitif bir ilişki vardır ve bu değerler, bakım kalitesinin, hasta bireylerin ve meslek üyelerinin memnuniyetinin önemli bir göstergesidir (Ferna´ndez-Feito ve ark., 2017). Mesleki değerler, profesyonel tutum ve davranışlarda, doğru ve yanlışın, iyi ve kötünün, önemli ve önemsizin, uygun ve uygun olmayanın ayrımına varmaya rehberlik eder. Aynı zamanda problem çözme, eleştirel düşünme ve öncelikleri belirleyebilme becerisinin gelişimine, hasta birey ve ailesinin endişelerinin farkına varılabilmesine olanak tanır (Altun, 2002; Can, 2013). Değer temelli hemşirelik eğitimi ise öğrencilerin mesleki kimliklerinin gelişimine katkı sağlar. Eğitimciler, öğrencilerin sosyalleşmesinde, mesleki değerlerin aktarılmasında ve değerlerin öğrenciler tarafından benimsenmesinde kilit rol oynamaktadır (Orak ve Alpar, 2012; Bijani ve Tehranineshat, 2017).

SONUÇ

Hemşirelik, temel sorumluluğu olan yardım etme amacına bakım eylemi ile ulaşan, birey, aile ve topluma gereksinim duydukları her durumda hizmet veren bir meslektir. Hemşireler, bu hizmeti sunarken, karar vermelerini gerektiren birçok durumla karşılaşırlar. Sağlıklı /hasta birey hakkındaki kararların her biri, bireyin yaşamına, onuruna ve bireyselliğine saygı gösterilerek alınmalıdır. Bakım uygulamalarını belirleyen, yönlendiren ve biçimlendiren bu kararlar, hem hemşirelerin hem de sağlıklı/hasta bireylerin sahip olduğu inanç ve değerlerden etkilenir. Sağlık hizmetini sunan profesyoneller olarak, hemşireler, kararlarını mesleki değerlere göre belirlemelidir. Mesleki değerler, aynı zamanda mesleki eylem ya da davranış standartları olarak hemşirelerin ve hemşirelik öğrencilerinin tutum ve davranışlarının temelini oluşturur. Mesleki kimliğin gelişimi için önemli bir unsur olan değerler, aynı zamanda, sağlıklı/hasta birey, meslektaşlar, diğer meslek üyeleri ve toplum ile etkileşiminde bir çerçeve niteliğindedir. Hemşirelik değerlerinin benimsenmesi bakım kalitesinin ve hasta memnuniyetinin artmasını sağlayacaktır.

KAYNAKÇA

1. Adıgüzel O, Tanrıverdi H, Özkan DS. Mesleki Profesyonellik ve Bir Meslek Mensupları Olarak Hemşireler Örneği. Yönetim Bilimleri Dergisi. 2011;9(2):237-257.
2. Keskin G, Yıldırım GA. Hemşirelerin Kişisel Değerlerinin ve İş Doyumlarının İncelenmesi. Ege Üniversitesi Hemşirelik Yüksekokulu Dergisi. 2006;22(1):119-133.
3. Poorrchangizi B, Farokhzadian J, Abbaszadeh A, Mirzaee M, Borhani F. The Importance of Professional Values From Clinical Nurses' Perspective in Hospitals of A Medical University in İran. BMC Medical Ethics. 2017;18(20):2-7.
4. Orak NŞ. İstanbul İlindeki Hemşirelerin Profesyonel Hemşirelik Değerleri ve Etkileyen Faktörlerin Belirlenmesi. Marmara Üniversitesi Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Doktora Tezi, İstanbul, 2005.
5. Orak NŞ, Alpar ŞE. Hemşirelerin Profesyonel Değerleri Ölçeği'nin Geçerlik ve Güvenirlik Çalışması. Marmara Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi. 2012;2(1):22-31.
6. Weis D, Schank MJ. Professional Values: Key To Professional Development. Journal of Professional Nursing. 2002;18(5):271-275.

7. Erim SE, Çevirme A. Hemşirelikte Kişisel ve Profesyonel Değerlerin Farkındalığı Önemli Mi?. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi. 2018;21(4):279-284.

8. Boozaripour M, Abbaszadeh A, Shahriari M, Borhani F. Ethical Values in Nurse Education Perceived by Students and Educators. Nursing Ethics. 2018;25(2):253-263.

9. Altun İ. Hemşirelik Esasları Hemşirelik Bilim ve Sanatı. Etik ve Değerler İçinde. Editörler: Aştı TA, Karadağ A. Akademi Basın ve Yayıncılık. 2017, İstanbul, Türkiye, s:114-122.

10. Can Ş. Hemşirelerin Mesleki Değerlerinin Bireyselleştirilmiş Bakım Algıları İle İlişkisi. İstanbul Üniversitesi Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Hemşirelik Esasları Programı, Yüksek Lisans Tezi, İstanbul, 2013.

11. Can Ş, Acaroğlu R. Hemşirelerin Mesleki Değerlerinin Bireyselleştirilmiş Bakım Algıları İle İlişkisi. F.N. Hemşirelik Dergisi. 2015;23(1):32-40.

12. Fahrenwald NL, Basset SD, Tschetter L, Carson PP, White L, Winterboer VJ. Teaching Core Nuring Values. Journal of Professional Nursing. 2005;21(1):46-51.

13. Karabacak Ü. Çağdaş Hemşirelikte Etik. Değerlerin Aydınlatılması İçinde. Çeviri Editörleri: Alpar ŞE, Bahçecik N, Karabacak Ü. İstanbul Tıp Kitapevi. 2013, 3. Baskı, İstanbul, s: 82-97.

14. Çulha Y, Acaroğlu R. The Relationship amongst Student Nurses' Values, Emotional Intelligence and Individualised Care Perceptions. Nursing Ethics. 2018:1-11

15. Baykara Z.G, Şahinoğlu S. Hemşirelikte mesleki özerklik kavramının incelenmesi. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi. 2013;16(3):176-181.

16. Baysal N. Ortaokul Sosyal Bilgiler Derslerinde değerler eğitimi uygulamalarının öğretmenler yönüyle değerlendirilmesi. Niğde Üniversitesi Eğitim Bilimleri Enstitüsü, İlköğretim Anabilim Dalı, Yüksek Lisans Tezi, Niğde, 2013.

17. Coşkun Y, Yıldırım, A. Üniversite öğrencilerinin değer düzeylerinin bazı değişkenler açısından incelenmesi. Yüzüncü Yıl Üniversitesi, Eğitim Fakültesi Dergisi. 2009;6(1**)**:311-328.

18. Kaya H, Işık B, Şenyuva E, Kaya, N. Hemşirelik öğrencilerinin bireysel ve Profesyonel Değerleri. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi. 2012;15(1**)**:19-26.

19. Özensel E. Sosyolojik bir olgu olarak değer. Değerler Eğitimi Dergisi. 2003;1(3**)**:217-239.

20. Donmez R.O, Ozsoy S. Factors influencing development of Professional values among nursing students. Pakistan Journal of Medical Sciences. 2016;32(4):988-993.

21. Babadağ K. Hemşirelik ve Değerler. Alter Yayıncılık, Ankara, 2010.

22. Kantek F, Kaya, A. Professional values, job satisfaction, and ıntent to leave among nursing managers. The Journal of Nursing Research. 2017;25(4):319-325.

23. Ferna´ndez-Feito A, Palmeiro-Longo M.R., Hoyuelos S.B., Garcı´a-Dı´az V. Howwork setting and job experience affect professional nurses' values. Nursing Ethics. 2017;1:1-14.

24. Altun I. Burnout and nurses' personal and professional values. Nursing Ethics**.** 2002;9(3):269-278.

25. Bijani M, Tehranineshat B. Nurses', nursing students' and nursing instructors' perceptions of professional values: A comparative study. Nursing Ethics. 2017;1:1-14.

26. https://www.aacnnursing.org/Education-Resources/AACN-Essentials (Erişim Tarihi: 10.12.2021).

27. https://www.icn.ch/nursing-policy/nursing-definitions (Erişim Tarihi: 10.12.2021).

CHECKLIST OF "TURBELLARIANS" SAMPLED AMONG CULTIVATED MUSSELS *MYTILUS GALLOPROVINCIALIS* IN BIZERTA LAGOON (NORTHERN TUNISIA)

Gammoudi Mehrez

University of Tunis El Manar, Faculty of Science of Tunis, Laboratory of Ecology, Biology and Physiology of Aquatic Organisms LR18ES41, 2092, Tunis, Tunisia.

ORCID ID: https://orcid.org/0000-0001-5756-5094

Ben Ahmed Raja

University of Tunis El Manar, Faculty of Science of Tunis, Laboratory of Ecology, Biology and Physiology of Aquatic Organisms LR18ES41, 2092, Tunis, Tunisia.

ORCID ID: https://orcid.org/0000-0002-0880-2855

Bouriga Nawzet

University of Tunis El Manar, Faculty of Science of Tunis, Laboratory of Ecology, Biology and Physiology of Aquatic Organisms LR18ES41, 2092, Tunis, Tunisia.

ORCID ID: https://orcid.org/0000-0001-6181-6896

ABSTRACT

Bizerta lagoon is a Mediterranean coastal lagoon situated in the North of Tunisia. This area is a significant zone of shellfish production (mussels, oysters and clams). The growing of mussel *Mytilus galloprovincialis* Lamark, 1819 is carried out in tables in southern part of Bizerta lagoon namely the Society of Tunisia lagoon. Investigations dealing with associated fauna of mussels in this site allowed us to identify and describe nine species of free-living flatworms. The Free-living flatworms (known previously as "Turbellarians") are a paraphyletic assemblage of all flatworms (Platyhelminthes) but the obligatory parasites (Neodermata). They can be found in almost all aquatic habitats, marine and freshwater, or in damp terrestrial locations. Identification of the free-living flatworms is based, in addition to external morphology, on the study of the internal anatomy made by histlogical sections. The determined species belong to two orders and eight families. They are the triclad *Procerodes dhorni* and the polyclads *Leptoplana mediterranea* (Bock, 1913), *Echinoplana celerrima* Haswell, 1907; *Imogine mediterranea* (Galleni, 1976)*; Discocelis tigrina* (Blanchard, 1847); *Thysanozoon brocchii* (Risso, 1818)*; Yungia aurantiaca* (Delle Chiaje, 1822)*; Prostheceraeus moseleyi* Lang, 1884 and *Prosthiostomum siphunculus* (Delle Chiaje, 1822). On the other hand, some taxonomical and biological data are offered for some species.

Keywords: Polyclads; Triclads; Mytiliculture; Bizerta lagoon

INTRODUCTION

The lagoon of Bizerta is a natural lagoon located in the north-eastern Tunisia between the Mediterranean Sea and Ichkeul Lake. This ecosystem is known by the intensive shellfish farming activities (clams, oysters and mussels). The Tunisian Society of Lagoon is a site where the mediterranean mussel *Mytillus gallprovincialis* is cultivated in tables. The parasitic flatworms fauna associated to the mussels in this site have been investigated (Ben Abdallah et al, 2012). Studies dealing with taxonomy, reproduction, embryonic development and ecology of some free-living flatworms from the same site have been also realized (Gammoudi *et al*, 2009; Gammoudi and Tekaya 2012; Gammoudi *et al*, 2011; Gammoudi *et al*, 2012; Gammoudi *et al*, 2016; Gammoudi *el al*, 2017). This last fauna (known previously as "Turbellarians") is a paraphyletic assemblage of all flatworms (Platyhelminthes) but the obligatory parasites (Neodermata). Currently, 11 "orders" of free-living flatworms are recognized (Laumer *et al*. 2015). Among them, the order Polycladida include almost exclusively marine species (Hyman, 1951;

Prudhoe, 1985). The order is divided in two suborders Acotylea and Cotylea according to the absence or presence of a sucker behind the female genital pore (Lang, 1884). On the other hand, the order Tricladida Lang, 1884 contain many marine species forming the suborder Maricola Hallez, 1892. In this context, we present a checklist of "Turbellarians" flatworms found in association with the bivalve *Mytilus galloprovincialis* and offer some data dealing with their taxonomy and biology.

MATERIAL AND METHODS

Free-living flatworms and mussels were collected from culture tables belonging to the Tunisian Society of Lagoons (STL), a mytiliculture farm at Menzel Jemil in Bizerta Lagoon, located in North of Tunisia (Fig. 1). Due to their delicate body, Flatworms were collected manually using a fine paintbrush to lift the worms from the mussel shells. In the laboratory, flatworms were kept in culture in a small aquarium. The water is changed daily. Observations on living animals using stereomicroscope allowed us to study the external and internal morphology (by transparency). For histological study, the flatworms were fixed and embedded in paraffin and subsequently serially sectioned at 7 lm and stained with eosin and toluidine blue.

RESULTS

Nine species of free-living flatworms belonging to the two orders Polycladida and Tricladida were found in association with cultivated mussels *Mytilus galloprovincilais.* Morphological and histological data were used to determine species (Fig.2).

The determined species are:

*Order Polycladida Lang, 1884

- Suborder Acotylea Lang, 1884

Echinoplana celerrima (Haswell, 1907)

Leptoplana mediterranea (Bock, 1913)

Imogine mediterranea (Galleni, 1976)

Discocelis tigrina (Blanchard, 1847)

-Suborder Cotylea Lang, 1884

Thysanozoon brocchii (Risso, 1818)

Yungia aurantiaca (Delle Chiaje, 1822)

Prostheceraeus moseleyi Lang, 1884

Prosthiostomum siphunculus (Delle Chiaje, 1822)

*Order Tricladida Lang, 1884

-Suborder Maricola Lang, 1884

Procerodes dohrni Wilhelmi, 1909

Fig.1: sampling location: Bizerta lagoon

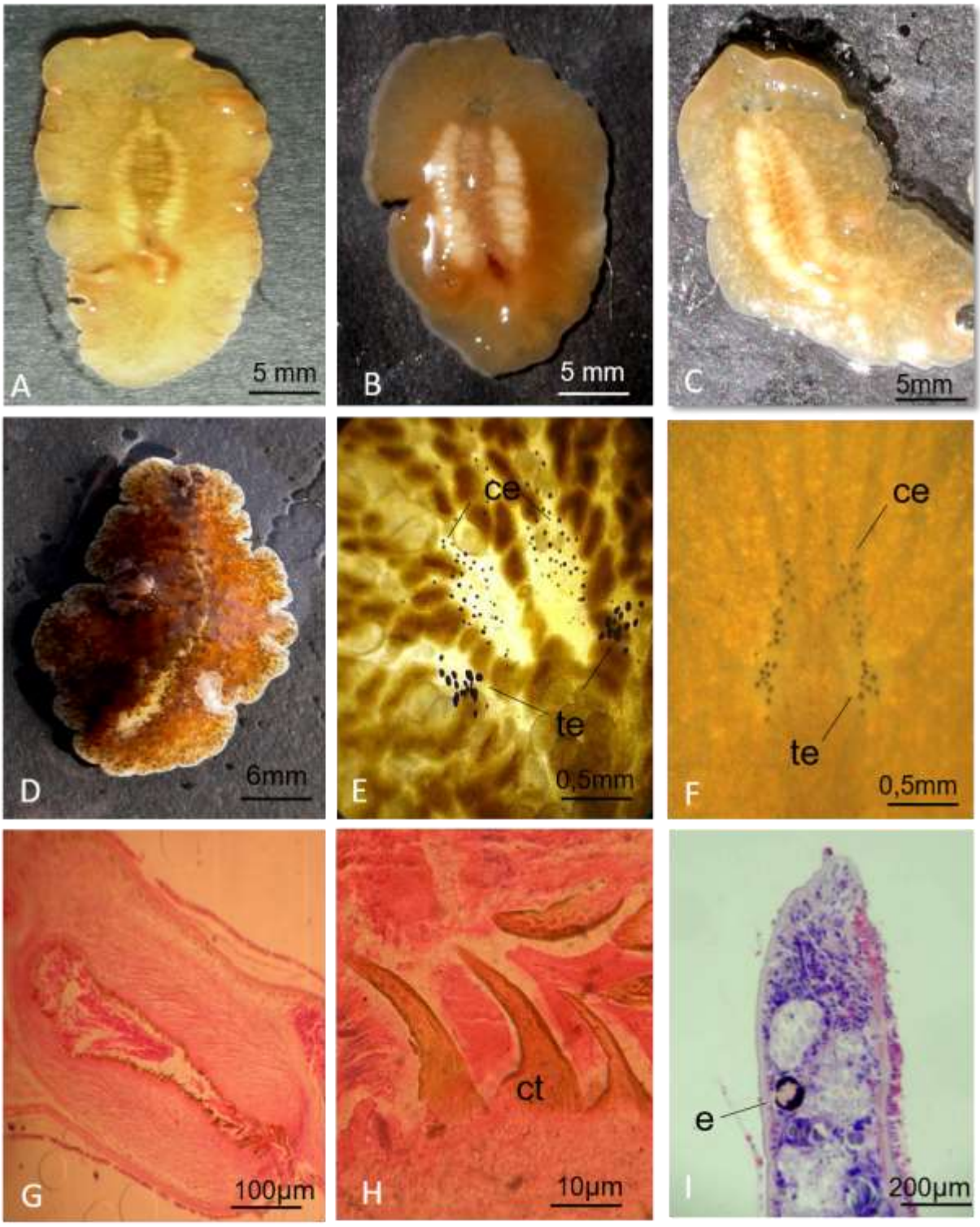


Fig.2: Morphology and histology of some "Turbellarian species" found in association with cultivated *Mytilus galloprovincialis* in Bizerta lagoon. **A**: Dorsal view of *Echinoplana celerrima*; **B**: Dorsal view of *Discocelis tigrina;* **C**: Dorsal view of *Leptoplana mediterranea;* **D**: Dorsal view of *Thysanozoon brocchii;* **E**: Cerebral eyes (ce) and tentacular eyes (te) of *Leptoplana mediterranea;* **F**: Cerebral yes (ce) and tentacular eyes (te) of *Echinoplana celerrima;* **G:** Section through cirrus sac of *Echinoplana celerrima;* **H**: Details of cirrus teeths (ct) of *Echinoplana celerrima.* I: Section through eye of *Procerodes dohrni*

DISCUSSION

In this work, the marine triclad *Procerodes dohrni* as well as the acotylean polyclad *Leptoplana mediterranea* are recorded for the first time from Bizerta lagoon.

The acotylean polyclad *Imogine mediterranea* was described as a serious predator of *Mytilus galloprovincialis* (Galleni *et al*, 1980; Gammoudi *et al*, 2016). The egg plates of this species are usually found inside empty mussel shells, attached to the inner or the outer surface in accordance to the observations made by Gammoudi et al (2016).

During our culture in the laboratory, The cotylean species *Prosthiostomum siphunculs* was observed to attack a damaged triclad *Procerodes dhorni* suggesting a predatory-prey relationship between both species.

Faubel (1984) considered *Prostheceraeus moseleyi* as incertea sedis based on the original description made by Lang (1884) who did not described uterine vesicles in the female apparatus. In our sections, these uterine vesicles are found and this is a confirmation of the findings of Noreña *et al* (2014) who mentioned the existence of these structures and deduced the validity of this species.

REFERENCES

Ben Abdallah, L.G., Chargui, T., Abidli, S., El Menif, N. T. (2012) Associated and digenean fauna of the mussel Mytilus galloprovincialis cultured on shellfish tables in the lagoon of Bizerta (Tunisia). Transitional Waters Bulletin. 6 (1), 25-38

Galleni L., Tongiorgi P., Ferrero E. & Salghetti U. (1980) Stylochus mediterraneus (Turbellaria: Polycladida), predator on the mussel Mytilus galloprovincialis. Marine Biology 55, 317–326.

Gammoudi, M., Tekaya, S. & Noreña, C. (2009) Contribution to the knowledge of Acotylean Polyclads (Platyhelminthes Polycladida) from Tunisian Coasts. Zootaxa, 2195, 43–60.

Gammoudi, M. & Tekaya, S. (2012) Distribution en Méditerranée occidentale de quelques polyclades (plathelminthes). Bulletin de la Société Zoologique de France, 137 (1–4), 197–213.

Gammoudi, M., Ben Rached, B. & Tekaya, S. (2011) les polyclades (plathelminthes de vie libre) du nord de la Tunisie: Inventaire et distribution. Bulletin de l'Institut National des Sciences et Technologie de la Mer de Salammbô, 38, 83–88.

Gammoudi, M., Noreña, C., Tekaya, S., Prantl, V. & Egger, B. (2012) Insemination and embryonic development of some Mediterranean polyclad flatworms. Invertebrate Reproduction and Development, 56 (4), 272–286.

Gammoudi, M., Ben Ahmed, R., Bouriga, N., Ben-Attia, M. & Harrath, A.H. (2016) Predation by the polyclad flatworm *Imogine mediterranea* on the cultivated mussel *Mytilus galloprovincialis* in Bizerta Lagoon (northern Tunisia) Aquaculture Research, 48 (4), 1608–1617.

Gammoudi, M., Garbouj, M., Egger, B & Tekaya, S. (2017) Updated inventory and distribution of free-living flatworms from Tunisian waters. Zootaxa 4263 (1): 120–138

Hyman, L.H. (1951) The invertebrates: Platyhelminthes and Rhynchocoela. The acoelomate Bilateria. Vol. II. McGraw-Hill, New York, 550 pp

Lang, A. (1884) Die Polycladen (Seeplanarien) des Golfes von Neapel und der angrenzenden Meeresabschnitte. Eine Monographie. Fauna und Flora des Golfes von Neapel und der angrenzenden Meeresabschnitte, herausgegeben von der Zoologische Station in Neapel. Engelmann, Leipzig, 688 pp

Laumer, C.E., Hejnol, A. & Giribet, G. (2015) Nuclear genomic signals of the "microturbellarian" roots of platyhelminth evolutionary innovation. Elife, 4, e05503

Norena, C., Marquina, D., Perez,J. & Almon, B. (2014) First records of Cotylea (Polycladida, Platyhelminthes) for the Atlantic coast of the Iberian Peninsula. Zookeys. 2014; (404): 1–22.

Prudhoe, S. (1985) A monograph on polyclad Turbellaria. Oxford University Press, New York, 259 pp.

NOVEL METHOD FOR DETERMINATION OF FATTY ACID COMPOSITION USING OTOLITH SHAPE IN SIX BENTHIC AND PELAGIC FISH SPECIES FROM THE GULF OF TUNIS

BOURIGA Nawzet

University of Carthage, High institute of Aquaculture and fishing of Bizerte, BP15, 7080 Menzel Jemil, Tunisia.

University of Tunis El Manar, Faculty of Science of Tunis, Laboratory of Ecology, Biology and Physiology of Aquatic Organisms, 2092, LR18ES41, Tunis, Tunisia.

ORCID ID: https://orcid.org/0000-0001-6181-6896

BEN AHMED Raja

University of Tunis El Manar, Faculty of Science of Tunis, Laboratory of Ecology, Biology and Physiology of Aquatic Organisms, 2092, LR18ES41, Tunis, Tunisia.

ORCID ID: https://orcid.org/0000-0002-0880-2855

GAMMOUDI Mehrez

University of Tunis El Manar, Faculty of Science of Tunis, Laboratory of Ecology, Biology and Physiology of Aquatic Organisms, 2092 , LR18ES41, Tunis, Tunisia.

ORCID ID: http://orcid.org/0000-0001-5756-5094

TRABELSI Monia

University of Tunis El Manar, Faculty of Science of Tunis, Laboratory of Ecology, Biology and Physiology of Aquatic Organisms, 2092, LR18ES41 Tunis, Tunisia.

ORCID ID: https://orcid.org/0000-0001-5291-6211

ABSTRACT

Previous fish studies have shown that the lipid content of the diet or its biochemical composition and energy metabolism influence the growth of otolith. Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are essential nutrients for most species of fish and their deficiency can affect many aspects of fish physiology, particularly the morphogenesis of otolith.

The purpose of this study was to investigate the potential correlation between fatty acid composition and otolith shape in three benthic and three pelagic fish species (Actinopterygii) from the Gulf of Tunis by addressing two complementary questions. First, is there a global relationship between fatty acid composition and otolith shape? Second, which fatty acids are involved in this relationship? To have a general answer to these questions, the relationships between the composition of saturated, monounsaturated, polyunsaturated and essential fatty acids, otolith shape and the vertical classification of the species studied were examined using a principal component analysis (PCA). Our data demonstrated a clear correlation between otolith shape and fatty acid composition that was more important for benthic fish. Overall, these results could be a valuable method to validate the otolith shape as a novel technique to characterize the fatty acid composition in fish species.

Keywords: Oolith shape, fatty acid, fishes, gulf of Tunis

1.INTRODUCTION

Otoliths are organized into three pairs, one pair of which, the sagittae, is the largest and most studied pair of otoliths in the teleostean fishes. They have been widely used as a tool in determining fish age

(Škeljo et al. 2015), which has powerful implications for fisheries science and management (Vasconcelos et al. 2018), taxonomy and phylogeny (Béarez & Schwarzhans 2013), evolution and ontogeny (Morais et al. 2013), spatial and temporal stock discrimination (Cardinale et al. 2004; Trojette et al. 2014, 2015), and population management (Pothin et al. 2006; Mérigot et al. 2007; Mejri et al. 2018; Ben Mohamed et al. 2019; Ben Labidi et al. 2020a; Khedher et al. 2021). Fish diet composition has also been found to influence otolith structure, opacity, and shape (Buckel et al. 2004; Cardinale et al. 2004; Gagliano & McCormick 2004; Hüssy 2008; Fernandez-Jover & Sanchez-Jerez 2015; Mille et al. 2016). Besides, several researchers have also reported that the lipid content of the diet or its biochemical composition and energy metabolism influence the growth of otolith (Mosegaard et al. 1988; Anthony et al. 2000; Sanchez-Jerez et al. 2002; Fablet et al. 2011; Mille et al. 2016).

Therefore, the purpose of this study was to investigate the potential correlation between fatty acid composition and otolith shape in three benthic and three pelagic fish species (Actinopterygii) from the Gulf of Tunis by addressing two complementary questions. First, is there a global relationship between fatty acid composition and otolith shape? Second, which fatty acids are involved in this relationship?

2. MATERIALS AND METHODS

2.1Sampling and study area

A total of 200 adult individuals of the carangid Mediterranean horse mackerel, *Trachurus mediterraneus* (Steindachner, 1868), the sardine, *Sardina pilchardus* (Walbaum,1792), the golden grey mullet, *Chelon auratus* (Risso, 1810), the red mullet, *Mullus barbatus* (Linnaeus, 1758), the black goby, *Gobius niger* (Linnaeus, 1758), and the greater weever *Trachinus draco*, (Linnaeus, 1758), were collected between March and May 2021 from five different stations in the Gulf of Tunis using artisanal fishing (Fig. 1).

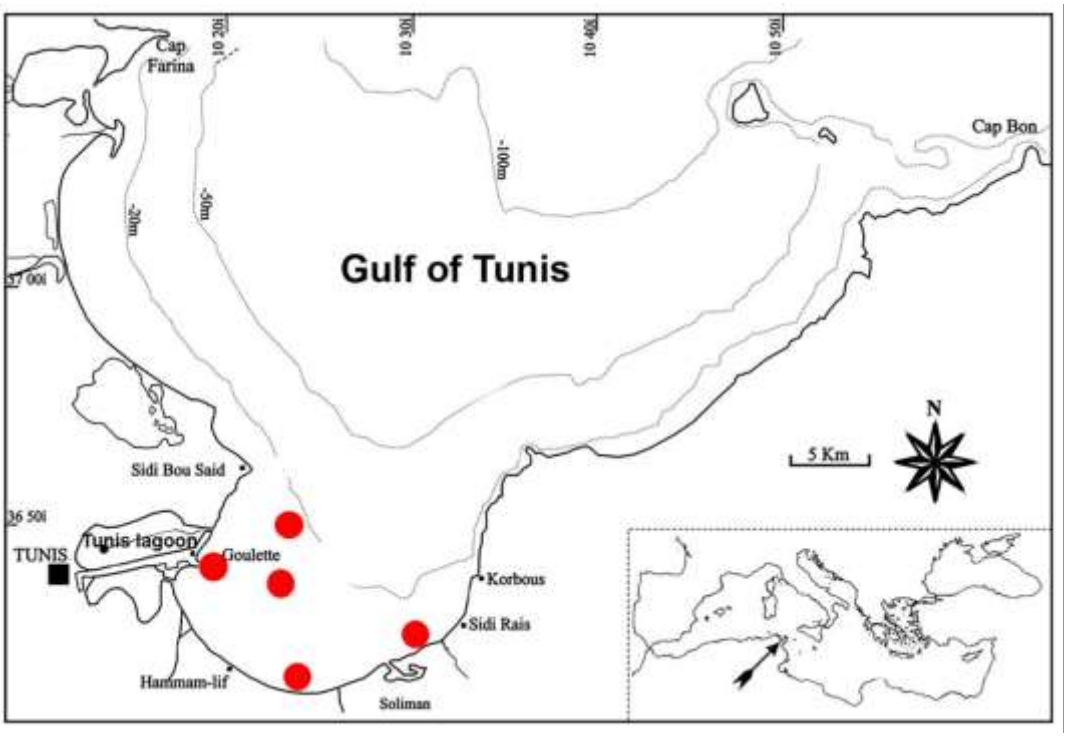


Figure 1: Sampling sites

2.2. Otolith extraction

Right and left otoliths were extracted from all individuals of the six species using the method described by Daverat et al. (2005). Thereafter, the otoliths were cleaned with distilled water, stored in Eppendorf tubes, and kept in dry storage for 24 h to eliminate humidity.

2.3. Otolith shape analysis

Each otolith was placed on a microscope slide on its convex side with the sulcus pointed down and the rostrum pointed in the same direction. Each pair of otoliths was photographed under a binocular loupe using Canon Ixus high-performance digital camera with a resolution of 20 megapixels. The obtained images were then processed by Photoshop CS6 software, which transformed the original images of otoliths into binary images. Afterwards, images of the shapes were analyzed using SHAPE 1.3 software (Iwata & Ukai 2002). The contour shape of each otolith was evaluated by elliptical Fourier analysis (EFA) as previously described by Ben Labidi et al. (2020a, b) following the procedures suggested by Kuhl & Giardina (1982).

2.4. Lipid extraction

Crude fats were extracted using chloroform: methanol (2:1) according to the method of Folch et al. (1957) and the lipid fraction was determined gravimetrically.

2.5. Fatty acids analysis

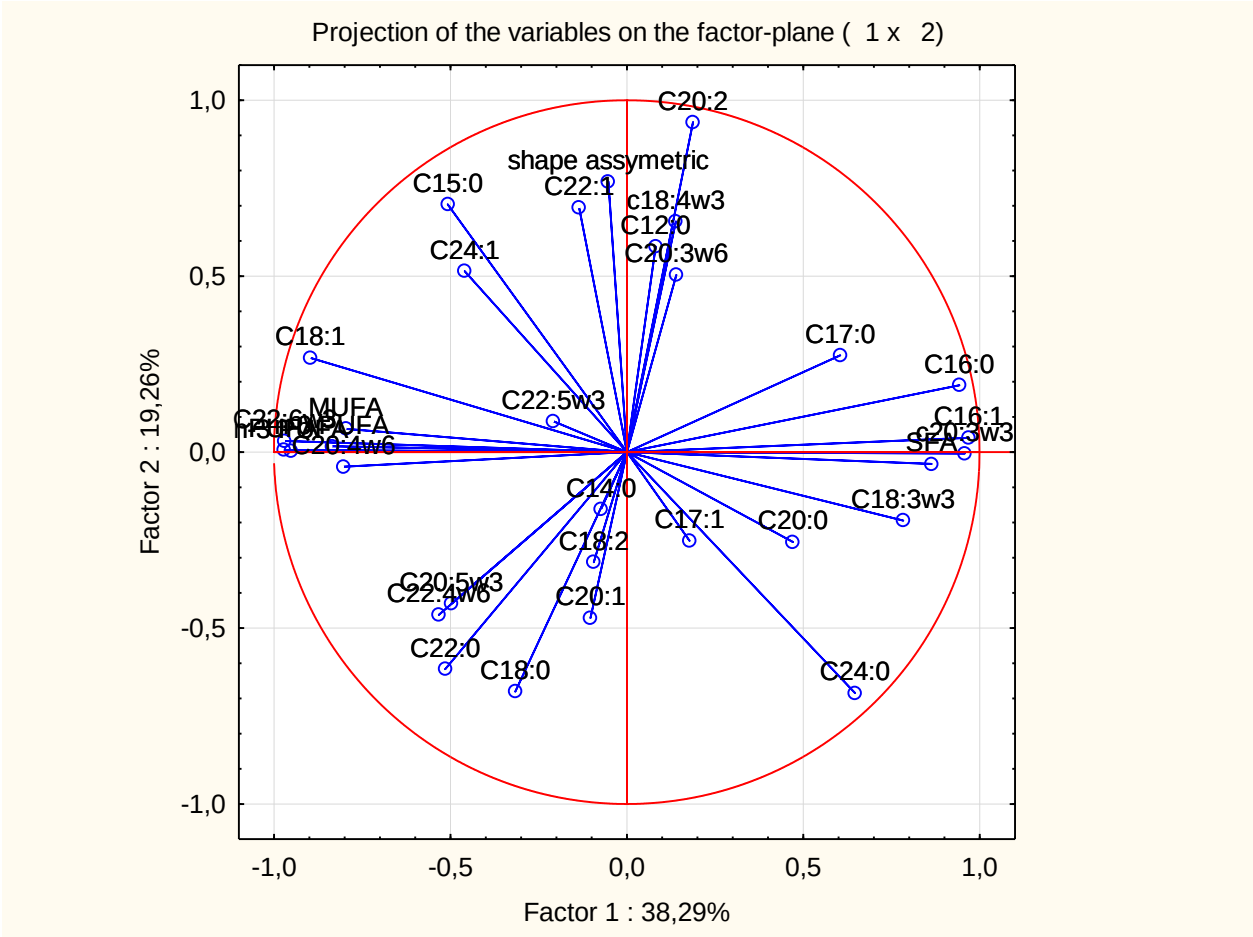
The fatty acids of fresh fishes were analyzed in triplicate. Fatty acid methyl esters (FAMEs) were determined according to Lepage & Roy (1986) protocol. Briefly, the analysis was performed on a Varian Agilent 200 6890N gas chromatograph. The fatty acids content in the total lipids of the samples was estimated using C21:0 as the internal standard (10 mg/ml) based on the peak area ratio. The fatty acids sequences were ranged according to the chromatographic retention times, and the values are given as percentages of the total fatty acids methyl esters.

2.6. Statistical analyses

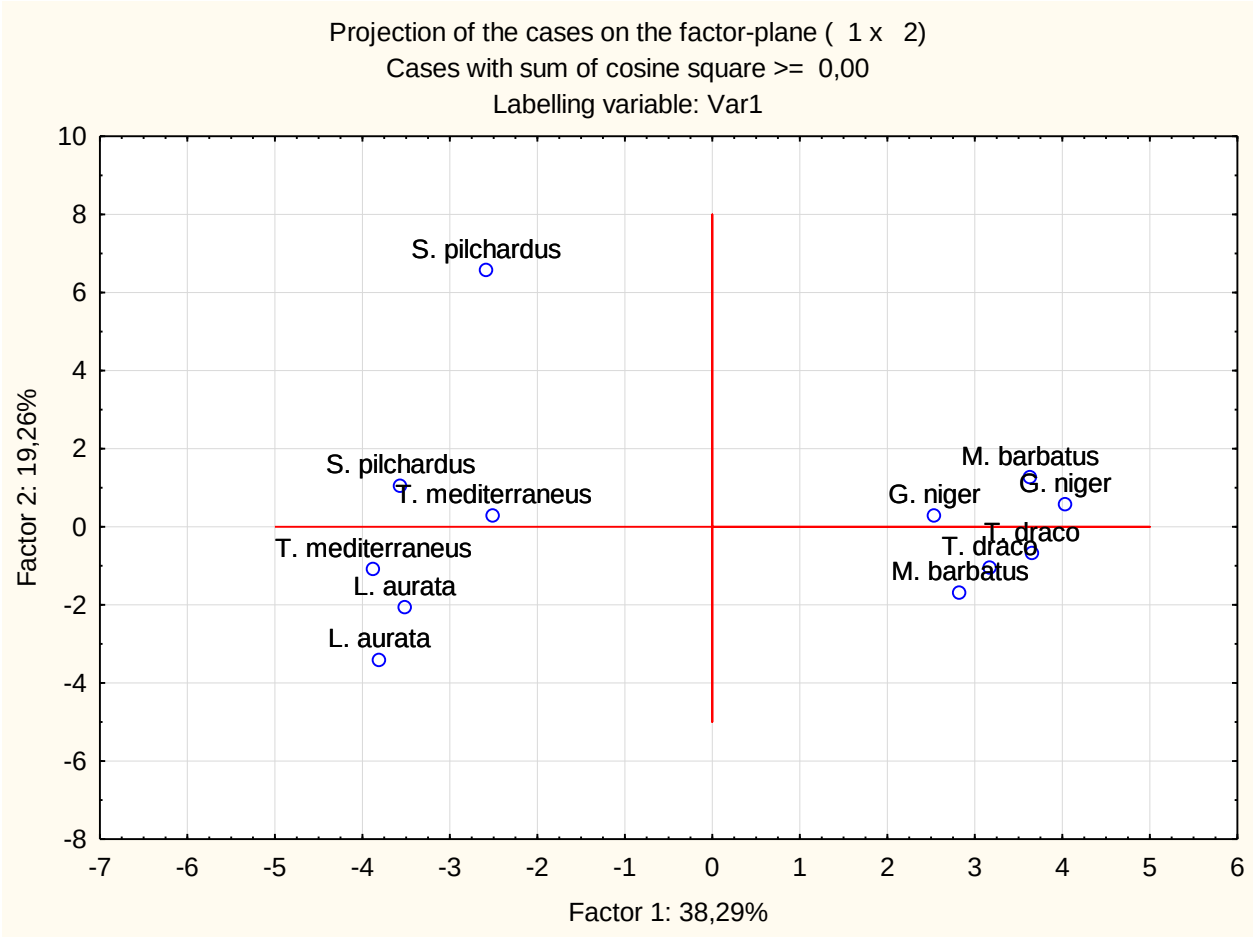
All statistics and the principal component analysis (PCA) were performed with Statistica software. Herein, principal component analysis (PCA) is the most used tool to explore similarities and hidden patterns among samples and clarify the relationship between data and grouping.

3. RESULTS AND DISCUSSION

To have global and general view of the obtained data, the screening of fatty acid composition and otolith shape asymetry on the same factorial showed different clusters (Fig. 2 a and b). The results showed that the PCA was produced using a two-dimensional model explaining 57.55% of the total variance. Our results show that saturated fatty acids (SFA) contributed to the discriminatory ability of the first factorial axis (38.29% of the variance explained). On the other hand, eicosapentaenoic (C20: 5w3), n-PUFA, polyunsaturated fatty acids (PUFA), docosahexaenoic (C22: 6w3), monounsaturated fatty acids (MUFA), n-6PUFA and arachidonic acids (C20: 4w6) determined the separation along the second axis and explained 19.26% of the total variance. Analysis of our data showed a clear separation between benthic and pelagic fish according to the otoliths shape and the profile of fatty acids. In agreement with this, our results showed that benthic fish had a strong correlation between large otoliths and SFA. However, pelagic fish were characterized by the highest amounts of MUFAs, PUFAs and their major compounds: n-3 PUFAs, C20: 5w3, C22: 6w3, n-6 PUFAs and C20: 5w6 and a small otolith.


Projection of the variables on the factor-plane (1 x 2)
Factor 2 : 19,26%
Factor 1 : 38,29%
1,0
0,5
0,0
-0,5
-1,0
-1,0
-0,5
0,0
0,5
1,0
C20:2
shape assymetric
C15:0
C22:1
c18:4w3
C12:0
C24:1
C20:3w6
C18:1
C17:0
C16:0
C22:5w3
MUFA
C16:1
C20:4w6
SFA
C14:0
C18:3w3
C17:1
C20:0
C18:2
C20:5w3
C22:4w6
C20:1
C22:0
C18:0
C24:0

(a)



(b)

Fig. 2. Principal component analysis (PCA) graphs showing the distribution of the fatty acid composition and the otolith shape (a) of the pelagic and benthic species (b) collected from the five stations in the Gulf of Tunis, Tunisia.

The contour shape asymmetry results are in agreement with those published on the sparid *Oblada melanura* (Barhoumi et al. 2018), (Trojette et al. 2015), *Pagellus erythrinus* (Mejri et al. 2018, 2020), *Boop boops* (Mahé et al. 2019b; Ben Labidi 2020a, b) and D. *vulgaris* (Khedher et al. 2021), which inhabit different habitats in Tunisian waters, including the Gulf of Tunis.

The shape of otoliths differed within species regardless of the depth of their living environment. For example, otolith shape asymmetry was found to be significantly different ($P < 0.05$) only between C. *auratus*, T. *mediterraneus*, and G. *niger* individuals living at different depths of 5 - 250 m (FAO-FIGIS 2005), 10 - 20 m 353 (Thomson 1990), and 30 - 80 m (Kara & Quignard 2019), respectively. Similar results have been reported by Mille et al. (2015) who mentioned that flatfish were more affected by otolith shape asymmetry than roundfish, with only one in four roundfish fish showed significant asymmetry.

Regarding the relationship of the shape of otoliths to the classification of these six species, it was found that the shape clearly classified these species into two main clades based on the nature of their living in the water column and the type of food they eat. The first clade clustered M. *barbatus*, G. *niger* and T. *draco* which mostly assume a benthic life (Froese & Pauly 2007; Kara & Quignard 2019), while the second grouped S. *pilchardus*, T. *mediterraneus*, and C. *auratus* which are considered to be pelagic or benthopelagic species (Ben-Tuvia 1986; Thomson 1990; Froese & Pauly 2006, 2017; Van Der Lingen et al. 2009; Yankova 2013). This result is in agreement with that of Bouriga et al. (2021) who categorized these six species into two groups, pelagic and benthic, based on the variation in otolith mass

asymmetry (X). In addition, based on PCA using the two-dimensional model, the results showed that M. *barbatus*, G. *niger*, and T. *draco* had a strong correlation with SFAs palmitic acid (C16:0) and stearic acid (C18:0), while the T. *mediterraneus*, S. *pilchardus*, and C. *auratus* had the highest contents of MUFAs and PUFAs and their major compounds, including n-3 PUFAs, C20:5w3, C22:6w3, n-6 PUFAs, and C20:5w6.

4. CONCLUSION

As regards the relationship between the asymmetry in the shape of otoliths and the fatty acids composition among the six examined species, it was shown that the asymmetry of the shape of otoliths detected in C. *auratus*, and T. *mediterraneus* was associated with the highest levels of MUFAs (EPA, DHA, and ARA), MUFAs (oleic acid (C18:1)), and omegas-3 and -6 content. However, the asymmetry of the shape found in G. *niger* was related to the high content of SFAs, especially palmitic acid (C16:0). Accordingly, we can conclude that the SFAs, MUFAs, PUFAs, and their major compounds have a clear correlation with the growth and asymmetry of otoliths in these species.

Our results showed that benthic fish had a strong correlation between large otoliths and SFA. However, pelagic fish were characterized by the highest amounts of MUFAs, PUFAs and their major compounds: C20: 5w3 and C22: 6w3, and a small otolith. These results confirm the validity of the otolith shape as a novel method to determine the fatty acids.

5. REFERENCES

Anthony, J.A., Roby, D.D. & Turco, K.R. (2000). Lipid content and energy density of forage fishes from the northern Gulf of Alaska. Journal of Experimental Marine Biology and Ecology 248: 53−78.

Barhoumi, M., Khoufi, W., Kalai, S., Ouerhani, A., Essayed, S. et al. (2018). The use of Fourier analysis as a tool for Oblada melanura (Linnaeus, 1758) stock unit separation in the south central Mediterranean Sea. Journal of the Marine Biological Association of the United Kingdom 98: 1725–1732. DOI: 10.1017/S0025315417001308.

Béarez, P. & Schwarzhans, W. (2013). Robaloscion, a new genus for Sciaena wieneri Sauvage, 1883 (Teleostei, Sciaenidae) from the southeastern Pacific, with clarification of the taxonomic status of Sciaena starksi Evermann and Radcliffe, 1917. Cybium 37(4): 273–279. DOI: 10.26028/cybium/2013-374-006.

Ben Labidi, M., Mejri, M., Shahin, A.A.B., Quignard, J.P., Trabelsi, M., et al. (2020a). Stock discrimination of the bogue Boops boops (Actinopterygii, Sparidae) form two Tunisian marine lagoons using the otolith shape. Acta Ichthyologica et Piscatoria 50: 413–422. DOI: 10.3750/AIEP/02978.

Ben Labidi, M., Mejri, M., Shahin, A.A.B., Quignard, J.P., Trabelsi, M., et al. (2020b). Otolith fluctuating asymmetry in Boops boops (Actinopterygii, Sparidae) from two marine lagoons (Bizerte and Kelibia) in Tunisian waters. Journal of the Marine Biological Association of the United Kingdom 100: 1135–1146. DOI: 10.1017/S0025315420001022.

Ben Mohamed, S., Mejri, M., Trojette, M., Ben Faleh, A., Allaya, H., et al. (2019). Otolith shape as a valuable tool to evaluate the stock structure of Mullus barbatus from two Tunisian lagoons (Boughrara and El Biban). Cahiers de Biologie Marine 60: 507–516. DOI: 10.21411/CBM.A.873DBD51.

Ben-Tuvia, A. (1986). Mugilidae. In P.J.P. Whitehead, M.-L. Bauchot, J.-C. Hureau, J. Nielsen & E. Tortonese (Eds.), Fishes of the North-eastern Atlantic and Mediterranean, (Vol. 3), (pp. 1197–1204). UNESCO, Paris.

Bouriga, N., Mejri, M.,, Dekhil, M., Bejaoui, S., Quignard, J.-P., et al. (2021). Investigating otolith mass asymmetry in six benthic and pelagic fish species (Actinopterygii) from the Gulf of Tunis. Acta Ichthyologica et Piscatoria 51(2): 193–197. DOI: 10.3897/aiep.51.64220.

Buckel, J.A., Sharack, B.L. & Zdanowicz, V.S. (2004). Effect of diet on otolith composition in Pomatomus saltatrix, an estuarine piscivore. Journal of Fish Biology 64: 1469–1484. DOI: 10.1111/j.1095-8649.2004.00393.

Cardinale, M., Doering-Arjes, P., Kastowsky, M. & Mosegaard, H. (2004). Effects of sex, stock, and environment on the shape of known-age Atlantic cod (Gadus morhua) otoliths. Canadian Journal of Fisheries and Aquatic Sciences 61:158−167. DOI: 10.1139/f03-151.

Daverat, F., Gazeau-Naudin, C. & Camoin, P. (2005). Eel otolith preparation for ageing [CD]. Bordeaux: Cemagref.

Fablet, R., Pecquerie, L., de Pontual, H., Høie, H., Millner, R., et al. (2011). Shedding light on fish otolith biomineralization using a bioenergetic approach. PLoS One 6: e27055. DOI: 10.1371/journal.pone.0027055.

FAO-FIGIS (2005). A world overview of species of interest to fisheries. Chapter: Trachurus mediterraneus. Retrieved July, 14, 2005, from www.fao.org/figis/servlet/species?fid=2311. 3p.

Fernandez-Jover, D. & Sanchez-Jerez, P. (2015). Comparison of diet and otolith growth of juvenile wild fish communities at fish farms and natural habitats. ICES Journal of Marine Science 72: 916−929. DOI: 10.1093/icesjms/fsu153.

Folch, J., Lees, M. & Stanley, G.H.S. (1957). A simple method for the isolation and purification of total lipides from animal tissues. Journal of Biological Chemistry 226(1): 497–509.

Froese, R. & Pauly, D. Eds. (2017). Trachurus mediterraneus. In FishBase. February, 2017 version.

Gagliano, M. & Mccormick, M.I. (2004). Feeding history influences otolith shape in tropical fish. Marine Ecology Progress Series 278: 291–296. DOI: 10.3354/meps278291.

Hüssy, K. (2008). Otolith shape in juvenile cod (Gadus morhua): ontogenetic and environmental effects. Journal of Experimental Marine Biology and Ecology 364: 35–41. DOI: 10.1016/j.jembe.2008.06.026.

Iwata, H. & Ukai, Y. (2002). SHAPE: a computer program package for quantitative evaluation of biological shapes based on elliptic Fourier descriptors. Journal of Heredity 93(5): 384– 385. DOI: 10.1093/jhered/ 93.5.384.

Kara, M.H. & Quignard, J.-P. (2019). Fishes in lagoons and estuaries in the Mediterranean 2, sedentary fish. London, UK: Wiley.

Khedher, M., Mejri, M., Shahin, A.A.B., Quiganrd. J.-P., Trabelsi, M., et al. (2021). Discrimination of Diplodus vulgaris (Actinopterygii, Sparidae) stock from two Tunisian lagoons using the otolith shape analysis. Journal of the Marine Biological Association of the United Kingdom 101: 743–751. DOI: 10.1017/S0025315421000667.

Kuhl, F.P., Giardina, C.R. (1982). Elliptic Fourier features of a closed contour. Computer Graphics and Image Processing 18: 236–258. DOI: 10.1016/0146-664X(82)90034-X.

Lepage, G. & Roy, C.C. (1986). Direct transesterification of all classes of lipids in a one-step reaction. Journal of Lipid Research 27(1): 114–120.

Mahé, K., Ider, D., Massaro, A., Hamed, O., Jurado-Ruzafa, A. et al. (2019b). Directional bilateral asymmetry in otolith morphology may affect fish stock discrimination based on otolith shape analysis. ICES Journal of Marine Science 76: 232–243. DOI: 10.1093/icesjms/fsy163.

Mejri, M., Trojette, M., Allaya, H., Ben Faleh, A.R., Jmil, I., et al. (2018). Use of otolith shape to differentiate two lagoon populations of Pagellus erythrinus (Actinopterygii: Perciformes:

Sparidae) in Tunisian waters. Acta Ichthyologica et Piscatoria 48(2): 153–161. DOI: 10.3750/AIEP/02376.

Mejri, M., Trojette, M., Jmil, I., Ben Faleh, A., Chalh, A. et al. (2020). Fluctuating asymmetry in the otolith shape, length, width and area of Pagellus erythrinus collected from the Gulf of Tunis. Cahiers de Biologie Marine 61: 1–7. DOI: 10.21411/CBM.A.4738CCD6.

Mérigot, B., Letourneur, Y. & Lecomte-Finiger, R. (2007). Characterization of local populations of the common sole Solea solea (Pisces, Soleidae) in the NW Mediterranean through otolith morphometrics and shape analysis. Marine Biology 151(3): 997–1008. DOI: 10.1007/s00227-006-0549-0.

Mille, T. (2015). Sources de variation intra-populationnelle de la morphologie des otolithes: Asymétrie directionnelle et régime alimentaire. Thèse de doctorat, Université de LILLE, France.

Mille, T., Mahe, K., Villanueva, M.C., DePontual, H. & Ernande, B. (2015). Sagittal otolith morphogenesis asymmetry in marine fishes. Journal of Fish Biology 87(3): 646–663. DOI: 10.1111/jfb.12746.

Mille, T., Mahé, K., Cachera, M., Villanueva, C.M., De Pontual, H., et al. (2016). Diet is correlated with otolith shape in marine fish. Marine Ecology Progress Series 555: 167–184. DOI: 10.3354/meps11784.

Morais, P., Rufino, M.M., Reis, J., Dias, E. & Sousa, R. (2013). Assessing the morphological variability of Unio Delphinus Spengler, 1783 (Bivalvia: Unionidae) using geometric morphometry. Journal of Molluscan Studies 80: 1–7. DOI: 10.1093/mollus/eyt037.

Mosegaard, H., Svedäng, H. & Taberman, K. (1988). Uncoupling of somatic and otolith growth rates in Arctic char (Salvelinus alpinus) as an effect of differences in temperature response. Canadian Journal of Fisheries and Aquatic Sciences 45: 1514−1524.

Pothin, K., Gonzalez-Salas, C., Chabanet, P. & Lecomte-Finiger, R. (2006). Distinction between Mulloidichthyes flavolineatus juveniles from Reunion Island and Mauritius Island (southwest Indian Ocean) based on otolith morphometrics. Journal of Fish Biology 68: 1–16. DOI: 10.1111/j.1095-8649.2006.01047.x.

Sanchez-Jerez, P., Gillanders, B.M. & Kingsford, M.J. (2002). Spatial variability of trace elements in fish otoliths: comparison with dietary items and habitat constituents in seagrass meadows. Journal of Fish Biology 61: 801−821. DOI: 10.1111/j.1095-8649.2002.tb00912.x. Škeljo, F., Brčić, J., Vuletin, V. & Ferri, J. (2015). Age and growth of the axillary wrasse, Symphodus mediterraneus (L.) from the eastern Adriatic Sea. Marine Biology Research 11(7): 780–784. DOI: 10.1080/17451000.2015.1016963.

Thomson, J.M. (1990). Mugilidae. In J.C. Quero, J.C. Hureau, C. Karrer, A. Post & L. Saldanha (Eds.). Check-list of the fishes of the eastern tropical Atlantic (CLOFETA) (Vol. 2), (pp. 855–859). Paris: JNICT, Lisbon, SEI, Paris, and UNESCO.

Trojette, M., Ben Faleh, A., Fatnassi, M., Ben Alalya, H., Mahouachi, N., et al. (2014). Applying sagitta otolith shape in the discrimination of fish populations Scorpaena porcus (Linnaeus, 1758) (Scorpaenidae) in the Tunisian coasts. Cahiers de Biologie Marine 55: 499–506.

Trojette, M., Ben Faleh, A., Fatnassi, M., Marsaoui, B., Mahouachi, N., et al. (2015). Stock discrimination of two insular populations of Diplodus annularis (Actinopterygii: Perciformes: Sparidae) along the coast of Tunisia by analysis of otolith shape. Acta Ichthyologica et Piscatoria 45(4): 363–372. DOI: 10.3750/AIP2015.45.4.04.

Van Der Lingen, C., Bertrand, A., Bode, A., Brodeur, R., Cubillos, L.A., et al. (2009). Trophic dynamics. In D.M. Checkley, J. Alheit, Y. Oozeki & C. Roy (Eds.). Climate change and small pelagic fish (pp. 112–157). Cambridge: Cambridge University Press.

Vasconcelos, J., Vieira, A.R., Sequeira, V., González, J.A., Kaufmann, M., et al. (2018). Identifying populations of the blue jack mackerel (Trachurus picturatus) in the Northeast Atlantic by using

geometric morphometrics and otolith shape analysis. Fisheries Bulletin 116: 81–92. DOI: 10.7755/FB.116.1.9.

CURRENT SOLUTIONS AND EVALUATIONS ON THE ANTIFOULING COATINGS USED IN AQUACULTURE

Cengizhan DAG

Dokuz Eylül University, The Graduate School of Natural and Applied Sciences, Department of Chemistry, İzmir, Türkiye.

ORCID ID: https://orcid.org/0000-0001-7687-7966

Levent CAVAS

Dokuz Eylül University, Faculty of Sciences, Department of Chemistry, İzmir, Türkiye.

ORCID ID: https://orcid.org/0000-0003-2136-6928

ABSTRACT

Biofouling organisms create very problematic conditions in fish production-based aquaculture. Closing of aquaculture nets via biofouling organisms prevents the penetration of high oxygen-saturated waters into the nets. Low oxygen saturation causes mortality of the fishes. Another important result of biofouling events on the aquaculture nets is the increased net weights that may also cause the collapse of the nets. Observation of biofouling-based diseases in the cultured animals is also big risk in this industry. Due to these high financial risks, coating of the nets with antifouling paints is of great importance. Antifouling paints consist of various binders, fillers and biocidal agents. Biocides are specific molecules that target biofouling organisms. However, they cause high damage to aquatic ecosystems due to their toxic effects. Biocides can accumulate on the sediments and they have a lethal effect on the non-target marine organisms. There is a great need for the discovery of new and environmentally friendly derivatives of biocides. This study exhibits the latest developments in this area and it is based on the review of the current market solutions and newly filed patents for protecting fishing nets in the aquaculture.

Keywords: Antifouling paints, biofouling, biocides, fish-cage nets

INTRODUCTION

Marine Biofouling

The deposition of un-wanted particles on solid surfaces is referred to as fouling. Similarly, biofouling is the term that describes the unwanted accumulation of organic molecules, microorganisms, algae and various sea plants on wettable surfaces. When any kind of object, such as a ship's hull, an oil pipeline line, or mariculture nets, is immersed in seawater, biological settlement occurs quickly (Sarkar et al., 2022; Zecher et al., 2018). Figure 1 shows the unwanted settlement of marine organisms on fish-cage net samples.

Figure 1. Biofouling progression on fish-cage net samples.

When artificial structures are submerged in seawater, they are subjected to various physicochemical processes, which result in the colonization of micro- and macro-living organisms. The creation of a conditioning layer by micro-living organisms on the submerged surface is the first stage of biofouling. The conditioning film is consisted of proteins, polysaccharides, and inorganic ions that are naturally found in seawater (Vinagre et al., 2020). The van der Waals forces among the molecules are the most important variables influencing the creation of a conditioning film layer. The rate of biofouling increases after the development of conditioning film layer (slime layer) and submerged surface invaded by macro-living organisms after the creation of the conditioning layer. Diatoms, bacteria, and basic single-celled creatures are known as the first colonizers. Second colonizers begin covering the surface when the slime layer is formed. Microalgae and algal spores are the most well-known types of the second colonizers. The final stage comes after the secondary colonizers. When macrofouling species settle on the surface, the biofouling process is completed. The fouling of natural sea surfaces by live creatures is a requirement of the ecosystem and is also advantageous to marine life. However, fouling of artificial surfaces by biological creatures has negative consequences. Marine and freshwater biofoulings have a significant impact on the sea transportation business as well as industrial aquatic activities such as wastewater treatment, water desalting, and aquaculture (Sarkar et al., 2022; Vinagre et al., 2020). Biofouling poses a threat to ship hulls, aquaculture nets, oil pipelines, and other submerged artificial surfaces (Figure 1 – 2).

Figure 2. A ship's propeller coated with calcified products associated with marine biofouling.

Fouling species invade the surface of aquaculture nets due to the large phylogenetic variety of fouling species, enormous surface areas that provided by cage nets, and an availability of nutrients from cage-based aquaculture (Champ, 2000). Biofouling on aquaculture nets can seal net pores, resulting in a significant rise in the total weight of the cage and inhibition of the flow of high-oxygen-saturated seawater entering the nets. As a result, oxygen delivery, nutritional exchange, and waste product disposal are constrained. All of these events impact the health of cultured organisms (Cronin et al., 1999).

Antifouling Applications

Because biofouling is a problem to all surfaces used in the maritime sector, researchers have been working for many years to find ways to eradicate it. Antifouling technologies are the approaches used to reduce the biofouling problem. Antifouling is the term, which describes all the efforts to prevent biofouling (Magin el at., 2010). Antifouling methods include various applications, including biomimetic techniques, surface cleanings, non-toxic and toxic coatings containing biocidal chemicals.

In the aquaculture industry, there are six suggested requirements for antifouling techniques. These strategies are based on chemical composition, effects on the species related to aquaculture species, environmental-friendly perspectives and cost (Fitridge et al., 2012).

CURRENT ANTIFOULING TECHNOLOGIES

Toxic Antifouling Coatings

Toxic antifouling coatings mainly consist of binder, biocide and filler materials. The biocide in this type of coating can leach in to the sea water in time to inhibit the important proteins of biofouling organisms. By this way, the surface that coated with toxic antifouling coating protected from unwanted settlement of biofouling organisms. Figure 3 represents the basic action mechanism of toxic antifouling coatings. Initially, the biocide release rate is very high and uncontrolled. For this reason, the antifouling performance of the coating is excellent in the first stages, but starts to deteriorate over time (Ali et al., 2020; Ferreira et al., 2019).

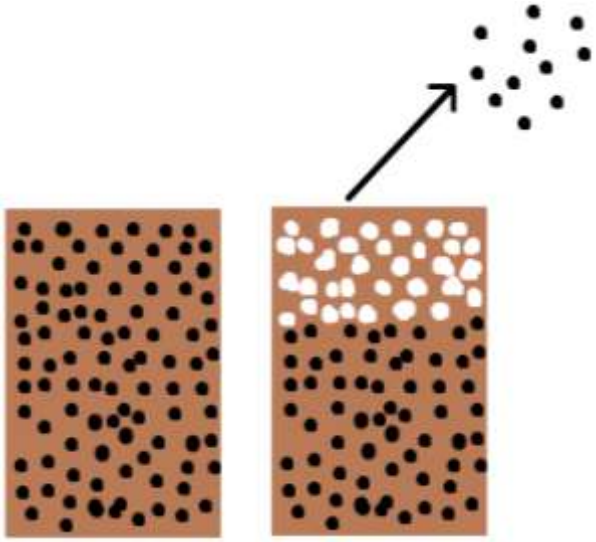


Figure 3. Action mechanisms of toxic antifouling coatings (Black dots represents biocides).

Covalently Bonded Biocides

Non-leaching biocides are a new technology that the biocide covalently bond to the antifouling paint-coated surface or net fibers. Although this technique is known as a more environmentally friendly approach since it does not release toxic chemicals into the marine environment, its antifouling performance is weaker than toxic coatings. Therefore, non-biocide-releasing coatings have only been used to protect membranes of biomedical devices from bacterial biofouling (Fitridge et al., 2012).

Non-Toxic Antifouling Coatings

According to the literature, non-toxic antifouling coatings were investigated under two main subtitles as hydrophobic and hydrophilic surfaces. While fluoropolymers and silicone coatings are widely used to create hydrophobic surfaces, highly hydrated zwitter ions such as glycine, betaine and sulfobetaine are utilized to obtain hydrophilic surfaces in non-toxic antifouling coating formulation (Gu et al., 2020).

Biological Predator Usage

Herbivore fishes are employed to avoid the undesired settlement of biofouling species, and this strategy has so far only proven effective in small aquaculture fish cages. The best-known example in this field is the Red Sea cucumber *Parastichopus californicus*, which is deposited in nets used in salmon culture to clean up biofouling organisms (Fitridge et al., 2012; Ahlgren, 1998). However, although the use of biological predators is the most environmentally friendly approach compared to the techniques described in this study, it is also the approach with the lowest antifouling performance.

Current Commercial Antifouling Coatings for Aquaculture Nets

According to the current commercial products, copper (I) oxide, copper thiocyanate, diiron trioxide, zinc pyrithion and econea were found as main biocides in their formulations. However, acrylic, vinyl-wax emulations and derivatized acrylics were found as main binder materials (Figure 4).

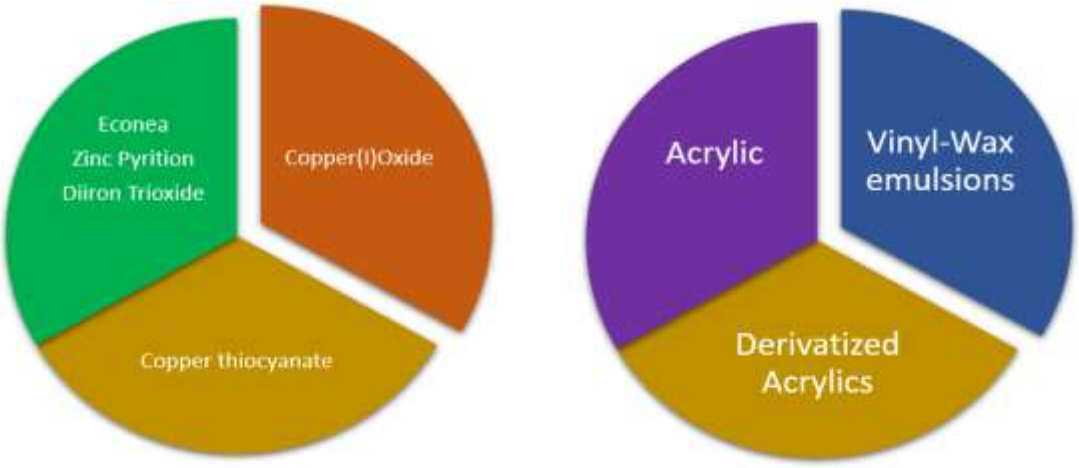


Figure 4. Main ingredients in commercial antifouling coatings for aquaculture applications

Current patents

In this study, 5 patents (CN101831226B, CN107573828B, JP4979890B2, WO2012098163A2, WO2011145927A1) related to antifouling coatings for fishing nets were examined. Commonly mentioned biocides in patents are given in Figure 5. According to Figure 5, metal pyrithiones, copper(I)oxide and copper thiocyanate were found as main biocides. However, hydrolase type enzymes, metal alloys and thorn-like fibers were also observed as innovative approaches in antifouling coating field.

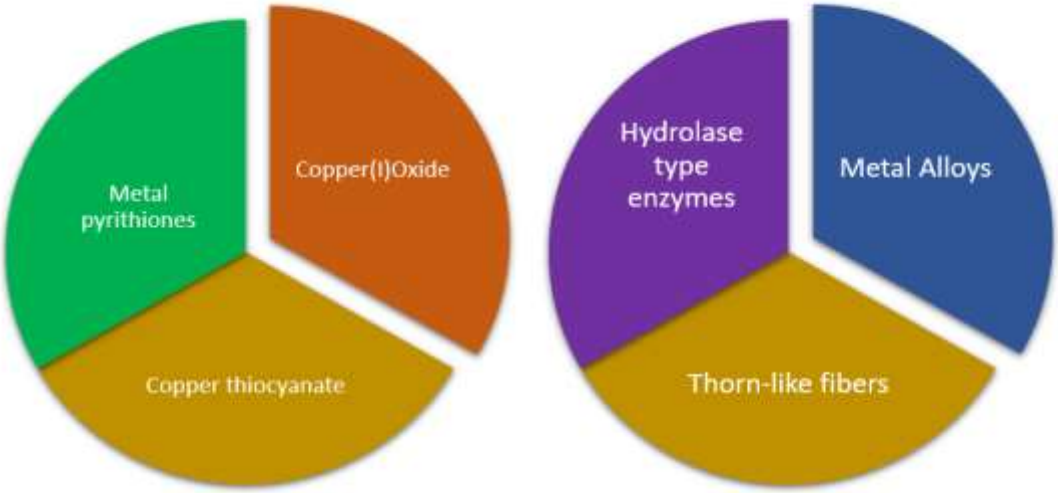


Figure 5. Main biocides and technologies that found in current antifouling coating patents for aquaculture applications

CONCLUSION

The number of antifouling studies on aquaculture nets is far less than the number of studies on other surfaces. Since biocides containing heavy metals can accumulate on the sediments and cause high damage to the environment, their use in this area should be limited or restricted. Most biocides are harmful to the marine ecosystem. Therefore, more environmentally friendly molecules need to be developed.

REFERENCES

Ahlgren, M. O. (1998). Consumption and assimilation of salmon net pen fouling debris by the red sea cucumber Parastichopus californicus: implications for polyculture. Journal of the World Aquaculture Society, 29(2), 133-139.

Ali, A., Jamil, M. I., Jiang, J., Shoaib, M., Amin, B. U., Luo, S. et al. (2020). An overview of controlled-biocide-release coating based on polymer resin for marine antifouling applications. Journal of Polymer Research, 27(4), 1-17.

Breur HJA, Malchev PG; World Intellectual Property Organization. 2021.12.21. Antifouling fibre coatings for curved constructions. France. WO2011145927A1.

Champ, M. A. (2000). A review of organotin regulatory strategies, pending actions, related costs and benefits. Science of the total Environment, 258(1-2), 21-71.

Chuanhai X, Ying L, Sujing L, Xuanxuan M, Lu F, Meng Y; China National Intellectual Property Administration, Ludong University. 2021.12.21. Broad-spectrum antifouling paint for fishing nets and preparation method thereof. China. CN107573828B.

Cronin, E. R., Cheshire, A. C., Clarke, S. M. and Melville, A. J. (1999). An investigation into the composition, biomass and oxygen budget of the fouling community on a tuna aquaculture farm. Biofouling, 13(4), 279-299.

Ferreira, O., Rijo, P., Gomes, J. F., Santos, R., Monteiro, S., Vilas-Boas, C. et al. (2019). Biofouling inhibition with grafted Econea biocide: Toward a nonreleasing eco-friendly multiresistant antifouling coating. ACS Sustainable Chemistry and Engineering, 8(1), 12-17.

Fitridge, I., Dempster, T., Guenther, J. and De Nys, R. (2012). The impact and control of biofouling in marine aquaculture: a review. Biofouling, 28(7), 649-669.

Gu, Y., Yu, L., Mou, J., Wu, D., Xu, M., Zhou, P. and Ren, Y. (2020). Research strategies to develop environmentally friendly marine antifouling coatings. Marine Drugs, 18(7), 371.

Isella F, Donelli I, Rosace G, Fusi GA, Cittadini C, Freddi G; World Intellectual Property Organization. 2021.12.21. Antifouling textile materials comprising polymeric coatings and enzymes. France. WO2012098163A2. World Intellectual Property Organization. 2021.12.21.

Magin, C. M., Cooper, S. P. and Brennan, A. B. (2010). Non-toxic antifouling strategies. Materials today, 13(4), 36-44.

Okimoto Y, Dogwood Y, Ashida T, Ono S; Japan Patent Office. 2021.12.21. Antifouling paint composition, antifouling coating, ship covered with the antifouling coating, underwater structure, fishing gear or fishing net. Japan. JP4979890B2.

Qiming F, Zhenying M, Jian C, Sihui W, Shoukang D, Jiangao S, Asmak S, Yongping W; China National Intellectual Property Administration, Jiangsu Liaoyuan Environmental Technology Co., Ltd. 2021.12.21. Fishing net anti-fouling agent and preparation method thereof. China. CN101831226B.

Sarkar, P. K., Pawar, S. S., Rath, S. K. and Kandasubramanian, B. (2022). Anti-barnacle biofouling coatings for the protection of marine vessels: synthesis and progress. Environmental Science and Pollution Research, 1-35.

Vinagre, P. A., Simas, T., Cruz, E., Pinori, E. and Svenson, J. (2020). Marine biofouling: A European database for the marine renewable energy sector. Journal of marine science and engineering, 8(7), 495.

Zecher, K., Aitha, V. P., Heuer, K., Ahlers, H., Roland, K., Fiedel, M. and Philipp, B. (2018). A multi-step approach for testing non-toxic amphiphilic antifouling coatings against marine microfouling at different levels of biological complexity. Journal of microbiological methods, 146, 104-114.

SALATALARDA SULAMA SUYU KAYNAĞINA BAĞLI OLARAK AĞIR METAL BİRİKİMİ

DETERMINATION OF HEAVY METALS IN LETTUCE DEPENDING ON THE SOURCE OF IRRIGATION WATER

Ebru SARIYER

Bursa Uludağ Üniversitesi, Fen Bilimleri Enstitüsü, Bahçe Bitkileri Anabilim Dalı, Bursa,Türkiye

ORCID NO: 0000-0001-5239-8637

Nuray AKBUDAK

Bursa Uludağ Üniversitesi, Ziraat Fakültesi, Bahçe Bitkileri Bölümü, Bursa, Türkiye

ORCID NO: 0000-0003-2669-5667

ÖZET

Dünyada her geçen gün artış gösteren kirlilik, canlı varlıkların yaşam çevrelerindeki riskleri de arttırmaktadır. Özellikle son yıllardaki endüstriyel gelişmelere bağlı olarak atık suların ağır metal içerikleri de sürekli artış göstermektedir. Bu çalışma, Nilüfer Çayı ile sulanan tarım arazilerinin ve İznik Gölü ile sulanan tarım topraklarında yetiştirilen marul (*Lactuca sativa* L. var. Longifolia, Adranita çeşidi) ve kıvırcık yapraklı salata (*Lactuca sativa* L.var. crispa, Funly çeşidi) çeşitlerinin ağır metal içeriklerini belirlemek amacıyla yapılmıştır. Bu amaçla; kontrol grubu bitkileri şebeke suyu ile sulanarak yetiştirilmiştir. Verimliliğin önemli bir göstergesi olan pazarlanabilir ürün artışı evsel kullanım suyu > Nilüfer Çayı > İznik Gölü sıralamasıyla sulama kaynaklarına bağlı olarak değişmiştir. Evsel su ile sulanan marulun nitrat içeriğinde önemli bir artış olmuştur. Nilüfer Çayı ile sulanan numunelerin Nikel (Ni) konsantrasyonu 0,180 mg/kg (cv.Adranita) ile 0,205 mg/kg (cv.Funly) arasında belirlenmiştir. Kadminyum miktarları ise İznik Göl Suyu ile sulanan örneklerde Funly kıvırcık yapraklı salata çeşidinde 0,055 mg/kg ve Nilüfer Çayı ile sulanan Adranita marul çeşidinde 0,072 mg/kg olarak bulunmuştur. Kurşun miktarlarını belirlemeye yönelik yapılan analiz sonucunda; Nilüfer Çayı ile sulanan örneklerde Funly marul çeşidinde 0,126 mg/kg, Adranita çeşidinde 0,131 mg/kg olarak belirlenmiş olup, İznik Göl suyu ile sulanan Funly marul çeşidinde 0,126 mg/kg, Robinson çeşidinde 0,543 mg/kg, Adranita marul çeşidinde 0,913 mg/kg olarak saptanmıştır. Elde edilen sonuçlara göre Nilüfer Çayı ve İznik Göl suyu ile sulanan üç çeşitte de Nikel (Ni), Kadmiyum (Cd), Kurşun (Pb) düzeyleri genel olarak Türk Gıda Kodeksinin vermiş olduğu limitlerin üzerinde bulunmuştur. Çalışmada; nitrat analizleri de yapılmış olup tüm bitkilerden alınan örneklerde nitrat miktarlarının Türk Gıda Kodeksinin vermiş olduğu limitlerin altında olduğu tespit edilmiştir.

Anahtar Kelimeler: Ağır metal, kalite, kirlilik, *Lactuca sativa*, sulama suyu

ABSTRACT

Pollution increased in the world every day which increases the risks of living beings in the living environment. Depending on the industrial development, especially in recent years shows a continuous increase in heavy metal content from waste water. This study was carried out to determine the heavy metal contents of Romaine lettuce (cv. Adranita) and lettuce (cv. Funly) grown on the irrigated agriculture soil with Nilüfer Stream and Iznik Lake in Bursa. For this purpose; control plants were irrigated with domestic water (from city water supply), other plants were planted in agricultural fields irrigated with Nilüfer Stream and Iznik Lake. Plants have also been evaluated for their heavy metal content and some quality parameters. Marketable yield increased in the order Domestic water > Nilüfer Stream > İznik Lake indicating productivity. There was a significant increase in the nitrate content of lettuce irrigated by domestic water. Nickel (Ni) concentration of samples irrigated with Nilüfer Stream was determined between 0,180 mg/kg (cv.Adranita) and 0,205 mg/kg (cv.Funly). Cadmium (Cd)

concentration of samples irrigated from İznik Lake water was determined 0,055 mg/kg (cv.Funly) and samples irrigated from Nilüfer River water was determined 0,072 mg/kg (cv.Adranita). As a result of analyzes performed to determine the amount of Lead; samples irrigated from Nilüfer River was found in Funly lettuce varieties 0,126 mg/kg, in Adranita lettuce varieties 0,131 mg/kg and samples irrigated from İznik Lake water was determined in Funly lettuce varieties was determined 0,126 mg/kg, in Robinson lettuce varieties 0,543 mg/kg, in Adranita lettuce varieties 0,943 mg/kg. Metal concentrations in several samples of irrigated from the Nilüfer River and İznik Lake were in excess of FAO/WHO and Turkish Regulations, indicating that consumption of these irrigated plants may represent an important exposure pathway to humans. The domestic water, Nilüfer Stream and İznik Lake irrigation applied for a season had no significant effects apart from, slight changes in number of deformation leaves per plant. In the study; nitrate analyzes were also carried out and it was determined that nitrate amounts in the samples taken from all plants were below the limits given by the Turkish Food Codex.

Key words: *Lactuca sativa*, heavy metal, irrigation water, pollution, quality

GİRİŞ

Salata ve marul ülkemizde yaprakları yenilerek tüketilen ve hemen hemen her türlü yemeğin yanında salata olarak değerlendirilen bir sebze grubunu oluşturmaktadır. Kalori miktarının yanı sıra yağ ve protein oranlarının çok düşük olmasının yanısıra bol lifli yapısı tüketimini olumlu yönde etkilemektedir. Ege, Marmara ve Akdeniz bölgelerinde sonbahar, kış ve erken ilkbahar aylarında, tüm yıl süresince yetiştirilmesi mümkün olan salata grubu bitkilerin üretimini sınırlandıran en önemli sorun sıcaklık ve gün uzunluğudur. Yetiştiriciliği kolay, vejetasyonu kısa olan ve taze olarak tüketilen bu sebzede önemli sorunların başında ağır metal birikimi de gelmektedir.

Ağır metaller biyolojik proseslere katılma derecelerine göre yaşamsal ve yaşamsal olmayan olarak sınıflandırılırlar. Yaşamsal olarak tanımlananların organizma yapısında belirli bir konsantrasyonda bulunmaları gereklidir ve bu metaller biyolojik reaksiyonlara katıldıklarından düzenli olarak besinler yoluyla alınmaları zorunludur (Bigersson vd., 1988). Ancak fazla miktarda bulunduklarında insan sağlığı başta olmak üzere tüm canlılara ve doğaya zararlıdırlar. Ağır metaller, su kaynaklarına, endüstriyel atıklar veya asit yağmurlarının toprağa, ırmak, göl ve yeraltı sularına ulaşmasıyla geçerler. Sulara taşınan ağır metaller aşırı derecede seyrelirler ve kısmen karbonat, sülfat, sülfür olarak katı bileşik oluşturarak su tabanına çöker ve bu bölgede zenginleşirler. Ülkemizde kapalı göllerimizde yeterli çevresel önlem alınmadığı ve su havzalarında kontrolsüz sanayileşmeye izin verildiğinden ağır metal konsantrasyonu sürekli yükselmektedir (Kahvecioğlu vd., 2004). Çalışmanın temel amacı; her geçen gün artan ağır metal kontaminasyon düzeyini belirleyebilmek ve bölgemiz için önemli sulama kaynağı olan İznik Gölü ve Nilüfer Çayı'nda sanayi ve evsel atıkların neden olduğu su kaynaklı kirliliğin tarıma verdiği zararın tespitinde bir adım oluşturmaktadır. Bu amaca yönelik olarak bölgemizde yoğun yetiştirilen ve tüketilen ayrıca ağır metaller açısından iyi bir akümülatör bitki olan salata gurubu sebzelerde ağır metal birikim oranını belirleyerek kalitesindeki değişimlerde tespit edilmiştir.

ARAŞTIRMA VE BULGULAR

Doğada metal kirliliği farklı kaynaklara bağlı olarak meydana gelmektedir (Goyer vd., 1981). Birçok metal, hava, su ve besinler ile organizmaya alınmaktadır (Lauwerys vd., 1993). Ağır metaller toksik etkileri nedeniyle bitkilerde transpirasyon, stoma hareketleri, su alımı, fotosentez, enzim aktivitesi, çimlenme, protein sentezi, membranstabilitesi, hormonal denge gibi birçok fizyolojik olayın bozulmasına neden olmaktadırlar (Öktüren Asri ve Sönmez, 2006). Bursa şehri de tarımın yoğun olarak yapıldığı şehirlerdendir ve bölgede bulunan su kaynakları sulama amaçlı yoğun olarak kullanılmaktadır. Su kaynakları karşılaştırıldığında bölgeler arasında farklılık gözlenmiş olup Funly ve Adranita çeşitlerinde Nikel miktarı Nilüfer Çayı ile sulanan örneklerde en yüksek (0,180 mg/kg, 0,205 mg/kg) düzeyde bulunmuştur (Tablo 3). Bu değerler Türk Gıda Kodeksi Limitlerinin (0,1-0,2 mg/kg) altında kalmıştır (Tablo 1). Bölgelerin sulama suyu analiz sonuçlarına (Tablo 2)) bakıldığında Nilüfer Çayı'nda Nikel miktarının (7,7 mg/l) ile diğer iki bölgeden çok daha yüksek olduğu görülmektedir. Funly ve Adranita çeşidi Nikel değerlerinin yüksek olmasının sulama kaynaklı olduğu düşünülmektedir. Hashem

ve ark. 'nın (2013) Mısır'daki El-Amia nehriden elde edilen endüstriyel atık sularla yaptığı çalışmada marul bitkisinde tespit edilen nikel miktarları 0,34-0,58 mg/kg olarak belirlenmiştir. Weldegebriel vd. (2011) tarafından yapılan çalışmada Etiyopya'nın Addis Ababa'da Akaki nehrinden alınan su ile sulanan marul bitkilerinde nikel miktarı 0,30-1,15 mg/kg arasında değişen değerler almıştır. Benzer sonuçlar Kadminyum miktarlarında da gözlenmiştir. Funly çeşidi kadminyum miktarları İznik Göl suyu ile sulanan örneklerde 0,055 mg/kg Adranita çeşidinde ise 0,072 mg/kg olarak saptanmıştır. Her iki değerde Türk Gıda Kodeksi'nin üzerinde ancak Dünya Sağlık Örgütü (0,2 mg/kg) ve Avrupa Komisyonu (0,3 mg/kg) tarafından yapraklı sebzelerde izin verilen sınır değerlerin çok daha altında kalmıştır. Bölgeler arasında en yüksek kadminyum değerinin alındığı İznik Gölü su değerleri incelendiğinde de diğer sulama kaynaklarına göre yüksek sonuç bulunduğu görülmektedir. Pip 'in (1991) Kanada'nın Manitoba bölgesinde maden ocakları yakınında yetiştirilen bitkilerde kadminyum değerini 3,75 mg/kg olarak saptamış olup çalışmamızda elde edilen kadminyum değerlerinden yüksek bulunmuştur. Allegria vd.,'nin (1991) İspanya'da yaptığı çalışmada da kadminyum değerleri çeşitli sebzelerde 0,85 mg/kg olarak saptamıştır. Yaman ve Güçer (1995) tarafından farklı bitkilerde kadminyum miktarı ortalama olarak 0,80 mg/kg elde edilmiştir. Sonuçlarımız Pip (1991), Allegria vd. (1991) ve Yaman ve Güçer (1995) tarafından yapılan çalışmalardan daha düşük tespit edilmiştir.

Funly ve Adranita çeşitlerinde kurşun miktarları sırasıyla; şebeke suyu ile sulanan örneklerde 0,109 mg/kg, 0,113 mg/kg iken, Nilüfer Çayı ile sulanan örneklerde 0,126 mg/kg, 0,131 mg/kg ve İznik Göl suyu ile sulanan örneklerde 0,609 mg/kg, 0,913 mg/kg olarak saptanmıştır (Tablo 3). Türk Gıda Kodeksi'ne göre kurşun miktarının 0,10 mg/kg olması gerekirken üç bölgede de maksimum limitin üzerinde bulunmuştur. İznik Gölü'nden sulanan bitkilerde kurşun miktarının yüksek olmasının su analizlerinde de açıkça görüldüğü üzere İznik Göl'ünün kurşun miktarının da diğer bölgelere göre oldukça yüksek olmasından kaynaklandığı düşünülmektedir. Yapılan çalışmalarla çalışmamızın kurşun miktarları karşılaştırıldığında, Allegria vd. (1991), Yaman ve Güçer (1995) yaptığı çalışmaların denememizden elde edilen sonuçlarla kurşun miktarı bakımından karşılaştırıldığında üç bölgeden de daha düşük sonuçlar elde edildiği görülmektedir. İznik Göl suyu ile sulanan bitki örneklerinin De Pieri vd. (1996) Kanada'da yerleşim alanlarına daha yakın olan yerlerde yetiştirilen marullarda kurşun miktarını 0,39 mg/kg olarak tespit etmiştir. İznik Göl suyu ile sulanan bitkilerin kurşun miktarının De Pieri vd.'nın (1996) yaptığı çalışmadan daha yüksek bulunmuştur.

Salatalarda en önemli kalite kriterlerinden olan bitki başına pazarlanabilir yaprak sayısı İznik Gölü ile sulanan örneklerde Funly çeşidinde 61,00 adet/bitki, Adranita çeşidinde olarak saptanmıştır. Bölgelere ait değerler arasında istatistiki açıdan fark bulunmamakla birlikte İznik Gölü'nün sulama suyunun daha yüksek sonuçlar verdiği gözlenmiştir. Pazarlanamaz yaprak sayısı, Funly çeşidinde Nilüfer Çayı ile sulanan bitki örneklerinde 11,67 adet/bitki Adranita çeşidinde 4,33 adet/bitki ve İznik Gölü ile sulanan Funly çeşidinde 9,66 adet/bitki Adranita çeşidinde 6,33 adet/bitki olarak belirlenmiştir (Table 4). Funly çeşidinde Nitrat birikimi sulama suyu kaynakları arasında önemli farklar çıkmazken, her iki çeşitte de şebeke suyu ile sulanan marul yapraklarında nitrat düzeyi daha yüksek bulunmuştur. Değerler, Türk Gıda Kodeksi'ne göre maksimum limitin çok altında kalmıştır (Table 4).

Tablo 1. Yeşil Yapraklı Sebzelerde Farklı Kuruluşların Bildirdiği Bazı Ağır Metal Sınır Değerleri

Element	Türk Gıda Kodeksi (mg/kg)	Dünya Sağlık Örgütünün (WHO) (mg/kg)	Avrupa Komisyonu (mg/kg)
Nikel (Ni)	0,2	-	-
Kadminyum (Cd)	0,050	0,2	0,1
Kurşun (Pb)	0,10	0,3	0,3
Azot (N)	3000		

Table 2. Şebeke suyu, Nilüfer Çayı ve İznik Gölü Ağır Metal İçerikleri

Metals	Şebeke Suyu (mg/l)	Nilüfer Çayı (mg/l)	İznik Gölü (mg/l)
Nikel (**Ni**)	< 0,02	7,7	1,248
Kadminyum (**Cd**)	< 0,02	< 0,100	0,006
Kurşun (**Pb**)	< 0,100	< 0,100	5,039

Table 3. Şebeke suyu, Nilüfer Çayı ve İznik Gölü'nden Sulanan Salataların Ağır Metal İçerikleri

Sulama Suyu Kaynağı	Ni (mg/kg)		Cd (mg/kg)		Pb (mg/kg)	
	Adranita	Funly	Adranita	Funly	Adranita	Funly
Şebeke Suyu	0,091 b	0,112 b	0,017 c	0,017 b	0,113 b	0,109 b
Nilüfer Çayı	0,205 a	0,180 a	0,072 a	0,013 b	0,131 b	0,126 b
İznik Gölü	0,104 b	0,117 b	0,023 b	0,055 a	0,913 a	0,609 a
$LSD_{(0.05)}$	0,020	0,012	0,003	0,012	0,048	0,083

Table 4. Şebeke suyu, Nilüfer Çayı ve İznik Gölü'nden Sulanan Salataların Kalite Değerleri

Sulama Suyu Kaynağı	Yaprak sayısı (adet/bitki)		Deforme yaprak sayısı (adet/bitki)		Nitrat (mg kg^{-1})	
	Adranita	Funly	Adranita	Funly	Adranita	Funly
Şebeke Suyu	34,00 a	38,67 b	6,33 a	7,00 a	1701,42 a	630,95 ***a***
Nilüfer Çayı	40,66 a	41,67 b	4,33 a	11,66 a	1458,32 ab	467,03 ***a***
İznik Gölü	41,33 a	61,00 a	6,33 a	9,66 a	1110,04 b	464,24 ***a***
$LSD_{(0.05)}$	17,82	18,34	2,83	5,19	195,65	92,32

SONUÇ

Şehirlerde son yıllarda hızlı nüfus artışı, plansız sanayileşme ve çarpık kentleşme ile birlikte gelen yoğun bir çevre kirliliği yaşanmaktadır. İlimizde bulunan sanayi tesislerinin artık ve atıklarının önemli düzeyde nikel, kadminyum ve kurşun içerdiği; özellikle metal, tekstil, elektrik-elektronik, kimya, çelik-döküm, otomotiv türü sanayi kuruluşlarından kaynaklandığı bilinmektedir. Bitkilerin ağır metallerle kontaminasyon durumu bölgelerin coğrafik özellikleri (toprağın yapısı, göl, gölet, nehir gibi yüzey sularının bulunması), iklim özellikleri ve bitkilerin yetiştirildikleri alanlarda sürdürülen faaliyetlerden etkilenmektedir. Hızlı sanayileşme ve kentleşme sürecine bağlı olarak, Bursa ovasının önemli su kaynaklarından biri olan Nilüfer Çayı'nın kentsel ve sanayi kökenli atıklarla ciddi boyutlarda kirlendiği bilinmektedir. Marmara bölgesinin güneydoğusunda önemli sulak alanlarımız arasında bulunan, ayrıca verimli tarım alanlarının yer aldığı İznik Gölü de günden güne kirlenmekte ve doğal yaşam alanı olarak hak ettiği ilgiyi görmemektedir. Başta zeytin işleme tesisleri ve gıda-kimya tesisleri olmak üzere pek çok endüstri tesisi göle veya göle dökülen akarsulara atık sularını boşaltmaktadır.

Sonuç olarak, Marmara Bölgesi'nin önemli tarım alanlarının yer aldığı bir ilimiz olan Bursa'da Nilüfer Çayı ve İznik Gölü ile sulanan alanlarda yetiştirilen marul, kıvırcık yapraklı ve baş salata örneklerinin nikel (Ni), kadminyum (Cd), kurşun (Pb) düzeyleri genel olarak yüksek bulunmuş olup nikel ve özellikle kurşun düzeyleri Türk Gıda Kodeksi'ni aşan sınır limitleriyle karşılaştırıldığında küçümsenemeyecek düzeydedir. Çalışmamızda üç bölgede yetiştirilen çeşitlerin ağır metal içerikleri arasında da farklılıklar olduğu tespit edilmiştir. Bu nedenle bazı çeşitlerin ağır metal toleransının yüksek olabileceği sonucuna varılabilir. Bu durumda; nüfus yoğunluğunun sanayinin fazla olduğu bölgelerimizde yapılan yetiştiriciliklerde kullanılmak üzere her çeşidin ağır metal dayanımlarının belirlenmesi önemlidir. Bu bölgelerde ağır metallere dayanımları yüksek olan çeşitler yetiştirilmelidir. Sonraki çalışmalarda; ağır

metal dayanımı yüksek çeşitlerin ıslah edilmesi insan sağlığı açısından önemli bir adımı oluşturacaktır. Kirliliğin tümüyle önlenmesi, sanayi, kentleşme ve tarımsal etkinliklerinin bugünkü durumu karşısında pek olası gözükmemektedir. Gelişmiş ülkeler kirliliği ve kirliliğin toplum sağlığına etkilerini en düşük düzeyde tutmanın çarelerini etkin bir biçimde araştırmakta ve uygulamaktadır. Buna yönelik olarak ülkemizde de; yerleşik durumdaki sanayinin arıtma tesislerinin tamamlanması ve yeni kurulacak sanayi kuruluşlarının mutlaka arıtma üniteleriyle birlikte planlanması gerekmektedir. Nikel, kadminyum, kurşun ve diğer ağır metallerin doğal denge ve canlıların yaşamıyla ilgili yönü, toplum sağlığı açısından ülkemizde de, en azından gelişmiş ülkelerdeki durumlara getirilmeli ve insan sağlığını koruyabilmek için, sürdürülmekte olan önlemlere ışık tutucu araştırmalara önem verilmelidir.

KAYNAKÇA

Allegria, A., Barberia, R. & Farre, R. (1991). Enviromental cadmium, lead and nickel contamination; possible relationship between soil and vegetable content. International *Journal of Enviromental Analytical Chemistry*, 339: 654-657.

Bigersson, B., Sterner, O. , Zimerson, E. & Chemie, G. (1988). Eine verst2ndliche Einführung in die Toxikologie, *VCHVerlagsgeselschaft*, 3(527): 8-26455.

De Pieri, L., Buckley, W.T. & Kowalenko, C.G. (1996). Cadmium and lead concentrations of commercially grown vegetables and of soils in the Lower Fraser Valley. *Canadian Journal of Soil Science*, 76(2): 173-182.

Goyer, R.A., Miller, C.R., Zhu, S.Y. & Victery, W.(1989). Non-metallothionein Bound Cadmium in the Pathogenesis of Cadmium Nephropathy in the Rat. *Toxicology and Applied Pharmacology*, 101, 232- 244.https://doi.org/10.1016/0041-008X(89)90272-X

Hashem, H.A., Hassanein, R.A., El-Deep, M.H. & Shouman, A.I. (2013). İrrigation with industrial wastewater activates antioxidant system and osmoprotectant acumulation in lettuce, turnip and tomato plants. *Ecotoxicology and Enviromental Safety*, 95: 144-152.

Kahvecioğlu, Ö., Kartal G., Güven A. & Timur S. (2004). Metallerin Çevresel Etkileri-I, www.metalurji.org.tr-(Erişim tarihi: 18.02.2014).

Lauwerys, R.P., Bernard, A.M., Buchnet, J.R. & Raels, H.H.(1993). Assessment of the Health Impact of Environmental Exposureto Cadmium: Contribution of Epidemiyologic Studies Carriedout in Belgium. *Environmental Research*, 62, 200-206. https://doi.org/10.1006/enrs.1993.1105

Öktüren Asri, F. & Sönmez, S.(2006). Ağır Metal Toksisitesinin Bitki Metabolizması Üzerine Etkileri. *Batı Akdeniz Tarımsal Araştırma Enstitüsü Derim Dergisi*. 23(2), 36-45.

Weldegebriel, Y., Chandravanshi, B.S. & Wondimu, T. (2011). Concentration levels of metals in vegetables grown in soils irrigated with river water in Addis Ababa, Ethiopia. *Ecotoxicology and Environmental Safety* 77: 57–63.

Yaman, M. & Güçer, Ş. (1995). Determination of Cadmium and Lead in Vegetables After Activated, Carbon Enrichment by Atomic Absorption Spectrometry, *Analyst*, 120: 101-105.

Pip, E. (1991). Cadmium, copper and leadin soils and garden produce near a metal smelter at Flin Flon , Manitoba. *Bulletin of Environmental Contamination and Toxicology*, 46: 790-796.

YEŞİL YAPRAKLI SEBZELERDE ORGANİK GÜBRE UYGULAMALARININ VERİME VE TOPLAM FENOLİK MADDE MİKTARLARINA ETKİLERİ

THE EFFECTS OF ORGANIC FERTILIZER APPLICATIONS ON PRODUCTIVITY AND TOTAL PHENOLIC COMPOUND AMOUNTS IN GREEN LEAFY VEGETABLES

Nuray AKBUDAK

Bursa Uludağ Üniversitesi, Ziraat Fakültesi, Bahçe Bitkileri Bölümü, Bursa, Türkiye

ORCID NO: 0000-0003-2669-5667

Ozan ZAMBİ

Ankara Üniversitesi, Kalecik Meslek Yüksekokulu, Bahçe Tarımı Programı, Ankara, Türkiye

ORCID NO: 0000-0001-7101-1856

Ufuk Tan DURAN

Bursa Uludağ Üniversitesi, Fen Bilimleri Enstitüsü, Bahçe Bitkileri Anabilim Dalı, Bursa, Türkiye

ORCID NO: 0000-0002-1329-5982

ÖZET

Bu çalışmada, organik üretimde yoğun olarak kullanılan bazı gübrelerin, taze olarak tüketilen yeşil yapraklı bazı sebzelerin (dereotu, roka ve tere) verimlilik ve kalite parametreleri üzerindeki etkileri araştırılmıştır. Bu amaçla, vejetasyon süresi kısa olan dereotu (BT-Çiçek, Lagün), roka (Bengi, Derya) ve terede (Zeybek, Bahargülü) ikişer çeşit kullanılarak vermikompost ve yarasa gübresi uygulamaları yapılmıştır.

Bu araştırmada, tere ve roka çeşitlerinde vermikompost uygulamaları ile yüksek verim elde edilirken, dereotu çeşitlerinde ise yarasa gübresi uygulamaları ile verimin daha yüksek çıktığı tespit edilmiştir. Toplam fenol miktarları karşılaştırıldığında; tere (Zeybek 798,4 mg GAE/kg, Bahargülü 824,7 mg GAE/kg) ve roka çeşitlerinde (Bengi 573,34 mg GAE/kg; Derya 1049,49 mg GAE/kg) vermikompost uygulamalarında önemli artışlar belirlenmiştir. Tere ve rokada vermikompost verimliliği arttırırken, dereotunda yarasa gübresinin etkisi daha fazla olmuştur. Renk üzerinde de organik gübrelerin tüm sebze türlerinde olumlu etkisi olduğu tespit edilmiştir. Benzer sonuç toplam klorofil miktarlarında da gözlenmiştir. Roka (Bengi 0,84 mg/g; Derya 0,87 mg/g) ve terede (Zeybek 0,66 mg/g; Bahargülü 0,67 mg mg/g) vermikompost uygulaması, dereotunda ise hem vermikompost (BT-Çiçek 6,23 mg/g) hem de yarasa gübresi (Lagün 7,67 mg/g) yüksek değerler vermiştir. Tüm türler yaprak boyları açısından değerlendirildiğinde, kontrol bitkilerine kıyasla vermikompost ve yarasa gübresi uygulamalarının etkili olduğu ve yaprak boylarını arttırdığı tespit edilmiştir.

Tüm sonuçlar birlikte değerlendirildiğinde, roka türüne ait Bengi ve Derya çeşitlerinde ve tere türüne ait Zeybek ve Bahargülü çeşitleri için vermikompost uygulaması önerilebilirken, dereotu türüne ait BT-Çiçek ve Lagün çeşitlerinde yarasa gübresi önerilmektedir.

Anahtar Kelimeler: Dereotu, Roka Organik Gübre, Tere, Vermikompost, Yarasa gübresi

ABSTRACT

In this study, the effects of some fertilizers, which are widely used in organic production, on the productivity and quality parameters of cresses, rockets and dills which are freshly consumed green leafy vegetables were investigated. For his purpose, two cress (Zeybek and Bahargülü), rocket (Bengi and Derya) and dill (BT-Çiçek and Lagün) cultivars which have short vegetation periods were used in vermicompost and bat fertilizer applications. In this research, vermicompost treatments gave higher

yield results in cress and rocket cultivars, whereas bat fertilizer application gave higher yield results in dill cultivars. When the total phenol amounts are compared, significant increases were observed in vermicompost applications in cress (Zeybek 798.4 mg GAE/kg, Bahargülü 824.7 mg GAE/kg) and rocket cultivars (Bengi 573.34 mg GAE/kg; Derya 1049.49 mg GAE/kg). Besides, It has been determined that organic fertilizers have a positive effects on colour and total dry matter amounts in all vegetable species. Similar results were also observed in total chlorophyll amounts. Vermicompost applications increased total chlorophyll contents in rocket (Bengi 0.84 mg/g; Derya 0.87 mg/g) and cress (Zeybek 0.66 mg/g; Bahargülü 0.67 mg/g) cultivars. However, In dill cultivars, both vermicompost (BT-Çiçek 6.23 mg/g) and bat fertilizers (Lagün 7.67 mg/g) were found to be effective in terms of total chlorophyll contents. When all species were compared in terms of leaf lengths, it was demonstrated that vermicompost and bat fertilizer treatments increased leaf lengths compared to control plants for all species. When all yield and quality parameters are evaluated together, vermicompost applications can be recommended for Bengi and Derya cultivars of rockets as well as Zeybek and Bahargülü cultivars of cresses. On the other hand, bat fertilizer applications can be suggested for BT-Çiçek and Lagün cultivars of dills.

Keywords: Bat fertilizer, cress, dill, rocket, organic fertilizer, vermicompost

GİRİŞ

Dereotu, roka ve tere ülkemizde ekonomik öneme sahip olmaya başlayan ve üretimi her yıl artan yeşil yapraklı sebze türlerindendir. Ülkemizde 2020 yılında üretilen dereotu üretim miktarı miktarı 8.267 ton, roka miktarı 15.045 ton, tere miktarı 8.352 tondur (TÜİK, 2022).

Ülkemizde bütün yıl boyunca yetiştirilebilen yeşil yapraklı sebzelerin genellikle taze yaprakları salata ve garnitür olarak tüketilmektedir. Ayrıca bu tip bitkiler yağ bitkisi olarak da üretilmekte; insan beslenmesinde, ilaç sanayisinde ve değişik şekillerde değerlendirilmektedir. Beslenmede yeşil yapraklı sebzelerin öneminin her geçen gün artması üretim ve tüketimini de hızla arttırmaktadır. Yeşil yapraklı sebzeler, ucuz olmalarına rağmen su, lifli maddeler, mineral maddeler, vitaminler ve antioksidan maddeler açısından zengin kaynaklardır. Vejetasyon süreleri de kısadır. Kısa zamanda hasat olumuna gelebilen sebzeler her mevsim pazar tezgâhlarında rahatlıkla bulunabilmektedirler. Bu grup sebzelerin en önemlilerinden olan dereotu, roka ve tere içerikleri, hoş koku ve hafif baharatlı yapıları nedeniyle iştah açıcı olarak günlük diyetlerde yer almaktadırlar. Dereotu, roka ve tere yaprakları çiğ olarak tüketildiğinden ihtiva ettikleri tüm içerikler hızla insan bünyesine de geçmektedir.

Çevre dostu üretim tekniklerinde (organik tarım ve iyi tarım uygulamaları) kimyasal gübrelerin yerine organik gübreler kullanılmaktadır. Bu gübrelerin yetiştiricilik süresince kullanılan tüm kaynaklara (su, toprak vb.) ve girdilere zarar vermeyecek nitelikte olması önemlidir. Yüksek düzeyde kimyasal gübre kullanımı özellikle azot içeren gübreler yaprakları yenen sebzelerde nitrit ve nitrat birikimine neden olmak ile birlikte toprağın yapısını da bozmaktadır. Organik tarımda yaygın olarak kullanılan bazı organik gübrelerin (vermikompost, yarasa gübresi) bu bitkilerin verim ve kalitesi üzerine etkilerini belirlemek, piyasada yoğun olarak kullanılan gübrelerin etkinliğinin tespiti açısından önemli olacaktır.

Vermikompost, solucanların kullanıldığı organik artık ve/veya atıkları kompostlaştırma işlemi sonucunda elde edilen ürün için kullanılmakla beraber, vermikompost ürünü genelde vermikest solucan dışkısı (gübresi) veya kısaca kest olarak adlandırılmaktadır (Edwards ve Bohlen, 1996).

Yarasa gübresi (bat guano), tamamen doğal ve özgür ortamlarda yaşayan ve kendi seçtikleri doğal yiyeceklerle beslenen yarasaların bulundukları mağaralardan elde edilen çok zengin bir bitki besinidir. Yarasa gübresinin bileşiminde; organik madde yanında N, P, K, Ca, Mg, Al, Fe ve S gibi bitki besin elementleri bulunmaktadır. Yarasa gübresinin yetiştiricilikte kullanılması bitki büyümesine olumlu etki yapmaktadır (Demirtaş vd., 2007; Gross vd., 2004; Mlay ve Sagamiko, 2008; Sothearen vd., 2014)

Türkiye'de yüksek bir rezervi bulunan yarasa gübresi, yeni yeni keşfedilen büyük bir potansiyeldir. Yaklaşık 40 bin mağaraya sahip olan Türkiye dünya da mağara cenneti olarak anılırken, Avrupa da mağara yoğunluğu açısından ilk sıralarda yer almaktadır. Bu 40 bin mağaradan sadece 20 adet mağara

turizme açılmıştır. Geriye kalan mağaralarda ise 5 – 6 milyon tonluk yarasa gübresi rezervi bulunduğu tahmin edilmektedir (Karagöz, 2014).

Organik yetiştiriciliğin artmasına paralel olarak da, üretimde kullanılabilen çok sayıda organik gübre üreticiye sunulmaktadır. Yapılan araştırmalar sonucunda farklı içeriklerdeki bu gübrelerin bitkilerin verim ve kaliteleri üzerine etkileri ile ilgili yeterli kaynak bulunmadığı görülmüştür. Konuyla ilgili yapılacak bu araştırma ile çevreyle dost, tüketiciye zarar vermeyen bir üretim olan organik tarım ile tüketiciye isteği doğrultusunda sağlıklı ve güvenilir ürünler vermek ve sonraki araştırmalara bir basamak oluşturmak hedeflenmiştir.

Ulukapı ve Şener (2018) yaptıkları bir çalışmada Serac F1 çeşidi karnabahar bitkisine vermikompost, yarasa gübresi ve kimyasal gübre uygulamışlardır. Verim ve kalite parametrelerine bakıldığında; vermikompost ve yarasa gübresinin çeşitli parametrelere bağlı olarak kimyasal gübreye kıyasla daha iyi sonuç verdiği sadece tarla koşullarında bitkilerin K alımında ve serada Ca alımı üzerinde daha olumlu sonuçlar verdiği belirlenmiştir.

Aydın Can, Ünal, Can (2019) marul bitkisine yaptıkları çalışmada farklı formda (toz ve pudra) ve farklı düzeylerde yarasa gübresi uygulamışlardır. Araştırmada, toplam verim, ortalama bitki ağırlığı, pazarlanabilir verim, yaprak sayısı, bitki boyu, bitki çapı ve gövde çapı değerleri belirlenmiştir. Toz formu artan doz miktarına bağlı olarak ortalama bitki ağırlığı ve pazarlanabilir verim değerlerinde artış sağlamıştır. Ayrıca kalite özellikleri açısından pudra formda olan yarasa gübresinin toz forma kıyasla daha başarılı olduğu belirlenmiştir.

Bu çalışmanın amacı; organik üretimde yoğun olarak kullanılan gübrelerin, taze olarak tüketilen yeşil yapraklı bazı sebzeler olan dereotu, roka ve terede verimlilik ve kalite parametreleri üzerindeki etkilerinin belirlenmesi amacıyla yapılmıştır.

ARAŞTIRMA VE BULGULAR

Dereotu, roka ve tere türlerinde ikişer çeşit kullanılarak yapılan vermikompost ve yarasa gübresi uygulamaları sonrasında verim parametrelerinden elde edilen sonuçlar karşılaştırıldığında; dereotu türüne ait BT-Çiçek ve Lagün çeşitlerinde en iyi sonuçlar, 388,95 g/0,1m^2 ve 379,82 g/0,1m^2 ile yarasa gübresi uygulamasından elde edilmiştir ve bu sonuçlar istatistiksel olarak önemli bulunmuştur. Roka türüne ait çeşitler incelendiğinde, Bengi çeşidinde her iki uygulama da kontrol grubuna kıyasla daha iyi sonuç vermiştir ve sonuçlar istatistiksel olarak önemli bulunmuştur. Bengi çeşidinde yarasa gübresi ve vermikompost uygulamaları ile elde edilen sonuçlar sırasıyla 398,36 g/0,1m^2 ve 371,34 g/0,1m^2 olarak tespit edilmiştir. Derya çeşidinde vermikompost uygulamasının 485,70 g/0,1m^2 ile verimi arttırdığı tespit edilmiştir. Tere türüne ait Zeybek çeşidinde vermikompost ve yarasa gübresinin verimi arttırdığı görülmüştür ve elde edilen sonuçlar sırası ile; 355,27 g/0,1m^2 ve 354.80 g/0,1m^2 olarak bulunmuştur. Bahargülü çeşidinde ise vermikompost uygulaması 318,05 g/0,1m^2 ile en iyi sonucu vermiştir ve bu sonuç istatistiksel olarak önemli bulunmuştur. Vermikompost ve yarasa gübresi uygulamaları sonrasında, dereotu, roka ve tere türlerine ait her iki çeşitte verimin kontrol bitkisine kıyasla % değişimi hesaplanmıştır. Buna göre; vermikompost ve yarasa gübresi uygulamaları için sırası ile, dereotu türüne ait BT-çiçek çeşidinde 19.0 ve 38.9; Lagün çeşidinde 8.35 ve 23.87 olarak bulunmuştur. Roka türüne ait Bengi çeşidinde 18.9 ve 24.4; Derya çeşidinde ise 26.0 ile 4.4; olarak hesaplanmıştır. Tere türüne ait Zeybek çeşidinde sırası ile 26.0 ve 4.4; Bahar gülü çeşidinde ise 5.04 ve 4.91 olarak tespit edilmiştir. Yaprak sayısı parametresi değerlendirildiğinde, BT-Çiçek çeşidinde uygulamalar arasında bir fark tespit edilemezken, Lagün çeşidinde ise kontrole kıyasla istatistiksel olarak fark yaratan uygulama 4,30 adet ile yarasa gübresi olarak belirlenmiştir. Roka türüne ait çeşitler incelendiğinde, Bengi çeşidinde kontrol grubuna kıyasla tüm uygulamalar istatistiksel olarak önemli bulunmuştur. En iyi sonuç veren uygulama 9,40 adet yaprak sayısı ile vermikompost uygulaması olarak tespit edilmiştir. Derya çeşidinde ise kontrol grubuna kıyasla uygulamalar arasında istatistiksel olarak fark bulunamamıştır. Zeybek çeşidinde de kontrol grubuna kıyasla uygulamalar arasında istatistiksel olarak fark bulunmadığı tespit edilmiştir. Bahargülü çeşidinde ise 10,16 adet ile en iyi sonuç vermikompost uygulamasından elde edilmiştir.

Yaprak boyları incelendiğinde, BT-Çiçek çeşidinde uygulamalar arasında istatistiksel olarak fark bulunamamış ancak Lagün çeşidinde yarasa gübresi uygulamasının 11.44 cm ile kontrol grubuna kıyasla yaprak boyunu arttırdığı ve bu artışın istatistiksel olarak önemli bulunduğu tespit edilmiştir. Roka türüne ait çeşitlerde uygulamaların yaprak boyuna etkisi olmadığı tespit edilmiştir. Tere türüne ait çeşitlerde ise vermikompost ve yarasa gübresi uygulamalarından elde edilen sonuçlar istatistiksel olarak önemli bulunmuştur; her iki uygulamanın da yaprak boyunu arttırdığı tespit edilmiştir.

Yaprak eni verileri değerlendirildiğinde, dereotu türüna ait BT-Çiçek çeşidinde 5,19 cm değeri ile vermikompost uygulamasının en iyi sonuç verdiği belirlenmiştir. Ancak, Lagün çeşidinde uygulamalar arasındaki farklılık istatistiksel olarak önemli bulunmamıştır. Roka türüne ait çeşitler incelendiğinde; Bengi çeşidinde de uygulamalar arasındaki farklılığın istatistiksel olarak önemli bulunmazken; Derya çeşidinde ise hem vermikompost hem de yarasa gübresi uygulamalarının sırası ile 3,35 cm ve 3,36 cm sonuçları ile yaprak enini arttırdığı ve bu artışın istatistiksel olarak önemli olduğu tespit edilmiştir. Tere türüne ait çeşitlerde yaprak eni parametresinden elde edilen sonuçlar istatistiksel olarak önemli bulunmamıştır.

Sap uzunlukları ölçüldüğünde, BT-Çiçek çeşidinde yarasa gübresi uygulamasının 12,55 cm ile en iyi sonuç verdiği tespit edilmiştir. Lagün çeşidinde ise yapılan uygulamalar sonucunda istatistiksel olarak önemli bir fark bulunamamıştır. Bengi çeşidinde vermikompost uygulaması (7,44 cm) ve Derya çeşidinde yarasa gübresi uygulaması (7,21 cm) diğer uygulama gruplarına göre istatistiksel olarak en iyi sonucu vermişlerdir. Tere türüne ait çeşitlerde yapılan uygulamaların sap uzunluğunu arttırdığı ve bu artışın istatistiksel olarak önemli olduğu belirlenmiştir ancak vermikompost uygulamasının (6,93 cm) yarasa gübresine (6,61 cm) kıyasla sap uzunluğunu daha fazla arttırdığı tespit edilmiştir.

Yaprak oransal su kapsamı değerlendirildiğinde; BT-Çiçek çeşidinde vermikompost (%93,0) ve yarasa gübresi (%95,9) uygulamalarının yaprak oransal su kapsamını arttırdığı tespit edilmiştir. Roka türüne ait Bengi ve Derya çeşitlerinde yapılan tüm uygulamalardan elde edilen sonuçlar istatistiksel olarak önemli bulunmuştur. Bengi ve Derya çeşitlerinde çeşidinde, vermikompost ve yarasa gübrelerinden elde edilen sonuçlar sırası ile %69,02, %67,57, %69,02 ve %65,18 olarak bulunmuştur. Tere bitkisine ait Bahargülü çeşidinde de vermikompost (%61,0)ve yarasa gübresi (%62,5) uygulamaları yaprak oransal su kapsamını arttırmıştır ancak Zeybek çeşidinde vermikompost uygulamasının %76,2 ile en iyi sonucu verdiği görülmüştür.

Klorofil a, klorofil b ve toplam klorofil içerikleri değerlendirildiğinde; BT-Çiçek çeşidinde kontrol grubuna kıyasla uygulamalar arasında fark bulunamamıştır. Lagün çeşidinde ise, yapılan uygulamaların klorofil b ve toplam klorofil miktarlarını arttırdığı belirlenmiştir. Klorofil b ve toplam klorofil değerleri sırası ile yarasa gübresi için 4,63 mg/g yaprak, 7,67 mg/g yaprak; vermikompost uygulaması için 2,46 mg/g yaprak ve 6,35 mg/g yaprak olarak tespit edilmiştir. Roka türünün iki çeşidinde de vermikompost uygulamasının klorofil değerlerini arttırdığı görülmüştür. Buna göre; Bengi çeşidinde vermikompost uygulamalarından elde edilen klorofil a, klorofil b ve toplam klorofil değerleri sırası ile 0.71 mg/g yaprak; 0.13 mg/g yaprak ve 0.84 mg/g yaprak olarak bulunmuştur. Derya çeşidinde ise vermikompost uygulamalarından elde edilen klorofil a, klorofil b ve toplam klorofil değerleri sırası ile 0.74 mg/g yaprak; 0.15 mg/g yaprak ve 0.89 mg/g yaprak olarak bulunmuştur. Zeybek çeşidinde uygulamalar arasında önemli bir fark tespit edilememiştir. Bahargülü çeşidinde ise vermikompost uygulamasının klorofil içeriklerini arttırdığı belirlenmiştir. Elde edilen klorofil a, klorofil b ve toplam klorofil değerleri sırası ile 0,52 mg/g yaprak, 0,15 mg/g yaprak ve 0,67 mg/g yaprak olarak bulunmuştur.

Renk parametreleri incelendiğinde; dereotu türüne ait Lagün çeşidinde tüm uygulamaların sarılığı azalttığı tespit edilmiştir. Roka ve terenin tüm çeşitlerinde yapılan gübreleme uygulamalarının renk parametresine etkisi olmadığı ve istatistiksel olarak farklılık bulunmadığı tespit edilmiştir.

Toplam fenolik madde içerikleri incelendiğinde ise; dereotu türünün her iki çeşidinde yarasa gübresinin (BT-Çiçek çeşidi 1030,9 mg GAE/kg ve Lagün çeşidi 1065,7 mg GAE/kg) en iyi sonucu verdiği tespit edilmiştir. Roka ve tere türlerinin her iki çeşidinde de vermikompostun daha iyi sonuçlar verdiği ve uygulamalar arası farklılığın istatistiksel olarak önemli olduğu belirlenmiştir. Buna göre; vermikompost uygulamalarından elde edilen sonuçlar roka türüne ait Bengi ve Derya çeşitlerinde sırası ile 824,74 mg

GAE/kg ve 573,34 mg GAE/kg; tere türüne ait Zeybek ve Bahargülü çeşitlerinde ise 798,4 mg GAE/kg ve 824,7 mg GAE/kg olarak bulunmuştur (Çizelge 1, 2, 3, 4, 5 ve 6).

Çizelge 1. Dereotu Türüne ait BT-Çiçek Çeşidi Verim ve Kalite Parametreleri

Uygulamalar	Verim (g/0,1m^2)	Çeşit Bazında % Değişim	Yaprak Sayısı (adet)	Yaprak Boy (cm)	Yaprak En (cm)	Sap Uzunluk (cm)	Yaprak Oransal Su Kapsamı (%)
Kontrol	237.52 c	-	3.90	9.24	4.74 b	10.51 b	80.7 b
Vermikompost	293.42 b	19,0	3.90	9.73	5.19 a	9.50 b	93.0 a
Yarasa	388.95 a	38,9	3.86	9.75	4.55 b	12.55 a	95.9 a
$Lsd_{0,05}$	45,88	-	-	-	0,42	1,31	6,59

Uygulamalar	Klorofil a (mg/g yaprak)	Klorofil b (mg/g yaprak)	Toplam Klorofil (mg/g yaprak)	L	a	b	Fenolik Madde (mg GAE/kg)
Kontrol	3.38	2.51	5.89	60.41 a	-33.47	-5.95	930.9 b
Vermikompost	3.31	2.92	6.23	60.70 a	-34.23	-5.08	857.2 b
Yarasa	3.39	2.20	5.59	59.46 b	-33.68	-5.23	1030.9 a
$Lsd_{0,05}$	-	-	-	0,64	-	-	79,33

Çizelge 2. Dereotu Türüne ait Lagün Çeşidi Verim ve Kalite Parametreleri

Uygulamalar	Verim (g/0,1m^2)	Çeşit Bazında % Değişim	Yaprak Sayısı (adet)	Yaprak Boy (cm)	Yaprak En (cm)	Sap Uzunluk (cm)	Yaprak Oransal Su Kapsamı (%)
Kontrol	289.15 c	-	3.10 b	9.96 b	3.60	10.12	81.8 a
Vermikompost	315.51 b	8,35	3.36 b	9.91 b	3.79	7.97	67.0 b
Yarasa	379.82 a	23,87	4.30 a	11.44 a	4.44	10.31	80.7 a
$Lsd_{0,05}$	18,10	-	0,43	0,54	-	-	1,17

Uygulamalar	Klorofil a (mg/g yaprak)	Klorofil b (mg/g yaprak)	Toplam Klorofil (mg/g yaprak)	L	a	b	Fenolik Madde (mg GAE/kg)
Kontrol	2.92	0.99 c	3.91 c	59.54 a	-33.70 b	-4.35 b	955.6 b
Vermikompost	3.89	2.46 b	6.35 b	59.38 b	-33.71 b	-3.75 a	884.4 c
Yarasa	3.04	4.63 a	7.67 a	59.45 a	-33.19 a	-3.85 a	1065.7 a
$Lsd_{0,05}$	-	0,51	1,30	0,10	0,15	0,45	34,85

Çizelge 3. Roka Türüne ait Bengi Çeşidi Verim ve Kalite Parametreleri

Uygulamalar	Verim (g/0,1m^2)	Çeşit Bazında % Değişim	Yaprak Sayısı (adet)	Yaprak Boy (cm)	Yaprak En (cm)	Sap Uzunluk (cm)	Yaprak Oransal Su Kapsamı (%)
Kontrol	300.91 b	-	7.49 c	8.27	3.53	6.96 b	64.37 b
Vermikompost	371.34 a	18,9	9.40 a	9.40	3.68	7.44 a	69.02 a
Yarasa	398.36 a	24,4	8.63 b	8.67	3.40	6.92 b	67,57 a
$Lsd_{0,05}$	37,11	-	0,44	-	-	0,67	3,65

Uygulamalar	Klorofil a (mg/g yaprak)	Klorofil b (mg/g yaprak)	Toplam Klorofil (mg/g yaprak)	L	a	b	Fenolik Madde (mg GAE/kg)
Kontrol	0.54 b	0.09 b	0.63 b	98.18	- 5.01	11.40	474.29 c
Vermikompost	0.71 a	0.13 a	0.84 a	98.09	- 7.07	13.69	824,74 a
Yarasa	0.42 b	0.13 a	0.57 b	97.94	- 9.41	14.67	570.59 b
$Lsd_{0,05}$	0,16	0,02	0,10	-	-	-	33,38

Çizelge 4. Roka Türüne ait Derya Çeşidi Verim ve Kalite Parametreleri

Uygulamalar	Verim (g/0,1m^2)	Çeşit Bazında % Değişim	Yaprak Sayısı (adet)	Yaprak Boy (cm)	Yaprak En (cm)	Sap Uzunluk (cm)	Yaprak Oransal Su Kapsamı (%)
Kontrol	367.9 b	-	7.16	7.16	3.07 b	6.56 b	64.37 b
Vermikompost	485.70 a	26	7.95	7.76	3.35 a	6.59 b	69.02 a
Yarasa	385.23 b	4,4	7.56	7.82	3.36 a	7.21 a	65.18 a
$Lsd_{0,05}$	14,28	-	-	-	0,20	0,28	3,80

Uygulamalar	Klorofil a (mg/g yaprak)	Klorofil b (mg/g yaprak)	Toplam Klorofil (mg/g yaprak)	L	a	b	Fenolik Madde (mg GAE/kg)
Kontrol	0.54 b	0.09	0.63 b	97.94	-10.27	13.36	471.15 b
Vermikompost	0.74 a	0.15	0.89 a	98.07	-10.22	14.29	573.34 a
Yarasa	0.42 b	0.16	0.58 b	98.15	-10.20	13.36	471.56 b
$Lsd_{0,05}$	0,02	-	0,08	-	-	-	33,41

Çizelge 5. Tere Türüne ait Zeybek Çeşidi Verim ve Kalite Parametreleri

Uygulamalar	Verim (g/0,1m^2)	Çeşit Bazında % Değişim	Yaprak Sayısı (adet)	Yaprak Boy (cm)	Yaprak En (cm)	Sap Uzunluk (cm)	Yaprak Oransal Su Kapsamı (%)
Kontrol	337.36 b	-	8.80 a	6.26 b	3.19	6.30 c	56.9 b
Vermikompost	355.27 a	5,04	8.66 a	9.89 a	3.82	6.93 a	76.2 a
Yarasa	354.80 a	4,91	8.00 b	8.60 a	3.26	6.61 b	55.0 b
$Lsd_{0,05}$	16,88	-	0,38	1,90	-	0,28	3,59

Uygulamalar	Klorofil a (mg/g yaprak)	Klorofil b (mg/g yaprak)	Toplam Klorofil (mg/g yaprak)	L	a	b	Fenolik Madde (mg GAE/kg)
Kontrol	0.42	0.19	0.61	88.06	-1.20	8.09	476.7 b
Vermikompost	0.49	0.17	0.66	97.80	-4.67	11.70	798.4 a
Yarasa	0.42	0.16	0.58	97.99	-13.60	14.84	456.2 b
$Lsd_{0,05}$	-	-	-	-	-	-	79,33

Çizelge 6. Tere Türüne ait Bahargülü Çeşidi Verim ve Kalite Parametreleri

Uygulamalar	Verim (g/0,1m^2)	Çeşit Bazında % Değişim	Yaprak Sayısı (adet)	Yaprak Boy (cm)	Yaprak En (cm)	Sap Uzunluk (cm)	Yaprak Oransal Su Kapsamı (%)
Kontrol	269.94 c	-	9.26 b	6.20 b	2.71	7.10 c	49.5 b
Vermikompost	318.05 a	15,1	10.16 a	7.90 a	2.97	7.83 a	61.0 a
Yarasa	296.99 b	9,10	8.93 b	7.10 a	2.77	7.46 b	62.5 a
$Lsd_{0,05}$	14,28	-	0,75	0,83	-	0,28	9,60

Uygulamalar	Klorofil a (mg/g yaprak)	Klorofil b (mg/g yaprak)	Toplam Klorofil (mg/g yaprak)	L	a	b	Fenolik Madde (mg GAE/kg)
Kontrol	0.16 c	0.20	0.36 b	97.94	- 10.27	13.35	468.2 c
Vermikompost	0.52 a	0.15	0.67 a	98.07	- 10.22	14.29	824.7 a
Yarasa	0.31 b	0.13	0.44 b	98.15	- 12.20	13.26	570.5 b
$Lsd_{0,05}$	0,02	0,08	0,05	-	-	-	42,25

SONUÇ

Üreticilerin vejetatif aksamı hızlı geliştirmesi sebebiyle azotlu gübreleri fazla kullanmaları sonucu bitkilerde nitrit ve nitrat birikimi olması, kimyasal gübre fiyatlarında yaşanan artışlar, Türkiye topraklarının organik maddece fakir olması ve buna benzer birçok sebep ile hem üreticiler hem de tüketiciler farklı gübre kaynaklarına yönelmişlerdir. Organik gübrelerin yeşil aksamı yenen sebzelerde kullanılmasına yönelik yapılan çalışmada gübrelerin verim ve kalite parametrelerini arttırdığı tespit edilmiştir. Yapılan çalışmada tüm sonuçlar birlikte değerlendirildiğinde, roka türüne ait Bengi ve Derya çeşitleri ve tere türüne ait Zeybek ve Bahargülü çeşitleri için vermikompost uygulaması önerilebilirken, dereotu türüne ait BT-Çiçek ve Lagün çeşitleri için yarasa gübresi önerilmektedir. İnsan sağlığını tehdit etmeyen sebzelerin yetiştirilmesi organik gübreler ile mümkün görülmektedir. Yapılan bu çalışma yarasa gübresi ve vermikompost çalışmalarına örnek olabilecektir. Gübre piyasasının büyüklüğü düşünüldüğünde, daha fazla sayıda organik gübrenin farklı dozlarının farklı tür ve çeşitlerde denenmesi üreticilere, tüketicilere ve bilim insanlarına fayda sağlayacaktır.

KAYNAKÇA

Aydın Can, B., Ünal, M., & Can, O. (2019). Farklı Yarasa Gübresi Uygulamalarının Marul Yetiştiriciliğinde Verim ve Kalite Üzerine Etkileri. *Uluslararası Tarım ve Yaban Hayatı Bilimleri Dergisi*, 5(1): 18-24. doi: 10.24180/ijaws.481660

Demirtaş, I., Arı, N., Arpacıoğlu, A., Kaya, H., & Özkan, C. (2007, September 4-7). *Different organic fertilizer chemical properties the effect of spent mushroom compost use on some soil properties and yield in greenhouse tomato cultivation*. V. National Horticulture Congress, Erzurum, Turkey.

Edwards, C.A., & Bohlen, P.J. (1996). *Biology and Ecology of Earthworms*. (3rd. Ed.) Chapman and Hall. https://www.chapmanhall.com/

Gross, R. S., Berna, F., Karkanas, P., & Weiner, S. (2004). Bat Guano and Preservation of Archaeological Remains in Cave Sites. *Journal of Archaeological Science*, 31, 1259-1272.

Karagöz, K. (2014) Yarasa Gübresinin Tarımda Kullanılma Olanakları. *Alınteri Zirai Bilimler Dergisi*, 27(2), 35-42.

Mlay, P. S., & Sagamiko, F. (2008). The Use of Bat Guano in the İmprovement of the Nutritive Value of Poor Quality Roughage Fed to Ruminants in Tanzania. *Veterinarski Arhiv*, 78(5), 417-427.

Sothearen, T., Furey, M. N., & Jurgens, J. A. (2014). Effect of Bat Guano on the Growth of Five Economically İmportant Plant Species. *Journal of Tropical Agriculture*, 52(2), 169-173.

Türkiye İstatistik Kurumu (2022, January 10). Bitkisel Üretim Verileri. http://www.tuik.gov.tr/PreTablo.do?alt_id=1001

Ulukapı, K., & Şener, S. (2018). Farklı Organik Gübrelerin Tarla ve Örtüaltı Koşullarında Yetiştirilen Karnabaharın Bitki Gelişimi ve Verim Parametreleri Üzerine Etkisi. *Selçuk Tarım ve Gıda Bilimleri Dergisi*, 32(3), 510-515. doi: 10.15316/SJAFS.2018.130

ERECTOR SPINAE PLANE BLOCK FOR AWAKE VIDEO ASISTED THORACOSCOPIC SURGERY

VİDEO YARDIMLI TORAKOSKOPİK CERRAHİ İÇİN EREKTÖR SPİNA PLAN BLOĞU

Assist. Prof. Dr. Resul Yılmaz

Necmettin Erbakan University, Meram Medicine Faculty, Anesthesiology and Reanimation Department, Konya, Turkey

ORCID NO: 0000-0002-5527-2893

Res. Assist. Dr. Numan Demiralp

Necmettin Erbakan University, Meram Medicine Faculty, Anesthesiology and Reanimation Department, Konya, Turkey

ORCID NO: 0000-0002-0734-4872

Assist. Prof. Dr. Gülçin Hacıbeyoğlu

Necmettin Erbakan University, Meram Medicine Faculty, Anesthesiology and Reanimation Department, Konya, Turkey

ORCID NO: 0000-0002-9438-3414

Assoc. Prof. Dr. Şule Arıcan

Necmettin Erbakan University, Meram Medicine Faculty, Anesthesiology and Reanimation Department, Konya, Turkey

ORCID NO: 0000-0002-8634-1150

Prof. Dr. Alper Kılıçaslan

Necmettin Erbakan University, Meram Medicine Faculty, Anesthesiology and Reanimation Department, Konya, Turkey

ORCID NO: 0000-0002-2570-5854

ÖZET

Video Yardımlı Torakoskopik Cerrahi (VATS) ameliyatları, çift lümenli endotrakeal tüplerin kullanılmaya başlamasından itibaren genel anestezi altında uygulanmaya başlanmıştır[1]. Genel anestezinin komplikasyonları; çift lümenli tüpe bağlı komplikasyonlar, ventilatöre bağlı akciğer hasarı, kardiyak performansta bozulma, postoperatif bulantı ve kusmadır. Özellikle genel durumu bozuk, ciddi komorbiditesi olan seçilmiş olgularda, genel anestezinin bahsi geçen komplikasyonlarından kaçınmak amacıyla uyanık VATS uygulanmaktadır. Uyanık VATS genellikle; plevral effüzyon, pnömotoraks, endotorasik kistler, amfizem, ampiyem, mediastinal biyopsi, kist, timoma için endikedir. Özellikle zor entübasyon, uyku apne sendromu veya rejyonel anestezi kontrendikasyonu gibi bir engeli bulunmayan seçilmiş olgularda uyanık VATS alternatiftir[2]. Uyanık VATS vakaları için sıklıkla torakal epidural anestezi uygulanır[3]. Torakal epidural anestezi (TEA) uygulaması zaman alıcı, invaziv ve nadir görülse de nörolojik komplikasyonları görüldüğüdünde ciddidir[3]. Daha az invaziv ve daha güvenli olan paravertebral blok da alternatif blok olarak tarif edilmiştir. Biz de bu olguda uyanık VATS planlanan hastamızda, başarısız torakal epidural anestezi uygulaması sonrasında ESP blok deneyimimizi paylaşmayı amaçladık.

Anahtar Kelimeler: Uyanık VATS, Erektör Spina Plan Bloğu, Ultrasonografi

ABSTRACT

Video-Assisted Thoracoscopic Surgery (VATS), have been performed under general anesthesia since the use of double-lumen endotracheal tubes[1]. Complications related to double-lumen tube are ventilator-induced lung injury, deterioration in cardiac performance, postoperative nausea and vomiting are complications of general anesthesia. In order to avoid the aforementioned complications of general anesthesia, awake VATS is applied especially in selected cases with poor general condition and serious comorbidities. Awake VATS is usually; indicated for pleural effusion, pneumothorax, endothoracic cysts, emphysema, empyema; mediastinal biopsy, cyst, thymoma. Awake VATS is an alternative, especially in selected cases that don't have any obstacle such as difficult intubation, sleep apnea syndrome or regional anesthesia contraindications. Thoracic epidural anesthesia is often used for awake VATS cases[3]. Thoracic epidural anesthesia (TEA) administration is time-consuming, invasive, and it is serious when neurologic complications occur although rare [3]. Less invasive and safer paravertebral block has also been described as an alternative block. In this case, we aimed to share our Erector Spinae Plane block experience after unsuccessful thoracic epidural anesthesia in our patient who was planned to have awake VATS.

Key Words: Awake VATS, Erector Spinae Plane Block, Ultrasonography

GİRİŞ

Uyanık VATS, spontan solunumu ve bilinci tam olan hastalarda bölgesel anestezi teknikleri altında yapılan, torakoskopik prosedürleri içerir. Bölgesel anestezi teknikleri, lokal anestezi, interkostal sinir blokları, paravertebral bloklar veya torasik epidural anesteziden (TEA) oluşur. Uyanık torakoskopik prosedür, değişken düzeyde sedasyon ile lokal-bölgesel anestezi tekniklerinin bir kombinasyonunu belirtmek için genel bir terimdir[4]. Bu sedasyon düzeyleri; sedasyonsuz (sadece lokal anestezi altında), hafif sedasyon, orta derece sedasyon (bilinç açık), derin sedasyon ve monitörize anestezi bakımını kapsamaktadır[5].

Uyanık VATS, plevra ve göğüs duvarı kaynaklı olan; plevral effüzyon, perikardiyal effüzyon, pnömotoraks, endotorasik kist, ampiyem; mediastinel biyopsi, kist ve timoma ve parenkim kaynaklı olanlar ise amfizem, interstisyel akciğer hastalığı ve akciğer nodülü gibi durumlarda endikedir[5]. Ancak bütün hastalar bu prosedürü uygulamak için uygun değildir. Anestezist ve cerrah her türlü risk faktörünü dikkatlice değerlendirerek hastaya en uygun yaklaşımı seçmelidir. Hastanın mental durumu, anksiyete seviyesi gibi psikiyatrik etmenler de göz önünde bulundurularak en uygun aday seçilmelidir. Hastanın pulmoner ve kardiyak açıdan instabil olması; obezite, paralizi, vücut deformitesi (kifoskolyoz), omuz ya da boyun ağrısı ve ya daha önceden pulmoner rezeksiyonu olan ve ciddi plevral adezyon olması gibi cerrahi durumlar da uyanık VATS için kontrendikasyon oluşturmaktadır[6].

Uyanık VATS'ın avantajları; çift lümenli endobronşial tüpün konumlandırılması esnasında oluşabilecek komplikasyonlar, mekanik ventilatör kaynaklı akciğer hasarı, nöromuskuler ve anestezik ajanların rezidüel etkileri, özellikle düşkün hastalarda genel anestezik ilaçların indüksiyonuyla oluşan kardiyak performansta bozulma ve kardiyak aritmiler ayrıca anestezik ilaçlar ve opioidlere bağlı postoperatif bulantı kusma ve opioidlerin neden olduğu solunumsal problemler gibi istenmeyen sonuçların görülmemesidir[7]. Lateral dekübit pozisyonunun yanı sıra dependant akciğere optimal fizyolojik ventilasyon perfüzyon uyumu ile sonuçlanan daha verimli bir diafragma kontraksiyonuyla spontan solunum yapabilirler.

Uyanık VATS' ın dezavantajları ise; hastanın lateral dekübit pozisyonunu tolere edememesi ve hareket etmesi, öksürük refleksi, mediastinal şift ve paradoksal solunum ve en önemlisi gerek operasyona gerekse de sedasyona bağlı hipoventilasyonun neden olduğu hipoksi ve hiperkarbi gibi durumlardır[8].

OLGU

Hastamız, 83 yaş, 85 kg, (BMI=26) ve koroner arter hastalığına sahip (koroner stenti mevcut), fiziksel kapasitesi 4 mets'ten küçüktü. Düzenli olarak asetilsalisilik asit (100 mg/gün) kullanıyordu. Sağ

unilateral plevral effüzyon nedeniyle plevral punch biyopsi nedeniyle vats planlanmıştı. Hastanın rutin preoperatif tetkiklerinde Hb: 15 gr/dl, biyokimya ve koagülasyon parametreleri normal sınırlar içerisindeydi. İleri yaş, komorbiditesi ve genel durumunun düşkün olması nedeniyle uyanık torokotomi prosedürü uygulanmasına karar verildi. Hastadan aydınlatılmış onamı yazılı ve sözlü olarak alındı. Hastanın ilk monitörizasyonda; nabız:103 atım/dk , TA: 185/103 (137) ve SP02: 87 olarak ölçüldü.

Başarısız epidural anestezi uygulaması sonrasında, hastaya erektör spina plan (ESP) bloğuna karar verildi. Hastaya prone pozisyonda lineer usg probuyla in-plane yaklaşımla, T6 ve T8 seviyelerinden ESP bloğu uygulandı. 2 seviyeden, toplam 20 ml %0.5 bupivakain ve 6 ml %2 prilokain uygulandı. Yakın hemodinamik takip için invaziv arteryal monitörizasyon kullanıldı. Saatlik idrar çıkışı takibi için foley sonda takıldı. Sedasyon amacıyla deksmetodomidin infüzyonu kullanıldı. Başlangıçta 127.5 ml/sa hızla 10 dakika yükleme sonrasında, 10.6 µg/kg/sa dozu ile intravenöz infüzyona devam edildi.

Yaklaşık 1 saat süren operasyon boyunca hastanın vital bulguları stabil seyretti. İntraoperatif kanaması olmayan hastanın, 50 cc/sa idrar çıkışı oldu. 750ml izotonik sıvı infüze edildi. Postoperatif ağrı kontrolü için, hasta kontrollü analjezi infüzyon pompası takılarak yoğun bakım ünitesine çıkarıldı. 24 saatlik periyotta; hastanın VAS skorlarının 5 in üzerine çıkmadığı kaydedildi. Postoperatif 3.gününde hasta taburcu edildi.

SONUÇ

Genel anesteziye nazaran daha az boğaz ağrısı, erken oral alım ve erken mobilizasyon, daha az pulmoner ve kardiyak komplikasyon gelişmesi, mekanik ventilatöre bağlı akciğer komplikasyonların ve ventilatör ilişkili pnömonilerin daha az görülmesi, daha az opioid kullanlması ve opioidlere bağlı daha az postop bulantı kusma görülmesi nedeniyle uyanık VATS tercih edilebilmektedir[8].

ESP bloğu sayesinde spinal sinirlerin dorsal ve ventral dalları bloke olur ve multi-dermatomal duyusal blokaj gelişir[9]. Toraks cerrahisinde de gerek anestezi gerekse de analjeziye katkı amacıyla son dönemde kullanımı çok yaygınlaşmıştır[8,10]. ESP bloğu ile başarılı bir şekilde tamamlanan bu olgu, uyanık VATS için anestezi seçiminde ESP' nin sıklıkla uygulanan torakal epidural anesteziye bir alternatif olabileceğini göstermektedir.

KAYNAKÇA

1. Rocco G. (2016). Non-intubated uniportal lung surgery†. *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*, *49 Suppl 1*, i3–i5. https://doi.org/10.1093/ejcts/ezv412

2. Chen, J. S., Cheng, Y. J., Hung, M. H., Tseng, Y. D., Chen, K. C., & Lee, Y. C. (2011). Nonintubated thoracoscopic lobectomy for lung cancer. *Annals of surgery*, *254*(6), 1038–1043. https://doi.org/10.1097/SLA.0b013e31822ed19b

3. Hung, M. H., Hsu, H. H., Chan, K. C., Chen, K. C., Yie, J. C., Cheng, Y. J., & Chen, J. S. (2014). Non-intubated thoracoscopic surgery using internal intercostal nerve block, vagal block and targeted sedation. *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*, *46*(4), 620–625. https://doi.org/10.1093/ejcts/ezu054

4. Irons, J. F., Miles, L. F., Joshi, K. R., Klein, A. A., Scarci, M., Solli, P., & Martinez, G. (2017). Intubated Versus Nonintubated General Anesthesia for Video-Assisted Thoracoscopic Surgery-A Case-Control Study. *Journal of cardiothoracic and vascular anesthesia*, *31*(2), 411–417. https://doi.org/10.1053/j.jvca.2016.07.003

5. Passera, Eliseo & Rocco, Gaetano. (2018). Awake video-assisted thoracic surgery resection of lung nodules. Video-Assisted Thoracic Surgery. 3. 3-3. 10.21037/vats.2018.01.01.

6. Gonzalez-Rivas, D., Bonome, C., Fieira, E., Aymerich, H., Fernandez, R., Delgado, M., Mendez, L., & de la Torre, M. (2016). Non-intubated video-assisted thoracoscopic lung resections: the future

of thoracic surgery?. *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*, *49*(3), 721–731. https://doi.org/10.1093/ejcts/ezv136

7. Hausman, M. S., Jr, Jewell, E. S., & Engoren, M. (2015). Regional versus general anesthesia in surgical patients with chronic obstructive pulmonary disease: does avoiding general anesthesia reduce the risk of postoperative complications?. *Anesthesia and analgesia*, *120*(6), 1405–1412. https://doi.org/10.1213/ANE.0000000000000574

8. Kao, M. C., Lan, C. H., & Huang, C. J. (2012). Anesthesia for awake video-assisted thoracic surgery. *Acta anaesthesiologica Taiwanica : official journal of the Taiwan Society of Anesthesiologists*, *50*(3), 126–130. https://doi.org/10.1016/j.aat.2012.08.007

9. Krishnan, S., & Cascella, M. (2021). Erector Spinae Plane Block. In *StatPearls*. StatPearls Publishing.

10. Raft, J., Chin, K. J., Belanger, M. E., Clairoux, A., Richebé, P., & Brulotte, V. (2019). Continuous Erector Spinae Plane Block for thoracotomy analgesia after epidural failure. *Journal of clinical anesthesia*, *54*, 132–133. https://doi.org/10.1016/j.jclinane.2018.10.024

BAKTERİ KAYNAKLI ANTİKANSER MOLEKÜLLER

BACTERIA-DERIVED ANTICANCER MOLECULES

Dr. Öğr. Üyesi Nazlı Pınar ARSLAN

ORCID ID**:** 0000-0002-3951-4418

Department of Medical Services and Techniques, Vocational School of Health Services, Bingol University, 12000 Bingol, Turkey

Dr. Öğr. Üyesi Handan ÇINAR-YILMAZ

ORCID ID**:** 0000-0001-7215-7822

Department of Medical Services and Techniques, Vocational School of Health Services, Bingol University, 12000 Bingol, Turkey

Öğr. Gör. Meryem DOYMUŞ

Department of Medical Services and Techniques, Hinis Vocational College, Ataturk University, Erzurum, Turkey

ORCID ID**:** 0000-0002-3184-1422

ABSTRACT

Cancer is the second most common cause of death worldwide. Lung, colorectal, prostate and breast cancer are the most diagnosed forms of this disease. Most of the drugs used or currently tested in cancer treatments are derived from plants, bacteria or fungi. Bacteria are one of the most important sources of natural products of medical and biotechnological importance. Bacteria produce enzymes, bacteriocins, toxins, and antibiotics, which are protein or peptide and have anticancer properties. To important anticancer enzymes originating from bacteria; asparaginase and arginine deaminase to bacteriocins; colicin, bovicin, nisin, pediocin, plantaricin, pyosin and microsin E492 to toxins; diphtheria toxin, exo-toxin A, botulinum toxin and antibiotics; Actinomycin D, bleomycin, doxorubicin and mitomycin C can be given as examples. For example, it has been reported that asparaginase from *Escherichia coli* for treatment of acute lymphoblastic leukemia; microscin E492 from *Klebsiella pneumoniae* for treatment of leukemia, cervical and colon cancer; pediocin PA-1 from *Pediococcus acidilactici* for treatment of lung and colon cancer; bleomycin from *Streptomyces verticillus* for the treatment of Hodgink lymphoma, testicular and ovarian cancer; doxorubisin from *Streptomyces peucetius* for treatment of breast, neuroblastoma, ovary, lymphoma, leukemia, stomach and thyroid cancers can be used. Bacteria also produce non-ribosomal peptides such as arenamide, ariachemycin, halolitoralin, lajollamycin, lusentamycin, mechercharmycin A, mixirin, padanamide, piperazimycin, proximycin, urukthapelstatin and halolitoralin, which have anticancer activity like other proteins or peptides. Arenamide from *Salinispora arenicola* against colon cancer; halolitoral from *Halobacillus litoralis* against stomach cancer; proximycin from *Verrucosispora* sp against stomach and breast cancer and urukthapelstatin from *Mechercharimyces assporophorigenens* against lung and ovarian cancers may be used as drugs.

Key words: bacterium, anticancer, biological activity

ÖZET

Kanser dünya çapında ikinci en yaygın ölüm nedenidir. Akciğer, kolorektal, prostat ve meme kanseri bu hastalığın en çok teşhis edilen formlarıdır. Günümüzde kanser tedavilerinde kullanılan veya hali hazırda test edilen ilaçların çoğu bitki, bakteri veya mantarlardan elde edilmektedir.

Bakteriler tıbbi ve biyoteknolojik öneme sahip doğal ürünlerin en önemli kaynaklarındandır. Bakteriler protein veya peptit yapısında olan ve antikanser özellik gösteren enzimler, bakteriyosinler, toksinler ve antibiyotikler üretmektedir. Bakteri kaynaklı önemli antikanser enzimlere; asparajinaz ve arjinin deaminaz, bakteriyosinlere; kolisin, bovisin, nisin, pediosin, plantarisin, pyosin ve mikrosin E492, toksinlere; difteria toksin, ekzotoksin A, botulinum toksin ve antibiyotiklere ise; aktinomisin D, bleomisin, doxorubisin ve mitomisin C örnek verilebilir. Örneğin, *Escherichia coli'*den elde edilen asparajinazın akut lenfoblastik lösemi, *Klebsiella pneumoniae'* den elde edilen mikrosin E492' nin lösemi, serviks ve kolon kanseri, *Pediococcus acidilactici'*den elde edilen pediosin PA-1'in akciğer ve kolon kanseri, *Streptomyces verticillus'*dan elde edilen bleomisin'in Hodgink lenfoma, testis ve ovaryum kanserinde, *Streptomyces peucetius'*dan elde edilen doxorubisin'in meme, nöroblastoma, ovaryum, lenfoma, lösemi, mide ve tiroid kanseri tedavisinde kullanılabileceği rapor edilmiştir. Bakteriler, ribozomlarda sentezlenmeyen ancak diğer protein veya peptitler gibi antikanser aktivite gösteren arenamid, ariakemisin, halolitoralin, lajollamisin, lucentamisin, mechercharmisin A, mixirin, padanamid, piperazimisin, proximisin, urukthapelstatin ve halolitoralin gibi peptitler de üretmektedirler. *Salinispora arenicola'*dan elde edilen arenamid kolon, *Halobacillus litoralis'*dan elde edilen halolitoralin mide, *Verrucosispora* sp.' den elde edilen proximisin mide ve meme, *Mechercharimyces asporophorigenens*'den elde edilen urukthapelstatin ise akciğer ve ovaryum kanserlerine karşı etkili olmaktadır.

Anahtar Kelimeler: bakteri, antikanser, biyolojik aktivite

GİRİŞ

1. KANSER VE KANSER TEDAVİSİNDE KULLANILAN DOĞAL ÜRÜNLER

Kanser, somatik hücrelerdeki genetik veya epigenetik değişikliklerden kaynaklanan ve vücudun diğer bölgelerine yayılabilen anormal hücre büyümesi ile karakterize edilen bir hastalıktır. Kanser dünya genelinde her yıl milyonlarca insanın ölümüne neden olmaktadır. Akciğer, kolorektal, prostat, mide, melanom ve meme kanseri bu hastalığın en çok teşhis edilen formlarıdır (Felício et al., 2017; Saini et al., 2020). Kanser tedavisinde kemoterapi, radyoterapi, cerrahi, kök hücre nakli, hormon tedavisi, immunterapi ve hedefe yönelik tedavi gibi çeşitli yöntemler kullanılmaktadır (Koul, 2020).

Kanseri tedavisinde kullanılan kemoterapik maddeler tek başına veya diğer ilaç veya tedavilerle birlikte kullanılabilmektedir. Kemo ilaçları; nasıl çalıştıklarına, kimyasal yapılarına ve diğer ilaçlarla ilişkilerine göre alkilleyici ajanlar, nitrozoüreler, antimetabolitler, anti-tümor metabolitler, topoizomeraz inhibitörleri, mitotik inhibitörler ve enzimler şeklinde gruplandırılabilirler (Pratt 1994; Siddik 2002; Kumar et al., 2017; Sun et al., 2017). Kanser tedavisinde kullanılan kemoterapik ajanların çoğu bitki, bakteri veya mantarlardan elde edilmektedir (Felício et al., 2017). Örneğin, halihazırda kanser tedavisinde kullanılan paklitaksel, irinotekan, vinblastin, ve vincristine gibi kemoterapik maddeler bitkilerden doğal yollarla elde edilmektedir (Sharifi-Rad et al., 2019). Mantarların ise Anguidine, Aphidicolin, Rhizoxin, Fumagillin, lampterol, Phenylahistin, Wortmannin, plinabulin, Camptothecin, Podophyllotoxins, Etoposide ve teniposide gibi antikanser özelliğe sahip metabolitler üretiği rapor edilmektedir. Hatta, endofitik mantarların tıpkı bitkiler gibi paklitaksel, vinblastin ve vincristine isimli antikanser molekülleri de ürettiği belirtilmektedir (Kornienko et al., 2015; Chen et al., 2016).

2. KANSER TEDAVİSİNDE KULLANILAN BAKTERİ KAYNAKLI ÜRÜNLER

Bakteriler antimikrobiyal, antiviral, antiobezite, antikoagulant, bağışıklık düzenleyici ve kolesterol düşürücü özellliğe sahip olan metabolitler üretmektedir (Tsai et al., 2014; Andryukov et al., 2019; Carpine and Sieber, 2021). Dahası, bakterilerin protein veya peptit yapısında olan ve antikanser özellik gösteren enzimleri, bakteriyosinleri, toksinleri ve antibiyotikleri de ürettiği bilinmektedir.

2.1. Antikanser enzimler

Akut lenfoblastik lösemi (ALL) başta çocuklar olmak üzere yetiskinlerde de görülebilen kanser türüdür. Çocuklarda görülen en yaygın kanser türü olma özelliğindedir. ALL hastalığında lenfositlerin ön hücresi olan lenfoblastlar tam olgunlaşmadan anormal bir şekilde kontrolsüz ve aşırı çoğalmaktadır. ALL tedavisinde kemoterapi ve radyoterapinin yanı sıra kemik iliği veya kök hücre nakli gibi yaklaşımlar uygulanmaktadır. (Tomblyn et al., 2009; Pulsipher et al., 2011; El-Naggar et al., 2014; Vora et al., 2016). L-asparaginazlar olarak bilinen enzimler kemoterapide kullanılan ilaçların en önemlileri arasındadır. Bu enzimler, düşük toksisitesi ve yüksek etkinliği sayesinde özellikle pediatrik onkolojide sıklıkla kullanılmaktadır (El-Naggar et al., 2014).

Normal hücreler aspartik asit ve glutamin aminoasitlerinden asparagin aminoasidini sentezleme özelliğine sahipken, ALL hastalarında kanserleşmiş T ve B-lenfositler (lenfomoblastlar) bahsedilen aminoasitlerden asparajin aminoasidini sentezleyememektedirler. Kanserleşmiş lenfomoblastlar hayatta kalmak ve çoğalmak için kandaki serbest asparagine ihtiyaç duyduğu için de, kandaki asparajin eksikliği kanserleşmiş lenfomoblastların apoptoza uğramasına ve ölmelerine neden olmaktadır. ALL tedavisinde L-asaparajinazları kullanmanın esası da kanserleşmiş lenfomoblastları asparajinsiz bırakmaya dayanmakatadır. L-asparaginazlar asparajini geriye dönüşümsüz olarak aspartik asit ve amonyoğa parçaladığı için L-asparaginazlar damar yolu ile kana verildiğinde kanda serbest formda bulunan asparajini tüketmektedir (Mahajan, et al., 2013; Muneer et al., 2020).

L-asparajinazlar birçok mikroorganizma türü tarafından sentezlense de bu enzimin ticari üretimi esas olarak *Esherichia coli* ve *Erwinia chrysanthemi* bakterileri ile gercekleştirilmektedir. Günümüze kadar klinik onay almış üç tip asparaginaz bulunmaktadır. Bunlardan ilki, doğal *E. coli* asparaginazı (Kidrolaz, Eunase), ikincisi polietilen glikol (PEG) kaplı *E. coli* asparaginazı (Oncaspar) ve üçüncüsü PEG kaplı *E. chrysanthemi* asparaginazı (Erwinase)' dır (Piątkowska-Jakubas vd., 2008; Pieters vd., 2011; Keating 2013).

L-asparaginaz, akut lenfoblastik lenfoma ve oksotrofik tümörlere karşı etkili bir terapötik olarak onaylanırken, arginin deiminaz, L-metionaz, L-arginaz, lisin oksidaz ve L-glutaminaz gibi enzimlerin terapötik potansiyeli klinik denemeler altındadır. Örneğin, *Alcaligenes faecalis*, *Bacillus cereus* MTCC 1305 ve *Halomonas meridiana* bakterilerinden elde edilen L-glutaminazların sırasıyla HeLa, hepatoselüler karsinom ve kolon kanseri hücre hatlarına karşı antitümor etki gösterildiği rapor edilmiştir (Singh et al., 2013; Pandinan et a., 2014; Mostofa et al., 2021). Glutamin, hücresel metabolik süreçlerde önemli bir rol oynayan, amonyak oluşumu ve glikosilasyon reaksiyonuna katılan ve ayrıca nükleotidler, glutatyon ve heksozamin gibi çeşitli azotlu metabolik ara ürünlerin sentezi için gerekli nitrojeni sağlayan bir amino asittir. Glutamin bağımlı tümör hücreleri, eksojen glutamin olmadan yaşayamaz. L-glutamini L-glutamik asit ve amonyağa hidrolize eden L-glutaminaz ile glutamin yoksunluğu oluşturmak, de novo protein sentezini bloke ederek tümör büyümesini seçici olarak inhibe eder ve kanserin ölümünü destekleyen oksidatif stres tarafından süperoksit seviyesinin artmasını sağlar (Mostofa et al., 2021).

2.2. Antikanser bakteriyosinler

Bakteriyosinler, bakteriler ve arkeler tarafından üretilen ve ribozomal olarak sentezlenen peptit yapısındaki moleküllerdir. Bakteriyosinlerin en bilinen özelliği patojen mikroorganizmalara karşı yüksek antimikrobiyal etkiye sahip olmasıdır. Bu özelliği nedeniyle bakteriyosinler veya bakteriyosin üreten mikroorganizmalar gıda endüstrisinde yaygın olarak kullanılmaktadır (Dobson et al., 2012; O'Connor et al., 2020). Literatürde, antimikrobiyal etkinliğinin yanında bakteriyosinlerin antikanser etkinliğe de sahip olduğu belirtilmektedir (Kaur and Kaur, 2015). Bakteriyosinlerin, antikanser etkisi esas olarak kanser hücrelerine bağlanma potansiyellerinin yüksek olmasından kaynaklanmaktadır. Normal memeli hücrelerinin çift katmanlı fosfolipid zarı, fosfolipidlerin iç ve dış yüzeydeki dağılımına göre asimetriktir. Dış yüzey, sfingomiyelin ve fosfatidilkolin gibi nötr kolin içeren zwitter-iyonik fosfolipidlerden oluşurken, iç yüzey fosfatidilserin ve fosfatidiletanolamin gibi aminofosfolipidlere sahiptir. Ancak kanser hücrelerinin bu asimetrik yapısında kayıp meydana gelmiştir. Kanser hücre zarının, yüksek seviyelerde anyonik fosfatidilserin, O-glikosillenmiş müsinler, sialile edilmiş gangliosidler ve heparin sülfatlar nedeniyle ağırlıklı olarak negatif bir yük taşıdığı

bilinmektedir. Bakteriyosinler de, doğası gereği katyonik özellikte olduğundan dolayı, nötr yapıdaki normal hücre zarlarının aksine, kanser hücrelerinin negatif yüklü hücre zarına tercihli olarak bağlanmaktadır (Kaur and Kaur, 2015; Baindara et al., 2018; Lin et al., 2021). İkinci olarak, kanser hücreleri, normal hücrelere göre daha yüksek membran akışkanlığına sahip olduğu için bakteriyosinler kanser hücrelerinin zarlarında daha fazla destabilizasyonuna neden olmaktadır. Üçüncü olarak da, kanser hücrelerinin zarları kanser hücrelerinin yüzey alanını artıran mikrovillusları daha fazla sayıda içerdiği için bakteriyosinler normal hücrelere oranla kanser hücre zarlarına daha fazla bağlanmaktadır (Kaur and Kaur, 2015).

Antikanser potansiyele sahip olan bakteriyosinlere; kolisin, bovisin, nisin, pediosin, plantarisin, pyosin, mikrosin E492 ve Laterosporulin10 örnek gösterilmektedir (Baindara et al., 2017; Karpiński and Adamczak, 2018). *Klebsiella pneumoniae'* den elde edilen mikrosin E492' nin lösemi, serviks ve kolon kanseri, *Pediococcus acidilactici'*den elde edilen pediosin PA-1' in akciğer ve kolon kanseri, *Esherichia coli*' den elde edilen kolisin E1' in meme kanseri (MCF7, ZR75, BT549, BT474, MDA-MB-231, SKBR3 ve T47D), osteosarkoma (HOS), leiomyosarkoma (SKUT-1) ve fibrosarkoma (HS913T) hücre hatlarına *Brevibacillus* sp.' den elde edilen Laterosporulin10 (S10)' un MCF-7, HEK293T, HT1080, HeLa ve H1299 hücre hatlarına, *Enterococcus thailandicus*' dan elde edilen LNS18' in HepG2 hücre hattına, *Lactococcus lactis*' den elde edilen nisin' in SW480 hücre hattına ve *Streptococcus bovis*' den elde edilen bovicin HC5' in MCF-7 ve HepG2 hücre hatlarına karşı antikanser etki gösterdiği tespit edilmiştir (Chumchalova and Smarda 2003; Paiva et al., 2012; Ahmadi et al., 2017; Baindara et al., 2017; Karpiński and Adamczak, 2018; Al-Madboly et al., 2020).

2.3. Antikanser toksinler

Bakteri kaynaklı toksinler protein ya da peptit yapısında olup bunların bazıları terapötik amaçlar için kullanılmaktadır. Antikanser potansiyele sahip olan önemli bakteriyal toksinlere difteria toksin, ekzotoksin A, botulinum toksin ve Listeriolysin O örnek gösterilmektedir. Botulinum toksin *Clostridium botulinum*' dan, difteria toksin *Corynebacterium diphtheriae*' dan, ekzotoksin A *Pseudomonas aeruginosa*' dan ve Listeriolysin O *Listeria monocytogenes*' den elde edilmektedir.

Özellikle, difteri toksini ve ekzotoksin A kanser hücre yüzeylerindeki antijenlere spesifik olarak bağlanma potansiyeline sahiptir (Karpiński and Adamczak, 2018; Trivanović et al., 2021). Botulinum toksin' in prostat ve nöroblastoma kanser hücre hatlarına, difteria toksin glioblastoma, T hücre lenfoma, meme ve serviks adenokarsinom hücre hatlarına karşı antikanser potansiyele sahip olduğu açıklanmaktadır (Zahaf and Schmidt, 2017; Karpiński and Adamczak, 2018). Hatta, difteri toksinlerinden bazılarının (Denileukin Diftitox ve Tagraxofusp SL-401) kanser tedavisinde kullanımı FDA tarafından onaylanmış, bazılarının (Tf-CRM107, DAB389EGF ve UCHT1) antikanser potansiyeli ise klinik deney (faz I-III) aşamasındadır. Benzer şekilde, *Pseudomonas* toksinlerinin de bazıları (Moxetumomab, Oportuzumabmonotox ve SS1P) faz I-III aşamasında test edilmektedir (Karpiński and Adamczak, 2018).

2.4. Antikanser aktiviteli antibiyotikler

Bakteri veya fungal antibiyotikler patojen mikroorganizmaların kontrolünde yaygın bir şekilde kullanılmaktadır. Ancak, literatürde bakteri kaynaklı bazı moleküllerin (aktinomisin D, bleomisin, doxorubisin ve mitomisin C) sadece antimikrobiyal aktivite değil aynı zamanda antikanser potansiyele de sahip olduğu rapor edilmektedir (Bhattacharya and Mukherjee, 2015; Mizuno, 2019). Aktinomisin D, hem DNA hem de RNA ekspresyonunu ve bunun sonucunda da protein sentezini bloke eder. Apoptoz üzerindeki etki mekanizması ise hücresel p53'ten bağımsızdır. Bleomisin, DNA'ya ve Fe(II)'ya bağlanır, moleküler oksijenin etkisi altında hidroksil radikalleri salınımını uyarır ve bunun sonucunda DNA hasarına ve Fe(II) oksidasyonuna neden olur. Mitomisin, DNA'ya bağlanarak DNA sentezini inhibe eder. Doxorubisin, DNA zincirlerinin baz çiftleri arasındaki interkalasyon ve replikasyon ve transkripsiyon işlemlerini bloke ederek hızlı büyüyen hücrelerde DNA ve RNA sentezini inhibe eder. Bu molekül demir aracılı serbest radikal üretme yoluyla hücre zarlarında, proteinlerde ve DNA'da oksidatif hasara neden olurlar (Thorn et al., 2011; Cagel et al., 2017; Farhane et al., 2018). *Actinomyces antibioticus*' dan elde edilen Aktinomisin D (dactinomycin) Ewing sarkoma ve nöroblastoma, *Streptomyces verticillus'*dan elde edilen bleomisin' in Hodgink lenfoma, testis ve

ovaryum kanseri, *S. peucetius'*dan elde edilen doxorubisin' in meme, nöroblastoma, ovaryum, lenfoma, lösemi, mide ve tiroid kanseri, *S. caespitosus'* dan elde edilen mitomisin C akçiğer, meme, serviks, mide, pankreas, melanom, safra ve kolon kanserlerinin tedavisinde kullanılmaktadır (Kaur and Kaur, 2015, Karpiński and Adamczak, 2018).

2.5. Antikanser özellikli ribozomal olmayan (non-ribosomal) peptitler

Ribozomal olmayan peptitler, yalnızca bakteri, siyanobakteri ve mantarlarda bulunan bir enzim kompleksi tarafından sentezlenen sekonder metabolitlerdir. Bu peptitler, d-amino asitler, N-terminal pozisyonlu yağ asidi zincirleri, N- ve C-metillenmiş rezidüler, N-formile edilmiş rezidüler, heterosiklik halkalar, glikosile edilmiş amino asitler ve fosforile edilmiş residüler gibi birçok ilginç kimyasal yapı içermektedirler (Sieber and Marahiel, 2003; Agrawal et al., 2017). Bakteri kökenli ribozomal olmayan antikanser peptitlere arenamidler, ariakemisin, halolitoralin, lajollamisin, lusentamisin, mechercharmisin A, mixirin, padanamid, piperazimisin, proximisin, urukthapelstatin ve halolitoralin örnek verilmektedir (Karpiński and Adamczak, 2018). Örneğin, Arenamidler *Salinispora arenicola*' dan, ariakemisinler *Rapidithrix sp*' den, halolitoralinler *Halobacillus litoralis'* den, lajollamisin *Streptomyces nodosus*' dan, lusentamisin *Nocardiopsis lucentensis*' den, mechercharmisin A *Thermoactinomyces* sp.' den urukthapelstatin *Mechercharimyces asporophorigenens*'den ve proximisin *Verrucosispora* sp.' den elde edilmektedir (Yang et al., 2002; Manam et al., 2005; Kanoh et al., 2005; Cho et al., 2007; Matsuo et al., 2007; Oku et al., 2008; Fiedler et al., 2008; Asolkar et al., 2009). Arenamid kolon, halolitoralin mide, proximisin mide ve meme, urukthapelstatin akciğer ve ovaryum, mechercharmisin A ise akçiğer ve lösemi kanserlerine karşı etkili olmaktadır (Karpiński and Adamczak, 2018).

SONUÇ

Bakteriler, farklı biyolojik aktivitelere sahip moleküllerin doğal kaynağıdır. Bakteri kaynaklı bazı bakteriyosinler, toksinler, enzimler, non-ribozomal peptitler ve antibiyotikler anti-kanser aktiviteye göstermektedir. Bu moleküllerin bazıları halihazırda FDA onayı altında kanser tedavisinde kullanılmaktadır. Bazıları ise klinik deney aşamasındadır.

KAYNAKÇA

Agrawal, S., Acharya, D., Adholeya, A., Barrow, C. J., & Deshmukh, S. K. (2017). Nonribosomal peptides from marine microbes and their antimicrobial and anticancer potential. Frontiers in Pharmacology, 8, 828.

Ahmadi, S., Ghollasi, M., & Hosseini, H. M. (2017). The apoptotic impact of nisin as a potent bacteriocin on the colon cancer cells. Microbial pathogenesis, 111, 193-197.

Al-Madboly, L. A., El-Deeb, N. M., Kabbash, A., Nael, M. A., Kenawy, A. M., & Ragab, A. E. (2020). Purification, characterization, identification, and anticancer activity of a circular bacteriocin from Enterococcus thailandicus. Frontiers in bioengineering and biotechnology, 450.

Andryukov, B., Mikhailov, V., & Besednova, N. (2019). The biotechnological potential of secondary metabolites from marine bacteria. Journal of Marine Science and Engineering, 7(6), 176.

Asolkar, R. N., Freel, K. C., Jensen, P. R., Fenical, W., Kondratyuk, T. P., Park, E. J., & Pezzuto, J. M. (2009). Arenamides A− C, cytotoxic NFκB inhibitors from the marine actinomycete Salinispora arenicola. Journal of natural products, 72(3), 396-402.

Baindara, P., Gautam, A., Raghava, G. P. S., & Korpole, S. (2017). Anticancer properties of a defensin like class IId bacteriocin Laterosporulin10. Scientific reports, 7(1), 1-9.

Baindara, P., Korpole, S., & Grover, V. (2018). Bacteriocins: perspective for the development of novel anticancer drugs. Applied microbiology and biotechnology, 102(24), 10393-10408.

Bhattacharya, B., & Mukherjee, S. (2015). Cancer therapy using antibiotics. Journal of Cancer Therapy, 6(10), 849.

Cagel, M., Grotz, E., Bernabeu, E., Moretton, M. A., & Chiappetta, D. A. (2017). Doxorubicin: nanotechnological overviews from bench to bedside. Drug discovery today, 22(2), 270-281.

Carpine, R., & Sieber, S. (2021). Antibacterial and antiviral metabolites from cyanobacteria: their application and their impact on human health. Current Research in Biotechnology, 3, 65-81.

Chen, L., Zhang, Q. Y., Jia, M., Ming, Q. L., Yue, W., Rahman, K., ... & Han, T. (2016). Endophytic fungi with antitumor activities: Their occurrence and anticancer compounds. Critical reviews in microbiology, 42(3), 454-473.

Cho, J. Y., Williams, P. G., Kwon, H. C., Jensen, P. R., & Fenical, W. (2007). Lucentamycins A− D, cytotoxic peptides from the marine-derived actinomycete Nocardiopsis lucentensis. Journal of natural products, 70(8), 1321-1328.

Chumchalová, J., & Šmarda, J. (2003). Human tumor cells are selectively inhibited by colicins. Folia microbiologica, 48(1), 111-115.

Dobson, A., Cotter, P. D., Ross, R. P., & Hill, C. (2012). Bacteriocin production: a probiotic trait?. Applied and environmental microbiology, 78(1), 1-6.

El-Naggar, N. E., El-Ewasy, S. M., & El-Shweihy, N. M. (2014). Microbial L-asparaginase as a potential therapeutic agent for the treatment of acute lymphoblastic leukemia: the pros and cons. Int J Pharmacol, 10(4), 182-199.

Farhane, Z., Bonnier, F., & Byrne, H. J. (2018). An in vitro study of the interaction of the chemotherapeutic drug Actinomycin D with lung cancer cell lines using Raman micro-spectroscopy. Journal of Biophotonics, 11(1), e201700112.

Felício, M. R., Silva, O. N., Gonçalves, S., Santos, N. C., & Franco, O. L. (2017). Peptides with dual antimicrobial and anticancer activities. Frontiers in chemistry, 5, 5.

Fiedler, H.-P.; Bruntner, C.; Riedlinger, J.; Bull, A.T.; Knutsen, G.; Goodfellow, M.; Jones, A.; Maldonado, L.; Pathom-aree, W.; Beil, W.; et al. Proximicin A, B and C, novel aminofuran antibiotic and anticancer compounds isolated from marine strains of the actinomycete *Verrucosispora*. *J. Antibiot.* **2008**, *61*, 158–163.

Kanoh, K., Matsuo, Y., Adachi, K., Imagawa, H., Nishizawa, M., & Shizuri, Y. (2005). Mechercharmycins A and B, cytotoxic substances from marine-derived Thermoactinomyces sp. YM3-251. The Journal of antibiotics, 58(4), 289-292.

Karpiński, T. M., & Adamczak, A. (2018). Anticancer activity of bacterial proteins and peptides. Pharmaceutics, 10(2), 54.

Kaur, S., & Kaur, S. (2015). Bacteriocins as potential anticancer agents. Frontiers in pharmacology, 6, 272.

Keating, G. M. (2013). Asparaginase Erwinia chrysanthemi (Erwinaze®): A guide to its use in acute lymphoblastic leukemia in the USA. BioDrugs, 27(4), 413-418.

Kornienko, A., Evidente, A., Vurro, M., Mathieu, V., Cimmino, A., Evidente, M., ... & Kiss, R. (2015). Toward a cancer drug of fungal origin. Medicinal research reviews, 35(5), 937-967.

Koul, B. (2020). Herbs for cancer treatment. Springer Nature.

Kumar Jain, C., Kumar Majumder, H., & Roychoudhury, S. (2017). Natural compounds as anticancer agents targeting DNA topoisomerases. Current genomics, 18(1), 75-92.

Lin, L., Chi, J., Yan, Y., Luo, R., Feng, X., Zheng, Y., ... & Pan, X. (2021). Membrane-disruptive peptides/peptidomimetics-based therapeutics: Promising systems to combat bacteria and cancer in the drug-resistant era. Acta Pharmaceutica Sinica B, 11(9), 2609-2644.

Mahajan, R. V., Saran, S., Saxena, R. K., & Srivastava, A. K. (2013). A rapid, efficient and sensitive plate assay for detection and screening of l-asparaginase-producing microorganisms. FEMS microbiology letters, 341(2), 122-126.

Manam, R. R., Teisan, S., White, D. J., Nicholson, B., Grodberg, J., Neuteboom, S. T., ... & Potts, B. C. (2005). Lajollamycin, a Nitro-tetraene Spiro-β-lactone-γ-lactam Antibiotic from the Marine Actinomycete Streptomyces n odosus. Journal of natural products, 68(2), 240-243.

Matsuo,Y.;Kanoh,K.;Yamori,T.;Kasai,H.;Katsuta,A.;Adachi,K.;Shin-Ya,K.;Shizuri,Y.Urukthapelstatin A, a novel cytotoxic substance from marine-derived *Mechercharimyces asporophorigenens* YM11-542. I. Fermentation, isolation and biological activities. *J. Antibiot.* **2007**, *60*, 251–255.

Mizuno, S. (2019). Hyperthermia Enhancement of the Cytotoxicity of Antitumor Antibiotics. Hyperthermia In Cancer Treatment: Volume 1.

Mostafa, Y. S., Alamri, S. A., Alfaifi, M. Y., Alrumman, S. A., Elbehairi, S. E. I., Taha, T. H., & Hashem, M. (2021). L-glutaminase synthesis by marine Halomonas meridiana isolated from the red sea and its efficiency against colorectal cancer cell lines. Molecules, 26(7), 1963.

Muneer, F., Siddique, M. H., Azeem, F., Rasul, I., Muzammil, S., Zubair, M., ... & Nadeem, H. (2020). Microbial L-asparaginase: purification, characterization and applications. Archives of Microbiology, 202(5), 967-981.

O'Connor, P. M., Kuniyoshi, T. M., Oliveira, R. P., Hill, C., Ross, R. P., & Cotter, P. D. (2020). Antimicrobials for food and feed; a bacteriocin perspective. Current opinion in biotechnology, 61, 160-167.

Oku, N., Adachi, K., Matsuda, S., Kasai, H., Takatsuki, A., & Shizuri, Y. (2008). Ariakemicins A and B, novel polyketide-peptide antibiotics from a marine gliding bacterium of the genus Rapidithrix. Organic letters, 10(12), 2481-2484.

Paiva, A. D., de Oliveira, M. D., de Paula, S. O., Baracat-Pereira, M. C., Breukink, E., & Mantovani, H. C. (2012). Toxicity of bovicin HC5 against mammalian cell lines and the role of cholesterol in bacteriocin activity. Microbiology, 158(11), 2851-2858.

Pandian, S. R. K., Deepak, V., Sivasubramaniam, S. D., Nellaiah, H., & Sundar, K. (2014). Optimization and purification of anticancer enzyme L-glutaminase from Alcaligenes faecalis KLU102. Biologia, 69(12), 1644-1651.

Piątkowska-Jakubas, B., Krawczyk-Kuliś, M., Giebel, S., Adamczyk-Cioch, M., Czyż, A., Lech-Marańda, E., ... & Hołowiecki, J. (2008). Use of L-asparaginase in acute lymphoblastic leukemia: recommendations of the Polish Adult Leukemia Group. Polskie Archiwum Medycyny Wewnętrznej= Polish Archives of Internal Medicine, 118(11).

Pieters, R., Hunger, S. P., Boos, J., Rizzari, C., Silverman, L., Baruchel, A., ... & Pui, C. H. (2011). L-asparaginase treatment in acute lymphoblastic leukemia: a focus on Erwinia asparaginase. Cancer, 117(2), 238-249.

Pratt, W. B. (1994). The anticancer drugs. Oxford University Press, USA.

Pulsipher, M. A., Peters, C., & Pui, C. H. (2011). High-risk pediatric acute lymphoblastic leukemia: to transplant or not to transplant?. Biology of Blood and Marrow Transplantation, 17(1), S137-S148.

Saini, A., Kumar, M., Bhatt, S., Saini, V., & Malik, A. (2020). Cancer causes and treatments. Int J Pharm Sci & Res, 11(7), 3121-34.

Sharifi-Rad, J., Ozleyen, A., Boyunegmez Tumer, T., Oluwaseun Adetunji, C., El Omari, N., Balahbib, A., ... & C Cho, W. (2019). Natural products and synthetic analogs as a source of antitumor drugs. Biomolecules, 9(11), 679.

Siddik, Z. H. (2002). Mechanisms of action of cancer chemotherapeutic agents: DNA-interactive alkylating agents and antitumour platinum-based drugs. The cancer handbook, 1.

Sieber, S. A., & Marahiel, M. A. (2003). Learning from Nature's Drug Factories: Nonribosomal Synthesisof MacrocyclicPeptides. Journal of bacteriology, 185(24), 7036-7043.

Singh, P., & Banik, R. M. (2013). Biochemical characterization and antitumor study of L-glutaminase from Bacillus cereus MTCC 1305. Applied biochemistry and biotechnology, 171(2), 522-531.

Sun, J., Wei, Q., Zhou, Y., Wang, J., Liu, Q., & Xu, H. (2017). A systematic analysis of FDA-approved anticancer drugs. BMC systems biology, 11(5), 1-17.

Thorn, C. F., Oshiro, C., Marsh, S., Hernandez-Boussard, T., McLeod, H., Klein, T. E., & Altman, R. B. (2011). Doxorubicin pathways: pharmacodynamics and adverse effects. Pharmacogenetics and genomics, 21(7), 440.

Tomblyn, M. B., Arora, M., Baker, K. S., Blazar, B. R., Brunstein, C. G., Burns, L. J., ... & Weisdorf, D. J. (2009). Myeloablative hematopoietic cell transplantation for acute lymphoblastic leukemia: analysis of graft sources and long-term outcome. Journal of Clinical Oncology, 27(22), 3634.

Trivanović, D., Pavelić, K., & Peršurić, Ž. (2021). Fighting Cancer with Bacteria and Their Toxins. International Journal of Molecular Sciences, 22(23), 12980.

Tsai, C. C., Lin, P. P., Hsieh, Y. M., Zhang, Z. Y., Wu, H. C., & Huang, C. C. (2014). Cholesterol-lowering potentials of lactic acid bacteria based on bile-salt hydrolase activity and effect of potent strains on cholesterol metabolism in vitro and in vivo. The Scientific World Journal, 2014.

Vora, A., Andreano, A., Pui, C. H., Hunger, S. P., Schrappe, M., Moericke, A., ... & Valsecchi, M. G. (2016). Influence of cranial radiotherapy on outcome in children with acute lymphoblastic leukemia treated with contemporary therapy. Journal of Clinical Oncology, 34(9), 919.

Yang, L., Tan, R. X., Wang, Q., Huang, W. Y., & Yin, Y. X. (2002). Antifungal cyclopeptides from Halobacillus litoralis YS3106 of marine origin. Tetrahedron letters, 43(37), 6545-6548.

Zahaf, N. I., & Schmidt, G. (2017). Bacterial toxins for cancer therapy. Toxins, 9(8), 236.

TERMAL KAMERANIN (TERMOGRAFİ) BOĞALARDA KULLANIMI

USING THE THERMAL CAMERA (THERMOGRAPHY) IN BULLS

Dr. Emre DEMİRCİ

Küre Tarım ve Orman İlçe Müdürlüğü

ORCID NO: 0000-0002-3558-1760

ÖZET

Gelişen teknoloji ve biyoteknolojiler hayvanlarda kullanılan tanı ve teşhis metotlarının da yenilikçi uygulamalarını geliştirmektedir. Hayvanlarda tanı ve teşhisteki en büyük zorluk hayvanların genel durumuna ilişkin bilgilerin hayvanlara herhangi bir işlem yapılmadan öğrenilememesidir. Termal kameradan (Termografi) elde edilen görüntü vücut yüzeyinin sıcaklığının ölçülmesine, bazı bölge veya noktalardaki sıcaklık artış veya azalışlarının belirlenmesiyle bölgenin veya noktanın fizyolojik veya patolojik kökeninin teşhisine yardımcı olabilmektedir. İnvaziv olmayan testler hayvanlara müdahaleye gerek duyulmamasından dolayı stresi azaltabilir. Termografi veteriner alanında günlük kullanımdan teşhise kadar uzanan geniş bir alanda kullanılabilmektedir. Büyükbaş, küçükbaş, tek tırnaklılar, domuz ve vahşi hayvanlar gibi çok çeşitli hayvan türlerinde kullanılabilir. Hayvanlarda çeşitli teşhis ve tanı metotları için termografi kullanılmaktadır. Sığırlarda östrus tespiti ve gebelik durumlarında kullanılmaktadır. Boğalarda ise termal kamera genellikle testiküler termoregülasyon mekanizmasının tespit edilmesi çalışmalarında kullanılmıştır. Kan damarlarının rolü ve bunların skrotum ve testis sıcaklıkları ile ilişkisi yapılan çalışmalarla bildirilmiştir. Termal kamera ölçümlerinde alınan sıcaklık gradyanlarının doğrudan kan damarlarıyla ilgili olduğu sonucuna varılmıştır. Sistemik enfeksiyon, kriptorşidizm ve testis anomalileri gibi çeşitli sebeplerin neden olduğu skrotal ısının yükselmesi ya da şiddetli soğuğa maruz kalınmasıyla testiste dejenerasyonlar meydana gelmektedir. Böyle bir durumda testiste meydana gelen dejenerasyonlar direk olarak sperma üretimine (spermatogenezis) negatif etki yapmaktadır. Testis termoregülasyonunun bozulması sonucu ortaya çıkabilecek patolojik bir durumun hayvanda infertiliteye neden olabileceği unutulmamalıdır. Hem ortamın hem de testis ısısının artması, normal sperm yüzdesini olumsuz yönde etkileyebilmektedir. Bu derlemenin amacı boğalarda termal kamera ile ölçülen testis ve skrotum gradyanlarının sıcaklık değerlerinin spermatolojik parametrelere etkisinin olup olmadığı bilgisini araştırmak ve ortaya koymaktır.

Anahtar Kelime: Termal Kamera, Testis, Fertilite

ABSTRACT

Developing technology and biotechnologies also develop innovative applications of diagnosis and diagnosis methods used in animals. The biggest difficulty in the diagnosis of diseases in animals is the inability to learn information about the general condition of animals without any action on the animals. The image obtained from the thermal camera (Thermography) can help to measure the temperature of the body surface and to diagnose the physiological or pathological origin of the region or point by determining the temperature increase or decrease in some regions or points. Non-invasive testing can reduce stress by not requiring animal intervention. Thermography can be used in a wide area ranging from daily use to diagnosis in the veterinary field. It can be used in a wide variety of animal species such as bovine, ovine, equine, pig and wild animals. Thermography is used for various diagnostic and diagnostic methods in animals. It is used for estrus detection and pregnancy in cattle. In bulls, the thermal camera was generally used in studies to determine the testicular thermoregulation mechanism. The role of blood vessels and their relationship with scrotum and testicular temperatures have been reported in studies. It was concluded that the temperature gradients taken in the thermal camera measurements are directly related to the blood vessels. Testicular degenerations occur due to increased scrotal temperature or exposure to severe cold caused by various causes such as systemic infection, cryptorchidism and

testicular anomalies. In such a case, degenerations in the testis directly affect sperm production (spermatogenesis) negatively. It should not be forgotten that a pathological condition that may arise as a result of disruption of testicular thermoregulation may cause infertility in the animal. The increase in both the environment and testicular temperature can negatively affect the percentage of normal sperm. The aim of this review is to investigate whether the temperature values of testes and scrotum gradients measured by the thermal camera have an effect on spermatological parameters in bulls.

Keywords: Thermal Camera, Testicle, Fertility

GİRİŞ

Termal kamera (Termografi) kızılötesi görüntülemenin bir çeşididir. Termografik kameralar elektromanyetik spektrumun kızılötesi bölümündeki elektromanyetik ışınımı tespit ederler ve bu ışınımdan resimler oluştururlar. Termografi temasın ve tahribatın olmadığı digital bir test yöntemidir. Bu yöntemle termal bir kamera yardımıyla bir objenin belirli bir derinliğine kadar termal yapısı hakkında bilgi edinilebilir. Termografide bir termal kamera ile bir madde üzerindeki termal kontrastlar belirlenmekte, elde edilen bilgiler bilgisayara aktarılmakta ve bir yazılımla değerlendirilmektedir.

Termografide kullanılan termal kamera ile bir objeden yayılan termal enerjinin görülüp, ölçülebilmesinin olanağı vardır. Termal kameralar görüntü ışığını kullanan genel kameralara benzer bir şekilde infrared radyasyonunu kullanarak görüntüleri elde eden bir kamera türüdür. Normal bir kameranın algıladığı dalga boyu 450 – 750 µm aralığındayken, termal kameralar 14,000 µm dalga boyunda çalışırlar. Termografi yaklaşık 1800'lü yıllarda kullanılmaya başlamış günümüzde tarımdan sanayiye birçok alanda kullanılan bir yöntemdir (Meola and Carlomagno, 2004; Güller, 2005).

Termal kamera son yıllarda özellikle tıp alanında uygulanmaya başlanmıştır. Termografi vücut yüzeyi ile temas etmeyen, ağrısız, radyasyonsuz, bireysel de kullanılabileceği gibi toplu taramaya da izin veren bir çeşit görüntü muayenesidir. Termografik görüntüleme protokolünün kullanılmasıyla bazı spesifik patolojik durumların belirlenmesi sağlanmaktadır. Veteriner alanında günlük izlemeden teşhise kadar uzanan geniş bir kullanım alanında kullanılmaktadır.

Termografinin diğer metotlara göre ağrısız-noninvaziv bir muayene olması ve temasa gerek olmaması, farklı bölgeler arasında karşılaştıran iki boyutlu görüntü sağlaması ve incelenen vücutta herhangi bir etki yapmaması nedeniyle güvenle kullanılabilinir (Gade and Moeslund, 2014). Termal kamera hayvanlar üzerinde farklı amaçlarla kullanılabilir;

1. Simetrik iki bölge arasındaki 1°C farkın aktif bir inflamasyonun varlığını gösterebileceğinden tanısal bir görüntüleme testi olarak;

2. Hayvan refahı çalışmalarında hayvanların önceden belirlenmiş ölçüde düzenli izlenmesi;

3. Klinik tablodan ortalama iki hafta önce sıcaklık artışı ile ilerleyen subklinik formdaki durumları saptamak için kullanılabilir. Termal kamera hayvanları direk etkileyebilecek güneş ışığı ve rüzgarın olmadığı ortamlarda kullanılmalıdır. Kalibrasyonu ölçümün yapılacağı günde ortam sıcaklığında yapılmalıdır (Kunç et al., 2007).

Termal kameranın insan androlojisinde 1980'lerde kullanılmaya başlanmasıyla veteriner alanının da termal kameraya ilgisi artmıştır. Yapılan ilk araştırmalar termal kameranın boğalarda testis termoregülasyonunu incelemek için kullanılabileceğini ve 0.01°C doğrulukla kızılötesi emisyonlara dayalı bir görüntü sağlayabileceğini gösterdi (Coulter, 1988). Yapılan çalışmalar skrotumun yüzey sıcaklığının skrotumun sıcaklığıyla pozitif korelasyon içinde olduğunu bildirmiştir. Araştırmacılar testiküler parankimi ve termal görüntülemenin testiküler termoregülasyon hakkında doğru bilgiler verdiğini bildirmiştirler (Kastelic et al., 2001; Lunstra and Coulter, 1997).

Testislerde ölçümü yapılan yüzey sıcaklıkları 5 (beş) ana başlıkta toplanabilir (Kahwage, 2015; Menagassi et. al., 2015).

1. Spermatik Kordun Ortalama Sıcaklığı

2. Testisin Proksimal Kutup Sıcaklığı

3. Testisin Distal Kutup Sıcaklığı

4. Epididimal Kuyruk Sıcaklığı

5. Skrotal Sıcaklık (Minimum, Maksimum ve ortalama)

Termoregülasyonunda randıman eksikliği olan testislerde, sıcaklık artışı, artan skrotal yüzey sıcaklığı ve testis iç sıcaklığı ile ilişkilidir. Bu ilişki sonuç olarak sperm kalitesini düşürür (Berry et al., 2011; Kastelic, 2014)

Koçlarda yapılan bir çalışmada egzersiz ve ateş sırasında vücut sıcaklığındaki büyük değişikliğe rağmen skrotumun sıcaklığının sabit olarak korunduğu bildirilmiştir. Bu sıcaklık korunmasının vücut iç sıcaklığının uyardığı tunica dartos kas aktivitesi tarafından kontrol edildiği tahmin edilmiştir (Maloney and Mitchell, 1996). Waites 1991 de yaptığı çalışmada koçlarda skrotal deri sıcaklığını 32 °C civarındaki normal değerinden 35-36 °C yükseltilmesiyle kırkılmamış koçlarda solunum hızının dakikada 200'ü aşan polipneik bir tepki oluşturmuştur. Uzun süre nefes nefese kalma durumunun da vücut sıcaklığında 2 °C ye kadar keskin bir düşüşe yol açtığını bildirmişlerdir. Skrotal cilt sıcaklığı 35 °C üzerine çıkarıldığında skrotumun ter bezleri eş zamanlı olarak 2-14 dakika aralıklarla ter atar. Terin buharlaşması cilt sıcaklığında 2,6 °C ye kadar keskin düşüşlere neden olduğunu görmüşlerdir. Nefes alma gibi genel refleks tepkilerini başlatan kutanöz reseptörlerin, nöral adrenerjik bir mekanizma yoluyla lokal ve refleks terlemeyi de başlattığı sonucuna varılmıştır. Iggo (1969) skrotumun kutanöz reseptörlerinin diğer cilt bölgelerinden daha fazla olduğunu, 35 ila 45 °C aralığındaki sıcaklıklar tarafından uyarılan ılık reseptörler ve 13 ila 33 °C arasındaki skrotal sıcaklıklar tarafından uyarılan soğuk reseptörler olarak iki farklı popülasyondan oluştuğunu bildirmiştir. Boğalarda yapılan bir çalışmada skrotal deri altı sıcaklıkları ısı stresi sonrasında 2-2,5 °C yükselmiştir. Artan bu sıcaklık sperma motilitesini düşürmüştür. Benzer şekilde morfolojik olarak normal ve akrozom bütünlüğü de önemli bir şekilde azalmıştır (Shahat et al., 2021). Menegassi et al. (2014) yaptıkları çalışmada kızılötesi termografinin, testis gradyanlarını ve bunun spermin fiziksel ve nicel yönleri üzerindeki sonuçlarını değerlendirmek için dolaylı bir yöntem olarak benimsenebileceği sonucuna vardığını bildirmişlerdir. Silva et al. (2017) yılında yapmış oldukları çalışmada skrotal yüzey sıcaklığının androlojik değerlendirmelerde testisleri anlamak için kullanılan hızlı, doğru ve noninvaziv bir yöntem olabileceğini bildirmişlerdir.

SONUÇ

Testis sıcaklığının vücut sıcaklığından 4-6 °C daha düşük olması testiste gerçekleşen spermatogenezisin sekteye uğramaması için elzem bir gerekliliktir. Testisin sıcaklığının vücut sıcaklığından düşük olmasını sağlanmak amacıyla çeşitli vücut mekanizmaları görev almaktadır. Bu mekanizmaların çeşitli sebeplerle fonksiyonlarını yitirmesi nedeniyle testis sıcaklığı vücut sıcaklığına yakın bir derecede kalabilir. Bu da doğrudan spermatogenezisi etkilemektedir. Termal kamera (Termografi) ile yapılacak olan sıcaklık ölçümleri testis termoregülasyonu hakkında hayvanların yaşamının her anında bize bilgiler sunmaya yardımcı olmaktadır. Özellikle boğalarda kesim öncesi alınacak veriler testislerin kullanılıp kullanılmaması hakkında ön bilgi edinmemizi sağlayacaktır. İnvaziv olmayan bu uygulamada yapılacak çalışmaların arttırılarak veri standardizayonu sağlanması boğa androlojisinde kullanılabilecek bir yöntem olabileceği düşüncesini arttırmaktadır.

KAYNAKÇA

Berry, D. P., Evans R. D. and Parland, S. Mc. 2011. Evaluation of bull fertility in dairy and beef cattle using cow field data. Theriogenology. 75; 172–181.

Coulter, G.H. 1988. Thermography of bull testes. Proc 12th Technical Conference on artificial insemination and reproduction, Milwaukee, WI, 22-23 April, National Association of Animal Breeders, Columbia, MO, p.58-62.

Gade, R. and Moeslund, T.B. 2014 Thermal cameras and applications: A survey. Mach. Vision Appl, v.25, p.245-262.

Güller, B. 2005. Koruma Altına Alınan Dikili Haldeki Ağaçların İç Kısımlarında Oluşan Çürüme Ve Boşlukların Termografi İle Belirlenmesi. Korunan Doğal Alanlar Sempozyumu 409-414.

Iggo, A. 1969. Cutaneous thermoreceptors in primates and sub-primates. J. Physio!., 200: 403-415.

Kahwage, P. R. (2015). *Respostas termolíticas e qualidade seminal de ovinos naturalizados criados em ambiente tropical*. Belém: Universidade Federal do Pará.

Kastelic, J.P, Cook, R.B, Pierson, R.A. and Coulter, G.H. 2001. Relationships among scrotal and testicular characteristics, sperm production, and seminal quality in 129 beef bulls. Can J Vet Res, v.65, p.111-115.

Kastelic, J. P. (2014). Understanding and evaluating bovine testes. Theriogenology, 81, 18–23.

Kunc, P., Knizkova, I., Prikryl, M. and Maloun, J. 2007. Infrared thermography as a tool to study the milking process. Agricultura Tropica et Subtropica, v. 40, n. 1, p. 29-32.

Lunstra, D.D. and Coulter, G.H. 1997. Relationship between scrotal infrared temperature patterns and natural-mating fertility in beef Bulls. J Anim Sci, v.75, p.767-774.

Maloney, S. K. and Mitchell, D. 1996. Regulation of ram scrotal temperature during heat exposure, cold exposure, fever and exercise. Journal of Physiology. 496.2, pp.421-430

Menegassi SRO, Barcellos JOJ, Dias EA, Koet C Jr, Pereira GR, Peripolli V, McManus C, Canozzi MEA, Lopes FG (2014) Scrotal infrared digital thermography as a predictor of seasonal effects on sperm traits in Braford bulls. Int J Biometeorol 59:357–364.

Menegassi, S. R. O., Barcellos, J. O. J., Dias, E. A., Koetz, C. Jr., Pereira, G. R., Peripolli, V. and Lopes, F. G. (2015). Scrotal infrared digital thermography as a predictor of seasonal effects on sperm traits in Braford bulls. *International Journal of Biometeorology*, *59*, 357–364.

Meola, C. and Carlomagno G.M. 2004. Recent advances in the use of infrared thermography. Meas. Sci. Technol. 15, R27-R58

Santos, A. X., Kahwage, P. R., Faturi, C., Quinzeiro Neto, T., Lourenço Junior, J. B., Joele, M. R. S. P. and Garcia, A. R. (2014). Feed supplementation with palm kernel cake-based concentrate increases the quality of water buffalo semen. *Animal Reproduction*, *11*, 85–95.

Shahat, A. M., Thundathil, J. C. and Kastelic J. P. 2021. Scrotal subcutaneous temperature is increased by scrotal insulation or whole-body heating, but not by scrotal neck insulation; however, all three heat-stress models decrease sperm quality in bulls and rams. Journal of Thermal Biology 100, 103064

Silva, L.K.X, Sousa, J.S., Silva A. O. A., Lourenço Junior, J. B., Faturi C., Martorano, L. G., Franco, I. M., Pantoja, M. H. A., Barros, D. V., Garcia, A. R. 2017. Testicular thermoregulation, scrotal surface temperature patterns and semen quality of water buffalo bulls reared in a tropical climate. *Andrologia*.; 00:e12836.

Waites, G. M. H. 1991. Thermoregula Tıon Of The Scrotum And Testıs: Studıes In Anımals And Sıgnıficance For Man. Edited by A. w. Zorgniotti, Plenum Press, New York.

LETHAL EFFECT OF ZN ON THE SPERMATOGENESIS OF MEDICINAL LEECH *HIRUDO TROCTINA* (ANNELIDA, HIRUDINEA) FROM TUNISIA

Ben Ahmed Raja [1] Bouriga Nawzet[1, 2] , FouzaI Farah[1] & Gammoudi Mehrez[1]

[1] University of Tunis El Manar, Faculty of Science of Tunis, Laboratory of Ecology, Biology and Physiology of Aquatic Organisms, 2092, LR18ES41, Tunis, Tunisia.

[2]High institute of Aquaculture and fishing of Bizerte, BP15, 7080 Menzel Jemil, Tunisie

ABSTRACT

This study was designed to investigate histopathologic effects of Zinc on the testes of mature medicinal leeches *Hirudo troctina* from Tunisia. Animals were exposed to 2 doses of zinc for 48h (low dose: 3.4, mg.l-1 and high dose: 6.8 mg.l-1). In low-dose (3.4 $mg.l^{-1}$) treatment group, the junctions between these cells to the anucleated cytoplasmic mass (the cytophore) via cytoplasmic bridges have faded and germ cells show necrotic. In the high dose (6,8 $mg.l^{-1}$) treatment group, the effect was more severe, as a result the number of degenerating cysts increased. Vacuolization and necrosis in germ cells were frequently seen. According to these findings, Zinc caused dose-related histopathological damage in testis of H. troctina and clearly shows that it affects male fertility in the studied leeches.

Key words: *Hirudo troctina*; Zinc; spermatogenic cysts; toxicity

1. INTRODUCTION

Heavy metals and chemical pollutants are very alarming given their toxic effects on animal health. Zn^{2+} is one of the important growth factors and plays a vital role in growth, development and appetite, etc. for fishes and other aquatic organisms **(Al- Weher S, 2008).** However, studies have shown that higher doses and longer exposure are not beneficial, and have toxic effects on aquatic organisms **(Zhou et al, 2002)** and is commonly classified as a metallic trace element (ETM) .The toxic concentrations of Zn vary among aquatic organisms, the exposure time and environmental conditions **(Jackson et al., 2005).** Toxic effects causing mortality, altered physiological activities and reproduction have been recorded in toxicological studies on leeches.

Given their physiological, biological and ecological properties, leeches represent an excellent model for developing ecotoxicological studies and testing the potential of several types of pollutants **(Wicklum & Davies, 1996).** In the aquatic environment, leeches are bioindicators of pollution recommended in monitoring the quality of limnic ecosystems and assessing the risks of contamination due to their high capacity for bioaccumulation of synthetic organic compounds **(Stanislava et al., 2009)**. *Erpobdella* (such as *Erpobdella testacea* and *Erpobdella octoculata*) has also been shown to have a high tolerance for pollution, pesticides, oils, sulfates, while they never tolerate zinc **(Ginsberg, 1998).** Other studies, examining the tolerance of leeches to pollution, have focused on water and sediment pollution, in particular contamination with heavy metals such as copper, mercury, aluminum and cadmium **(Sawyer, 1986; Lapkina et al., 1987; Petrauskiene, 2003).** In Tunisia, toxicological research on leeches in general and on medicinal leeches in particular is almost absent and is limited to the study of the effect of BTEX (a mixture of volatile organic compounds: benzene, toluene, ethylbenzène and xylène) on the gonads of the two freshwater leeches: *Limnatis nilotica* and *Erpobdella johanssoni* recently produced by **Khaled et al., (2016 and 2017).**

The aim of the present study was to determine for the first time the effects of Zn on the spermatogenesis of the African medicinal leech *Hirudo troctina* at short-term exposure.

2. MATERIALS AND METHODS

2.1. Sample collection and exposure conditions

Adult leeches were carefully collected, during their breeding season (May–July), from the Malaabi dam at Menzel Temime (36° 49′ N, 10° 59′ E belonging to Nabeul governorat) in 2019. The Mallabi dam has been included on the RAMSAR convention list since September, 2012 (international treaty for the conservation and sustainable use of wetlands). Leeches were kept for one week at room temperature (20°C) in an aerated glass and fed crushed chicken livers.

To investigate the short-term exposure toxicity of Zn, worms of mass 12 -15g were used for the experiments and with equal amounts of each component, experiments with two concentrations 3,4 mg/L and 6,8 mg/L were run in triplicate (15 leeches per replicate) for 48 hours. A control group of 15 specimens was kept in glass with clean water for 48 hours.

The choice of concentrations was inspired from the results obtained by Petrauskiené (2008) on a species of medicinal leech belonging to the same genus Hirudo (Hirudo verbana) (for more details see Petrauskiené, 2008).

2.2. Histology

After exposure to the pollutants at room temperature, 5 specimens of H. troctina from the two concentrations (3,4 mg/L and 6,8 mg/L) were dissected, and gonads were removed and fixed in Bouin Hollande. Then, they were embedded in paraffin wax, sectioned to 6-µm thickness, and stained with eosin and bleu de toluidin. Photos were taken with a light microscope Leica containing a camera linked to software and a camera Nikon.

3. RESULTS

3.1. Behavioral alteration:

In the present study, behavioural phase of H. troctina was categorized into three phases based on their physical movement and aggressiveness which were changed after certain time interval of their placement in the glass containing Zinc contaminated water.

- primitive phase: during this phase, leeches exposed to both Zn treatments (3,4 mg. L^{-1} and 6.8 mg L^{-1} of Zinc), show a change in their locomotion. In fact, treated leeches show at first an immediate increase in swimming activity, then their movements slowed and became slower. Some were found to be curled up and unable to move at the bottom of the glass (Fig.1).

-Second phase: At the end of the first 24 h, the majority of the specimens exposed to 6.8 mg L^{-1} secreted brown mucus and showed permanent contraction and shortening of the whole body with rolling of the posterior part of the body.

-Last phase: At the end of the experiment and when they were brought back to clean water, the leeches showed a total recovery of their shape and the normal activity of their bodies.

In both treatments tested (3,4 mg. L^{-1} and 6.8 mg L^{-1} of Zinc) , no mortality of leeches occurred. However when returned to clean water, all leeches exhibited total recovery to their normal body shape and activity patterns.

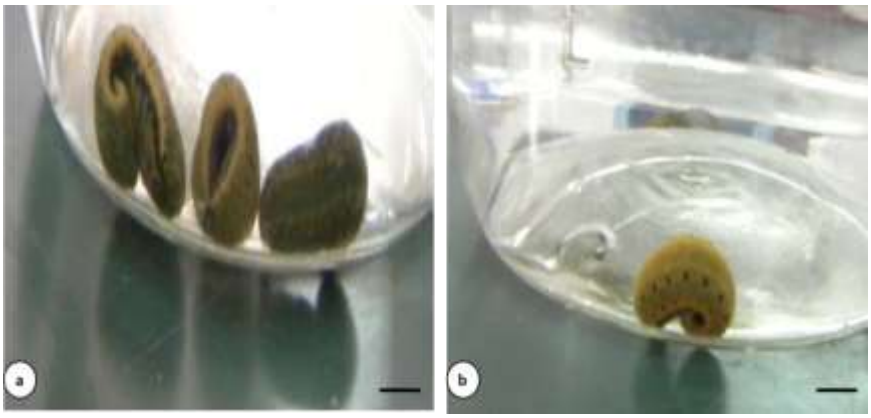


Figure1: Responses of *Hirudo troctina* when exposed to 3,4 mg.L^{-1} and 6,8 mg.$L^{-1}$of Zinc.

(a) Changes in body shape: coiled leeches and unable to move to the bottom of the vials.

(b) Permanent contraction and shortening of the whole body with winding of the posterior part of the body

3.2 Histological analyses

According to light microscopic examinations, spermatogenesis appeared normal in the control group animals (Fig.2a-f), with germ cells in cystic organizations were easily observed (Fig.2a-f).

This investigation showed that zinc treatment caused dose-related histopathologic changes in testes of *H. troctina* which were detected in both concentrations (3,4 mg. L-1 and 6.8 mg L-1 of Zinc) in comparison with control group (Fig.2 g-k).

The low dose group treatment (3.4 mg.L^{-1}) shows degeneration of the cysts closer to the wall**.**

Moreover, some cysts have lost their regular shape and are characterized by loss of germ cells, vacuolation and bursting of the cytoplasmic mass (the cytophore) and by exfoliation of germ cells in the testicular lumen**.** Germ cell necrosis was seen also in some cysts (Fig.2g-k).

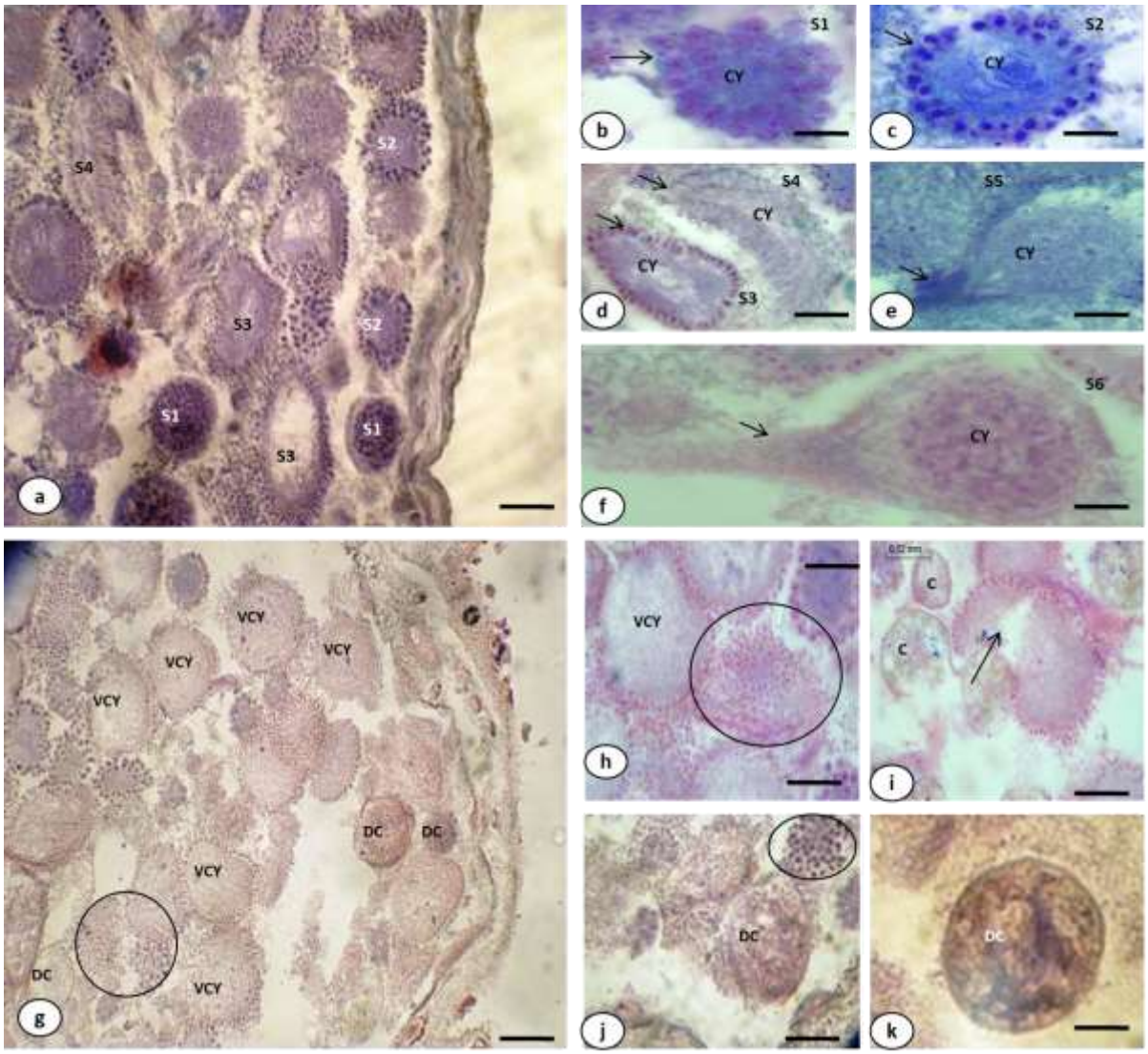


Figure2: Hematoxylin and eosin staining of paraffin sections of *Hirudo troctina* testis.

(a) Histological section of the testis fro control group showing the different stages of spermatogenesis; **(b)** Stage 1: relatively large rounded germ cells (arrow) are shown connected to a central anucleate cytoplasmic mass (the cytophore) (CY) which is still not very abundant at this stage; **(c)** Stage 2: we have noted a mitotic activity of the germ cells (arrow) inside the testisac . At this stage, the cytophore (CY) increases its volume and becomes more granular following the division of the germinal elements; **(d)** Stage 3: more numerous cells (arrow) of small size appear in connection with the cytophore (CY)which becomes more developed and Stage 4: the cells (arrow) show in elongation and they are still attached to the cytophore (CY). At this stage, the cytophore reaches its maximum development and is very rich in organelles; **(e)** Stage 5 the cells (arrow) are filiform and long. At this stage the germ cells are still attached to the cytophore (CY); **(f)** Stage 6: At the end of spermiogenesis, the germ cells (arrow) (which correspond to the spermatozoa) begin to detach from the cytophore (CY). **(g)** Histological section of a testis from a specimen exposed to 3.4 mg.L-1 of Zinc for 48h showing the different types of alterations : vacuolated cysts (vcy), dispersed germ cells are also present (circles)(Cy), degenerating cells (DC); **(h)** Vacuolated cysts (vcy), dispersed germ cells (circles)(Cy); **(i)** Shrunken cysts (C) and burst cytophore (arrow); **(j)** Dispersed germ cells (circles)(Cy) and degenerating cells (DC); **(k)** Degenerating cells (DC).

In the high-dose group (6,8 mg.L^{-1}), similar effects were noted but they are more severe than the group exposed to the lower dose (Fig.3). Indeed, an increase in the number of disorganized cysts was observed.

While vacuolization in germ cells was also detected in many cysts (Fig. 3B) and evident germ cell necrosis was conspicuous (Fig. 3C).

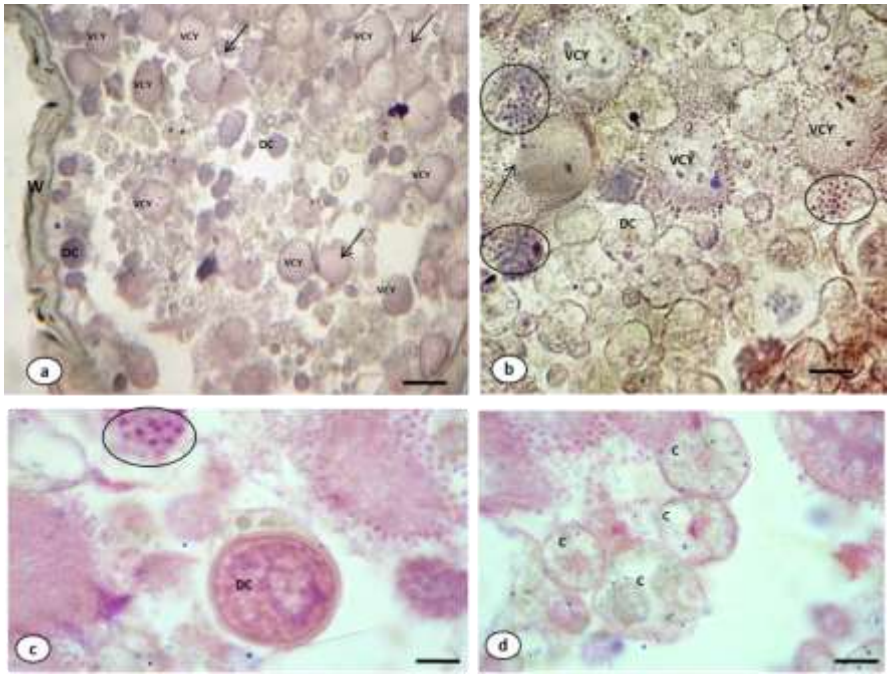


Figure3: Histological section of a testis from a specimen exposed to 6.8 mg. L-1 of Zinc for 48h revealing a more intense effect compared to the 3.4 mg. L-1 of Zinc. **(a)** Section shows vacuolated cysts (vcy), Degenerating cells (DC) and burst cytophore (arrow); **(b)** Dispersed germ cells (circles)(Cy) vacuolated cysts (vcy) and burst cytophore (arrow); **(c)** Dispersed germ cells (circles)(Cy) and Degenerating cells (DC); **(d)** Shrunken cysts (C). The number of altered cysts increased.

DISSCUSSION

Reproductive toxicity is a major concern and histological abnormalities in ovaries and testes may be caused by many factors: xenobiotic toxicants, phenols, heavy metals, and pesticides **(Marutirao, 2013).** Many studies have demonstrated that pollutants could have adverse effects when used at high enough concentrations but that they have no effects in considerably lower concentrations **(Liu et al. 2008)**

Moreover, the effect of different compounds and polluted environment on medicinal leech has been investigated (heavy metal mixture, water and silt from different monitoring sites: the Kuršių Lagoon,the Nemunas River, and the Drūkšiai Lake). Changes in physiological and behavioural responses indicate that medicinal leech is a sensitive and convenient model animal for pollution investigations **(Petrauskienė, 2008).**

The present study shows the effect of zinc on the spermatogenesis of the medicinal leech *Hirudo troctina*. Specimens are exposed to two concentrations 3.4 mg.$L^{-1}$and 6.8 mg.L^{-1}in the short term. This exposure causes the body to curl, excess mucus, delaying their movement (locomotion) and the difficulty of hanging on with the two suction cups. Similar results were found by **Petrauskienne (2003, 2004)** and **Kazalauskienne et al., (2010**) who recorded behavioral disturbances in the medicinal leech *Hirudo verbana* after exposure to crude oil, phenols, heavy metals and trichlophon. On the other hand, **Khaled et al. (2017)** to confirm these results in two freshwater leeches *Limnatis nilotica* and *Erpobdella johanssoni* following their exposure to BTEX.

Zinc has a significant toxic effect on the testis of the studied leeches and also induces serious alterations in the normal structure of the cysts, an increase in empty cysts and increased vacuolation have been observed. These results are in agreement with the study of **Khaled et al., (2017). Davies et al. (1995)**

reported that after exposure of the leech *Nephelepsis obscura* to cadmium, their reproductive potential and sperm production decreased.

This is in agreement with our results concerning the medicinal leech H. troctina. In addition, Our findings agreed with previous studies that also investigated the effect of Zinc on the sensitivity and reproduction of the earthworm Eisenia Andrei , showing that Zinc significantly reduced reproduction of this species at soil concentrations, and induced the production of malformed cocoons **(Van Gestel et al.1993)**

Indeed, Zinc and Cadmium have similar chemical properties and belong to the same chemical group and as showen in the study of **Westcott (1997)**, the cadmium exposure induced a detrimental effect on the structure and development of reproductive tissue in the freshwater predatory leech Nephelepsis obscura which leads us to obtain similar results for the gonads of *Hirudo troctina* under the effect of zinc. According to these same authors, the reduction in the number of spermatozoa is an effective biological marker making it possible to recognize the sublethal effects which directly affects the dynamics of the populations.

However, the level of sensitivity of organisms to pollutants seems to vary among species, during exposure, and by concentration and life stage. Reproductive toxicity in leeches has seldom been addressed. Further studies, therefore, are needed to address these issues.

REFERENCES

Al-Weher, S.M. (2008) Levels of Heavy Metal Cd, Cu and Zn in Three Fish Species Collected from the Northern Jordan Valley, Jordan. Jordan Journal of Biological Sciences, 1, 41-46.

Davies, R.W. ; Singhal, R.N. & D.D., Wicklum. (1995)- Changes in reproductive potential of the leech Nephelopsis obscura (Erpobdellidae) as biomarkers for cadmium stress. Canadian Journal of Zoolog- 73 (12), pp. 2192- 2196.

Ginsberg, D. (1998) Natural History of Leeches (Annelida: Hirudinea). University of Michigan Biological Station Archives

Jackson WT, et al. (2005) Subversion of cellular autophagosomal machinery by RNA viruses. PLoS Biol 3(5):e156

Kazlauskienė, N. ; Svecevičius, G. ; Petrauskienė, L. & M. Z., Vosylienė. (2010)- Behavioural Responses of Medicinal Leech and Rainbow Trout Exposed to Crude Oil and Heavy Fuel Oil in Ontogenesis. Polish Journal of Environmental Studies- 19, pp. 429-433.

Khaled, I. (2017)-Evaluation de l`impact des polluants BTEX sur la reproduction des deux espèces de sangsues d`eau douce Limnatis nilotica et Erpobdella johanssoni (clitellata, hirudinea).Thèse de Doctorat, Faculté des sciences de Tunis- p. 193.

Khaled, I. ; Ferjani, H. ; Ben Ahmed, R. & A.H., Harrath. (2016)- Effetcs of oil- related environmental polluants on gonads of the freshwater leech Limnatis nilotica (Annelida, Hirudinea). Invertebrate Reproduction & Development- pp.286-293

Lapkina, L.N. ; Flerov, B.A. ; Chalova, I.V. & I.I., Jakovleva. (1987)- Behavioural responses in the young leech Hirudo medicinalis as a tool for biotest. Comparative physiology and aquatic toxicology. University of Jaroslavl- pp.11 – 17.

Liu, J. ; Goyer, R. A. & M. P., Waalkes. (2008)- Toxic Effects of Metals. In Casarett, L. J. and Doull, J., Casarett and Doull's toxicology: the basic science of poisons, New York, The McGraw-Hill Companies- chap. 23, pp. 931-979.

Marutirao (2013) studied histological changes in the ovary of freshwater fish Puntius ticto under dimethoate toxicity .International journal of pharmacy & life sciences.

Petrauskien, L. (2003)- Water and sediment toxicity assessment by use of behavioral responses of medicinal leeches. Environment International- 28, pp.729-736.

Petrauskien, L. (2004)- The medicinal leech as a convenient tool for water toxicity assessment. Environmental Toxicology- 19, pp.336-341.

Petrauskiené, L. (2008)- Lethal effects of Zn, Cu and their mixture on the medicinal leech (Hirudo verbena). EKOLOGIJA- Vol.54. No.2, pp.77-80.

Sawyer, R. T. (1986)- Leeches biology and behavior. Oxford University press. Oxford-Vol.3, p.1065

Wicklum, D. & R. W., Davies. (1996)- The effects of chronic cadmium stress on energy acquisition and allocation in a freshwater benthic invertebrate predator. Aquatic Toxicology- 35, pp.237-252.

Zhou XW, Zhu GN, Sun JH. 2002. Effects of the interaction of heavy metals on the accumulation of copper in the tissues of the fish (Carassius auratus). J Zhejiang University (Agriculture & Life Sciences). 28(4): 427-430. (in Chinese)

IMPACT OF COVID-19 PULSES MARKET AND DEVELOPING VALUE CHAIN ON RETAIL, WHOLESALE AND DAAL FACTORY LEVEL ANALYSIS IN SINDH-PAKISTAN

Dr. Faiz Muhammad Shaikh

Professor & Chairman

Deptt: Agri: Economics

SZABAC-Dokri

Prof. Dr. Fateh Muhammad Marri

Vice Chancellor SAU-Tando jam

Prof. Dr. Jan Muhammad Mrri

ABSTRACT

This research investigates Impact of COVID-19 Pulses Market and Developing Value chain on Retail, Wholesale and Daal factory level Analysis for the Farmers of Larkana and Sukkur. Data were collected from various retail, wholesale, Processor, agent in different cities of Sindh Pakistan. A well-structured and pre-tested questionnaire was prepared with the help of the experts and project team and Before starting the survey, the enumerators were rigorously trained in various areas and ifor one day by the project team responsible for the baseline survey in Larkana District. In first few visits I checked them whether they are collecting information according to the questionnaire. Focus group discussion were carried out to get information from farm level. Value chain analysis of pulses is carried out to identifiy the current practices, opportunities for improving value chain at different levels of value chain of pulses. It was revealed that Pulses play an important role in farming systems worldwide. They have proved to be ideal crops for achieving improvements in nutrition and health conditions, reducing poverty through higher food security and enhancing ecosystem re- silience, particularly in developing countries like Pakistan ACIAR Australian Centre for innovative Agriculture Research is making efforts to improve value chain of pulses in Pakistan considering all value chain actors. The research project intends to understand the current practices and obstacles, different value chain actors are facing. After identifying the possible interventions to improve value chain of pulses in the country, interventions will be tested across the value chain. In order to see the effect of interventions on the performance of interventions. It was revealed that Value chain analysis of pulses is carried out to identifiy the current practices, opportunities for improving value chain at different levels of value chain of pulses. For this purpose, the high end-stores, superstores and grocery shops were visited in in Larkana, Sukkur Hyderabad and Karachi. . Wholeslaers, merchants, processors (*Channa factory*) and farmers were contacted for detailed study of value chain of mung beans. chick peas and Lentil. Results reveal that size of grain, color, packaging, Brand cleanliness and freshness are important attributes of pulses when the consumers make decision in purchasing pulses from the supermarkets and or super stores. Main issues recently he faced that in 50k.g of chickpea bag 2k.g dust, in lentil 50.kg bag 4 .kg dust and broken seed from lentil. In Mungbeans 50.kg bags 2.kg dust particals' and broken Mungbeans. In Hyderabad we have visited Ahmed Ali Wholesaler located in Main issues recently he faced that in 50k.g of chickpea bag 3k.g dust, in lentil 50.kg bag 3 .kg dust and broken seed from lentil. In Mungbeans 50.kg bags 2.kg dust particulars' and broken Mungbeans.

Key Words: COVID-19, Pulses Market and Value chain, Retail, Wholesale

TORSIONAL RESISTANCE OF NITI ROTARY INSTRUMENTS A CRISTALLOGRAPHIC PHASE STUDY

Dr. Rodolfo REDA

Department of Oral and Maxillo Facial Sciences, Sapienza University of Rome, 00161 Rome, Italy

Dr. Alessio ZANZA

Department of Oral and Maxillo Facial Sciences, Sapienza University of Rome, 00161 Rome, Italy

Dr. Maurilio D'ANGELO

Department of Oral and Maxillo Facial Sciences, Sapienza University of Rome, 00161 Rome, Italy

Dr. Dario DI NARDO

Department of Oral and Maxillo Facial Sciences, Sapienza University of Rome, 00161 Rome, Italy

Prof. Dr. Luca TESTARELLI

Department of Oral and Maxillo Facial Sciences, Sapienza University of Rome, 00161 Rome, Italy

ORCID NO: 0000-0003-3904-3000

ABSTRACT

The aim of this study was to assess the role of the crystallographic phase of Nickel titanium (NiTi) rotary instruments in determining their torsional resistance during different bending conditions, such as different degrees and angles of curvature. 200 F-One 20.04 instruments (Fanta Dental, Shanghai, China) were used, 100 austenitic instruments and 100 martensitic instruments. Each group was divided in 5 subgroups according to the different bending conditions (straight canal, 90 or 60 of curvature degrees and 3 mm or 5 mm of radius of curvature). The static torsional test was performed by using a device composed of an electric motor capable of recording torque values (Ncm); a vice used to secure the instruments at 3 mm from the tip; and artificial canals, which allow instruments to remain flexed during test. Each instrument was rotated at 500 rpm with a torque limit set to 5.5 Ncm until its fracture. Torque at Fracture (TtF) was registered. A scanning electron microscopy (SEM) observation was conducted. The collected data confirm that an increase in the angle of curvature and a decrease in the radius of curvature of the artificial canals lead to an increase of TtF values with a statistically significant difference ($p < 0.05$), both in the austenitic and martensitic groups. Regarding the comparison between austenitic and martensitic groups in the same bending condition, a statistically significant difference was found only when the torsional test was performed in the canals with the degrees of curvature of 90 and the radius of curvature of 3 mm and 5 mm, with the austenitic instruments showing a higher TtF than the martensitic ones. In conclusion, it can be stated that the crystallographic phase influences the maximum torque at fracture when the instruments are subjected to severe bending and that the radius of curvature significantly influences their torsional resistance.

Keywords: crystallographic phase; endodontics; nickel-titanium; root canal treatment; torsional stress

PREVALENCE OF MALNUTRITION AMONG PRESCHOOL CHILDREN IN RURAL NORTHERN KERALA-INDIA

Dr. Jyothi. H

Assistant Professor in Food & Nutrition, Department of Homescience, Government College for Women, Trivandrum, Kerala, India.

Dr.Mini Joseph

Assistant Professor in Food & Nutrition,Department of Homescience Government College for Women,Trivandrum,Kerala, India

ABSTRACT

The period of preschool children is an important stage for the formation and preservation of health in the future (Bergier et al., 2016). Undernutrition is one of the greatest problems for Indian childhood.

Objective The objective of the study is to assess the prevalence of malnutrition in the rural north of Kerala

Research Methodology **A** cross-sectional survey was carried out in the rural areas of Malappuram District, out of the total of 138 villages, 26 villages from 7 Taluks with judicious participation were selected randomly by considering inter-regional disparities in development.

Results It is noted that the height and weight were absolutely on par with the WHO median values up to 6 months of age. When age progresses the height and weight get deviated from the standard median values and falls below of it. The overall percentage of moderate underweight is 17.33, severe underweight is 1.78 pecent. The moderate stunting percentage was 23.33 and severe stunting observed was 8.67 percent. The moderate wasting was found to be 13.78 percent and severe wasting was 3.33 percent. The prevalence of malnutrition was 39.1 pecent (176/450) for the preschool children between 0 and 6 years. Further 10 percent of the children had deficit in either two of the anthropometric indicators.

Conclusion The inference that can be brought pertaining to the pattern of malnourishment among preschool children in Malappuram district is that the underweight (weight for age) condition progresses with increasing of age.

Key words: Underweight ,Stunting, Wasting,Malnutrition, Prevalence

CAM ELYAF ORANININ TEK DUVARLI KARBON NANOTÜP İLE GÜÇLENDİRİLMİŞ SMC POLİMER KOMPOZİTİN ELEKTRİKSEL ÖZELLİKLERİNE ETKİSİ

THE EFFECT OF GLASS FIBER RATIO ON THE ELECTRICAL PROPERTIES OF SMC POLYMER COMPOSITE REINFORCED WITH SINGLE WALL CARBON NANOTUBES

Aykut ILGAZ

Balıkesir Üniversitesi, Fen Edebiyat Fakültesi, Fizik Bölümü, Çağış Kampüsü

ORCID ID: 0000-0002-9632-0281

ÖZET

Bu çalışmada, tek duvarlı karbon nanotüp (TDKN) ile güçlendirilmiş levha kalıp bileşiminin (Sheet Molding Compound-SMC) bileşenlerinden olan doymamış polyester reçine ve kalsiyum karbonatın ($CaCO_3$) hacim oranı sabit tutulmuş ve cam elyaf oranı değiştirilerek bu durumun malzemenin elektriksel özelliklerine etkisi incelenmiştir. Bunun için ağırlıkça % 17 ve % 34 cam elyaf içeren TDKN ile modifiye edilmiş iki numune sıcak pres metoduyla üretilmiştir. Üretilen numuneler basit çubuk geometrisine sahip hale getirilmiş ve numunelerin akım-voltaj (I-V) ölçümleri alınmıştır. Akım-voltaj grafiğinden çıkarılan malzemelerin direnci ve boyutları kullanılarak özdirenç değerleri buna bağlı olarak da doğru akım iletkenliği hesaplanmıştır. Elde edilen sonuçlar, yüzde % 0,9'luk karbon nanotüp katkısının perkolasyon eşiğini geçmeye yettiğini ve malzemenin iletime geçtiğini göstermiştir. Ayrıca, ağırlıkça % 17 cam elyafa sahip numunenin doğru akım iletkenliği, % 34 cam elyaf takviyeli numunenin iletkenliğine göre daha üstün olduğu bulunmuştur. Bu durum düşük elyafa sahip numunede karbon nanotübün daha iyi bir iletken ağı kurduğunu göstermektedir. Üretilen kompozitlerin alternatif akım iletkenlikleri ve dielektrik özellikleri de oda sıcaklığında 50 Hz ila 5 MHz frekans aralığında empedans analizörü ile incelenmiştir. Empedans spektroskopi sonuçları, her iki numune için de düşük frekans bölgesinde alternatif akım iletkenliğinin artan frekans ile artış gösterdiğini ortaya koymuştur. Artan elektrik alanın neden olduğu atlama (hopping) mekanizması bu bölgedeki artışın nedeni olarak düşünülmektedir. Yüksek frekans değerlerinde ise iletkenliğin artışı yavaşlamıştır. Bu değerlerde iletkenlik neredeyse frekanstan bağımsız hale gelmiştir. Malzemelerin dielektrik sabiti, kayıp faktörü ve kayıp tanjantı değerleri de düşük ve yüksek frekanslarda polarizasyonların etkisi dikkate alınarak analiz edilmiştir. Bunun yanı sıra cam elyafın ve diğer bileşenlerin dağılımlarını incelemek için numunelerin SEM görüntüleri alınmıştır. Elde edilen görüntüler iki malzeme için karşılaştırmalı olarak incelenmiştir.

Anahtar Kelimeler: Tek Duvarlı Karbon Nanotüp, Levha Kalıplama Bileşimi, Cam Elyaf Oranı, Elektriksel İletkenlik, Dielektrik Özellikler.

ABSTRACT

In this study, the volume ratio of unsaturated polyester resin and calcium carbonate (CaCO3), which are the components of the single-walled carbon nanotube (SWCN) reinforced sheet molding compound (SMC), was kept constant and the effect of this on the electrical properties of the material was investigated by changing the glass fiber ratio. For this, two samples modified with SWCN containing wt. 17 % and wt. 34 % glass fiber were produced by hot press method. The produced samples were made to have simple bar geometry and current-voltage (I-V) measurements of the samples were taken. The resistivity values and the direct current conductivity were calculated by using the dimensions and resistance of the materials extracted from the current-voltage graph. The obtained results showed that wt. % 0.9 carbon nanotubes were sufficient to pass the percolation threshold and the material started conducting. The direct current conductivity of the sample with wt. % 17 glass fibers was also found to be superior to the conductivity of the sample with wt. % 34 glass fibers reinforcement. This shows that the carbon nanotube establishes a better conductive network in the sample with low glass fiber. The alternating current conductivity and dielectric properties of the produced composites were also

investigated with an impedance analyzer in the frequency range of 50 Hz to 5 MHz at room temperature. Impedance spectroscopy results revealed that the AC conductivity in the low frequency region increased with increasing frequency for both samples. The hopping mechanism caused by the increased electric field is thought to be the reason for the increase in this region. On the other hand, the increase in conductivity has been slowed down at high frequency values and the conductivity has been become almost independent of frequency. The dielectric constant, loss factor and loss tangent values of the materials were also analyzed considering the effect of polarizations at low and high frequencies. In addition, SEM images of the samples were taken to examine the distribution of glass fiber and other components. The obtained images were investigated comparatively for the two materials.

Keywords: Single-Walled Carbon Nanotube, Sheet Molding Compound, Glass Fiber Ratio, Electrical Conductivity, Dielectric Properties.

COMPUTATIONAL INVESTIGATION OF PYRROLIDIN DERIVATIVES AS NOVEL GPX4 / MDM2–P53 INHIBITORS BY USING 3D/2D-QSAR, MOLECULAR DOCKING, MOLECULAR DYNAMICS SIMULATIONS AND MMGBSA FREE ENERGY

Kamal TABTI[1,*], Larbi ELMCHICHI[1], Abdelouahid SBAI[1,*], Hamid MAGHAT[1], Mohammed BOUACHRINE[1,2] and Tahar LAKHLIFI[1]

[1] Molecular Chemistry and Natural Substances Laboratory, Faculty of Science, Moulay Ismail University of Meknes, Morocco.

[2] Higher School of Technology - EST Khenifra, Sultan Moulay Sliman University, Benimellal, Morocco.

ABSTRACT

The p53 is a tumor suppressor protein that adjusts cell cycle and growth arrest as well as genes that restore DNA damage and apoptosis. MDM2 (murine double minute 2) is a main p53 antagonist. We created a novel QSAR model using a series of highly active spiro [pyrrolidin-3,2-oxindoles] that consisted of 29 compounds that were experimentally validated to inhibit the MDM2-p53 interaction.

Three optimal models have been developed CoMFA / E + S, CoMSIA / S+H+A and HQSAR have revealed good statistical results, but the CoMSIA mode only which validates all the external validation tests applied successfully. Based on the CoMSIA / S+H+A model was carefully chosen to design four compounds with values of inhibitory activity greater than the highly active compound in the data set. The Newly designed compounds were docked in the target receptor binding site (ID: 4LWU). The newly designed compound Pred 01 showed the highest affinity with a value of -9.4kcal / mol, while compound N°04 which represents the data set and control compound (Nutlin-3) showed binding energies of the order of -8.8 kcal / mol and -8.2kcal / mol, respectively. In addition, the roles of lipinski and veber were estimated, the results obtained demonstrate that the proposed molecules involve good oral bioavailability and an ability to diffuse through different biological barriers. For in-depth study, The Pred01 / receptor, N°04 / receptor and Nutlin-3 / receptor complexes were selected via dynamic simulation analyzes with a simulation time of 100 ns and, also their free binding energy was examined operating the MM-GBSA approach. The molecular docking results obtained accentuate the crucial residues responsible for the ligand / protein interaction, providing insight into the mode of interaction. The MD simulation analysis confirms the conformational stability of the selected complexes during the MD trajectory, and the fluctuations recorded are insignificant. The results of MM-GBSA reveal that the new compound Pred 01 exhibits the lowest free energy, which confirms the result of molecular docking.

Keywords: MDM2–p53. Spiro [pyrrolidin-3,2-oxindoles]. QSAR. Docking molecular . MD simulations. MM-GBSA

EMC MODELING OF THE ACTIVE ELEMENTS

Miloudi Mohamed

University of Relizane, Faculty of Science and Technology, Department of Electrotechnical & Automatic Engineering, Relizane, Algeria.

ORCID ID: https://orcid.org/ 0000-0001-6416-0204

Miloudi Houcine

University of Sidi Bel Abbes, Faculty of Electrical Engineering, Department of Electrical Engineering, Sidi Bel Abbes, Algeria.

Bendaoud Abdelber

University of Sidi Bel Abbes, Faculty of Electrical Engineering, Department of Electrical Engineering, Sidi Bel Abbes, Algeria.

Rami Abdelkader

University of Sidi Bel Abbes, Faculty of Electrical Engineering, Department of Electrical Engineering, Sidi Bel Abbes, Algeria.

Benhadda Nassireddine

University of Sidi Bel Abbes, Faculty of Electrical Engineering, Department of Electrical Engineering, Sidi Bel Abbes, Algeria.

ABSTRACT

In current electrical systems, power electronics are increasingly used to condition electrical energy. Static converters have undergone significant technological development in particular to increase their efficiency and compactness. These performances are essentially due to the increase in the speed of electronic switches which allows a reduction in switching losses (absence of a switching assistance circuit) and the appearance of new targeting techniques. However, the technological implementation of these modern components is not without posing some problems of electromagnetic compatibility (environmental disturbances and self-disturbance). The modern design of static converters no longer allows the principles and elementary rules of electromagnetic compatibility (EMC) to be ignored, whether in the prototype development or pre-industrialization phase. This is why designers of static converters are interested in the electromagnetic compatibility of their systems.

It is well known that the switching edges of electrical quantities at the switching cell level are far from having a rectangular shape. This is due to several factors such as the strongly non-linear behavior of the semiconductor components and the imperfection of the passive elements and the connections. In practice, the responses of generator models reflecting the power signals within a cell are represented by a trapezoidal shape. This simplified waveform is characterized by a rise time, a fall time and a chopping period. These terms determine the envelope of the spectrum and highlight the spectral extent of the signal. The lower the switching times, the more the spectrum is extended towards the high frequencies and the more the coupling between the environment and the source of disturbance becomes critical. Physically, the transition phases are never so brutal and the derivative cannot undergo this discontinuity. Each time the power switches are switched, resonance phenomena appear and the resulting parasitic signals appear in the form of oscillatory regimes. These disturbances can take two distinct forms: so-called conducted disturbances.

Keywords: Electromagnetic Compatibility, Modeling, High-Frequency, Switch.

ALJİNAT ESASLI BİYOKOMPOZİT KÜRELERİN ÜRETİMİ VE KONTROLLÜ İLAÇ SALIMINDA KULLANILABİLİRLİKLERİNİN ARAŞTIRILMASI

PRODUCTION OF ALGINATE BASED BEADS AND INVESTIGATION OF THEIR USE IN CONTROLLED DRUG RELEASE

Doktor Öğretim Üyesi, Gülsüm Aydın

Selçuk Üniversitesi, Fen Fakültesi, Biyoteknoloji Bölümü, Konya, Türkiye

ORCID ID: https://orcid.org/0000-0002-3868-8563

Yüksek Lisans Öğrencisi, Cenan Öztürk

Selçuk Üniversitesi, Fen Bilimleri Enstitüsü, Biyoteknoloji Bölümü, Konya, Türkiye

ORCID ID: https://orcid.org/0000-0003-2631-6903

ÖZET

İnsan vücudunun koruma, önleme sistemleri ve iyileşme özellikleri olsa bile çoğu zaman hastalıklar karşısında savunmasızdır. İlaçlar en büyük biyolojik destekleyiciler olarak kullanılsa da büyük çoğunluğu klasik dozaj formları ile uygulanmaktadır. Klasik yöntemlerle üretilen ilaçların içerdiği etken maddeler hızla ve aşırı dozlarda kan plazmasına geçerek canlı üzerinde toksik etkilere sebep olabilmektedir. Birçok alandaki bilimsel gelişmelerin hızla artmasıyla farmakoloji gibi tıbbi bilimlerde kontrollü ilaç salım sistemleri konusu yoğun bir ilgi odağı haline gelmiştir. Kontrollü salım sistemlerinin içeriğinde genel olarak bir ilaç taşıyıcı faz ve etken maddeyi içeren ilaç fazı bulunmaktadır. Birçok farklı yöntemle, formülasyonlarla ve fiziksel formlarda üretilebilen kontrollü salım sistemlerinin amacı sürekli tedavi edici düzeydeki ilacın kan plazmasına ve hedef dokulara salınımını uzun süreler boyunca gerçekleştirerek canlı üzerinde meydana gelebilecek toksik etkiler ve istenmeyen komplikasyonların önüne geçmek dolayısıyla kullanılan ilacın verimini en üst seviyeye çıkarmaktır. Gerçekleştirdiğimiz çalışmada bitkisel kaynaklı, doğal, biyouyumlu ve biyobozunur olan aljinat polimeri ile yüksek şişme kapasitesi ve yüksek fiziksel dayanıklılığı bulunan kaolin kili kullanılarak iyonik jelasyon yöntemi uygulanarak farklı formülasyonlar ile analjezik bir ilaç olan ibuprofen taşıyıcı mikroküresel sistemler üretilmiştir. Farklı konsantrasyonlarda aljinat, kaolin, ibuprofen ve $CaCl_2$ kullanılarak farklı pH'larda üretimler gerçekleştirilmiştir. Her formülasyon için enkapsülasyon oranları hesaplanarak optimum parametreler ile maksimum enkapsülasyon verimine sahip formülasyon pH4'lük solüsyon ortamı, %3 Aljinat konsantrasyonu, %1 Kaolin konsantrasyonu, %0,3 İbuprofen konsantrasyonu, 1,5 saatlik homojenizasyon süresi ve %2,5 CaCl2 konsantrasyonu olarak belirlenmiştir. Gerçekleştirilen salım çalışmaları sonucunda mideyi taklit eden pH 1,4'lük ortamda oldukça yavaş şekilde salım gerçekleşirken, bağırsak ortamını taklit eden pH 7,6'lık ortamda zaman ile doğru orantılı olarak ilaç salımı gerçekleşmiştir. İlaç taşıyıcı fazın, tamamen doğal kaynaklı olması sayesinde hedef canlılar üzerindeki olumsuz etkilerinin önüne geçilmesi, gerçekleştirilen ilaç salınımı sonrasında metabolik aktivitelerle monomerlerine ayrılması beklenmektedir. Üretilen sistemin verimliliği ve kullanılan biyolojik kökenli malzemeler sayesinde gerçekleştirilen çalışmanın literatür için özgün nitelikte olduğu düşünülmektedir.

Anahtar Kelimeler: Sodyum aljinat, kaolin, ibuprofen, biyokompozit küre, kontrollü ilaç salımı

ABSTRACT

Even if the human body has protection, prevention systems and healing properties, it is often vulnerable to diseases. Although drugs are used as the largest biological supplements, the vast majority are administered with conventional dosage forms. The active substances contained in the drugs produced

by conventional methods can pass into the blood plasma rapidly and in excessive doses and cause toxic effects on the living thing. With the rapid increase in scientific developments in many fields, the subject of controlled drug release systems in medical sciences such as pharmacology has become a focus of intense interest. Controlled release systems generally contain a drug carrier phase and a drug phase containing the active substance. The purpose of controlled release systems, which can be produced in many different methods, formulations and physical forms, is to maximize the efficiency of the drug used by preventing the toxic effects and unwanted complications that may occur on the living thing by continuously releasing the therapeutic level drug into the blood plasma and target tissues for long periods of time. In our study, ibuprofen carrier microspherical systems, an analgesic drug, were produced with different formulations by applying the ionic gelation method using a herbal, natural, biocompatible and biodegradable alginate polymer and kaolin clay with high swelling capacity and high physical durability. Production was carried out at different pHs by using different concentrations of alginate, kaolin, ibuprofen and CaCl2. By calculating encapsulation rates for each formulation, the formulation with optimum parameters and maximum encapsulation efficiency is pH4 solution medium, 3% Alginate concentration, 1% Kaolin concentration, 0.3% Ibuprofen concentration, 1.5 hour homogenization time and 2.5% CaCl2 concentration. has been determined. As a result of the release studies carried out, while the release occurred very slowly in the pH 1.4 environment imitating the stomach, the drug was released in direct proportion to the time in the pH 7.6 environment mimicking the intestinal environment. Due to the fact that the drug carrier phase is completely natural, it is expected that its negative effects on target organisms will be prevented, and that it will be separated into its monomers by metabolic activities after the drug release. Thanks to the efficiency of the system produced and the materials of biological origin used, the study is thought to be unique for the literature.

Key Words: Sodium alginate, kaolin clay, ibuprofen, biocomposite sphere, controlled drug delivery

ENVIRONMENTAL DEGRADATION AND SOCIO-ECONOMIC DEVELOPMENT OF THE NIGER-DELTA-REGION OF NIGERIA- A CASE OF OGONI-LAND

Dr. CHUKWUEMEKA G. EME

Lecturer, Department of Business Administration,

Faculty of Management Sciences; National Open University of Nigeria, Jabi, Abuja

ABSTRACT

Due to oil exploration and other human activities in the Niger Delta region, there is evidence of environmental degradation all over the area (Oronto, 1998). Environmental degradation is occasioned by consistent flow of industrial wastes, oil spills, gas flares, fire-disaster, acid rain, flooding, erosion, etc., which have led to the destruction of properties and human lives.This research paper reviews environmental degradation and pollution in oil producing areas of the Niger Delta region with particular reference to Ogoni community in the context of the patterns, causes and effects of such degradation.Policy/legal options for upgrading the degraded environment such as stoppage of oil spillage and gas flaring, flooding, pollution and erosion, etc. are also suggested.Modernization and dependency, critical and stakeholder theories shaped the theoretical foundations of the study. Questionnaire was the instrument used by the researcher for the collection of data for the research work. In analysing the data gathered for the research work, the researcher made use of tables and percentages to analyse the responses on the questionnaire administered to the respondents. He therefore used the Chi-Square Inferential Statistical Method to test the hypotheses and to reach the research conclusion.The research findings infers that meaningful implementation of Environmental Laws and Regulations through effective and inclusive environmental education of both the oil producing companies and the entire citizenry of the Niger Delta region on proper modern oil exploration techniques would go a long way in the fight to eradicateenvironmental degradation and pollution in the Niger Delta region.This research concludes that the relevant environmental agencies such as the Federal Ministry of the Environment, National Environmental Standards and Regulations Agency (NESREA) and other environmental stakeholders and NGOs should rise to the challenge to protect, enhance a healthy and safe environment in keeping with the current United Nations Environmental World order of eradicating all forms of environmental degradation and to ensure sustainable development not only for the present generation but for the future generations yet unborn.The research therefore recommends that the Federal Government of Nigeria should as a matter of national urgency immediately flag off the much publicized environmental pollution clean-up exercise of the entire Niger Delta region with particular reference to Ogoni community.

Key Words: Environment, environmental degradation/pollution, oil spillage, gas flaring, Multi-national oil companies (MNOCs), Niger-Delta region, Ogoni-land

1.0 BACKGROUND OF THE STUDY

One of the greatest problems facing the Niger Delta region in Nigeria is that of environmental degradation which causes great damages to the earth. Environmental pollution takes place when the environment cannot process and neutralize harmful by-products of human activities in due course without any structural or functional damage to its system. Pollution occurs when the natural environment is unable to decompose the generated elements and on the other hand, when man fails to decompose those pollutants artificially. This has negative impacts on crucial environmental services such as provision of clean water, air and arable land without which life on earth as we know it would be difficult. Environmental pollution is a problem both in developed and developing countries. Factors such as population growth and urbanization invariably place greater demands on the environment and

stretch the use of natural resources to the maximum. Such overuse of natural resources often results in nature's degradation.

Human environment is made up of the following aspects: the physical, social, economic, political and technological. The physical environment consists of air, land and water; the social environment consists of the relationship existing among them; the technological environment consists of experiences and practices required for constant adaptation and survival; while the political environment is defined by the degree of authority exercised by some over others.

The environment is said to be polluted when there is substantial alteration in form and function of the components of the physical environment which in turn produces harmful effects on human beings. The key word here is ''substantial'' which is used to show that no component of the physical environment is said to be polluted until it has been altered in form or function in such a way that it can immediately or potentially harm human being directly or indirectly.Environmental pollution may cause short term or long term detriment to the earth's ecological balance which lowers the quality of life. Pollution may cause primary damage in form of minor changes in the delicate balance of the environment that are detectable over a long period.

With the increase in waste production, indiscriminate discharge of untreated industrial wastes into water ways, the spewing of thousands of tons of particulates and airborne gases into the atmosphere, the throw away attitude toward solid wastes, and the use of newly developed chemicals without considering the potential consequences have resulted in major environmental disasters which will eventually force governments, groups, organizations and individuals to undertake more effective environmental planning and adopt more effective pollution eradication measures.

In Niger Delta, one of the threatening environmental problems prevalent in the area is environmental pollution caused by oil exploration and related activities. As an oil producing region, oil spillage is one of the most outstanding causes of water and land or soil pollution while air pollution is mostly caused by gas flaring and industrial effluents. The direct impact of oil explorationin the region has been felt by everyone living in the area.

Some of these issues include ecological degradation, environmentalpollution, associated human rights abuses, high inflation and loss of livelihood. It would only be fair if these groups of people are adequately compensated.Niger Delta according to Ashong and Aniefiok[1], is of two classifications, namely: physiographic (core) Niger Delta and oil producing Niger Delta. The core Niger Delta includes states like Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Ondo and Rivers. The Niger Delta as currently defined by government comprises Abia, Akwa-Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers States with a total of 180 local government areas and a combined population of over 28 million persons. Ekpo sees such inclusion of other oil producing states from other geo-political zones, as a measure of administrative convenience adopted by the government.[2]

The resulting ecological devastation as a result of oil exploration and related activities are enormous. Oil film in water prevents natural aeration killing fish and other aquatic lives, farm lands are lost, drinking water and air are made unsafe for human consumption. The resultant impact on the residents is enormous, yet the amount of wealth generated from these areas are not re-invested in order to lessen these environmental impacts. This clearly could culminate into environmental racism and discriminatory acts, a systematic denial of rights.The mangrove forests of the Niger Delta are important ecological resource as they provide essential ecosystem including soil quality, stability, medicines,

[1]Ashong, T & Aniefiok, P. 'Media Coverage of Environmental Pollution in the Niger Delta', Vol.6, No.1, pp.34-43 Aug. 2007

[2] Ekpo, S. 'Environmental Impacts of Petroleum Exploration in Nigeria', in International Journal of Environmental Issues,
Vol.7, pp.155-175, Ikot Ekpene Development Universal Consortia, 2004

healthy fisheries, wood for fuel and shelter, tannins and dyes and critical wildlife habitats, the river hippopotamus, and crocodiles are increasingly threatened by the activities of the oil companies.

During creation, God made the earth a beautiful place for man to inhabit. In the book of Isaiah 45: 18, it reads, ''for thus said the Lord that created the heavens, God himself that formed the earth and made it, he hath established it, he created it not in vain, he formed it to be inhabited''. Unfortunately, man's action and inaction is destroying the mother earth which is meant to sustain life. Hence, there is the need to put structures in place to minimize the risk or negative effects of necessary actions of man on the environment and create environmental friendly attitudes. It is pertinent to note that nature sustains its inhabitants and the fate of nature depends on human hands. Therefore, man's survival depends on how the mother earth is sustained. This calls for adopting an environmental friendly attitude capable of entrenching a healthy environment capable of meeting human needs, as well as support healthy living.

Such environmental friendly attitude can be achieved through environmental education and strict adherence to environmental laws and regulations in the country. Man's activities on the environment upon which he exists calls for caution from different organizations, conventions and institutions at local and global levels as intervention measures aimed at checking man's inhumanity to nature. Such abuse by man upon the environment is termed environmental degradation or environmental pollution.The issue of man's insensitivity to the environment was considered so important by the United Nations General Assembly that in 1984, it set up a body known as the World Commission on Environment and Development (WCED) to formulate a global agenda for a positive change in this area. Back home in Africa, the first African Ministerial Conference (AMICON) held in Cairo, Egypt came up and what they called the Cairo Programme for African Cooperation, which among other things emphasized backing up the eradication of environmental degradation or pollution with enabling laws was adopted.[3]

1.1 Statement of Research Problem

Years of insensitivity to environmental issues or near complete lack of attention to environmental concerns have turned the Niger Delta into one of the most endangered ecosystems in the world and particularly, in Nigeria. Various forms of ecological activities go on in the region. Prominent among them is oil exploration. This has led to springing up of industries whose activities also generate waste which are not properly managed and result in environmental pollution.Successful environmental pollution management is dependent on successful enlightenment campaigns to educate, sensitize and mobilize the populace in the struggle to ensure a safe and sustainable environment.

It is in the light of the above deplorable environmental problems of oil spillage and gas flaring in the Niger Delta region with its attendant land, air and water pollution of the region and to find an enduring and lasting solution to the menace that this research work is of utmost importance.

1.2 Aims and Objectives of the Study

The purpose of this study is to evaluate the effects of environmental degradation and pollution on the Niger-Delta with special reference to Ogoni Community. The specific objectives of this study includes:

1. To identify the causes of environmental degradation of the Niger Delta region especially in the Ogoni community.

2. To find out the extent of damages caused by environmental degradation through oil spillages, gas flaring and its attendant soil pollution in the Niger Delta region especially in the Ogoni community.

[3]Ononiwu, G. 'First African Ministerial Conference on the Environment (AMICON)', in International Journal of Environmental Issues, Vol.2, No.3, pp.102-167, 1986

3. To find out the types of environmental pollution that is prevalent in the Niger Delta region especially in the Ogoni community.

4. To proffer measures to mitigate or ameliorate the effects of environmental degradation in the Niger Delta region through effective environmental legislations and regulations and proper environmental education of the people and prospecting oil companies.

2.1 Methodology

This study adopted survey research design. Oladele defined a research design as an organized engine aimed at finding and identifying research problems.[4]This study also employs a descriptive method of study. Gay described a descriptive research as a process of collecting data in order to test hypothesis or answer questions concerning the current state of the subjects in the study. In addition, the author pointed out that the purpose of a descriptive research is to determine and report the way things are done, and to describe such things as possible behaviour, attitude, values and characteristics[5].

The population of this study was composed of some employees of the major oil producing companies of the Niger-Delta region of Nigeria amongst which were Shell Petroleum Development Company (SPDC), Exxon-Mobil Producing Nigeria Ltd., Nigeria Agip Oil Company, Elf Petroleum Ltd., Texaco-overseas (Nigeria) Petroleum Company, Ashland Oil Company (USA), Denimix Oil Company Ltd. (Germany), Conoil Oil Producing Company, Chevron Oil Producing Ltd., etc. and some members of Ogoni community who are directly affected by environmental degradation and oil spillages caused by oil exploration and exploitation in the region. A total of one hundred (100) persons were selected for the study conveniently chosen by the researcher through random sampling.A sampling size of eighty (80) persons of both selected employees of oil producing companies and members of the oil producing community of Ogoniland was used for the study. The researcher used simple random sampling techniques to choose the total population of the study. Taro Yamani's Formula[6] was used to determine the sample size out of the total population. Questionnaire was the instrument used for the collection of data for the research work. The researcher subjected the research instrument (questionnaire) to test and re-test experiment as a way of measuring its validity. In this method, the questionnaire was administered to a small group of employees of selected oil companies and some selected members of the Ogoni community and re-administered to the same group of people. The responses elicited from respondents on the two occasions was comparably the same.

In analysing the data gathered for the research study, the researcher made use of tables and percentages to analyse the responses on the questionnaire administered to respondents. The Chi-Square Inferential Statistical Method was then used to test the hypothesis and to reach the research conclusion.

Data collection for the research was made in two parts. Data was collected from both primary and secondary data sources. The primary data were obtained from oral interviews with some employees of selected oil producing companies and some members of the Ogoni community and from responses to questions in the questionnaire. The secondary source of data was from books, journals, magazines and other industry publications.

2.2 Hypotheses

In line with the above stated aims and objectives of this study, the following hypotheses were employed:

Ho: Oil exploration and exploitation in the Niger Delta region of Nigeria does not lead to environmental degradation or pollution through oil spillage and gas flaring in the region.

[4]Oladele, D. 'CONTEMPORARY DISCOURSES ON QUALITATIVE RESEARCH', Niyat Publishers, pp-111-130, 2007
[5]Gay, M. 'TEACHING RESEARCH METHODOLOGY', McGraw Hill, U.S.A.., pp. 156-178, 1981
[6] Yamani, T. 'STATISTICS: AN INTRODUCTORY ANALYSIS ', Harper and Row Publishers, New York, U.S.A. pp.41-72, 1964

H1: Oil exploration and exploitation in the Niger Delta region of Nigeria leads to environmental degradation or pollution through oil spillage and gas flaring in the region.

2.1Review of Related Literature

According to Bischoff and Lambretchs, Niger Delta is one of the world's largest wetlands covering 20,000 square kilometres, the fragile ecosystems within the area include mangroves, fresh water, swamp forests, and coastal barrier islands and contain significant biodiversity including rare species.[7] The current legislative definition of the Niger Delta by the Federal governmentof Nigeria includes Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers State) in the southern part of the country.[8]

Oil exploration in the region has produce negative consequences to the natural habitat Environmentalists have indicated that the quality of crops in the Niger Delta is rapidly deteriorating.[9] The continuing quest for oil without the requisite Environmental Impact Assessment (EIA) adversely affected the quality, size and shape of traditional staples, such as cassava, yam and plantain.

Chukwuemeka et al., remarked that in the Niger Delta, Ogoni-land's 56 oil wells account for 15% of Nigeria's oil production. Yet few Ogoni communities have electricity, the ratio is one medical doctor per thousand people, child mortality rates are the highest in the Niger Delta region, and unemployment among the Ogoni population is 85%. Ken Saro-Wiwa, a known activist, argued that the people of Ogoniland and the people of the Niger Delta are like the goose that laid the golden egg but suffer the most severe form of deprivation and poverty. In 1993, arising from the Ogoni people's protest of passive resistance against Shell, the Nigerian Army laid siege on Ogoniland, and their leader, Ken Saro-Wiwa and eight others received death sentence by a tribunal convened under the military government.[10]

According to authors cited above,environmental degradation caused by the oil spill and other oil and gas activities have worsened the economic levels of the people by destroying the once abundant fishing grounds and decreasing availability of quality agricultural land, thereby furthering impoverishment of those affected. They argued that the impact of social conflict and the implications of foreign investment in the region is high,and that the respondents were more serious on environmental degradation than financial compensation. Findings revealed that the people of the Niger Delta Region believe that compensation after environmental destruction is not a solution to the preservation of the environment. Environmentalists and other advocates identify environmental devastation of the Niger Delta region as a global concern. The oil development linkage debate in Africa revolves around the resource curse argument that oil wealth is the cause of government corruption and violent conflicts.

In the literature, some theories and propositions in explaining the occasional linkage between natural resources and civil strife consists of grievance theory, fragile state theory, separatists' incentive theory, and looting theory[11]. Kingston et al[12]and Akinde[13]argued that foreign capital exclusively

[7] Bischoff & Lambrechts, 'The Regional Impact of Political Risks: The Conflicts in the Niger Delta Region', Vol.1, p.92, 2010. See also Snapps, J. 'Youth Restiveness and Industrial Disruption in the Niger Delta', Vol. 1, No. 3, pp.57-102, 2011

[8]Ihayere, Ogeleka & Ataine, 'The Effects of the Niger Delta Oil Crisis on Women Folks', Journal of Africa Studies, p.3, 2014

[9]Edino et al. 'Perceptions and Attitudes towards Gas Flaring in the Niger Delta, Nigeria', Vol. 2, No.1, pp.47-112, 2010

.[10]Chukwuemeka et al., 'Niger Delta Youth Restiveness and Socio-economic Development of Nigeria', Vol.2, p.41-52, 2011

[11]Ihua, O. 'Looting After a Disaster: A Myth or Reality?' Natural Hazards Observers, Vol. 2. No. 2, pp. 102-143, 2011

[12]Kingston et al. 'Sediment Hydrocarbons in Former Mangrove Areas of the Niger Delta', Vol. 3, No 1, pp. 122-176, 2011

[13]Akinde, J. 'Restructuring the Public Sphere for Social Order in the Niger Delta Region through Polycentric Planning', pp.19,2011

dominates oil production to the extent that some have applied the concept of the rentier-state to Nigeria's political economy. Consequently, the state is vulnerable to the fluctuating fortunes of oil as a commodity and over time other potential sectors of the economy have also been undermined by this dependence.[14]Thus, power calculations by the hegemonic elite have revolved around the control and sharing of oil rents.[15]

The lack of equitable distribution of oil wealth and environmental degradation from exploration activities remain key factors aggravating actions from environmental rights groups. These issues further increases inter-ethnic conflicts and civil disturbances from ethnic militias, such as the Movement for the Emancipation of the Niger Delta (MEND), Movement for the Survival of Ogoni People (MOSOP) and the Niger Delta Vigilante Force (NDVF). For instance, Angola, Democratic Republic of Congo (DRC), Sierra Leone, Sudan and Rwanda amongst others are countries that have experienced various forms of degrees of resource conflict in Africa.[16]These findings espouse the inherent contradictions which a developing country like Nigeria has to deal with, and reflect the nature of social movements in the context of the Niger Delta.

The various scholars and authors studying the Niger Delta crisis have argued and espoused perspectives and analysis that shaped their views of countries like Nigeria. The focus was to evaluate the claims regarding the effects of degradation and other impact on the Niger Delta Region (NDR). The study provides a foundation to explore among other issues the relevance of environmental education to both the oil prospecting companies, the entire citizenry of the Niger Delta and even to the government in their quest to eradicating environmental degradation in the region. Of utmost interest to the study is the response of the government to the behaviour of multinational oil corporations (MNOCs) and the people affected by the activities of these corporations.[17]

In the area of litigations and compensation for victims of environmental degradation, the common law rule in Ryland vs. Fletcher (1866) L. R. Ex. 266 and Donogue vs. Stevenson (1932) A. C. 562 which has been the main reference for the tort of Negligence and Nuisance is outdated, and cannot meet the claim of the victims of oil spillage which is currently taking place in the Niger Delta region. In the similar veins, the criminal liabilities under the Oil in Navigable Water Act also fall short of adequacy and reliability in the present state of technology in Nigeria today.Respectively, relevant in this regard are Nigerian cases of Shell-BP Ltd vs. Cole & Ors. (1978) N. S. C. C. Vol. 11 p.96 and its counterpart Isaiah vs. Shell Petroleum Development Company of Nigeria Ltd (2008) where it was reiterated by the learned Justice Belgore, JSC, that the exclusive jurisdiction of ascertaining oil spillage is accorded to the Federal High Court on the basis of Section 239 (1)(a)of the Constitution (Suspension and Modification) Decree No. 107 of 1993. Other related cases include Abacha &Ors vs. GaniFawenhinmi (2000) where it was succinctly asserted by the Supreme Court that the provisions of Article 24 of the African Charter on Human and Peoples Rights 1981 was justiciable, and hence, the respondent/appellant's fundamental rights has been infringed; Ogiade& 2 Ors vs. S. P. D. C. (1997) and Umudje vs. Shell-BP (1975) 9/11 S. C. 155 where it was reiterated that the claimant who alleges environmental pollution must prove it beyond reasonable doubt to succeed in such claim.

Other related case laws include Attorney General Lagos State vs. Attorney General of the Federation &Ors (2003); AG Ogun State &Ors vs. AG Federation & Ors (1982) NCLR 166, Supreme Court of Nigeria, 1982 and Adediran vs. Interland Transport Ltd (1986) where it was stated inter alia that the consent of the Attorney General of the Federation (AGF) was no longer required for the competence of action in public nuisance.

[14]Emuedo, K. 'Conflicts in the Niger Delta Region', Vol. 2, No.1, pp. 55.109, 2011

[15]Okafor & Babatunde. 'An Analytical Evaluation of the Costs of Conflicts in Nigeria', Vol.2, No.1, pp.30-42, 2011

[16]Agbiboa, Maiangwa & Obi, 'Corruption in the Underdevelopment of Niger Delta Region of Nigeria', 5(8), p. 108-131, 2003

[17]Paki & Ebienfa.,'Oil and Development Deficit in Africa: The Failure of Intervention Agencies', p. 133-140, 2011

It is settled law in environmental litigation and in law of Negligence and Nuisance that the Plaintiff in order to succeed must prove the following principles:

1) The polluter owed him a duty of care

2) The polluter is in breach of that duty of care

3) The breach has caused foreseeable damage to the Plaintiff.

Ola, C. S. in his own contribution to the discourse on Industrial and Oil Pollution in the Niger Delta region defined environmental pollution to include the introduction of new materials into the environment by technology.[18]Generally, the presence of matter or energy whose nature, location or quality produces undesired, environmental effects invariably, leads to environmental degradation of the Niger Delta region. This assertion is true and cannot be over-emphasized. The most damaging type of pollution to the environment is caused by oil. The effects of the damage and the attitude of the oil companies involved are not encouraging. It is generally agreed that environmental pollution caused mainly by oil spillage and indiscriminate disposal of oil waste and cuttings are common place in the various oil regions. He argued further and posited that ‘‘the products of industries are found everywhere and ecological systems are being destroyed. Oil is produced on onshore and mainstream particularly in the Niger Delta Basin and offshore and so vegetation and farmland are destroyed’’.

The World Bank estimates that oil companies in Rivers and Delta States spill over 2,300 m3 of oil in 300 major accidents yearly. On its part, Shell says it spilled an average of 7,350 barrels of oil a year between 1989 and 1996 and that a total of 221 spills occurred in the course of its operation. It is not unlikely that the figures above are grossly under-estimated. Grevy, M. notes that oil companies tend to under-estimate the incidents of oil spillage and the total spillage might be ten times as high.[19]Odogwu, T. asserted that as from the 1990s, this negligent practice gave way for a proper articulation of several issues bothering on the oil industry. Foremost in this respect was environmental justice and equity.[20]This course was given ideological underpinning by Ken Saro-Wiwa and his group. Over time, the oil majors came to realize that it could no longer be business as usual. Thus, there was a resemblance of a prodded response to the environmental challenges in the oil-bearing enclave of the Niger Delta.

Atsegbua et al. further posited, and as stated in the earlier position, that the torts of Negligence, Nuisance and the rule in Ryland vs. Fletcher (1866) L. R. 310, L. 330, has not been of much aid to the victims of oil pollution.[21] Government intervention by way of legislation and regulation has also had limited success. In respect of these shortcomings, he advocated that an alternative approach be put in place, hence, a reliance on the economic approach or analysis. Economic Approach or analysis of the menace of oil pollution on the environment would provide a better perspective for dealing with the problem of oil pollution. He further explained that among the inter-disciplines that had sprang up around the law in this country, the economic approach although of recent origin occupies a prominent place.To this extent, the economic analysis of law adopts a theoretical and functional approach. The economic approach theorists distinguishes allocative efficiency from distributional matters. They are concerned with allocative efficiency as against distributional issues. Allocative efficiency is the allocation of economic goods by a composite market forces. This would lead to a ‘pareto optimal’. This equilibrium is regarded as ‘neo-classical model’ which means that under assumptions, reliance on competitive markets will lead to optimum for society.

Finally, in this regard, the inclusion of environmental clause into the Constitution of the Federal Republic of Nigeria(CFRN) 1999 can be said to be a landmark in the quest for the protection and sustainability of the Nigerian environment; although, the clause in Chapter2, Section 20 of the

[18]Ola, C. S. ‘Industrial and Oil Pollution in the Niger Delta Region’, Vol.1, No. 3, pp. 113-117, 1984

[19]Grevy, M. ‘The Costs of Oil Spillage in the Niger Delta Region’, Vol. 2, No. 1, pp. 79-88, 1995

[20]Odogwu, T. ‘’ENVIRONMENTAL JUSTICE AND EQUITY, Tabansi Publishers, Lagos, pp. 74-99, 1981

[21]Atsegbua et al. ‘ENVIRONMENTAL LAW IN NIGERIA: THEORY AND PRACTICE’, Lagos, Akoka Press Ltd.,pp.30-42, 2010

Constitution is far from meeting the yearnings and expectations of the environmentalists. This is as a result of the fact that the Constitution has not given adequate recognition to the environmental rights and healthy environment as a fundamental right. The Nigerian environmental clause cannot be compared to that of Mali, South Africa, DRCCongo and Indian provisions or measure up to Article 1 of the World Commission on Environment and Development (WCED) General Principles concerning Natural Resources and Environmental Interferences which stated inter alia that all human beings have the fundamental rights to an environment adequate for their health and well-being.[22]In addition to this, is the omnibus included that nobody can sue government in Nigeria for failing to perform its obligations on the basis of the provisions of the Chapter 2 (Fundamental Objectives and Directive Principles of State Policy) of the 1999 Constitution.[23]The third flaws is the inability of the Constitution to list the protectionof the environment expressly as a substantive item in either of the legislative lists, particularly the concurrent lists, making it an incidental or auxiliary matter.

3.1 Causes of Environmental Degradation/Pollution in the Niger Delta Region

3.1.1 Environmental Degradation/Pollution

According to Holdgate, pollution is the introduction by man into the environment of substances or energy liable to cause hazards to human health, harm to living resource as ecological damage, or interference with legitimate uses of the environment.[24] Environmental pollution, on the other hand, is ‘‘any addition to air, water, soil or land that threatens the health, survival or activities of human or other living organism’’. Such chemical or form of energy that cause harm is called pollutant.[25] The pollutants can be solid, liquid or gaseous products or wastes produced when a resource is extracted, processed, made into products or used. Equally, it can take the form of unwanted energy, emissions, such as excessive heat or radiation.Similarly, Mahoney states that the United Kingdom’s Environmental Protection Act (EPA) (1990) declares pollution of the environment as what is released into any environmental medium as a result of human activity which is capable of causing harm to human or other living organisms supported by the environment.[26]

One of the greatest problems that the Niger Delta region is facing today is that of environmental pollution coming from oil exploration, extraction and related activities. Environmental pollution of the physical environment is of three basic types namely: air pollution, water pollution and soil/land pollution.

Air Pollution: This is the presence of contaminated or polluted substances in the air that do not disperse properly and thus interfere with human health or welfare or produce other environmental effects which result in poor ambient air quality. According to Nwosu & Uffoh, air pollution has to do with the dangerous contamination of the atmosphere, which reduces the quality of air we breathe.[27]

Air pollution can be caused by nature and can be man-made. Some of the natural causes include volcanic eruption, whirl winds or wind storms, earthquakes and so on. While the man-made causes include wrong solid waste disposals, gas flames, oil exploration and use, industrial pollution and many other such factors which also have damaging effects on both aquatic and terrestrial life.[28]

[22]Munro, P & Lamers, F. ‘Exploring Article 1 of the World Commission on the Environment (WCED), 1986:38
[23]Constitution of the Federal Republic of Nigeria (CFRN) 1999 (As Amended 2011)
[24]Holdgate, P. ‘EFFECTS OF AIR POLLUTION ONCHILDREN’S HEALTH AND DEVELOPMENT’, McGraw Hill Publishers, U.S.A. pp. 102-189, 1993
[25]Miiler et al. (1998) Supra
[26]Mahoney, A. ‘Valuing Air Quality Impacts on Transportation’, Vol. 4, No. 2, pp. 37-79, 1999
[27]Nwosu, O. M. & Uffoh, B. A. ’ENVIRONMENTAL PUBLIC RELATIONS: PRINCPLES, STRATEGIES, ISSUES AND CASES’, IDS Publishers, UNN, Enugu, 2003
[28]Uchegbu, S. N. ‘ENVIRONMENTAL MANAGEMENT AND PROTECTION’, Precision Publishers, Enugu, p.45, 1988

In Nigeria, ambient air pollution emanates from three major sources: energy generation, industry and transportation all of which increase with population and economic growth while households, commercial and industrial activities produce a wide range of air pollutants. Other pollutants to monitor regularly for better air quality are what the World Health Organization (WHO) calls the ‘‘classical’’ pollutants. These are lead suspended particulate matter (LSPM), nitrogen dioxide, carbon monoxide and ozone particulate matter (term for the mixture of solid particles and liquid droplets found in theair).

The resultant effects of air pollution are reduced lung functioning, irritation of eyes, nose, mouth and throat. Others include increased respiratory disease such as bronchitis, reduced energy level disruption, endocrine, reproductive and immune system, neuro-behavioural disorders, cardiovascular problems, climatic change and so on.

Water Pollution: Water pollution occurs when a concentration of certain pollutants are introduced into the water or water source for reasonably long period for it to have some negative effects on the physical, biological and chemical qualities of water.[29] Water pollution takes place at either the surface or ground levels. Surface water includes such water bodies as streams, oceans, run-offs, lakes, lagoon etcetera while underground water consists of water that has percolated below the top soil and usually to an aquifer. Surface water is usually polluted through industrial water, faecal discharges or other dissolved organic solids, run-offs and chemical discharges, while ground water is usually polluted by compounds such as lead. These eventually found their way to the aquifers. Water pollution can also indirectly occur as an offshoot of soil pollution.

Land/Soil Pollution:

This is the alteration of form and function of terrestrial biosphere through improper handling of human, household and commercial wastes. Soil contamination also occurs when chemicals are released by spill or underground tank leakage into the soil. Such contaminants may include hydrocarbons, heavy metals, chlorinated hydrocarbons etc. Petroleum hydrocarbons are naturally occurring hydrocarbon substances and, depending on the length of the carbon chain, can occur in gas or solid form.

These are formed by the decay of organic substances trapped within sedimentary rocks. High temperatures and pressure convert the trapped matter into hydrocarbons. Liquid hydrocarbon found in nature is also referred to as crude oil.[30]

These wastes are categorized according to their form and source. In terms of form, there are biodegradable and non-biodegradable. Biodegradable wastes are those that can decompose through microbial activity while non-biodegradable wastes are not easily decomposed by microbial activity and last very long before decomposing. Non-biodegradable wastes include such polyethylene-based materials as plastics and rubber. Others are glass and asbestos-containing materials. Also, wastes can be categorized as solid or liquid in terms of form. In terms of source, wastes are categorized as household, commercial or industrial. Household wastes include kitchen refuse, faecal discharge and so on. Industrial wastes are usually effluence and sludge while commercial wastes are wastes generated in the normal cause of exchange of goods and services.

3.1.2 Causes of Environmental Degradation/Pollution in the Niger Delta Region of Nigeria

The following are the major causes of environmental degradation in the Niger-Delta region of Nigeria.

a.Oil Spills:

Oil spill is one of the major environmental hazards in the Niger Delta. This particular cause of environmental hazard contaminates water, destroy plants and animals. The causes of oil spill have been

[29]Nwosu & Uffoh (2005) Supra

[30]UNEP (2011). Environmental Assessment of Ogoni-land, http://post conflict, unep. Ch//publications/OEA/UNEP-OEA, pdf retrieved. Last visited: 14 January, 2020

attributed to poorly maintained pipelines,'blow-outs' of poorly maintained oil well and sabotage. Some pipes are rusty, some reportedly forty years old and needs major repairs.

In Kpeen community, Khana Local Government Area of Rivers State where Yorla oil field is located, there have been frequent conflicts between the oilgiant Shell Petroleum Development Company (SPDC) and the people due to oil spillages. This had in some cases led to loss of lives and properties. For instance, in 2011, a protest by the youths over a huge explosion which took place in April 29 at the Well 10 facility,Yorla oil field, led to the killing of Friday Nwudo, a welder aged 30. The explosion spilled crude oil sporadically for days into adjacent settlements, streams, swamps, lakes and rivers. Nwudo joined other youths of the area who were protesting the blowout and lost his life.[31]

In Bodo community, oil spillage affected creeks such as Patrick waterside; Sivibila waterside, Sugi waterside and Kegborozor waterside thus, nose-diving the fortunes of poor fishermen in the area. This deplorable situation in Yorla and Bodo is replicated in other oil producing communities such as Korokoro, Ibubu and NsisiokenOgale which UNEP identified as a community where people have been drinking water contaminated with benzene, a substance known to cause cancer at levels over 900 times above World Health Organization guidelines. A recent UNEP report has identified over 300 potentially contaminated sites from information provided by NOSDRA, SPDC (Shell) and satellite imagery.[32]

The findings of the assessment will be used for remediation to aid the rehabilitation of Ogoni-land to meet international standard. The full report including the results from all the assessments and the recommendations regarding rehabilitation and remediation was published in 2019.[33]

In Niger Delta, farmlands, mangroves, fishes, drinking waters are gone due to oil spills leading to a loss of the ecosystem. Soil or farmlands are turned into cakes of crude oil, fishes are gone due to polluted water, drinking waters are contaminated, crops are stained, fade and die due to crude oil, fumes from gas flaring visit the people with breathing difficulties.

Presenting the UNEP Environmental Assessment of Ogoniland in August 4, 2011, Ibrahim Thiaw, UNEP Director, Division for Environmental Policy, noted that it took more than 14 months to do the report during which 200 locations were visited, 122 kilometre pipeline rights of way surveyed, 5000 medical reports examined; and 23,000 people were interacted with at local community meetings. According to UNEP, given the dynamic nature of oil pollution and extent of contamination, failure to begin addressing urgent public health concerns and commencing a clean-up will only exacerbate and unnecessarily prolong the Ogoni people's suffering.[34]According to UNEP reports, full environmental restoration of Ogoniland will take an estimated time of 25 to 30 years and would need N150 billion. This will be possible through a combination of modern technology to clean up contaminated land and water ways, backed up by practical action at the regulatory, operational and monitoring levels, the report suggested.[35]

[31]Ajaero, C. 'Shell's Guilty as Charged', Newswatch, pp. 20-22, Sept. 12, 2011
[32]UNEP (2019). Environmental Assessment of Ogoni-land, http://post conflict, unep. Ch//publications/OEA/UNEP-OEA. Pdf retrieved. Last visited: 14 May, 2020;
[33]UNEP (2019). Environmental Assessment of Ogoni-land, http://post conflict, unep. Ch//publications/OEA/UNEP-OEA. Pdf retrieved. Last visited: 14 May, 2020;Adati (Oil Exploration and Spillages in the NDR),Vol.1 No. 3, p.3-10, 2020
[34]Ajaero (2011, 2020) Supra
[35]Ikuomola, G. 'ENVIRONMENTAL CLEAN-UP OF THE NIGER DELTA', Pacesetters Publishers, Lagos, pp.40, 2011

Table 1: **Number of Oil spills and the Volume in Barrels between2013 and 2020**

This table below shows number of oil spill and the volume in barrels in Nigeria between **2013 and 2020**

Year	No. of Spills	Volume in Barrels
2013	2,191	44,945.25
2014	1,833	76,902.03
2015	1,973	81,134.43
2016	2,121	36,995;79
2017	4,021	102,846.01
2018	3,743	189,777.13
2019	2,899	491,283.37
2020	3,796	1,173,113.75
Total	22,577	2,096,997.76

Source: Oyegun (2013b, 2020)

Well Blowouts:

According to United Nations Environment Programme (UNEP) ‘‘blowouts’’ is oil industry terminology for a situation in which control of oil well is lost during drilling or operation. More frequent during drilling, blowouts lead to the release of hydrocarbons (crude oil, produced water and associated gas) into the environment. Often, such mixture will catch fire and burn until such times the well is brought back under control. Blowouts could be caused by pressure, corrosion and illegal tapping leading to oil spills and fires. Such spill or fire can take months before it could be brought under control. See Appendix B showing a picture of a well blowout. (Source:[36])

In 2013, Shell BP leaked 23,446 barrels of crude oil out of the total of 44,945.25 barrels for that year as shown in Table 1 above into the seas of Forcados terminal and in 2020, 612,000 barrels of crude oil were spilled as a result of Texaco oil well blowout. Between 2013 and 2020, more than 1.1 million barrels of crude oil were spilled as a result of rupturing in Escravos terminal in Warri, Delta State.Most recently, precisely May 2020, a major blow out occurred in Escravos in Delta State, which affected eight creeks and villages in the area. The spill caused economic paralysis, with destruction to fishponds and vegetation, nets and traps. It also resulted in a loss of 40,000 barrels of oil (Ajaero, 2020).This will bring about steaming temperatures, acidification of the waters and air miles around the natural gas rig, thus causing a great damage of marine life. Communities affected by the blow out are Korokoro, Ibubu, Bodo, Koluana I and II, Sangana, Foropa, Bisangbene, Ezetu, both in Delta and Bayelsa States.

Equipment Failure: This is another oil spillage factor which result from poorly maintained equipment used in oil exploration and transportation. In May and December 2019, pressure surge valve of Exxon Mobil and SPDC opened due to equipment failure causing Qua Iboe terminal Tank Farm spill and Umudike II spill in OhajiEgbema Local Government of Imo State.[37]

b) Abandoned Oil facility:

An abandoned oil facility in the Niger Delta is another cause of environmental pollution in the area. In Ogoniland for example, some containers are left lying around since SPDC were forced out of the area some years ago. Where such containers are not empty, there are no indications of the contents. Tampering with such facility may lead to fire outbreak. From the environmental point of view, UNEP notes that corrosion of such metallic objects lead to ground contamination by heavy metals.

[36]UNEP (2011) Environmental Assessment on Ogoni-land (Supra)

[37]Ogboi, E. in Kperegbeyi et al. ‘’Oil Spillage and Economic Consequences in the Niger Delta, Vol.2, No. 1, p.28, 2005

c) Artisanal Refining:

Artisanal refining means local and crude way of refining petroleum products. This involves the use of metal drums to boil crude oil whose fumes are collected in tanks through pipes welded together. This is common in the Niger Delta region where distilleries are heated on open fire throwing dark plumes of smokes into the air and increasing the risk of fire outbreaks. Also, soil where such practice took place will suffer contamination from hydrocarbons. See Appendix B showing air pollution resulting from artisanal refining and the resultant effect on the environment of the Niger Delta region and Ogoniland in particular. (Source:[38])The location at which artisanal refining has been carried out present a picture of total environmental devastation. See table 2 below.

Table 2: Some Oil Pollution Incidences in Nigeria

Year	Location	Quantity Spilled	Cause of Spillage	Effect on Environment
1979	Forcados	570,000	Terminal rupture of the bottom	Fishing activities/ mangrovedestroyed
1980	Funiwa Oil well	421,000	Oil well blow out	Destruction of fish, crab,socio-economicactivitiesaffected
1981	Oyakama	30,000	Oil well blow out	Over 25 hectares of agricland destroyed
1982	Abudu pipeline	5.240	Oil well blow out	Pay loader destroyed/damage to agric, crops
1983	Oshika	10,000	Pipeline rupture	Fish destroyed, watercontaminated
1986	Funiwa oil well	200,000	Oil well blow-out	About 350 hectares ofmangrove, fishes killed
1994	Agoda Brass oil pipeline		Pipeline corrosion	Over 10 sq. Km of farmland
1998	Idoho (Mobil)	401,000	Offshore discharge	Over 10 sq. km land destroyed, lakes and riverscontaminated
2003	Kwale oil well explosion			About 5 lives lost
2003	Kalabilema oil spill / explosion		Causes not yet ascertained	Oil spill/explosion

Source: Adeyanju, J. A. (2004)

d) Improper Industrial Waste Disposal

Industrial wastes are disposed in the region without regard to human life and safety as well as its effects on the environment. An example is a waste disposed of in several hundred big bags of 1 cubic-metre reinforcement plastic bags which amounted to 1,100-1,500 cubic metres of oil mixed with grey clay

[38]UNEP (2011) Environmental Assessment on Ogoni-land (Supra)

containing small rock fragments with seeping from the bags, forming puddles in the ground and leaching into the soil.[39]

In 1999, for instance, tragedy befell the citizens of Erovie, a community in the Niger Delta who were poisoned by toxic waste from Shell Oil's Operations. Local residents experienced health problems after Shell Oil Company injected litres of waste into an abandoned oil well in Erovie. Many who consumed crops or drank water from swamps in the area complained of vomiting, dizziness, stomach ache and cough. This graphic example is a case of what environmental pollution can result to. See Appendix B for Tipping of oil waste in OkanOyaa Eleme LGA.

e) Sabotage:

This is a deliberate nefarious human activity on oil pipelines either for the purpose of making quick money or wilfully making oil companies suffer loss. According to Ikporukpo in Ekpo, sabotage as an oil spillage factor accounts for 3% of the total oil spills world-wide and about 33% of oil spills in Nigeria. For instance, in August 2001, several kilometres of the Trans Niger pipeline were excavated and cut in sizeable lengths for onward transportation to buyers. This act spilled oil at B-Dere and K-Dere communities in Gokana Local Government Area of Rivers State.[40]

Ugochukwu, Onyema in Nwosu and Uffoh further stated that in August 2001, ¾ inch plug belonging to Exxon Mobil were removed which led to Qua Iboe terminal spill in Mkpanak which affected vegetation, farmlands, and buildings in the vicinity of the spill.[41]

f) Gas Flaring:

Adeyanju, opined that gas flaring brings about ecosystem heat stress and acid rain. Acid rain in turn induces the destruction of fresh water fishes and forests.[42] In another report, Oladejo inAdeyanju noted that constant gas flaring in the oil producing areas of Niger Delta contributes significantly to the atmospheric level of carbon dioxide, which is a major component of green-house gases that causes global warming.[43]

3.2 Effects of Environmental Degradation on the Socio-economic Development of the Niger-Delta Region of Nigeria

Oil spillage has a major impact on the ecosystem into which it is released and may constitute ecocide, immense tracts of the mangrove forests, which are especially susceptible to oil mainly because it is stored in the soil and re-released annually during inundations.An estimate of 5 to 10% of Nigerian mangrove ecosystems have been wiped out either by settlement or oil. The rainforest which previously occupied some 7,400 km2 of land has disappeared as well.Spills in populated areas often spread out over a wide area, destroying crops and aquacultures through contamination of the groundwater and soils; the consumption of dissolved oxygen by bacteria feeding on the death of fishes. In agricultural communities, often a year's supply of food can be destroyed instantaneously. Because of the careless nature of oil operations in the Niger-Delta, the environment is growing increasingly uninhabitable.People in the affected areas complain about health issues including breathing problems and skin lesions, many have lost basic human rights such as health, access to food, clean water, and an

[39]UNEP (2011) Ogoni land Environmental Analysis, http://www.unep publications/OEA/UNEP. Last visited:14/05/2020

[40]Ikpurokpo in Ekpo; 'Effects of Sabotage on Oil Communities in Niger Delta', Vol. 2, No. 1, pp.57-79, 1986, 2010

[41]Ugochukwu, Onyema in Nwosu & Uffoh. 'Environmental Degradation of the Niger Delta, Vol. 1, No. 1, pp.45, 2005

[42]Adeyanju, J. U. 'Government and the Oil Pollution Crisis in Nigeria', Vol. 2, No. 1, pp. 17, 2004

[43]Oladejo in Adeyanju. 'Assessing the Impact of Gas Flaring on the Niger Delta Region, Vol. 2, No. 4, pp.67, 1998, 2004

ability to work. On January 30, 2013, a Dutch court ruled that Shell is liable for the pollution in the Niger-Delta region.

The following were the identified major effects of environmental degradation in the Niger-Delta region of Nigeria with particular reference to Ogoni community.

a. Loss of Mangrove Forests:

The Niger-Delta region consists of extensive mangrove forests and rain forests. The large expanses of mangrove forests are estimated to cover approximately 5,000 to 6,590 km2 of land. Mangrove remain very important to the indigenous people of Nigeria as well as to the various organisms that inhabit these ecosystems.Human impact from poor land management, upstream coupled with the constant pollution of petroleum has caused five to ten percent of these mangrove forests to disappear.[44]

The volatile, quickly penetrating and viscous properties of petroleum have wiped out large areas of vegetation. When spills occur close to and within the drainage basin, the hydrologic force of both the river and tides force spilled petroleum to move up into areas of vegetation.Mangrove forests are included in a highly complex trophic system. If oil directly affects any organism within an ecosystem, it can indirectly affect a host of other organisms. These floral communities rely on nutrient cycling, clean water, sunlight, and proper substances. With ideal conditions they offer habitat structure, and input of energy via photosynthesis to the organisms they interact with. The effects of petroleum spills on mangroves are known to acidify the soils, halt cellular respiration, and starve roots of vital oxygen.

An area of mangroves that has been destroyed by petroleum may be susceptible to other problems. These areas may not be suitable for any native plant growth until bacteria and microorganisms can remediate the conditions. A particular species of mangrove,Rhizophoracanosathrives higher in the-Delta region. As the soil supporting Rhizopheracanosa become too toxic, a non-native invasive species of palm, Nypafruticans, quickly colonizes the area. This invasive species has a shallower root system that destabilizes the banks along the waterways, further affecting sediment distribution lower in the Delta region. Nypafruticans also impedes navigation and decreases overall biodiversity. In places where Nypafruticans has invaded, communities are investigating how the palm can be used by local people.[45]

The loss of mangrove forests is not only degrading life for plants and animals, but for humans as well. These systems are highly valued by the indigenous people living in the affected areas. Mangrove forests have been a major source of wood for local people. They are also important to a variety of species vital to subsistence practices for local indigenous groups, who unfortunately see little to none of the economic benefits of petroleum.

Mangroves also provide essential habitat for rare and endangered species like manatee and pygmy hippopotamus. Poor policy decisions regarding the allocation of petroleum revenue has caused political unrest in Nigeria. This clash among governing bodies, oil corporations, and the people of the Niger-Delta region has resulted in sabotage to petroleum pipelines, further exacerbating the threat to mangrove forests.

The future for mangrove forests and other floral communities is not all negative. Local and outside groups have provided funds and labour to remediate and restore the destroyed mangrove swamps. The federal government of Nigeria established the Niger Delta Development Commission (NDDC) in 2000 which aims to suppress the environmental and ecological impacts petroleum has had in the

[44]Wikipedia, http://www.wikipedia.com; ''Effects of Environmental Degradation on the Niger Delta Region,' Last Visited: 24
January, 2021.
[45]Wikipedia, http://www.wikipedia.com; Ibid

region. Governmental and non-governmental organizations (NGOs) have also utilized technology to identify the source and movement of petroleum spills (Wikipedia, 2020).[46]

b. Depletion of Fish Populations:

The fishing industry is an essential part of Nigeria's sustainability because it provides much needed protein and nutrients for people, but with the higher demand on fishing, fish populations are declining as they are being depleted faster than they are able to restore their number. Fishing needs to be limited along the Niger River, and aqua-cultures should be created to provide for the growing demand on the fishing industry. Aquaculture allows for farming for production and provide more jobs for the local people of Nigeria.Overfishing is not the only impact on marine communities. Climate change, habitat loss, and pollution are all added pressures to these important ecosystems. The banks of the Niger River are desirable for people to settle. The river provides water for drinking, bathing, cleaning, and fishing for both the dinner table and trading to make a profit.

Oil contamination affects the fish population and affects the farmers that rely on fishing to support their family. By enforcing laws and holding oil companies accountable for their actions the risk of contamination can be greatly reduced. By limiting the devastation caused by disturbances to the marine environment, such as pollution, overfishing and habitat loss, the productivity and biodiversity of the marine ecosystems would increase.[47]

c. Water Hyacinth Invasion:

Water hyacinth is an invasive species that was introduced into Africa as an ornamental plant and which thrives in polluted environments. Water hyacinth has the capability to completely clog the waterways in which it grows, making it nearly impossible to navigate fishing boats. In recent years, it has found its way into the Niger River, choking out both sunlight and oxygen to the marine organisms that live there.

Whenspecies such as water hyacinth makes its way into the ecosystem, it competes with native plants for sunlight, diminishing energy resources within the marine environment. With the loss of energy some populations will not be able to survive, or their numbers may drop beyond a point of no return creating a threatened environment. Added to the loss of energy, water hyacinth also takes up and depletes the water of oxygen which is essential to the livelihood of all marine organisms.[48]

d. Natural Gas Flaring:

Nigeria flares more natural gas associated with oil extraction than any other country in the world with estimates suggesting that of the 3.5 billion cubic feet (100,000,000 m3) of associated gas (AG) produced annually, 2.5 billion cubic feet (70,000,000 m3) or about 70% is wasted by flaring. This equals about 25% of the UK's total natural gas consumption and is the equivalent of 40% of Africa's gas consumption in 2001. Statistical data associated with gas flaring are notoriously unreliable, but Nigeria may waste US$ 2 billion per year by flaring associated gas.

While OPEC and Shell the biggest flarer of natural gas in the world and Nigeria respectively claim that only 50% of all associated gas is burnt off via flaring these data are contested. The World Bank reported in 2004 that ''Nigeria currently flares 75% of the gas it produces. Gas flares have potentially harmful effects on the health and livelihood of nearby communities, as they release poisonous chemicals including nitrogen dioxides, sulphur dioxide, volatile organic compounds like benzene, toluene, xylene and hydrogen sulphide, as well as carcinogens like benzapyrene and dioxins. Humans exposed to such substances can suffer from respiratory problems. These chemicals can aggravate asthma, known to be chronic bronchitis.

[46]Wikipedia, http://www.wikipedia.com; Supra
[47]Wikipedia, http://www.wikipedia.com; Ibid
[48]Wikipedia, http://www.wikipedia.com; Supra

In November, 2005, a judgement by the Federal High Court of Nigeria ordered that gas flaring must stop in a Niger Delta community as it violates guaranteed constitutional rights to life and dignity. In a case brought against Shell Petroleum Development Company of Nigeria (SPDC), Justice C. V. Nwokorie ruled in Benin City that ''the damaging and wasteful practice of flaring cannot lawfully continue.'' As of May 2011, Shell had not ceased gas flaring in Nigeria.

4.0 CONCLUSION

Niger Delta region in Nigeria is a region known for oil exploration and related activities. It is a region faced with environmental pollution or degradation. One of the threatening environmental problems in Nigeria prevalent in this area is oil pollution resulting from oil spills, which have caused devastation effects on communities around the area of spill, destroyed aquatic lives, vegetation and farm lands.

This exploratory study which looked at the effects of environmental degradation or pollution in the Niger Delta region of Nigeria with particular reference to Ogoni community indicated that environmental education is necessary to enlighten both the government, oil companies, institutions and other stake holders on environmental best practices in relation to implementation of environmental laws and regulations; and most importantly, the public enlightenment campaigns by oil producing companies on the urgent needfor the environmental clean-up of the oil producing communities of the Niger Delta region and thereby eradicating the negative impact on the health of the people of the Niger Delta region and conservation of the ecosystem and mangrove forests of the region.

Again, the study revealed that the root cause of environmental pollution in the Niger Delta is oil spillage even as the researcher tends to believe that environmental education will add impetus to the struggle for having a healthy environment as well as sustainable environment.Niger Delta region is an endangered area; threatened by environmental pollution caused by oil exploration and related activities whose remediation on cost run into billions of naira and would run for over 30 years. Therefore, further pollution should be vehemently fought and resisted in order not to reap today and compromise the needs of the future generations. Since nature sustains its inhabitants and the fate of nature depends in human hands, there is the need for environmental education to enrich environmental friendly attitudes, better understanding of existing regulations on the environment as well as making of better regulations capable of ensuring a healthy environment that meet human needs and support healthy living.

REFERENCES

Adeyanju, J. U. (2004), Government and the oil pollution crisis in Nigeria. In International Journal of Environmental Issues vol. 2, Nos. 1 &2, pp. 217-227, Ikot EkpeneDevelopment Universal Consortia

Afinotan, L. A., &Ojokorotu, V., (2009), The Niger Delta crisis: Issues, challenges and Prospects. African Journal of Political Science and International Relations,3, 191-198

Agbiboa, D., &Maiangwa, B., (2012), Corruption in the underdevelopment of the Niger Delta region in Nigerian Pan African Studies, 5(8), 108-131. Retrieved from hhtp://www.panafrican.com

Ajaero, Chris (2011), African Charter on Human and Peoples Rights (ACHPR) 1981, Article 24

Ajaero, Chris (2011, Sept. 12) Shell's guilty as charged, Newswatch p. 20.

Akinde, S. R. (2010), Restructuring the public sphere for social order in the Niger Delta Region through polycentric planning: What lesson for Africa, African and AsianStudies, 9, 55-82, doi: 10, 1163/158921010X491263 Communication, 21, 73-75, doi: 10, 1100113528071072876

Ekpo, S. (2010), Environmental impacts of petroleum exploration and exploitation in Nigeria. In International Journal of Environmental Issues vol. 7, No. 1, pp162-175, Ikot Ekpene, Development Universal Consortia

Emuedo, C. (2010), Politics of conflict of oilification and petro-violence in the Niger Delta. Global Journal of Social Sciences, 9, 75-81.

Eweje, G. (2007), Multinational oil corporations' CSR initiatives in Nigeria: The scepticism of Stakeholders of host oil communities, Managerial Law, 49, 218-235, doi:10, 108, 08090550710841240

Grevy, O. (1995) Oil Pollution in the Niger Delta Region, Macmillan Press, Lagos, Vol. 2,p. 102 – 148

Hodge, T. (2000) Effects of Environmental Degradation in the Niger Delta Region, Tabansi Publishers, Port Harcourt, p. 52 - 70

Ikuomola, Vincent (2011, Aug. 5), N150b needed to clean up Ogoniland. The Nation p. 8

Ihayare, C., Ogeleka, ,D. P.&Ataine, T. G. (2005), The effects of the Niger Delta oil crisis on the Women folks. Journal of African Studies, 21, 101.122

Inglehart, E., &Welzel, C. (2009), Development and Democracy: What We Know About Modernization Today. Journal of Foreign Investment

Millar, G. T. (1998), Living in the Environment (10thed) Cincinatti, Wadsworth publishing co.

Munro, K. &Lamers, M. (1986) Highlights on Article 1 (WCED)1984; National Conference on Nigerian Environment, Lagos, p. 30 - 42

National Environmental Standards and Regulations Enforcement Agency (NESREA) 2007

Nkememenam, A. C. (2009), Press coverage of child trafficking in Nigeria: a content analysis of Daily Sun and Vanguard newspapers. Unpublished M. A. Research project, Mass Communication, University of Nigeria, Nsukka.

Nwosu and Uffoh (2005), Environmental Public Relations Management: Principles,Strategies, Issues and Cases; IDS UNN

Enugu Obot, I. M., Essien, E. F. and Ben, D. O. (2010), Implications of oil spillage on environment for crop farming activities in Akwa Ibom State. In International Journal of Environmental Issues, vol. 7, No. 1, June 3010, pp 215-222, IkotEkpene, Development Universal Consortia

Odogwu, P. (1981) Environmental Justice and Equity: Issues and Proceedings, Tonad Publishers, Lagos, p. 111 - 122

THE ROLE OF BUSINESS ETHICS IN THE EFFICIENT MANAGEMENT OF THE NIGERIAN PUBLIC SERVICE

Dr. Eme, Chukwuemeka G.

Lecturer, Business Administration, National Open, University of Nigeria, Abuja, Nigeria

ABSTRACT

Business ethics seeks to resolve questions of business etiquettesand morality by defining concepts such as good and evil, right and wrong, virtues and vice, justice and crime. The motivations of this paperare to analyse the risks of an unethical business misconduct disaster which is ever arising due to the complexity of the global business environment with particular reference to the Nigerian public institutions and private enterprises.Again, the paper explores the need for public and private organisations in Nigeria to effectively make corporate social responsibility a norm to provide social benefits to the business and public administrativeenvironments where it operates. Global interdependence is a compelling dimension of the global business environment, creating demands on ethical business behaviours, social responsibility, economic development in host countries, and environmental protection around the world. However, there were still several large multinational companies indulging in ethically-questionable business practices. If multinational companies behave unethically, it soon comes to the notice of the public and the company's image is tainted. Multinationals are worse off for having behaved unethically in the interest of short term gains, as the bad publicity generated by unethical practices leads to far greater losses in the long run.

Key Words: Business ethics, globalization, business enterprises, multi-national companies (MNCs), Nigerian public service

1.0 INTRODUCTION

One approach to understanding business ethics is to take an individual perspective and focus on personal morals, character and the person. This approach assumes that virtues linked to the high moral ground of truthfulness, honesty, and fairness are self-evident and easy to apply in a complex global environment. This approach would assume that organizational values and ethics training may be more appropriate for individuals with unacceptable moral development. It also assumes that employees will be able to control their decision making environment independent of managers and co-workers. Another approach to understanding business ethics is to assume that organizational values and compliance systems are necessary to prevent people from engaging in unethical conduct. This approach recognizes the risks and the complex decision-making environment in a global environment. Business ethics programs and organizations combine values and compliance, which requires training and constant vigilance.

All organizations will face ethical lapses, unintentional misconduct, and complacency from employees when they observe serious misconduct. The scandals and unethical conduct that have occurred globally have taught us that some people deliberately break the law or engage in inappropriate behaviour. Many others see ethical issues when devising what they think as an innovative scheme for success.

Ethics may be defined as the moral principles that govern a person's behaviour or attitude that affects the way he carries out an action or activity. It is that branch of knowledge that deals with moral principles. Ethics or moral philosophy is a branch of philosophy that involves systematizing, defending, and recommending concepts of right and wrong behaviour. Ethics seeks to resolve questions of human morality by defining concepts such as good and evil, right and wrong, virtue and vice, justice and crime.

As a field of intellectual inquiry, moral philosophy also is related to the fields of moral psychology, descriptive ethics, and value theory.

Three major areas of study within ethics recognized today are:

1. **Meta-ethics**; concerning the theoretical meaning and reference of moral propositions, and how their truth values (if any) can be determined.

2. **Normative ethics**; concerning the practical means of determining a moral course of action.

3. **Applied ethics;** concerning what a person is obligated (or permitted) to do in a specific situation or a particular domain of action.

Business ethics, on the other hand, can be defined as an act of addressing the morality of economic systems (e.g. the free market, communism, socialism) and the conduct of the organisations found within these systems (e.g. corporation in a free market system).Many firms have a set of policies on business conduct and legal compliance. The policies embrace ethics, internal controls, conflict of interest and a host of other areas, all of which are designed to promote good and ethical business practices. Employees are acquainted with these policies and are made to sign undertakings to maintain them. As a matter of policy, the company is ready to concede business opportunity in favour of its code of ethics.

Why should businessmen be ethical in their conduct? Appearing to be ethical, it may be suggested, is simply good business. Other more specific significance of business ethics are as follows:

- Consumers are arguably more likely to buy from a company which can be seen as acting ethically.

- Graduates are more likely to be attracted to companies which treat their employees fairly and give customers a fair deal.

- Ethical business practice is a means of forestalling legislation and stringent government regulations.

- Business ethics requires companies doing their bit to contribute towards a just, fair and egalitarian society, while also ensuring that environmental pollution is brought under control.

- Another significance of business ethics stems from the fact that businesses need to retain the vast amount of social power entrusted to them by the public.

The extent of ethical behaviour of businesses is influenced by the following factors:

- **Cultural differences**: Culture is the way of life of people and transmitted from one generation to another. The extent of ethical behaviour is therefore a function of the culture of a particular country. For instance, what does it mean for a businessman to do the right thing in China, USA or Nigeria? Taking bribe is considered a norm in Nigeria and several Third-World nations.

- **Knowledge:** Greater knowledge increases the chance of making the right decision. Business decisions not based on facts or a clear understanding of the consequences could harm employees, consumers, the company, and other stakeholders. An employee or manager is held responsible for his/her decisions, actions or inactions. Therefore, the right questions should be asked all the time before decisions are taken.

- **Organizational Behaviour:** The foundation of an ethical business climate is ethical awareness and clear standards ofbehaviour. Companies that strongly enforce company codes of conduct and provide business ethics training help employees recognise and reason through ethical problems. Similarly, companies with strong ethical practices set a good example for employees to follow. On the other hand, companies that commit unethical acts in the course of doing business open the door for employees to follow suit.

Social responsibility, on the other hand, is the obligation (of managers) to pursue the policies, to make decisions, or to follow lines of action which are desirable in terms of objectives and values of our

society. More so, social responsibility is an interpersonal relationship, mutual interdependence that exists when people are continuously dependent upon one another in both an organized and unorganized way.Social responsibility can also be regarded as implied, enforced felt obligation of managers, acting in their ethical capacities, to serve or protect the interests of groups other than themselves. It is seen as the intelligent and objective concern or the welfare of society which restrains individual and corporate behaviour from ultimately destructive activities, no matter how profitable and which leads in the direction of positive contributions to human betterment.

Business social responsibility exists in all the enterprises with their customers, owners, employees, suppliers, creditors, management, government, and the society as a whole. The social responsibility of economic enterprises is in the efficient use of resources, to produce economic wealth (production of goods and services to satisfy people's material wants). In the production of goods and services, a business enterprise is socially responsible in such a way that no restriction is placed upon the legitimate rights and interests of any person; to observe by word and deed the ethical standards of society.

Business enterprises discharge their obligations to employees by giving them better-than-competitive wage and fringe benefits; economical prices and quality merchandise to consumers; gifts and scholarships to educational institutions in their vicinity in terms of education and research which have a direct relationship to the future of the business by making available better trained human resources or advanced knowledge which will be beneficial to the business.

Donations, provision of social infrastructure e.g. clinics, good roads etc. by the business; donating services and maintaining uneconomical operations and job creation; free tax collections and donations of services of gifted managers to the government and sacrificing the right to manage to the unions are part of the corporate social responsibilities of business to the communities where they operates.

There are many factors that accounts for the apparent neglect of social responsibility in Nigerian business enterprises. They include:

- Relative small size of Nigerian business enterprises: The smallness in terms of size and financial strength of these firms makes it practically impossible for them to adopt social responsibility.
- Profit maximization pursuit by large enterprises owned by foreign firms to the detriment of caring less for social responsibility. They see social responsibility on the part of the indigenous businessmen as act of patriotic gesture on their part.
- Unethical business practice- dishonesty, embezzlement, smuggling, hoarding etc.
- Lack of initiative on the part of the government.
- The general down turn of the economy resulting to high rate of unemployment and severe inflation.
- Lack of professionalism in management style: Many Nigerian managers do not perceive social responsibility as one of the key functions of management. Their training and experience do not arouse such consciousness in them as some considered it a novel, or at best informal and intuitive management function.
- Societal little expectation of social responsibility as the various bodies to play dominant role in enforcing conformity (e.g. Federal Environmental Protection Agency (FEPA), Standard Organization of Nigeria (SON), Federal Ministry of Health, Federal Institute of Industrial Research (FIIRO) etc. were non-functioning. Generally, there is no well-established department of public affairs, scarcely any group of individual bodies that scrutinize corporate social responsibility or social welfare in any Nigerian business organizations. At best, the only effective tool that the government uses to obtain compliance is persuasion.
- Some of the foreign entrepreneurs come from countries where the consciousness for social responsibility is at best in their basic infancy e.g. Britain, Taiwan, India, etc.

- Total reliance on publicly-owned enterprises in the provision of essential services in rail, airport, broadcasting, (radio and television), health, postal and communication services, electricity, oil drilling refining and distribution, water, iron and steel etc. Since these large enterprises are financed by the tax payers it is assumed that they are socially responsible since, their pre-occupation is in social welfare redistribution.
- Ignorance of the role business enterprises should play in the area of social responsibility.

The frequently mentioned social responsibility includes:

- Contribution to community development.
- Employment opportunities generation.
- Price control.
- Avoidance of smuggling.
- Environmental sanitation.
- Product safety guarantee.
- Consumers oriented labelling.
- Prevention of product defects.
- Assist government in identifying and making credit facilities available to qualified farmers, fish and shrimp farmers etc.
- Fair advertising.
- Generous donations and support to games and sports.
- Contribution to arts.
- Rural development.
- Donation to orphanages and rehabilitation centres.
- Contribution to educational institutions and research centres in form of scholarship and research grants.
- To eliminate poverty and provide quality health care.
- Apprenticeship schemes for the unemployed e.g. Leventis Group, UAC etc.
- Releasing understandable and reliable accounting statements.

1.1The Concept of Business Ethics in Public Service Administration

The word ‘ethics’ has a Greek and Latin origin respectively. Traditionally, it refers to the customary values and rules of conduct (as in ‘’cultural ethos’’ and social mores), as well as insights about what counts as human excellence and flourishing. ‘’Ethics’’ and ‘’morality’’ are often used interchangeably by us today. But ethics also refers to moral philosophy, i.e. a discipline of ethical analysis of the meaning and justification of moral beliefs.

Ethics and morality along with law and etiquette are essentially normative, that is, they prescribe human behaviour as obligatory, prohibited or permissible. There is considerable overlap between ethics and law, and ethics and etiquette. Much of the law embodies ethical principles: respect for basic rights to life, property, and the right of citizens to participate in political life. It is usually unethical to break the law.A breach of etiquette can also be unethical if it is done intentionally to offend someone simply for one’s amusement.

Ethics goes beyond etiquette, though, it includes matters that nearly every human society considers significant: action such as lying, breaking a promise or killing someone are more serious than social faux pros. Ethics also has to with human character and motivation, which in many cases are irrelevant to etiquette and law.

Law and etiquettecan sometimes be criticized on moral grounds. According to Anam (2011) Public sector ethics addresses the fundamental premises of a public administrator's duty as a steward'' to the public. In other words, it is the moral justification and consideration for decisions and actions during the completion of daily duties when working to provide the general services of government and non-profit organizations. Ethics are an accountability standard by which the public will scrutinize the work being conducted by the members of these organizations.

Furthermore, Anam (2011) added that decisions are based upon ethical principles, which are the perception of what the general public would view as correct. Having such a distinction ensures that public administrators are not acting on an internal set of ethical principles without first questioning whether these principles would hold to public scrutiny. It also has placed an additional burden upon public administrators regarding the conduct of their personal lives.

Davis (1990) has defined ethics as ''those morally permissible standards of conduct that each member of a group wants every other to follow even if their following them would mean he or she has to follow them too''. Thus, the concept 'ethics' is reserved for the morally permitted standards that apply only to particular groups. Professional ethics would therefore refer to those special standards governing the conducts of members of a particular professional group basically because they are members of that profession. Professional ethics can only be learnt as part of the training for that profession. Thus, members of the administrative system are expected to learn the ethics of their profession either during formal training or on the job.

Thompson (1985) has defined administrative ethics as involving the application of moral principles to the conduct of official responsibilities and duties. Chapman (2008) on the other hand has defined civil service ethics as the application of moral standards in the course of official work. So it is expected of civil servants to apply and exercise certain ethical considerations when they are faced with a situation where they have to make value judgement that have implications for their professional standing.

Public sector ethics is an attempt to create a more open atmosphere within governmental operations. Ethics must be seen as an ongoing activity and not as a status to be attained. Ethics is not just about establishing a set of rules or codes of conduct but are an ongoing management process that underpins the work of government (Hondeghem, 1998). In the complex world of public administration, norms and values rarely provides clear-cut answers to difficult problems. Ethics should be thought of as helping to frame relevant questions about what government ought to be doing and how public administrators ought to go about achieving those purposes'' (Denhadt as cited in Hondeghem, 1998).

Ethics in the public service are therefore the broad norms that stipulates how public servants should behave and exercise judgement and discretion in carrying out their official duties. Central to administrative ethics are attitudes, standards and systems of values which have been internalized in the civil servant. Its foundation is the belief that what public officials and employees do has a central and inescapable normative component involving values, morality and ethics (York, 2004).

Even the members of the society expect the civil servant to act with unwavering integrity, absolute impartiality and devotion to the public interest and the state (Rohr, 2006). This becomes important because the public service is often seen as the extension of the government and the logic of modern government depends increasingly on the acceptability of those who govern to those they govern, acceptability which is further enhanced if those who are governed have confidence in the moral uprightness of those who govern (Baker, 2001). The failure or the jettison of every ethical standard will inevitably lead to corruption and corrupt practices in the public service as well as the lowering of efficiency and effectiveness of service delivery.

The Values and Ethics Code for the Public Service sets forth the values and ethics of public service to guide and support public servants in the integrity of the Public Service. The Code also serve to strengthen respect for, and appreciation of, the role played by the Public Service within Nigerian democracy. The Public Service of Nigeria is an important national institution. Through the support they provide to the duly constituted government, public servants contribute in a fundamental way to good governance, to democracy and to Nigerian society. The role of the Public Service is to assist the Government of Nigeria to provide the peace, order and good government.

Ethical behaviour is that which is morally accepted as ‘’good’’ and ‘’right’’ as opposed to ‘’bad’’ or wrong in a particular setting. Considering some questions like, is it ethical to do personal business on the organization’s time? Is it ethical to pay bribe to obtain a business contract? It is obvious that despite one’s initial inclination to respond to these questions, the major points of it all is to remind organization that the public at large is demanding that government officials, managers, workers in general and the organizations represent all act according to high ethical and moral standard. The future will bring a renewed concern with maintaining high standards of ethical behaviour in organizational transactions and in the work place.

The effective management of ethical issues requires that organizations ensure that their managers and employees know how to deal with ethical issues in their everyday work lives. Therefore, organizational members must first understand some of the underlying reasons for the occurrence of unethical practices. From the above, we can assert with Anam (2011) what ethics in public organizations deals with.

1. Ethics deals with the character and conduct and morals of human beings. It deals with good or bad, right or wrong behaviour; it evaluates conduct against some absolute criteria and puts negative or positive values on it (Henekom, 1984). Guy (1990) agrees with Henekom because he views ethics as different from law because it involves no formal sanctions. It is different from religion because it makes no theological assumptions. It is different from aesthetics because it is aimed beyond self-interests of others. Ethics is both a process of inquiry and code of conduct. As a code of conduct, it is like an inner eye that enables people to see the rightness or wrongness of their actions (Guy, 1990).

2. The ethical question is closely linked to human existence. The essence of mankind lies in the fact that he/she can reflect upon, as well as evaluate him/herself and his/her deeds. To be in a position to evaluate, a set of evaluation criteria or values is required as yardsticks (Vander Waldt & Helmbols, 1995).

3. Heynes (1986) is of the opinionthat ethics has to do with the actions of man. Consequently, it requires adjustments in the actions and attitudes of the public manager in relation to his colleagues and the public as well as in relation to himself. According to De Villiers (1989), the basis of the evaluation of human behaviour is to be found in a system of values. Ethical values and integrity as a basic value as well as the rule of law are key elements of every democratic society. Public officials in their daily execution of their functions and management of public funding, dispose of discretionary competencies. These values must not only protectthe citizens against arbitrary use of this power, but also the public authority itself against any improper use of this power by its public officials. The public officials themselves must be protected against any abuse or diversion of law or authority on behalf of the public authority or its official bodies (Hondeghem, 1998).

4. In addition to the above, Hondeghem (1998), writes that ethical behaviour is essential for an effective and stable political-administrative authority as well as social and economic structures. Corruption can disturb economic competition; endanger free trade and stability on which the free economy is based.

Esterhuyse (1989) writes that to make this evaluation possible, specific criteria are required. These evaluation criteria can be utilized as yardsticks and have a regulatory and evaluator functions. Aspects such as quality of life, legitimacy of public institutions and the management style of the public sector may be derived from the moral-ethical culture. The moral-ethical culture which prevails on the public sector is dependent on the values of society. A society which does not, or is not allowed to express

moral protest in public can cause political office-bearers to have a low sense of responsibility and integrity. Consequently, the possibility of corruption and maladministration is increased (Esterhuyse, 1989).

The imperative of day to day organizational performance are so compelling that there is little time of inclination to divert attention to the moral content of organizational decision making. An effective organizational culture should encourage ethical behaviour and discourage unethical behaviour. Admittedly, ethical behaviour may cost the organization but it is important to enforce it among the members of the organization in order to achieve organizational goals, even though ethical problems in organization continue to greatly concern the society, government, individuals, etc.

The potential impact that organizational culture can have on ethical behaviour has not really been explored. What is needed in today's complicated times is for more organizations to step forward and operate with more positive ethical cultures. It is often said that the only constant in life is change and nowhere is this truer than in the workplace. As the years approach, companies face a variety of changes and challenges that will have a profound impact on organizational dynamics and performance. In many ways these changes will decide who will survive and prosper into the next century and who will not. Among these challenges are the following:

i) The challenge of international competition

ii) The challenge of new technologies

iii) The challenge of increased quality

iv) The challenge of employee motivation and commitment

v) The challenge of managing a diverse workforce

vi) The challenge of ethical behaviour.

These are challenges that must all be met by organizations and managers concerned about survival and competitiveness in future. Ebitu (2012) affirms this, when he said that business ethics is applicable to accentuate an ethical consensus in business relationship, activities and actions with customers in order to survive, stabilize and grow; as customers expects a level of acceptable conduct from business organizations, through product service quality, avoiding deceptive adverts, product safety and fairness in all dealings.

1.2 The Concept of Business Ethics, Values and the Public Service in Nigeria

Ethics: Ethics is a moral law of human conduct or behaviour considered from the point of view of good or evil. It is an action, which is morally good or morally evil. Ethics derives from the Greek noun ''ethos'' meaning ''the customs and conventions of a given community'' (Fredrick, 2017).Bottorf (2007) (as cited in Casimir, Izueke and Nzekwe, 2014) describes ethics as a body of principles or standards of human conduct that govern the behaviour of individuals and groups. Ethics means principles by which to evaluate behaviour as right or wrong, good and bad, in respect of character and conduct, which ought to be accepted by a class of individuals. Put differently, ethics could be described as a study of standards that the professionals in question ought to accept and observe. Politt (2003) defines ethics as rules of conduct and behaviour, which relate to questions of right or wrong, good or evil. Ethics refers to a system of moral principles or rules of behaviour (Oxford Dictionary, 7th edition). Laxmikant (2007), puts it thus ''they provide rules of the game''.

From the definitions above, it could be deduced that ethics are well based standards of right and wrong, which prescribe what individuals ought to do usually in terms of rights, obligations, benefit to the society, fairness, or specific virtues. In public service, business ethics refer to the professional code of morality expected of civil servants in the civil service. They constitute the moral fibre of civil servants

and regulate the conduct and behaviour of different classes of civil servants. Thus, misconducts which are not permitted in the public service are unethical conducts.

Values: In the opinion of Obiora (2017) ethics is about values and values are not merely utopian''. Value is that which men desire, expect or forbid. Values are stable, long lasting beliefs regarding what is important in a variety of situations. According to Ezeani (2005) values represent what individuals, organizations, nations etc. desire and want. Values differ from individual to individual, group to group, institution to institution, community to community, profession to profession etc.Therefore, values refer to beliefs about what is right and wrong and what is important in life. They are those enduring beliefs that influence the choices people make among available means or ends. They are those things that are vital to or valued by someone or organization. They are what public servants and the general public see and judge to be right. They constitute the moral, professional and ethical attributes of character which must be instilled in the members of the public service. Values are what define individuals, institutions, cultures and people. They are ''a set of principles or standards of behaviour regarded as desirable, important and held in high esteem by a particular society in which a person lives, and the failure to hold them results in blame, criticism or even outright condemnation''(Obiora, 2016). Thus, values guide persons to do the right things, act morally, be morally sound, and give meaning and strength to a person's character.

Studies show that ethics and values are inter-related and are often inter-changeably. Ethics which are founded on values are vital codes of human conduct. Ethics promote harmonious life of integrity. Ethics deal with the integrated development of human personality. It touches the human person, human dignity, and all the obligations, and the society at large. Ethics focuses the attention of people on the ultimate human goal which influences all good values to replace every evil value in the society. Hence, ethics and the values of the public service refer to morally correct, honourable and acceptable behaviours required of public servants.

Public Service: This generally means the activities of government employees and institutions aimed at formulating and implementing governmental policies and programmes for the interests of the public (Agba et al (2013). According to Adebayo (2000), civil service or public service is responsible for the management of the machinery of government and carrying out the day-to-day duties that public administrations demand.

The Public Service of Nigeria:

The Nigerian Public Service is an embodiment of the civil service, line ministries and extra-ministerial agencies. It also includes states and national assemblies, the judiciary, the Armed forces, the police and other security agencies, the paramilitary agencies, departments and agencies. The public service in Nigeria plays a lot of roles in policy making. These functions include rendering professional and technical advice on government policies based on expertise, experience acquired over a long period of service. The public service of Nigeria also ensures the implementation of all government policies and programmes for the achievement of set goals and objectives. Also, the Nigerian public service is to ensure they comply with plans, due process and adequately or properly implement projects. Again, the Nigerian public service ensures operation of development consciousness, performance oriented, effective and efficient administration system. It promotes the dynamic growth of socially responsible private sector within the framework of national economic objectives and acts as a springboard for public policy, especially where the political leadership is weak.

The Public Service of Nigeria is an important national institution, part of the essential framework of Nigeria presidential democracy. Through the support they provide to the duly constituted government, public servants contribute in a fundamental way to good governance, to democracy and to Nigerian society. The role of the Public Service is to assist the Government of Nigeria to provide for peace, order and good government, provide the foundation for Public Service roles, responsibilities and values. The democratic mission of the Public Service is to assist Ministers, under law, to serve the public interest. The Values and Ethics Code for the Public Service sets forth the values and ethics of public service to

guide and support public servants in all their professional activities. It serves to maintain and enhance public confidence in the integrity of the Public Service. The code also serves to strengthen respect for, and appreciation of the role played by the Public Service of Nigeria.

2.1Business Ethics in the Nigerian Public Sector

Attempts at cultivating ethical conduct in the Nigerian public sector have found overt manifestations in the Public Sector Rules (as instruction manual for civil/public servants). Financial Regulations; Due Process Act and ancillary enactments that seek to guide and regulate the activities of public officials in the discharge of their duties. The profoundest and perhaps the most laudable of effort at instilling ethical behaviour is contained in the Code of Conduct for Public Officers as spelt out in the fifth Schedule of the 1999 Constitution of the Federal Republic of Nigeria as amended in 2011.

In Nigeria, the manifestation of unethical practices and the intertwining adverse effect take the form of bribery, peonage, nepotism, embezzlement, use of one's position/public office for self-enrichment, absenteeism, cronyism, corruption in administrative and personnel practices, lack of accountability and transparency in the conduct of government and private businesses. All these have untoward consequences explainable in terms of poor or ineffective implementation of government policies and retarding development efforts, generally. From the work of Ayanda, (2012), fraud, extortion, embezzlement, bribery, nepotism, influence peddling, bestowing of favour to friends among others are some of the unethical conducts in the public service.

Some of the manifestations of corruption (in the Nigerian public sector) according to Egwemi(2012:p.75) include solicitation or acceptance, directly or indirectly, by a public official or any other person, of any goods of monetary, or other benefit or for another person or entity, in exchange for any act or omission in the performance of his or her public functions. The offering or granting, directly or indirectly to a public official or any other person for the purpose of directly obtaining benefits for himself or for a third party; to mention just a few. Attempts at reversing the above ugly state of affairs have led successive Nigerian governments to institutionalizing mechanisms for enforcing ethical conduct in Nigerian public administration.

2.2Forms of Unethical Behaviours inNigerian Public Sector and Organizations

It is a fact that that the Nigerian society is facing tremendous ethics and value crisis today due to personal greed, selfishness, indifference to others, conflict of interest, laziness, etc. These have brought about large scale corruption in almost all spheres of life – personal and public, economic and political, moral and religious. Over the years, there has been erosion of the essential social, moral and spiritual ethics and values and an increase in cynicism and nihilism at all levels. Francis, F. (2007) writes that ''Social capital refers to high stock of values like honesty, loyalty, trust, integrity, discipline, hard work, etc. The Nigerian public servants, are mandated to abide by conduct, rules otherwise known as public service rules which are in their nature of do's and don'ts. The rules are totally not enough to deal with cases of misconduct of public servants as they give numerous escape routes for the unscrupulous. It is therefore high time the rules are expanded to make them adequate and properly strengthen code of ethics and values for civil servants. Ethics and value are meant to prescribe standards of integrity and conduct that are to apply to public service. Code of ethics and values cover such issues as; public comment, release of information, integrative role of public services, and continuous improvement through professional socialization and team work. Thus, ethics and values among other things should include integrity, impartiality, service orientation and procedural fairness, open accountability and transparency, devotion to duty and exemplary conduct, etc. Ethics and values help give public servants a vision, a purpose and an idea to strive for in the course of performing their duties. A high standard of ethics and values among public servants is necessary to set example for the larger populace.

The potential for individuals and organizations to behave unethically is limitless. Unfortunately, the potential is too frequently realized. For instance, the common story of Manville Corporation on how greed overtook concerns about human welfare when the Manville Corporation suppressed evidence that asbestos inhalation was killing its employees or when Ford killed to correct a known defect that made

its Pinto vulnerable to gas tank explosions following low speed rear-end collisions (Bucholz, 1989). Companies that dump dangerous medical and oil waste materials into our rivers and oceans also appear to favour their own interests over public safety and welfare. The dumping of chemical wastes in rivers and waterways in Koko in present day Delta State by the Italian merchants in 1988 was a strong case of environmental degradation and pollution in complete desecration of environmental laws in Nigeria and total disregard to life and environmental safety.

Unethical organizational practices are embarrassingly a common place. It is easy to define such practices as dumping polluted chemical wastes into riversand waterways as in the case of the Koko saga mentioned above, bribery and corruption in the different aspect of the economy, sexual harassment and fraudulent results, examination malpractice in the campuses as unethical. Yet these and many other unethical practices go on almost routinely in many organizations. Why is this so? In other words, what accounts for the unethical actions of people in many organizations? One answer to the question of why individuals knowingly commit unethical action is based on the idea that organizations often reward behaviours that violate ethical standards. Consider for example how many business executives are expected to deal in bribes and payoffs despite the negative publicity and ambiguity of some laws and being punished for their actions.

Posner and Schmidt (1984) explain that organizations tend to develop counter norms, accept organizational practices that are contrary to prevailing ethical standards. Within organizations, however, it is often considered not only acceptable but desirable to be much more secretive and deceitful. The practice of stonewalling, willingly hiding relevant information is quite common. One reason for this is that organizations may likely or actually punish those who are too open and honest. Looking at the negative treatments experienced by many employees who are willing to blow whistle and expose unethical behaviour, other employees who are opportune to expose unethical behaviour will definitely withdraw. For example B. F. Goodrich rewarded employees who falsified data on quality aircraft brakes in order to win certification (Posner & Schmidt, 1984).

Similarly, it has been reported that the executives of Metropolitan Edison Company encouraged employees to withhold information from the press about ‘’’Three Mile Island’’ accident (Gray& Rosen, 1982). Both incidents represent cases in which the counter norms of secrecy and deceitfulness were accepted and supported by the organization. The unethical problems/issues raised in the scandal of Nestle Nigeria Foods Plc and breastfeeding, Proctor and Gamble products and particularly ‘’My Pikin’’ syrup in Nigeria is still very fresh in our memory. There are many other organizational counter norms that promote immorally and unethical practices. Because these practices are commonly rewarded and accepted, suggests that organizations may be operating within a world that dictates its own set of accepted rules. This reasoning suggests a second answer to the question of why organizations knowingly act unethically. This is so because managerial values exist that undermine integrity. In a recent analysis of executive integrity, Wolfe explains that managers have developed some ways of thinking (of which they may be quite unaware) that foster unethical behaviours (Wolfe, 1988).

3.1Strategies to Promote Business Ethics in Nigerian Public Service

Improving the ethical climate of an organization enhances and preserves its reputation, inspires loyalty and advertises that it has ethics message right. Thus Rubbins (1993) analyzes the strategies to promote ethical behaviour to include the following:

1. **Evaluating Ethical Behaviour:** It is important for organizations to undergo internal ethics audits on a regular basis as this will add great value to the organization. Also there is need to communicate and model behavioural standard from the highest levels of an organization down to the entry level positions. This ensures that there is no gap between ethical standards and the actual

behaviour of employees. By regularly evaluating these standards and the behaviour of the organization's leadership, compliance to ethical behavioural norms of an organization can effectively be promoted.

2. **Educating Employees**: One strategy to improve the ethical behaviour of an organization is to constantly educate the employees on ethical values as this equips them with the knowledge of what kind of behaviour is expected of the employees. This can be done through seminars, conferences or periodic training.

3. **Protecting Employees:** One problem that might arise in the promotion of ethical guideline is the fear employees may have regarding their role in reporting unethical or questionable behaviour by another employee or even a superior. An employee must be assured that they will be safe from retaliation from other employees or supervisors who might be turned in for engaging in questionable activities. The best way to make this assurance is to offer employees confidential channel through which they can report bad behaviour. A company ethics hotline is one way to increase employee willingness to speak out. Another might be suggestion box kept in a secured location where other employees are not likely to see one of their fellow employees turning them in. Employees must be confidently assured that reporting bad behaviour is expected and safe.

4. **Top managers** on their own part should see themselves as role models and also realize that ethical behaviour can be managed and the only way is to avoid ethical dilemmas.

5. **Organizations** should endeavour on their part to reward employees' actions that are in line with ethical demand made on staff by members. On the other hand, employees that do not meet such demands should be sanctioned or punished. Creating ethical guidelines has several advantages which include the following:

- It helps employees identify what their firm recognizes as acceptable business practices.
- A code of ethics can be an effective internal control on behaviour which is more desirable than external control such as government regulations.
- A written code helps employees avoid confusion when determining whether their decisions are ethical.
- The process of formulating the code of ethics facilitates discussion among employees about what is right and wrong and ultimately creates better decisions (Lamb et al, 1999).

Social responsibility theory which is an extension of the libertarian theory places emphasis on the moral and social responsibility of persons and institutions.Folarin in Nkememenam (2009) explains further that social responsibility theory owes its origin to Hutchins Commission set up in the United States of America in 1947 to re-examine the concept of press freedom as enunciated in libertarian theory.

Social responsibility is an ethical framework and suggests that an entity be it an organization or individual, has an obligation to act for the behalf of society at large. Social responsibility is a duty every individual has to perform as to maintain a balance between the economy and the ecosystem. A trade-off may exist between economic development in the natural sense, and the welfare of the society and environment, though this has been challenged by many reports over the past decade. Social responsibility means sustaining the equilibrium between the two. It pertains not only to organizations but also to everyone whose action impacts the environment.This responsibility can be passive, by avoiding the harmful acts, or active, by performing activities that directly advance social goals. Social responsibility must be intergenerational since the actions of one generation have consequences on those following.

Some critics argue that corporate social responsibility (CSR) distracts from the fundamental economic role of businesses; others argue that it is nothing more than superficial window-dressing or ''green washing'', others argue that it is an attempt to pre-empt the role of government as a watchdog over powerful corporations though there is no systematic evidence to support these criticisms.

4.1 Conclusion

Among most corporate organizations exists ethical standards that guide the behaviour of workers in the system. Violations of these ethics has grievous consequences and this has put a check on attitude of workers in the performance of their work. It follows therefore that the existence of the various codes of ethics serves as a guide to the performance level and productivity level of firms. Ethical rules of conduct in product quality service delivery and attitudes of employees should be duly carried outand those found guilty are made to face the consequences due their offence. By this it will serve as a deterrent to others and will increase the level of compliance to ethical standards and codes in the organization. Social responsibility in our daily business is important in such a way that it assists government in providing less for the environment where a particular business operates, though, not highly enforced in Nigeria. If done, it will help a great deal.

Research revealed that majority of Nigerian business enterprises have not shown sufficient interest in their social responsibilities. No enterprise exists in isolation. Business Administrators, Managers and Public Administrators/public civil servants alike should respond to socially approved values and help in formulating ethical norms as part of their social responsibility so as to be successful in their business endeavours and service delivery.

For our society to survive, practical importance must be attached to business social responsibility such as is being attached to profit. The society should not be allowed to decay or degenerate into slums, due to lack of attention but, all business owners, management, public administrators, creditors, employees, customers have a large role to play in social responsibility by supporting social needs with company revenue thus, achieving credibility.

It is highly expected on the part of Nigerian business and public enterprises to have charitable and cultural programmes, get involved in youth projects, make liberal donations to educational institutions, and be keenly interested in the personal needs of the individuals who participate directly or indirectly in their organizations.

The so-called Nigerian factor has contributed to businesses that are not carrying out its social responsibility. However, it is anticipated that in years to come, more businesses will carry out its social responsibility in Nigeria.

REFERENCES

Anam, B. E. (2011), The Framework of Public Administration, Calabar: Kingsview Publishers.

Ani, C., Izueke, M., and Nzekwe, I. F. (2014). Public Sector and Corruption in Nigeria: An Ethical and Institutional Framework of Analysis, 4(3), Article ID: 48543,9 pages DOE:10.4236/ojpp,2014.43029

Agha, M. S., Ochimana, G. E. and Abubakar, Y. I. (2013). Public Service Ethics and the Fight against Corruption in Nigeria: A Critical Analysis. International Journal of Public Administration And Management Research (IJPAMR), 2 (1) Website: http://www.rcmss.com ISSSN 2350-2231 (Online) ISSN 2346-7215(Print)

Bucholz, R. A. (1989), Fundamental Concepts and Problems in Business Ethics, Prentice Hall

Cole, G. A. (2002), Management Theory and Practice (5th Ed.) London: The Primes.

De Villiers, D. (1989), Community Expectations of Ethical Behaviour of Public Officials. SAPA. 24(4) 162.

Ebitu, E. T. (2012), Promoting ethical behaviour in business in Nigeria and International Market. International Journal of Innovation In Management Sciences, 4(2), 126-130.

Esterhuyse, W. P. (1989), The Nature and Role of Morality: Speech during the Second Winelands Conference, University of Stellenbosch, 28-29 September.

Etuk, E. J. (2009), The Nigerian Business Environment (2nd edition) Calabar: University Of Calabar Press.

Gray, L. H. & Rosen, H. (1982), Organizational and Management Principles. New York Institution of Public Administration.

Guy, M. E. (1990), Ethical Decision Making in Everyday Work Situations. New York. Quorum Books.

Henekom, J. A. (1984), Technological Ethics, Social Ethic, NG: Kerkboekhandel.

Harrington, S. J. (1991), ‘’What Corporate America is Teaching and Ethics’’, Academy of Management Executive 5(1), 21-30.

Heynes, R. N. (1986), Conflicts in Human Values.Golembiewski, R. T. Public Administration as a Developing Discipline. New York: Marcel Dekker.

Hondeghem, A. (1998), Ethics and Accountability in a Context of Governance and New Public Management. Amsterdam: IOS Press. Guidelines/generalprocurement_guidelines.

Lamb, C. W ., Hair, J. F. and McDaniel C. (1999), Essentials of marketing, Cincinnati, Smith Western Publishing Company.

Nelson, R. P. (1989), Changing Unethical Organizational Behaviour: Academy of Management Executive’ 3(2) 123-130.

Pollitt, C. (2003). The Essential Public Manager: Public Policy and Management, UK: Open University Press, McGraw-Hill Education.

Posner, G. and Schmidt, W. (1984), Values and the American Manager: All Update, California Management Executive 1(1), 171-182.

Robbins, S.P. (1992), Organizational Behaviours (8th edition) India: Prentice Hall.

Schermerhorn, J. R. (1989), Management Par Productivity. New York: John Wiley.

Trevino, L. K. (1986), Ethical Decision making in Organization: A Person – Situation Interactionist Model, Academy of Management Review 11(3) pp 601-617.

Vander Wadlt, G. and Helmbold, R. (1995),The Constitution and a New Public Administration, Cape Town: Jut and Co. Ltd.

Wolfe, R. T. (1988), Impact of Accountability and Ethics on Public Service Delivery: A South African Perspective. South Africa: Nelson Mandela Metropolitan University, Port Elizabeth.

THE ROLE OF STAFF TRAINING AND MANAGEMENT DEVELOPMENT ON EMPLOYEE ENGAGEMENT AND MOTIVATION IN THE NIGERIAN PUBLIC SECTOR - A CASE OF NATIONAL OPEN UNIVERSITY OF NIGERIA (NOUN)

Dr. CHUKWUEMEKA GODSON EME

Department Of Business Admnistration, Faculty Of Management Sciences, National Open University Of Nigeria, Jabi-Abuja

ABSTRACT

Staff training and management development is mainly a powerful tool to enhance organizational performance, competitiveness and economic growth. Both organizations and employees, as well as nations, needs training. Employees need to develop their careers or to get better compensations; organizations need skilful and efficient employees to improve performance and productivity, promote competitiveness, decrease absenteeism and turnover as well as to improve client satisfaction; governments depend heavily on a skilled labour force with the capacity to learn, adapt, and master competitiveness in a globalized economy.The study adopted survey research design. Extant literature on staff training and development process and its relationship with employees' performance are silent. We explore the role of staff training and management development in employee motivation in the Nigerian Public Service. We propose that the stages of staff training and management development process influence employee performance. The results support our proposition and also produce five stages which constitutes the stages of the training and development process. In addition, the design stage emerged as the strongest predictor of employee's performance-the most important stage of the training and management development process in the sector.

Key Words: Staff training, management development, motivation, employee performance, Nigerian public service, National Open University of Nigeria (NOUN)

1.0 BACKGROUND OF THE STUDY:

In today's ever challenging competitive environment, employees have to be kept current on the skills and knowledge they need to contribute to the achievement of organizational objectives. Training and management development has become a potent factor of success.Training and management development therefore present the opportunity to widen and expand the knowledge base of all employees. Yet, some employers of labour still consider training and management development programmes for the workforce as waste of resources. They argue that the employee will lose many productive hours of work while attending training sessions, which may delay the completion of projects on schedule. Furthermore, training imposes heavy costs on the firm. Despite the contending argument, training and management development provides both the organization as a whole and the individual employees with benefits that make the costs incurred and the time spent a worthwhile investments **(Campbell, 2000).**

In most industries, the yearly increase in the level of productivity that is required to sustain and retain leadership position in the industry has increased dramatically. What is needed, essentially, is a continuous level of innovation both in product and in business processes. Increased efficiency and continuous improvement in the processes are not sufficient under current realities to sustain dominant position. Therefore, organizations must develop processes and also train the employees and provide them with incentives to sustain high level of productivity in the enterprise **(Jones & Hills, 2000).**

Many countries in the world are becoming increasingly aware of the fact that economic growth does not occur as a result of new technology or perfect combination of factors of production, it also depends

on the development of human resources.Some writers see ‘’training’’ and ‘’management development’’ as synonymous. Others look at them as different concepts. **Jonesand Hills (2000)** believe that ‘’training’’ primarily focuses on teaching organizational members how to perform their current jobs and helping them acquire the knowledge and skills they need to be effective performers. ‘’Management development’’ on the other hand, focuses on building the knowledge and skills of organizational top executive members so that they will be capable of making better decisions and taking on new responsibilities and challenges.

The word ‘’Development’’ or precisely ‘’Management Development’’ is used in relation to the process of helping managerial employees who perform non-routine jobs to improve on their managerial administrative and decision-making abilities.Management development involves training, educating and improving the knowledge of the senior management staff in an organization **(Adamolekun, 1983).** The focus of management development is on the long term preparation of employees for future work demands. Management development contributes to business success by helping the organization to grow the managers it needs to meet its present and future needs. It helps to improve the performance of managers, gives them the opportunity to apply their own initiatives and engage on creative thought. Management development efforts provides for management succession.

Management development is the process of developing of manager’s knowledge, skills and attitude through instructional demonstrations and practical exercises to meet the present and future needs of the organization **(Humble, 1979).**An effectively realized and conducted career development has a number of potential benefits and purposes which are beneficial both to the individual as well as to the organization. These benefits include: to strengthen the relationships between the individual and the organization; to help individuals to realize their potentials; to reduce managerial and professional obsolescence; to aid affirmative action and provide equal opportunities to all; to demonstrate social responsibility; to encourage the long-range outlook/retain managerial personnel for a long period of time amongst others.

Manpower training must be provided by experts who know how to train. Therefore, while determining to make training programmes effective, it must be geared towards particular needs and goals of the enterprise. In other words, the training programme must be well-developed, adequately conducted and implemented by competent trainers and instructors. Above all, training exercise must be properly evaluated to determine whether or not those specific goals on which it was directed had been achieved.

Training programmes must pass through careful investigation and analysis in its various stages from the assessment of needs to programme evaluation. **Mc Ghee and Thayer (2011),** identified three major areas that need to be analysed while packaging a training programme. These areas are as follows:

i) **Organizational Analysis**: Determining where training emphasis should be placed within the organization.

ii) **Operational Analysis:** Determining what the content of the training programme should be with regards to the employees’ requirement for performing their job effectively.

iii) **Manpower Analysis**: Determining the skills, knowledge and characteristics an employee should possess if he is to perform the job assigned to him in the organization effectively.

Obisi (2011) highlighted some vital issues in Training and Management development of employees in Nigerian tertiary institutions and corporate organizations. According to the author, the following issues are relevant to training and management development effectiveness.

- Organizational training and development philosophy
- Strategic focus in training
- Planning the training programme
- Identifying training objectives

- Evaluation of training

Any organization that does not have a clear staff development philosophy is bound to fail because this invariably means that such organization does not have a serious approach for staff training and management development. Training activities in an organization should be a continuous process and not a once and for all activity. Effective training should be one designed to solve problems and to fill gaps in employee performance. It is not proper for any organization to embark on any training which is not relevant to it and its people. Moreover, the organizationshould embark on a planned training and management development programmes and not haphazard ill-timed programmes.

An organization has to evaluate their training programmes to enable them to find out whether or not the training has achieved its purpose and objectives. One of the ways of evaluating training programmes is by getting reactions from the trainees by asking those who attended the training sessions to write a report or by designing a comprehensive questionnaire soliciting their response on the programme.

2.0 OBJECTIVES OF THE STUDY:

The ultimate aim of every staff training and management development is to add value to human resources. Any training and management development that does not add value should be abandoned. Organizations should therefore make training and management development of their workforce a continuous activity**(Obisi, 2011).**This research study tries to weigh and measure the assumption that training and management development is the key factor for improving organizational productivity. The researcher undertook an intensive study aimed at finding out the effectiveness of staff training and management development in the achievement of improved productivity in Nigerian Universities with particular reference to the National Open University of Nigeria (NOUN).

3.0 STATEMENT OF THE RESEARCH PROBLEM:

Many management experts have asserted that training and management development is the key element in the process of productivity improvement. Thus, staff training and management development as human resources strategy is gradually becoming an invaluable factor for sustainable organizational growth.Therefore, this study is aimed at evaluating training and management development as a strategy for improving productivity in the Nigerian Universities, with particular reference to the National Open University of Nigeria (NOUN) where the researcher is a staff.

Furthermore, recent shift in focus have recognized human resources as the most valuable asset of any organization. With the availability of machines, materials and even money, nothing can be done without the involvement of human beings who possess the skills and knowledge for organizational performance. Training and management development is the magic wand employees need to enhance their performance and realize their potentials. Therefore this study seeks to find out the effects of training and management development and its relationship to the profitability of an educational institution, in this case Nigerian Universities, with particular reference to the National Open University of Nigeria (NOUN).

4.0 SCOPE AND LIMITATIONS OF THE STUDY:

This study limits itself to finding out the extent to which training and management development of workers impacts positively on productivity in Nigerian Universities. It tries to discover whether intensified training and management development has the capability to ensure continuous improvement in organizational productivity.Conducting an effective research in Nigeria is not always easy due to the fact that most people are reluctant to release information needed for research study. The researcher will devote enough time and effort in making sure that enough data are gathered to accomplish the research

work. There is also the problem of time constraint as the researcher had to carry out the research work alongside his official duties as a staff of the National Open University of Nigeria (NOUN).

5.0 METHODOLOGY:

It is often said that a research without a proper research design is like a boat without a Rudder to direct its course in the sea. **Oladele (2007)** defined research as an organized engine aimed at finding and identifying research problems. This research paper employed a descriptive method of study**. Gay (1981**) defined a descriptive research as a process of collecting data in order to test hypothesis or answer questions concerning the current status of the subject in the study. In addition, the author pointed out that the purpose of a descriptive research is to determine and report the way things are done and to describe such things as possible behaviour, attitude, values and characteristics. These descriptions of descriptive research match with the purpose of this study as its intention is to assess whether or not training and management development of employees has positive effect on organizational productivity in the Nigerian universities with particular reference to the National Open University of Nigeria.

6.0 CONCLUSION:

This research provided University administrators in Nigeria with thorough understanding of the merits of training and management development of employees and its usefulness as vehicle for achieving improved productivity which translates to increased operational revenue for their institutions. The study has proved to be beneficial to human resources managers and others concerned with personnel management. It also help them to better understand and appreciate the usefulness of training and management development to the improvement of organizational productivity. Armed with this knowledge, the human resources managers is in a better position to advice management on the need to encourage and fund training programmes for their workforce. The study equally contributed some knowledge to the academic community by serving as useful resource for future researchers in the same area of study.

REFERENCES

Adamolekun, L. (1983), Public Administration: Nigeria and Comparative Perspective' London, Longmans Publishers.

Asika, N. (1991), Research Methodology: Ikeja, Longman Plc., Nigeria.

Aina, S. (2005), Managing the Capital in Nigeria: Ikeja, Nigeria. Fountain Training Consult.

Bernalin, J. (2007), Human Resources Management: McGraw-Hill, 7th Edition

Campbell, C. (2011), An Approach to the Training and Development of Managers: Gulf Publishing, Texas, U.S.A.

Close, R. B. (1981), Production and Operations Management: A life Cycle Approach;McGraw Hill Publication.

Cassio, W. F. (2006), Managing Human Resources Productivity: McGraw Hill, 7th Edition.

Gay, M. (1981), Research Methodology: McGraw Hill Book Publishing, New York, U.S.A.

Hawlyshyn, A. (1975), Personnel Management Education – A Conceptual Framework:McGraw Hill (UK).

Hippo, E. B. (1996), Principles of Personnel Management. McGraw Hill Book Publishing New York, U.S.A.

Hornby, A. S. (2000), Oxford Advanced Learners Dictionary of English; Oxford University, Press.

Humble, R. (1979), Management, Macmillan, New York, U.S.A., Sixth Edition.

Jones, P. et al (2000), Contemporary Management; New York, Irwin and McGraw Hills.

Lyndon, R. P. and Paneek, U. (2017), Training Development, Irvin Durnsey Publications,page 12.

Mc Ghee, W. A. & Thayer, P. (2011), Training in Business and Industry. John Willy & SonsInc., London, p.1.

Obisi, C. (1996), Personnel Management: Freeman Publications, Ibadan, Nigeria.

Obisi, C. (2011), Employee Training and Development in Nigerian Organizations: Some observation and Agenda for Research. Australian Business and Management Research, vol. no. 9.

Oladele, O. (2007), Introduction to Research Methodology: Niyat Publishers, Lagos.

Onah, F. O. (2003), Human Resources management, Enugu: Fullado Publishing Company.

Obikere, D. S. (1980), Methods of Data Analysis in Social and Behavioural Sciences: Auto Century Publishers Limited, Nigeria.

Wolfbein, S. (1996), Education and Training for Full Employment: Columbia University, Paris, Columbia, USA.

ŞANLIURFA İLİ KATI ATIK KARAKTERİZASYONU VE COVİD-19 ETKİSİYLE TIBBİ ATIK BERTARAFI

SANLIURFA PROVINCE SOLID WASTE CHARACTERIZATION AND MEDICAL WASTE DISPOSAL BY COVID-19 EFFECT

Sümeyra ATEŞ

Harran Üniversitesi, Fen Bilimleri Enstitüsü, Çevre Mühendisliği ABD, Şanlıurfa, Türkiye.

ORCID ID: 0000-0001-5246-485X

Hakki GÜLŞEN

Harran Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü, Şanlıurfa, Türkiye.

ORCID ID: 0000-0002-0726-555X

ÖZET

Küreselleşen dünyada artan nüfus miktarıyla beraber, sanayileşme ve kentlerin hızla büyümesi sonucunda, her geçen gün bu artışa orantılı olarak daha fazla atık miktarı oluşmaktadır. Dünyada kaynakların bilinçsizce kullanılması ve tüketimi sonucu oluşan atıklar da bunlara eşdeğer artmaktadır. Dolayısıyla, her atığın doğaya zarar vermeden değerlendirilmesi veya oluşan atıkların toplanması, taşınması ve bertaraf edilmesi dünyanın ekolojik dengesi açısından büyük önem taşır.

Bu çalışmada, Şanlıurfa il ve ilçelerinde oluşan katı atıklar için, Birleşmiş Milletler Kalkınma Programı kapsamında katı atık karakterizasyon çalışmaları yürütülmüştür. Şanlıurfa Büyükşehir Belediyesi Entegre Katı Atık Yönetim Planı çerçevesinde Şanlıurfa il genelindeki mevcut atık yönetim durumu özetlenmiş olup, paydaş analizi yapılarak, atık tahminleri, ilin yağışlı ve kuru mevsim katı atık karakterizasyon çalışmaları yapılmıştır. Bununla beraber, Şanlıurfa il ve ilçelerinde tıbbi atık miktarlarındaki artış nüfus miktarı baz alınarak son yıllara göre değerlendirilmiştir. Özellikle 2020 yılının başında meydana gelen COVİD-19 virüsüyle, hastanelerin acil kısımları yetersiz kalıp, bazı devlet hastaneleri pandemi hastanesi olarak işleve devam etmiştir. Pandemi döneminde oluşan atık miktarındaki dalgalanmalar, alınan önlemlerin ve kısıtlamaların katı atık ve tıbbi atık üzerindeki etkilerinin mukayese edilmesi hedeflenmiştir. Yapılan araştırmalarda, Şanlıurfa ilindeki belediye ve kamu kurumlarının sıfır atık, geri dönüşüm-geri kazanım ve yeniden kullanım çalışmalarını değerlendirilmiştir.

Anahtar Kelimeler: Katı Atık, Tıbbi Atık, Sıfır Atık, COVİD-19, Şanlıurfa.

ABSTRACT

As a result of rapid urbanization and industrialization, with the rapidly growing population in the globalizing world, more and more waste amounts are proportionally formed every day. Moreover, Waste generated as a result of unconscious use and consumption of resources in the world also increases at an equivalent rate with them. Therefore, the evaluation of each waste without harming nature or the collection, transportation, and disposal of the resulting wastes are of great importance in terms of the ecological balance of the world.

This study was carried out to evaluate the solid waste characterization by considering the solid waste generated in provinces and districts of Şanlıurfa within the scope of the United Nations Development Program. In this study, the current waste management situation, stakeholder analysis, waste estimates, and rainy and dry season solid waste characterization studies of Şanlıurfa province were determined within Şanlıurfa Metropolitan Municipality Integrated Solid Waste Management Plan. Nonetheless, the

increase in the amount of medical waste in Şanlıurfa provinces and districts will be evaluated according to recent years based on the amount of the population. Especially with the COVID-19 virus that occurred at the beginning of 2020, the emergency parts of the hospitals were insufficient and some public hospitals continued to function as pandemic hospitals. It was aimed to compare the fluctuations in the amount of waste generated during the pandemic period and the effects of the measures and restrictions taken on solid waste and medical waste. In the researches that will be carried out, the zero waste, recycling-recovery and reuse studies of municipal and public institutions in Şanlıurfa province will be evaluated.

Keywords: Solid Waste, Medical Waste, Zero Waste, COVID-19, Sanliurfa.

SOĞUTMA FANININ KESTİRİMCİ BAKIM YÖNTEMİ UYGULAMASI İLE TİTREŞİM ANALİZİ VE YAPISAL ESNEKLİK ARIZASININ GİDERİLMESİ

ELIMINATION OF STRUCTURAL FLEXIBILITY FAILURE AND VIBRATION ANALYSIS BY APPLICATION OF PREDICTIVE MAINTENANCE METHOD OF COOLING FAN

Zafer Ömer Günindi

Eti Soda AŞ., Ankara, Türkiye.

ORCID ID: https://orcid.org/ 0000-0001-8109-3197

Ali Osman Kurban

Kırşehir Ahi Evran Üniversitesi, Makine Mühendisliği Bölümü, Türkiye

ORCID ID: https://orcid.org/ 0000-0003-0537-3896

Merdin Danışmaz

Kırşehir Ahi Evran Üniversitesi, Makine Mühendisliği Bölümü, Türkiye

ORCID ID: https://orcid.org/ 0000-0003-2077-9237

ÖZET

Hava fanları endüstride kullanılan gaz fazındaki akışkana yön veren, havayı bir yerden belli bir hacimde alıp başka bir yere ileten ekipmanlardır. Prosesteki rolü, akışkan yataklı kurutucuda akış oluşturarak zorlanmış taşınım ile ısı transferi prosesi ile ürünün hızla kurumasını sağlamaktır. Hava fanı, bu proses için birinci derecede önemli bir ekipmandır. Bu ekipmanda gerçekleşebilecek bir arıza, üretimin durmasına ve ürün kalitesi konusunda problemler yaşanmasına neden olmaktadır. Titreşim ölçüm cihazıyla ve diğer ekipmanlar ile yapılan ölçümlerde, titreşim frekanslarının ve şiddetinin değerlendirilmesi neticesinde makinada meydana gelmiş veya gelebilecek arızalar belirlenmektedir. Bunun sonucu olarak, döner ekipmanlarda (fan, pompa, kompresör vb.) meydana gelen hasarların erken teşhisi durum izleme odaklı bakım programlarının en önemli görevlerinden bir tanesidir. Her döner ekipmanda, farklı birçok arıza (rulman ve dişli arızası, balans arızası vb.) meydana gelebilir. Bu arızalardan yapısal esneklik durumu da makine arızası olarak karşımıza çıkmaktadır. Ancak yapısal esneklik arızası, ekipman üzerine tek noktadan sabitlenmiş sensor titreşim trendi izleme yöntemleri ile tespit edilmesi oldukça zordur. Yapısal esneklik arızasının titreşim analizi ile tespiti için yataklardan 3 eksenden de ölçüm alınarak hız spektrumu, ivme spektrumu ve zarf spektrumu grafikleri incelenmeli ve izin verilen değer aralıklarında olması sağlanmalıdır. Zaman dalga formu grafikleri ile analizleri yapısal esneklik arızası karşısında beklenen cevabı vermemektedir. Bu çalışmada, bir maden tesisinde bulunan hava fanında meydana gelmiş yapısal esneklik arızasının kestirimci bakım aracı titreşim analizörü ölçümleri sayesinde spektrum analizi ile erken teşhisi ele alınmıştır. Esnekliğin hangi kısımdan ve hangi yatak bölgesinde olduğunun belirlenmesi için gerçekleştirilen spektrum analizi detayları ile açıklanmıştır. Arıza giderilerek sistem uygun çalışma koşulları yeniden sağlanmıştır.

Anahtar Kelimeler: Kestirimci bakım, Yapısal esneklik, Titreşim analizi.

ABSTRACT

Air fans are equipment that directs the gas phase fluid used in the industry, takes the air from one place in a certain volume and transmits it to another place. Its role in the process is to provide rapid drying of the product by the forced convection heat transfer process by creating flow in the fluid bed dryer. The air fan is a primary equipment for this process. A malfunction that may occur in this equipment causes production to stop and problems in product quality. In the measurements made with a vibration measuring device and other equipment, malfunctions that have occurred or may occur in the machine are determined as a result of the evaluation of vibration frequencies and severity. As a result, early diagnosis of damage to rotating equipment (fan, pump, compressor, etc.) is one of the most important tasks of condition monitoring-oriented maintenance programs. In each rotating equipment, many different faults (bearing and gear failure, unbalance, etc.) may occur. Structural flexibility is one of these failures, which is also seen as a machine failure. However, structural flexibility failure is very difficult to detect with sensor vibration trend monitoring methods fixed on the equipment from a single point. In order to detect the structural flexibility failure by vibration analysis, the velocity spectrum, acceleration spectrum and envelope spectrum graphs should be examined by taking measurements from all 3 axes of the bearings, and it should be ensured that they are within the permissible value ranges. Analysis with time waveform graphs does not give the expected response to structural flexibility failure. In this study, the early diagnosis of structural flexibility failure in an air fan in a mining facility is handled by spectrum analysis, by means of predictive maintenance tool vibration analyzer measurements. Spectrum analysis carried out to determine from which part and which bed region the flexibility is, is explained in detail. The fault was eliminated and the system was restored to suitable working conditions.

Keywords: Predictive maintenance, Structural flexibility, Vibration Analysis.

HYBRIDIZATION OF DIVIDE-AND-CONQUER TECHNIQUE AND SINE COSINE ALGORITHM FOR BETTER CONTRAST ENHANCEMENT IN MEDICAL IMAGES

Khouloud Alaa

Laboratory MASI, Multidisciplinary Faculty of Nador, University of Mohammed First, 62702 Selouane-Nador, Morocco.

ORCID ID: https://orcid.org/ 0000−0001−6014−213X

Fatima Aqel

IR2M Laboratory, Hassan First University, Settat, Morocco.

ORCID ID: https://orcid.org/ 0000−0001−5633−0311

Mohamed Atounti

Laboratory MASI, Multidisciplinary Faculty of Nador, University of Mohammed First, 62702 Selouane-Nador, Morocco.

ORCID ID: https://orcid.org/0000−0001−8867−9086

ABSTRACT

Objective: The objective of this work is to propose a new method for optimal contrast enhancement of a medical image. The main idea is to improve the Divide-and-Conquer method to enhance the contrast and highlight the information and details of the image, based on a new conception of the Sine Cosine algorithm. The Divide-and-Conquer technique is a suitable method for contrast enhancement with an efficiency which depends directly on the choice of weights in the decomposition subspaces.

Methods: A new hybrid algorithm was used in this work to select the optimal weights based on the optimization of the enhancement measure (EME).

Results: To evaluate effectiveness of the proposed algorithm, experimental results are presented showing the robustness and efficiency of the proposed hybridization technique, and producing high contrast and clear images.

Conclusion: The proposed model has always a high value of enhancement measure EME than classical Fitzhugh-Nagumo system and classical Divide-and-Conquer for different images, which explains the good quality of the image enhanced by the proposed method.

Keywords: Medical Image, contrast enhancement, Divide-and-Conquer Algorithm, Sine-Cosine Algorithm, Hybrid optimization algorithm, Fitzhugh Nagumo model.

EXISTENCE THEORY OF BOUNDARY VALUE PROBLEMS FOR A HADAMARD FRACTIONAL DIFFERENTIAL INCLUSIONS

Habib Djourdem

Relizane University, Faculty of science and technology, Department, of Mathematics, Algeria,

ORCID ID: https://orcid.org/0000-0002-7992-581X

ABSTRACT

In recent years, the study of differential equations and inclusions supplied with a variety of boundary conditions and including fractional derivatives has known a huge development; this is due to the fact that the operators of fractional derivation are nonlocal which allowed to model many phenomena in various fields of science and engineering. Indeed, there are numerous applications in viscoelasticity, electrochemistry, control, porous media, electromagnetism, etc.

The Hadamard fractional derivative was introduced by Hadamard in 1892, this derivative has the properties that its kernel contains a logarithmic function of arbitrary exponent and the Hadamard derivative of a constant does not equal to 0.

Hybrid fractional differential equations have also been studied by several researchers. This class of equations involves the fractional derivative of an unknown function hybrid with the nonlinearity depending on it. Some recent results on hybrid differential equations

In this work, we are concerned to prove the existence of solutions for a nonlocal hybrid boundary value problem of Hadamard fractional integro-differential inclusions supplemented with nonlocal integral boundary conditions. Our main tool is the Dhage fixed point theorem of te sum of three operators.

Keywords: equicontinuous, selection, Carathéodory.

THE IMPACT OF THE CORONAVIRUS PANDEMIC ON THE DEVELOPMENT OF DEPRESSION IN THE WORLD

Małgorzata Waniek

Faculty of Applied Sciences

WSB University, Dąbrowa Górnicza, Poland

Rui Alexandre Castanho

Faculty of Applied Sciences

WSB University, Dąbrowa Górnicza, Poland

College of Business and Economics,

University of Johannesburg PO Box 524

Auckland Park, South Africa

ABSTRACT

Depression is a disease, just like hypertension or diabetes, and can affect anyone. According to World Health Organisation estimates, depression will be the most common illness in the world by 2030. A study was conducted to examine the impact of the Coronavirus pandemic on the development of depression worldwide. The report notes that even before the COVID-19 outbreak, statistics on mental health problems in the world were already dramatic. According to the UN, prior to the pandemic, 264 million people worldwide suffered from depression and the second most common cause of death in people aged 15-29 was suicide. In addition, 20 per cent of people living in regions of armed conflict suffered from mental disorders. According to the report, people with severe mental disorders live 10-20 years less than the general population. Despite this, less than half of the world's governments say they have mental health policies that comply with human rights conventions. Human rights violations against people with severe mental disorders are widespread. In low- and middle-income countries, 76 to 85% of people with mental disorders are not receiving adequate psychological and pharmacological treatment for their needs. There is less than one mental health professional for every 10 000 people and, on average, countries spend 2% of their budget on improving the mental health of their citizens.

Keywords: COVID 19; depression; WHO; Health Systems, psychology

BAŞVURUDA TİROİD HORMON PROFİLİ NORMAL OLAN SUBAKUT TİROİDİT OLGUSU

A CASE OF SUBACUTE THYROIDITIS WITH NORMAL THYROID HORMONE PROFILE ON ADMISSION

İhsan BOYACI

Dr. Öğr. Üyesi., İstanbul Medipol Üniversitesi Tıp Fakültesi, İç Hastalıkları Ana Bilim Dalı, Fatih, İstanbul

sorumlu yazar: İhsan Boyacı, İstanbul Medipol Üniversitesi Tıp Fakültesi, İç Hastalıkları Ana Bilim Dalı, Fatih, İstanbul, 34093, Türkiye

ÖZET

AMAÇ: Subakut tiroidit (SAT), tiroid bezinin viral orijinli akut inflamatuvar bir hastalığıdır. Klinik ve laboratuvar bulguları hastalığın fazı ve gidişi ile değişir. En tipik belirtisi, tiroid lobunda şiddetli ağrı, duyarlılık ve sert bir büyümedir. Ağrı boyuna, çeneye, dişlere ve kulağa vurabilir. Yutkunma, öksürük, baş hareketleri, elle dokunmak ve giysi teması ağrıyı arttırabilir. Ağrı gelişmeden günler önce geçirilmiş üst solunum yolları enfeksiyonu (ÜSYE) öyküsü vardır. Genellikle bu hastalar tanı öncesinde bir antibiyotik tedavisi almıştır. Bizim olgumuzda ÜSYE tanısı ile antibiyotik tedavisi almış ve başvuruda tiroid hormon profili normal olan SAT hastasıdır. Buradaki amacımız SAT tanısında anamnez ve fizik muayenin ne kadar önemli olduğunu vurgulamaktır.

OLGU: 44 yaşında kadın hasta, boğaz ağrısı, yutma güçlüğü ve ateşlenme yakınmalarıyla başvurdu. 2 haftadan beri olan boğaz ağrısı çenesine, dişlerine doğru yayılım gösteren ve yutkunmakla artan karakterdeymiş. Ateşi gün içerisinde 39 °C'leri buluyormuş. İlk gittiği klinikte ÜSYE tanısı ile sefuroksim tedavisi verilmiş.Yakınmalarında bir gerileme olmaması üzerine kliniğimize başvurmuş.

FIZIK MUAYENE: Genel görünümü bitkin, orofarenks hiperemik, sağ tiroid loju ağrılı, sert ve hassas, ateş:38.3°C, tansiyon: 130/80 mmHg nabız:104v/dk, solunum sayısı: 18/dk, solunum sesleri doğal.

LABORATUVAR: ESH: 98 mm/s, CRP:84,6 mg/L, lökosit:13,66 $10^3/\mu L$ (nötrofil % 72.7), TSH:0,578 µIU/mL, serbest T_3:4,11 pg/L , serbest T_4:1,51 ng/dL

Tiroid USG: hipoekojen ağırlıklı heterojenite, kaba eko striktürü ve retiküler patern izlenmektedir.Doppler tetkikinde normal vasküler yapılar gözlemlenmektedir.

Tiroid Sintigrafisi(Teknesyum Uptake):15 dakika Tc-99m uptake %0,1 olarak hesaplanmıştır (Normal:%0,5-3,75). Supresyon ile uyumlu sintigrafik bulgular.

TARTIŞMA: Hastanın alınan anamnezinde ağrının karakteri ve ateşi, öncesinde bir ÜSYE'nin olması, muayenede sağ tiroid lobunda palpasyonla ağrı saptanması, normal tiroid hormon profiline rağmen SAT tanısını desteklemiştir. Akut faz reaktanlarının da yükselmiş olması ve tiroid sintigrafisininde supresif olması tanıyı kuvvetlendirmiştir. Naproksen sodyum ve propranolol HCI tedavisinin iki hafta sonrası hastanın yakınmalarının geçmesi ve akut faz reaktanlarının düşmesine rağmen başta normal olan TSH 'de supresyon görülmüştür. Sonraki takiplerinde eutroidi saptanmıştır.

SONUÇLAR: SAT olgumuzda da görüldüğü üzere anamnez ve fizik muayene bir klinisyenin en önemli tanı aracıdır. Laboratuvar tetkikleri tanıyı doğrulamasa da, özenle alınan anamnez ve yapılan fizik muayene her zaman için tanı koymada daha değerlidir.

ANAHTAR KELİMELER: subakut tiroidit; tiroid hormon profili; üst solunum yolu enfeksiyonu; akut faz reaktanları

ABSTRACT

OBJECTIVE: Subacute thyroiditis (SAT) is an acute inflammatory disease of viral origin of the thyroid gland. Clinical and laboratory findings vary with the phase and course of the disease. The most typical symptom is severe pain, tenderness and a hard growth in the thyroid lobe. The pain can radiate to the neck, jaw, teeth, and ear. Swallowing, coughing, head movements, hand touching and clothing contact may increase the pain. It has a history of upper respiratory tract infection (URTI) days before the development of pain. Usually, these patients receive a course of antibiotics prior to diagnosis. Our case is a SAT patient with a diagnosis of URTI who received antibiotic treatment and had a normal thyroid hormone profile at admission. Our aim here is to emphasize the importance of anamnesis and physical examination in the diagnosis of SAT.

CASE: A 44-year-old female patient presented with complaints of sore throat, dysphagia and fever. The sore throat, which has been going on for 2 weeks, was in the character of spreading to his jaw and teeth and increasing with swallowing. Her fever reached 39 °C during the day. Cefuroxime treatment was given and diagnosed with URTI in the first clinic she went to. She applied to our clinic because her complaints did not regress.

PHYSICAL EXAMINATION: General appearance is exhausted, oropharynx hyperemic, right thyroid lobe is painful, hard and tender, fever: 38.3°C, blood pressure: 130/80 mmHg pulse: 104b/min, respiratory rate: 18/min, respiratory sounds are normal.

LABORATORY: ESR: 98 mm/h, CRP:84.6 mg/L, leukocytes:13.66 $10^3/\mu L$ (neutrophil 72.7%), TSH:0.578 µIU/mL, free T_3:4.11 pg/L , free T_4:1.51 ng/dL

Thyroid USG: Heterogeneity with hypoechogenicity at the forefront, rough eco structure and reticular pattern are observed. Normal vascular structures are observed in Doppler examination.

Thyroid Scintigraphy (Technetium Uptake): Tc-99m uptake for 15 minutes was calculated as 0.1% (Normal: 0.5-3.75%). Scintigraphic findings consistent with suppression.

DISCUSSION: The character of the pain and fever in the patient's anamnesis, the presence of a previous URTI, and painful palpation in the right thyroid lobe on examination supported the diagnosis of SAT despite normal thyroid hormone profile. Elevated acute phase reactants and suppressive thyroid scintigraphy strengthened the diagnosis. Two weeks after naproxen sodium and propranolol HCl treatment, the patient's complaints resolved. Acute phase reactants also dropped. Despite this, suppression was observed in TSH, which was initially normal. In the subsequent follow-ups, euthyroidism was detected.

RESULTS: As seen in our SAT case, anamnesis and physical examination are the most important diagnostic tools of a clinician. Although laboratory tests do not confirm the diagnosis, carefully taken anamnesis and physical examination are always more valuable in diagnosing . Although laboratory tests do not confirm the diagnosis, carefully taken anamnesis and physical examination are always more valuable in diagnosing.

Keywords: subacute thyroiditis; thyroid hormone profile; upper respiratory tract infection; acute phase reactants.

KENT İÇME SUYU ARITMA TESİSLERİNDEN ELDE EDİLEN İÇME SULARI İÇİN ÇEVRE ETİKETİ (EKO-ETİKET) SİSTEMİNİN OLUŞTURULMASI

CREATING AN ENVIRONMENTAL LABEL (ECO-LABEL) SYSTEM FOR DRINKING WATER OBTAINED FROM CITY DRINKING WATER TREATMENT FACILITIES

Şennur ALTUNDAĞ

Harran Üniversitesi, Fen Bilimleri Enstitüsü, Çevre Mühendisliği ABD, Şanlıurfa, Türkiye.

ORCID ID: 0000-0001-9831-8153

Mehmet Fatih DİLEKOĞLU

Harran Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü, Şanlıurfa, Türkiye.

ORCID ID: 0000-0001-7407-1635

ÖZET

Kent içme suyu arıtma tesislerinden elde edilen içme suları için ‘’Eko Etiket’’ veya “Çevre Etiket Sistemi” oluşturularak içme sularının tesise girişinden çıkışına kadar olan süre zarfında suların çevreye, insana, sağlığa, iklime ve doğal yaşama olumsuz etkilerinin minimuma indirilmesi hedeflenmektedir. Çevre etiket sistem uygulamalarının mevcut var olan ürün gruplarına ilaveten, toplum tarafından en çok tüketilen bir ürün olan içme sularına uygulanması ile çevre ve insan sağlığı için zararlı olabilecek ürünlerle, çevre dostu ürünler arasında ayrım yapılmasını sağlamaktır. Günümüzde, çevresel farkındalıkların ve kaygıların giderek artması ve sıkça duymaya başladığımız bir kavram olan “yeşil”, pek çok farklı alanda “çevre dostu” yaklaşımını ifade etmek için kullanılmaktadır.

Bu çalışmadaki amacımız çevre dostu olan ürünlerin tercih edilebilmesine öncelik edip bunun için ortam sağlamaktır. Öte yandan çevre etiket siteminin kullanımı sayesinde daha bilinçli ve çevreye duyarlılığı fevkalade yüksek olan toplumsal bir alışkanlıkta elde edinilecektir. Bu sayede çevreden gelebilecek rahatsızlıklar ve sağlık problemleri de büyük ölçüde engellenmiş olacaktır. Tüm dünyada hızla kullanılmaya başlayan bu sistem oldukça rağbet görmekte ve pek çok ülkenin geleceğe ilişkin çevre planlarında en üst safhada yer almaktadır. Eko etiket sisteminin hayata geçirilmesi sayesinde daha bilinçli ve çevre duyarlılığı yüksek toplumsal bir kazanım elde edinilecektir.

Anahtar Kelimeler: Eko etiket, Çevre etiket sistemi, İçme suyu, Temiz üretim, Sürdürülebilirlik

ABSTRACT

It is aimed to minimize the negative effects of water on the environment, people, health, climate and wildlife in the process from the entrance to the exit of drinking water by creating an "Eco Label" or "Environmental Label System" for drinking water obtained from the city's drinking water treatment plants. In addition to existing product groups, environmental label system applications are applied to drinking water, which is the most consumed product by society, and to ensure that the products that may be harmful to the environment and human health are distinguished between environmentally friendly products. Today, "green", a concept that we are increasingly hearing about and environmental awareness and concerns, is used to express its "environmentally friendly" approach in many different areas.

In this study, it is aimed to prioritize the preference of environmentally friendly products and provide an environment for this. On the other hand, thanks to the use of environmental labeling system, it will be obtained in a social habit that is more conscious and has exceptionally high sensitivity to the environment. In this way, environmental disturbances and health problems will be greatly prevented.

This system, which is being used rapidly all over the world, is very popular and is at the highest stage in the environmental plans of many countries for the future. Thanks to the implementation of the eco label system, a more conscious and environmentally sensitive social gain will be achieved.

Keywords: Eco label, environmental label system, drinking water, clean production, sustainability

THE IMPORTANCE OF PROBIOTICS AND PREBIOTICS IN NUTRITIONAL SUPPORT

Ayşenur Demirbaş

Bezmialem Vakif University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul, Turkey.

ORCID ID: https://orcid.org/0000-0002-3957-4787

Ayşe Güneş Bayır

Bezmialem Vakif University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul, Turkey.

ORCID ID: https://orcid.org/0000-0002-9993-7850

ABSTRACT

There are many factors necessary for the continuation of human life and the continuation of a healthy life. One of the most important of these is nutrition. Nutrition science is used to prevent and cure many diseases. In the treatment processes of the diseases that occur, nutritional therapy plays a major role in addition to drug therapy. Nutrition therapy, provided that it is specific to the disease and the person; It is given orally, by enteral tube and parenterally. In cases where oral nutrition cannot be used (eg. acute diseases, intensive care patients), enteral and parenteral nutrition are used and the primary choice is the enteral route. Nutritional support plays a major role not only in the prevention of an existing disease, but also in the prevention of complications related to this disease or in alleviating its effects. These complications can occur in many different ways, such as diarrhea, constipation, skin sores, imbalance in blood sugar levels, in addition to any existing disease, acute or chronic. Recently, the use of probiotics and prebiotics has come to the fore in the treatment of these problems, especially in the intestines. When probiotics and prebiotics are taken in sufficient amounts, they act on the intestinal flora and have a positive effect on human health. Due to these effects, various studies have been conducted in which probiotic and prebiotic supplements are used in enteral nutrition support in order to observe both the effects on diseases using enteral nutrition support and the preventive or curative effects of various complications that occur in patients receiving enteral nutrition support. This study was conducted to compile the information in the relevant literature in order to determine the effects of prebiotics and probiotics on human health when used as supplements in nutritional support.

Keywords: Nutrition, probiotics, prebiotics

SELECTIVE DISTRIBUTION THROUGH E-COMMERCE OF DERMO-COSMETIC PRODUCTS

Felicia Andrei

University of Medicine and Pharmacy VICTOR BABES Timisoara, Faculty of Pharmacy, Department I, Dermatopharmacy and Cosmetology, Timisoara, Romania

ORCID ID: https://orcid.org/0000-0002-5668-3520

Srdjan Nikoric

University of Medicine and Pharmacy VICTOR BABES Timisoara, Faculty of Pharmacy, Department I, Dermatopharmacy and Cosmetology, Timisoara, Romania.

ORCID ID: https://orcid.org/0000-0000-0000-0000

ABSTRACT

Today, more and more websites of pharmacies and drugstores are put online and offer their customers dermo-cosmetic products. Gold, the traditional distribution methods of this type of product are subject to selective distribution contracts between the manufacturer and the distributor. Which means these products cannot be freely sold by all types of businesses given that these are specific products, used to have an action on the skin of human beings. They are thus subject to control and are regulated by the public health code in each country. When distributed by authorized structures (pharmacies and drugstores), the customer has greater confidence in the quality of dermo-cosmetic products made available to them and benefit from advice and the expertise of those authorized to sell these products, pharmacists and pharmacy technicians. When these same products are offered for sale on Internet, the customer loses the possibility of benefiting from this adapted advice and can even doubt the quality of the products given the large number of fraudulent sites put online.

Also, we can wonder if the distribution of dermocosmetic products on the Internet should be framed differently and why. What if the Internet is now suitable for the selective distribution of these high-quality products and technicality.

In the first part, we will present the selective distribution of dermo-cosmetics products as reflected in the current "classic" distribution scheme. We will detail the concept of dermo-cosmetic products and we will analyze the legal and economic aspects of its distribution, and describe the current market.

In a second part, the selective distribution of dermo-cosmetic products will be confronted with the characteristics and specificities of e-commerce, as well as latest legislative and jurisprudential developments applicable in this area.

Keywords: e-comerce, dermocosmetics, distribution

CHARACTERIZATION OF INDUSTRIAL EFFLUENTS AND CONTRIBUTION TO THE INSTALLATION OF A WASTE WATER TREATMENT STATION WITHIN THE CIBELII COMPANY

Imane Ammayen

Ibn zohr University, Faculty of Sciences, chemical process engineering, Agadir, Morocco.

ORCID ID: https://orcid.org/0000-0003-2999-7847

Mohamed ERRAMI [(b)]; Khadija Kouya [(c)]; Abdallah HADFI [(a)]

Process Engineering Laboratory, Team "Materials and Physico-Chemistry of Water", Faculty of Sciences, Ibn Zohr University, Agadir, Morocco

Team of Physical Chemistry and Environment, Faculty of Sciences, Ibn Zohr University, Agadir, Morocco

Agronomy and Veterinary Institute Hassan II, Agadir, Morocco

ABSTRACT

The production process of fishmeal and fish oil in a company generates wastewater which is discharged directly into the natural environment. The regulations oblige companies to comply with the standards in force concerning the following physicochemical parameters: pH, temperature, conductivity, oil and Grease, chemical oxygen demand (COD), biochemical oxygen demand (BOD) and Suspended solids (SS).

From this perspective, this project aims to study the characterization of industrial effluents from a fishmeal and fish oil company (CIBELII) with a view to determining the best solution to manage effluents and reduce pollutants.

As part of this project, a specific study of the parameters pH, temperature, conductivity, COD, BOD, SS, and oil and grease is carried out. The values of these parameters are compared with the Moroccan standard.

The results obtained show on the first hand that the pH and temperature comply with the standard. On the second hand, the recorded values of the following parameters: COD, BOD_5, SS, Grease and oil and conductivity far exceed the limits authorized by the Moroccan standard.

The different phases of the project made it possible to characterize the pollution of effluent. The results obtained determine the type of effective treatment which will allow the regulatory requirements for the physico-chemical parameters studied to be met. The rejection must then undergo a physicochemical and biological treatment both aimed at ensuring that the effluent is biodegradable in nature with a high SS value.

This treatment is based on a static degreaser, static sieve, grease float, buffer tank, dissolved air flotation, biological tanks, sludge tank and a sludge dewatering unit.

Keywords: Wastewater, physico-chemical analysis, pollution, effluent, environment, treatment.

HEAT TRANSFER ENHANCEMENT USING NANOFLUIDS IN HEAT PIPES

İpek Aytaç

University of Turkish Aeronautical Association, Faculty of Engineering, Mechanical Engineering, Ankara, Turkey.

ORCID ID: https://orcid.org/ 0000-0003-1213-8325

ABSTRACT

Conventional heat transfer fluids such as water, oil, ethyl alcohol and air are used in areas such as air conditioning, heating and cooling, electronics. However, the low heat transfer properties of conventional working fluids used in heat transfer are one of the major barriers to efficiency. Various methods have been tried to increase the thermal conductivity of these fluids. One of them is nanofluids formed by adding nano-sized metal particles into conventional fluids. The structures of nanofluids are stable and the particle size is small. Thus, as a result of the movements of nanoparticles that cause micro-movement in the fluid, thermal convection increases, the heat transfer area expands, which makes them more attractive compared to conventional fluids. The aim of this study is to develop nanofluids that contain CuO and ZnO nanoparticles as working fluid in heat pipes, have a much higher heat storage and heat carrying properties than water, and examine the effect on heat pipe performance. The heat pipe used in the study is positioned at an angle of 90° and consists of the evaporator zone, the condenser zone and the adiabatic zone. In the experimental study, the heat pipe was filled with working fluid, corresponding to 1/3 of the evaporator volume. Experiments were performed separately for water and nanofluids, and the results were compared. As a result, the use of nanofluid as working fluid instead of water increased the efficiency at all Reynolds numbers and decreased the thermal resistance of the heat pipe. Therefore, the heat transfer has also increased. It was concluded that the improvement rate in thermal resistance of CuO/water nanofluid at each Re number is higher than that of ZnO/water nanofluid.

Keywords: Heat pipe, nanofluid, thermal performance.

THE STUDY OF THE ORIGIN OF THE SCALING PHENOMENON FORMED IN WATER DISTRIBUTION INSTALLATIONS AND THE EFFECT OF AN INORGANIC INHIBITOR AS AN ENVIRONMENTALLY FRIENDLY INHIBITOR

Mohamed El housse

University Ibn zohr, Faculty of science, Department of chemistry, Agadir, Morocco.

Abdallah Hadfi

University Ibn zohr, Faculty of science, Department of chemistry, Agadir, Morocco.

Abdelghani El kihal

University Ibn zohr, Faculty of science, Department of chemistry, Agadir, Morocco.

Prof. Dr. Said Ben-aazza

University Ibn Zohr, Faculty of science, Department of chemistry, Agadir, Morocco.

Mohamed Errami

University Ibn zohr, Faculty of science, Department of chemistry, Agadir, Morocco.

Ali Driouiche

University Ibn zohr, Faculty of science, Department of chemistry, Agadir, Morocco.

ABSTRACT

The scaling phenomenon is defined as the formation of minerals scales with low solubility, calcium carbonate in most cases, on surfaces in contact with water. It leads to large economic losses because it hinders heat exchange and can reduce pipe diameter, resulting in a significant reduction in water flow. In this work the effectiveness of phosphate fertilizer on scale formation in water distribution installations is investigated, using different techniques including LCGE method, conductivity test, Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), and scanning electron microscopy (SEM), for a synthetic calco-carbonic solution with a hardness of 40 °F under the experimental conditions of T=25°C. The results show that when a little quantity of inorganic inhibitor (2.1 mg/L) was added to the investigated solution, calcium carbonate precipitation was totally blocked. Furthermore, a clear change of the morphology and crystalline phase form of the formed scale in the presence of inhibitor is observed. As a result, we are recommending the use of this fertilizer as a new eco-friendly scale inhibitor for water distribution installations.

Keywords: Scaling, Environmental friendly Inhibitors, Calcium carbonate.

LORENZ KAOTİK SİSTEMİNİN STLmax YÖNTEMİYLE ANALİZİ

ANALYSIS OF THE LORENZ CHAOTIC SYSTEM WITH THE STLmax METHOD

Muhittin Bayram

Dicle Üniversitesi Elektrik-Elektronik Mühendisliği Bölümü, Diyarbakır, Türkiye.

ORCID ID: https://orcid.org/0000-0002-9941-4347

ÖZET

Bu çalışmada, Lorenz kaotik sistemi kısa süreli maksimum Lyapunov üstelleri (STLmax) ile analiz edilmiştir. Bu bağlamda, öncelikle MATLAB ortamında Lorenz sisteminin simulink modeli oluşturulup zaman grafikleri bulunmuş ve sonra bu zaman serilerinin faz uzay grafikleri çizdirilmiştir. Daha sonra Lorenz sisteminin değişik başlangıç değerlerine göre STLmax grafikleri bulunmuştur. Yapılan bu çalışmada farklı başlangıç değerlerinde sistemin zaman grafiklerinde farklılıklar saptanmıştır. Kaotik sistemler başlangıç şartlarına hassas bağlıdır ve girişteki küçük bir değişiklik, sonucu büyük bir oranda etkileyebilmektedir. Kaotik işaretin Kaotiklik derecesi ne kadar büyük ise o işaretin öngörüsü bir o kadar zorlaşır. Kaotik işaretler, kriptolojide (şifrelemede) kullanım alanına sahip olup mesajları maskelemek için kullanılmaktadırlar. Kaotiklik derecesi büyüdükçe gizlenmek istenen mesajlar bir o kadar güvende olabilmektedir. Bundan dolayı bu çalışmada, Lorenz kaotik sistemi STLmax yöntemiyle incelenmiş ve değişik başlangıç değerlerindeki işaretlerin farklı sonuçlar ürettiği bulunmuştur. Kaotik sistemin STLmax değerlerini elde etmek için öncelikle kaotik sistemin ürettiği zaman sinyallerine ayrı ayrı bu yöntem uygulanmış ve tüm zaman sinyallerinin STLmax grafikleri çizdirilmiştir. STLmax değerinin pozitif olması sistemin kaotik olduğunu göstermektedir. Başlangıç değerleri değiştirildiğinde farklı sonuçlar elde edildiği görülmüştür. Periyodik sinyallerde STLmax değeri sıfır çıkmış, kaotiklik derecesi yükseldikçe STLmax değerinin de yükseldiği görülmüştür. Bu da kaotiklik derecesi ile STLmax arasında doğru orantı olduğunu göstermektedir.

Anahtar Kelimeler: Faz uzayı, Kaos, Kaotik sistem, Lyapunov üsteli ve STLmax.

ABSTRACT

In this study, the Lorenz chaotic system is analyzed with the short-term maximum Lyapunov exponents (STLmax). In this context, first of all, the simulink model of the Lorenz system was created in the MATLAB environment and the time graphs were found, and then the phase space graphs of these time series were drawn. Then, STLmax graphs of the Lorenz system were found according to different initial values. In this study, differences were determined in the time graphs of the system at different initial values. Chaotic systems are sensitive to initial conditions, and a small change in input can greatly affect the result. The greater the degree of Chaoticity of the chaotic sign, the more difficult it is to predict that sign. Chaotic signals have a field of use in cryptography and are used to mask messages. The greater the degree of chaoticity, the safer the messages to be hidden. Therefore, in this study, the Lorenz chaotic system was investigated with the STLmax method and it was found that the signals at different initial values produced different results. In order to obtain the STLmax values of the chaotic system, this method was applied separately to the time signals produced by the chaotic system and STLmax graphs of all time signals were drawn. A positive STLmax value indicates that the system is chaotic. It was observed that different results were obtained when the initial values were changed. The STLmax value was found to be zero in periodic signals, and it was observed that the STLmax value increased as the degree of chaoticity increased. This shows that there is a direct proportionality between chaoticity and STLmax.

Keywords: Chaos, Chaotic system, Phase space, Lyapunov exponent, and STLmax.

KİLO KAYBI VE ORAL KANDİDİYAZİS İLE PREZENTE OLAN AIDS OLGUSU

A CASE OF AIDS PRESENTING WITH WEIGHT LOSS AND ORAL CANDIDIASIS

İhsan BOYACI

[1]Dr. Öğr. Üyesi., İstanbul Medipol Üniversitesi Tıp Fakültesi, İç Hastalıkları Ana Bilim Dalı, Fatih, İstanbul

ORCID ID: https://orcid.org/ 0000-0001-7369-0426

ÖZET

AMAÇ: Edinsel bağışıklık yetmezlik sendromu (AIDS) ilk kez 1980'lerin başında ortaya çıkmış, dünya çapında ürkütücü boyutlara ulaşmıştır. Bu sendrom insan bağışıklık yetmezliği virüsü (HIV)'nün neden olduğu ciddi bir kronik infeksiyon hastalığıdır. Bağışıklık sistemi baskılanmış hastalarda oral kandidiyazis ve kilo kaybı sık gözlenir. Burada ki amacımız tedaviye dirençli oral kandidiyazis ve özellikle de kilo kaybının eşlik ettiği olgularda AIDS 'nin öncelikli düşünülmesi gereken bir infeksiyon olduğunu vurgulamaktır.

OLGU: 49 yaşında erkek hasta, ağızda yara, iştahsızlık ve kilo kaybı yakınmalarıyla başvurdu. 1 aydan beri yakınmaları olan hastanın 10 kg kadar kilo kaybı olmuş. Ağızdaki yaralardan dolayı yemesi de güçleşmiş ve iştahıda azalmış. İbuprofen, psödoefedrin, klorfeniramin maleat ve amoksisilin klavunat kullanmış. Yakınmalarının geçmemesi üzerine kliniğimize başvurmuş.

ÖZ GEÇMİŞİ: İşitme ve konuşma engelli

FİZİK MUAYENE: Kaşektik, konjoktiva soluk, palatum molle ve dilin üstünü tamamen kaplayan kirli sarı-beyaz renkte plak, solunum doğal DSS: 12, S1 S2 normal S3 (-) nabız: 88v/dk tansiyon: 120/80 mmHg, organomegali (-)

LABORATUVAR: ESH: 25mm/s, hemoglobin: 10,7 g/dL, MCV: 85,4 fL , RDW: % 13,5 lökosit: 8,5 10^3/µL, PLT:165 10^3/µL, demir: 18 µg/dL, demir bağlama kapasitesi: 215 µg/dL ferritin: 598,2 ng/mL, dil sürüntüsü kültürü: Candida Albicans üredi, AntiHIV-1/2 Antikor + HIV-1 Antijen: 338.5 S/CO

TARTIŞMA: Olgunun işitme ve konuşma engelli olmasından dolayı anamnez kısıtlı olarak alınabildi. Yapılan fizik muayenede dil üzerindeki plak kaldırıldığında mukozada kanama odakları görüldü. Görünüm olarak kandida infeksiyonu düşündüren plaktan mantar kültürü alındı. Muayene ve anamnez sonrası yapılan değerlendirmede kandida infeksiyonuna kilo kaybının da eşlik etmesi HIV infeksiyonuna işaret etti. HIV serolojisi testleri istendi. Ampirik olarak triflukan ilk gün 200 mg yükleme ve günlük100 mg idame doz bir hafta hastaya verildi. Bir haftanın sonunda kandida plağında bir gerileme olmadı, bu arada kültür sonucu Candida Albicans olarak rapor edildi. HIV serolojisi pozitif olan hastanın doğrulama testi de pozitif geldi.

SONUÇLAR: AIDS'li hastalarda immun sistemin baskılanması sonucu en sık olarak oral kandidiyazis gözlenir. Klinisyenleri yanıltabilecek çok farklı biçimlerde karşımıza çıkabilir. Normal floramızda bulunan kandida fırsatçı bir infeksiyondur. Klinisyenler kilo kaybının eşlik ettiği ve oral mukozayı özellikle tutan kandida infeksiyonlarında AIDS ayırıcı tanıda gözden kaçırmamalıdır.

Anahtar Kelimeler; HIV; AIDS; oral kandidiyazis; kilo kaybı

ABSTRACT

OBJECTIVE: Acquired immunodeficiency syndrome (AIDS) first appeared in the early 1980s and has reached alarming proportions worldwide. This syndrome is a serious chronic infection disease caused by the human immunodeficiency virus (HIV). Oral candidiasis and weight loss are common in

immunocompromised patients. It is aimed to emphasize that AIDS is an infection that should be considered primarily in cases accompanied by treatment-resistant oral candidiasis and especially weight loss.

CASE: A 49-year-old male patient presented with mouth sores, loss of appetite and weight loss. The patient, who has had complaints for 1 month, has lost 10 kg of weight. Due to the sores in the mouth, it was difficult for him to eat and his appetite decreased. He used ibuprofen, pseudoephedrine, chlorpheniramine maleate and amoxicillin-clavulanate. He applied to our clinic because his complaints did not go away.

MEDİCAL HİSTORY: Hearing and speech impairment

PHYSICAL EXAMINATION: Cachectic, pale conjunctiva, palatum molle and dirty yellow-white plaque covering the tongue completely, breathing sounds are normal, S1 S2 normal S3 (-), pulse: 88 b/min, blood pressure: 120/80 mmHg, organomegaly (-).

LABORATORY: ESR: 25mm/h, hemoglobin: 10.7 g/dL, MCV: 85.4 fL , RDW: 13.5% leukocytes: 8.5 10^3/µL, PLT: 165 10^3/µL, iron: 18 µg/dL , iron binding capacity: 215 µg/dL ferritin: 598.2 ng/mL, tongue swab culture: Candida Albicans grown, AntiHIV-1/2 Antibody + HIV-1 Antigen: 338.5 S/CO

DISCUSSION: Due to the fact that the patient was hearing and speech impaired, anamnesis could be taken in a limited way. In the physical examination, when the plaque on the tongue was removed, bleeding foci were observed in the mucosa. Fungal culture was taken from the plaque, which was suggestive of Candida infection in appearance. In the evaluation made after examination and anamnesis, weight loss accompanying candida infection indicated HIV infection. HIV serology tests were requested. Empirically, triflucan was given 200 mg loading on the first day and 100 mg daily maintenance dose for one week. At the end of one week, there was no regression in the candida plaque, meanwhile, the culture result was reported as Candida Albicans. The confirmatory test of the patient, whose HIV serology was positive, was also positive.

RESULTS: Oral candidiasis is frequently seen in AIDS patients because the immune system is suppressed. It can appear in many different forms that may mislead clinicians. Candida found in our normal flora is an opportunistic infection. Clinicians should not ignore AIDS in the differential diagnosis of candida infections accompanied by weight loss and especially involving the oral mucosa

Keywords: HIV; AIDS; oral candidiasis; weight loss

EFFECT ON PRODUCTION AND PRODUCTION FACILITIES OF CHİCKPEA (CICER ARIETINUM L.) PLANTS IN MALATYA ECOLOGICAL CONDITIONS

Cengiz YÜRÜRDURMAZ

Sütçü İmam Üniversitesi Ziraat Fakültesi Tarla Bitkileri Bölümü, Kahramanmaraş, TÜRKİYE.

ORCID ID: https://orcid.org/0000-0002-3407-0184

Simge Gözde SARIOĞLAN

Sütçü İmam Üniversitesi Fenbilimleri Enstitüsü Tarla Bitkileri Ana Bilim Dalı, Kahramanmaraş, TÜRKİYE.

ORCID ID: https://orcid.org/0000-0001-6800-4049

Yusuf GÜLER

Sütçü İmam Üniversitesi Fenbilimleri Enstitüsü Tarla Bitkileri Ana Bilim Dalı, Kahramanmaraş, TÜRKİYE.

ORCID ID: https://orcid.org/0000-0002-2319-6101

ÖZET

Bu çalışma 2020 yılı içerisin de Malatya ili Battalgazi ilçesin de Malatya Turgut Özal Üniversitesi Ziraat Fakültesi bilimsel ve araştırma tarım arazisinde deneme kurulmuştur. Denemede (ÇAĞATAY, HASANBEY, HİSAR, MENEMEN-92, AZKAN, AYDIN-92, ARDA, ÇAKIR, ASLANBEY ve IŞIK-05) kullanılmıştır. Tesadüf deneme planına göre 3 tekerrürlü olarak yürütülmüştür. Deneme de bitki boyu, ilk bakla yüksekliği, bitkide ana dal sayısı, bitkide bakla sayısı, dolu bakla sayısı, birim alan tane verimi ve yüz tane ağırlığı özellikleri incelenmiştir. Araştırmada, çeşitlerin bazı verim ve verim ile ilgili özellikler bakımından değerlendirildi ve çeşitler arasında bu özelliklerin farklılık gösterdiği gözlemlenmiştir. Çeşitler içinde birim alan tane verimi arasındaki farklılıklar belirlenmiştir ve 326,67 kg/da ile 117,67 kg/da arasında değişiklik bulunmuştur. Çeşitler arasında en çok bakla sayışana sahip çeşit 9.967 adet ile Aslanbey çeşit olmuştur. En az bitkide bakla sayısına sahip çeşit 7.633 adet ile Işık olmuştur. Bitki boyları arasında en yüksek bitki boylarına sahip 35,767 cm ile 24,533 cm arasında farklar önemli görülmüştür.

Malatya ekolojik koşullarında nohut çeşitlerinin incelenen özelliklere göre Aydın-92 çeşit daha uygun ve verim açısında diğer çeşitlere göre daha çok verim verdiği görülmüştür. Aydın-92 çeşit üzerinde daha çok bilimsel araştırmalar yapılarak Malatya koşullarında yaygın olarak ekimi yapılabilir.

Anahtar Kelimeler: Nohut, genetik değişim, verim, verim unsurları.

ABSTRACT

This study was conducted in Malatya Turgut Özal University Faculty of Agriculture scientific and research agricultural land in Battalgazi district of Malatya province in 2020. Attemept (ÇAĞATAY, HASANBEY, HİSAR, MENEMEN-92, AZKAN, AYDIN-92, ARDA, ÇAKIR, ASLANBEY ve IŞIK-05) were used. It was carried out in 3 replications according to a random trial plan. In the experiment, plant height, first pod height, number of main branches per plant, number of pods per plant, grain yield per unit area and hundred grain weight were investigated. In the study, the cultivars were evaluated in terms of some yield and yield-related features, and it was observed that these characteristics differed between cultivars. Differences in grain yield per unit area were determined within the cultivars and it was found to vary between 326.67 kg/da and 117.67 kg/da. Among the varieties, the variety with the highest number of broad beans was the Aslanbey variety with 9,967. The variety with the lowest number

of pods per plant was Işık with 7,633. The differences between the highest plant heights between 35,767 cm and 24,533 cm were found to be significant.

According to the examined characteristics of chickpea varieties in Malatya ecological conditions, Aydın-92 variety is more suitable and yields more than other varieties in terms of yield. More scientific research on Aydın-92 variety can be done in Malatya conditions.

Key words: Chickpea, variety, yield, yield elements

AIRWAY MANAGEMENT IN A PATIENT WITH INTRAORAL TUMOR - CASE REPORT

AĞIZ İÇİ KİTLESİ OLAN HASTADA HAVAYOLU YÖNETİMİ- OLGU SUNUMU

Kemal Serhan SANDIKÇI

Osmancık Devlet Hastanesi, Department of Anesthesiology and Reanimation, Çorum, Turkey.

ORCID ID: https://orcid.org/0000-0002-2789-7976

ABSTRACT

Difficult airway is expressed by the complex interplay between patient factors, clinical preparation, and operator skill. The proposed definition includes: difficult face mask and supraglottic airway ventilation (LMA, intubating LMA, laryngeal tube), difficult supraglottic airway placement, difficult laryngoscopy, difficult tracheal intubation and failed intubation.

In this case, we aimed to present the airway management of a patient with an intraoral tumor and a difficult airway.

A 20-year-old, 23 kg female patient applied with the complaint of swelling in the mandible. The patient, who had a history of chronic renal failure, meningomyelocele, motor mental retardation, and had undergone peritoneal dialysis for 9 years, was diagnosed with parathyroid adenoma and Brown tumor in the mandible. Parathyroidectomy operation was planned for the patient. The patient had a mass that completely filled the oral cavity and extended outward. A difficult airway was predicted in the patient. Therefore, different sizes of intubation tubes, different sizes of laryngoscopic blades, intubation stylets, supraglottic airways, fiberoptic bronchoscope, transtracheal jet ventilation device and emergency tracheotomy set were available. Routine monitoring (pulseoximetry, electrocardiogram, non-invasive blood pressure measurement, capnograph) was applied. Midazolam 0.04mg/kg IV was administered to prevent anxiety. Remifentanil 0.01 mcg/kg/min iv infusion was started. After intravenous administration of 0.5 mg/kg of ketamine, awake nasal fiberoptic intubation was performed with a number 5 spiral tube. After airway safety was ensured, the operation was started by administering propofol 2mg/kg IV and rocuronium 0.6 mg/kg. The patient underwent parathyroidectomy by general surgery. There were no intraoperative complications. After parathyroidectomy, tracheotomy was performed on the patient's ear, nose and throat side. The patient was transferred to the intensive care unit with postoperative tracheostomization and O2 support with ambu.

Conclusion:

Awake fiberoptic intubation is the standard approach in clinical scenarios where difficulty in tracheal intubation is anticipated and mask or supraglottic ventilation may not be successful or there may be a risk of aspiration. It is possible to perform intubation before induction of general anesthesia, as there are risks such as poor ventilation and oxygenation, failure to maintain airway patency, and incorrect intubation.

Keyword: Difficult airway, Awake fiberoptic intubation

ÖZET

Zor havayolu, hasta faktörleri, klinik hazırlık ve işlemi yapanın yeteneği arasındaki kompleks etkileşim ile ifade edilir. Önerilen tanım şunları içermektedir; zor yüz maskesi ve supraglottik hava yolu ventilasyonu(LMA, intubating LMA, larigeal tüp), zor supraglottik airway yerleştirilmesi, zor laringoskopi, zor trakeal entübasyon ve başarısız entübasyon.

Biz bu olguda ağız içi kitlesi olan ve zor havayolu düşünülen hastanın havayolu yönetimini sunmayı amaçladık.

20 yaşında, 23 kg. ağırlığında bayan hasta mandibulada şişlik şikayetiyle başvurmuş. Özgeçmişinde kronik renal yetmezlik, meningomyelosel, motor mental retardasyon, tanısı olan 9 yıldır periton diyalizine giren hastaya paratiroid adenomu ve mandibulada Brown tümörü tanısı konmuş. Hastaya paratiroidektomi operasyonu planlanmış. Hastanın ağız boşluğunu tamamen dolduran ve dışarı uzanım gösteren kitlesi mevcuttu. Hastada zor havayolu öngörüldü. Bu yüzden farklı boyutlarda entübasyon tüpleri, değişik boyutlarda laringoskopik bleytler, entübasyon stileleri, supraglottik airwayler, fiberoptik bronkoskop,transtrakeal jet ventilasyon cihazı ve acil trakeotomi seti hazır bulunduruldu.Rutin monitörizasyon(pulseoksimetre, elektrokardiyogram, non inviziv kan basıncı ölçümü, kapnograf) uygulandı. Anksiyeteyi önlemek amacıyla 0,04mg/kg midazolam İV uygulandı. 0,01 mcg/kg/dak. İV remifentanil inf. başlandı.0,5 mg/kg. ketamin İV uygulandıktan sonra 5 numara spiralli tüp ile uyanık nasal fiberoptik entübasyon uygulandı. Havayolu güvenliği sağlandıktan sonra 2mg./kg. propofol IV ve 0,6 mg/kg. rokuronyum uygulanarak operasyona başlandı. Hastaya genel cerrahi tarafından paratiroidektomi yapıldı. İntraop herhangi bir komplikasyon olmadı. Paratiroidektomi sonrası hastaya kulak burun boğaz tarafından trakeotomi açıldı. Hasta postop trakeostomize, ambu ile O2 desteğinde yoğun bakım ünitesine devredildi.

Sonuç:

Uyanık fiberoptik entübasyon, trakeal entübasyonda zorluk öngörülen ve maske veya supraglottik ventilasyonun başarılı olamayabileceği veya aspirasyon riski olabilecek klinik senaryolarda standart yaklaşımdır. Entübasyonun, kötü ventilasyon ve oksijenasyon, hava yolu açıklığının sağlanamaması, hatalı entübasyon gibi riskler olduğu için genel anestezi indüksiyonundan önce yapılması mümkündür.

Anahtar kelimeler: zor havayolu, uyanık fiberoptik entübasyon

INTRACARDIAC THROMBUS DUE TO CENTRAL VENOUS CATHETER- CASE REPORT

SANTRAL VENÖZ KATATERE BAĞLI OLUŞAN İNTRAKARDİYAK TROMBÜS- OLGU SUNUMU

Kemal Serhan SANDIKÇI
Osmancık Devlet Hastanesi, Department of Anesthesiology and Reanimation, Çorum, Turkey.
ORCID ID: https://orcid.org/0000-0002-2789-7976

ABSTRACT

Central venous catheters are cannulation devices used to access the central venous circulation and are inserted via wire guidance (ie the Seldinger technique). The central venous catheter is used as a route for rapid administration of drugs, chemotherapy, nutritional support, blood components, monitoring of patients, or combinations thereof. When central venous catheters are used in conventional routes (eg subclavian, jugular, and femoral veins), complication rates vary up to 15% and are primarily due to mechanical dysfunction, infection, and thrombosis.

In this case, we presented the treatment approach to a patient with intracardiac thrombus due to catheter infection.

A 61-year-old female patient was undergoing dialysis 3 times a week due to chronic renal failure. He was receiving medical treatment for diabetes mellitus and hypertension. The patient had a dialysis catheter in the right subclavian vein. The patient, who applied to an external center with the complaint of fever one week ago and received treatment for Catheter infection, applied to us when his general condition deteriorated. In the physical examination of the patient, arterial blood pressure was 130/85 mmHg, heart rate was 75 beats/min, heart rhythm was regular, and he had a murmur. In the echocardiography of the patient; Severe Tricuspid regurgitation, ejection fraction 60%, and 63X21 mm mobile thrombus along the catheter were detected in the right heart cavities. The patient, who was scheduled for open heart surgery, was monitored by the cardiovascular surgeon. Cardiopulmonary bypass (CPB) was started in the patient who underwent routine open heart surgery procedures (5 lead ECG, Intra-arterial pressure measurement (right radial), Central venous catheter (left VJI), Transesophageal echocardiography and Cerebral pulseoximetry). The catheter with the thrombus at the tip was removed by right ventriculotomy and the patient was transferred to the intensive care unit after exiting the CPB.

Conclusion:

Central Venous Catheterization is frequently used for various reasons such as central venous pressure monitoring, pulmonary artery catheterization and monitoring, transvenous cardiac pacing, temporary hemodialysis, drug use, rapid fluid infusion, air embolism aspiration. This procedure has its own complications such as mechanical, thromboembolic and infectious. Thrombus incidence is observed more frequently in patients whose catheter tip is located at the right atrium tip than in patients with superior vena cava tip. Therefore, in patients with central venous catheters, caution should be exercised in terms of thrombus at the catheter tip and should be checked intermittently with echocardiography.

Keyword: Central Venous Catheterization, Thrombus

ÖZET

Santral venöz kateterler, santral venöz dolaşıma erişmek için kullanılan kanülasyon cihazlarıdır ve tel kılavuzluk yoluyla (yani Seldinger tekniği ile) yerleştirilir. Santral venöz kateterin ilaçların hızlı

uygulanması, kemoterapi, beslenme desteği, kan bileşenleri, hastaların izlenmesi veya bunların kombinasyonları için bir yol olarak kullanılmaktadır. SVK geleneksel yollarda (örneğin subklavian, juguler ve femoral venler) kullanıldığında, komplikasyon oranları %15'e kadar değişir ve esas olarak mekanik işlev bozukluğu, enfeksiyon ve trombozdan kaynaklanır.

Biz bu olguda katater enfeksiyonu nedeniyle intrakardiyak trombüs görülen hastaya tedavi yaklaşımını sunduk.

Olgu:

61yaşında Kadın hasta kronik renal yetmezlik nedeniyle haftada 3 kez diyalize girmekteydi. Diyabetes mellitus ve hipertansiyon nedeniyle medikal tedavi almaktaydı. Hastanın Sağ subclavian vende kalıcı diyaliz kateteri mevcuttu. 1 hafta önce ateş şikayetiyle dış merkeze başvuran ve Kateter enfeksiyonu nedeniyle tedavi alan hastanın genel durumu kötüleşince tarafımıza başvurdu. Hastanın fizik muayenesinde arteriyel tansiyon 130/85 mmHg, kalp hızı75 atım/dk id, kalp ritmi düzenli ve üfürüm yoktu. Hastanın yapılan incelemelerinde ekokardiyografisinde; İleri Triküspit yetmezliği, ejeksiyon fraksiyonu %60 ve Sağ kalp boşluklarında kateter boyunca 63X21 mm hareketli trombüs saptandı. Kalp damar cerrahisi tarafından açık kalp cerrahisi planlanan hastaya moniterize edildi. (5 derivasyon EKG, İntraarteryel basınç ölçümü (sağ radial),Santral venöz kateter (sol VJI),Trans özefageal ekokardiyografi ve Serebral pulseoksimetri) açık kalp cerrahisi rutin prosedürler uygulanan hastada kardiyopulmoner bypass (KPB) başlandı. Sağ ventrikülotomi ile ucunda trombüs bulunan katater alındı ve KPB'den çıkılarak hasta sorunsuz yoğun bakıma devredildi.

Sonuç:

Santral Venöz Kateterizasyon santral venöz basınç izlemi, pulmoner arter kateterizasyonu ve izlemi, transvenöz kardiyak pacing, geçici hemodiyaliz, ilaç kullanımı, hızlı sıvı infüzyonu, hava embolisi aspirasyonu gibi çeşitli nedenlerle sık kullanılmaktadır. Bu işlemin mekanik, tromboembolik ve enfeksiyöz olmak üzere kendine özgü komplikasyonu vardır. Kateter ucu sağ atrium ucunda bulunan hastalarda trombüs insidansı, vena kava süperiorda bulunan hastalara oranla daha sık gözlenmektedir. Bu nedenle santral venöz katater takılan hastalarda katater ucunda trombüs açısından dikkatli olunmalı ve ekokardiyografi ile aralıklı kontrol edilmelidir.

Anahtar Kelime: Santral venöz kateter, Trombüs

DİYARBAKIR İLİNDE SÜT SIĞIRLARINDA MEVSİM VE GEBELİK ORANI İLİŞKİSİ

THE RELATIONSHIP OF SEASON AND PREGNANCY RATE IN DAIRY CATTLE IN DİYARBAKIR PROVINCE

Mehmet Ferit ÖZMEN

Dicle Üniversitesi Veteriner Fakültesi, Dölerme ve Suni Tohumlama Anabilim Dalı, 21280, Sur, Diyarbakır, Türkiye

ORCID ID: 0000-0002-5531-220X

ÖZET

Sunulan çalışma, Diyarbakır ilinde sığırlarda yıl içinde tohumlama yapılan mevsimin gebelik oranını etkileyip etkilemediğini belirlemek için gerçekleştirilmiştir. Bu amaçla bir yıl boyunca aynı bakım ve beslenme koşullarına sahip sığırlara (n: 2943) tohumlamadan 30-35 gün sonra ultrason muayenesi gerçekleştirilerek gebelik oranları belirlendi. Çalışma verileri incelendiğinde gebelik oranlarınının kasım ayında en yüksek değere ulaştığı ağustos ayında ise en düşük değerin elde edildiği belirlenmiştir. Çalışmada ilde yıl içinde NSİ (Sıcaklık nem indeksi) değerinin en yüksek olduğu haziran, temmuz, ağustos ve eylül aylarında gebelik oranlarının (sırasıyla %26,%27,%18,%23) diğer aylara göre düşük olduğu belirlenmiştir. Dolaysıyla işletmelerin tohumlama programları oluşturulurken bu durumun göz önünde bulundurması ve olası gebelik kayıplarını minimuma indirmek için ilave tedbirlerin alınması gerektiği kanısına varılmıştır.

Anahtar kelimeler: Sıcaklık, mevsim, sığır, gebelik oranı

ABSTRACT

The present study was carried out to determine whether the insemination season affects the pregnancy rate in cattle in the province of Diyarbakir. For this purpose, pregnancy rates were determined by ultrasound examination 30-35 days after insemination in cattle (n: 2943) with the same care and feeding conditions for a year. When the study data were examined, it was determined that the pregnancy rates reached the highest value in November and the lowest value was obtained in August. In the study, it was determined that the pregnancy rates (26%, 27%, 18%, 23%, respectively) were lower in the province in June, July, August and September when the NSI (Temperature and Humidity Index) value was the highest during the year compared to other months. Therefore, it was concluded that enterprises should take this into account while creating their insemination programs and additional measures should be taken to minimize possible pregnancy losses.

Key words: Temperature, season, cattle, pregnancy rate

GİRİŞ

Ülkemizde 2020 yılı verilerine göre 17.963.000 sığır bulunmaktadır. Toplam süt üretiminin ve et üretiminin yaklaşık % 90' ı sığır yetiştiriciliğinden elde edilmektedir. Diyarbakır 639.370 adet sığır sayısı ile Türkiye de sığır yetiştiriciliğinin en çok yapıldığı iller arasında yer almaktadır (Anonim, 2021). İlde son dönemde sulu tarım faaliyetlerinin artması yem üretimi konusunda kolaylıklar sağlaması büyükbaş hayvan yetiştiriciliğinin daha da gelişmesi potansiyeli doğurmaktadır. Meteorolojik veriler incelendiğinde bölgede karasal iklimin hakim olduğu, sıcaklık değişiminin -24.2 °C ile 46.2 °C arasında değiştiği görülmektedir (Toprak vd., 2009). Önümüzdeki yüzyılda küresel sıcaklıkta 1.8-4.0°C aralığında bir artış öngörülmesi hisedilen sıcaklığın daha da yükseleceği anlamına gelmektedir (Koç ve Uğurlu, 2019) . İklim değişikliği hem hayvansal üretim kapsamında hemde genel olarak sürdürülebilir

kalkınmanın önünde önemli etkileri olabilecek bir tehdit unsurudur (Koyuncu ve Nageye, 2020). Çevre sıcaklığı, nem, radyasyon, rüzgâr ve yağış miktarı gibi faktörler sıcaklık stresini oluşturmaktadır. Isı nem indeksi (SNI) (Temperature-Humidity Index) sıcaklık stresini derecelendirmede kullanılan en yaygın değerlendirmedir. Buna göre reprodüktif fonksiyonlar için kritik değer 72' dir (Kennedey et al. 2007) . Yüksek sıcaklık ve nem SNİ değerini artırırken yem tüketimi azalmaktadır. Azalan yem tüketimi negatif enerji dengesine neden olduğundan başta GnRH olmak üzere FSH, LH, östrojen ve progesteron sentezinde meydana gelen aksamalar ile artan vücut sıcaklığından dolayı uterusa gelen kan akımının azalması embriyonik ölümlere ve üreme performansında bozulmalara neden olmaktadır.(Arı, 2015; Drew, 1999; Alnmier et al., 2002; DeRensis and Scaramuzzi, 2003; De Rensis et al., 2002). Dolaysıyla ısı stresi günümüzde süt sığırı işletmelerinde en önemli parmetresi olan dölverimini olumsuz etkilemektedir (Baran ve Özdaş, 2015).Diyarbakır bölgesinde SNİ değerleri incelendiğinde en yüksek değerlerin haziran-eylül ayları arasında sırasıyla 71.54; 75.55; 75.63 ve 70.37 olduğu belirlenmiştir (Çelik, 2021).

Çalışmamızdaki amaç büyükbaş hayvan yetiştiriciliğinde önemli bir yere sahip olan ve geleceğe yönelik daha da gelişim potansiyeli olan Diyarbakır İlinde suni tohumlamaların yapıldığı mevsimin döl verimine yani gebelik oranına etkisinin bulunup bulunmadığını belirlemektir.

MATERYAL METOD

Çalışma kapamında Diyarbakır ilinde kurulu bir işletmede aynı bakım ve besleme koşullarına sahip inekler bir yıl boyunca takip edilmiştir. Her ay suni tohumlama yapılan ineklerin kaydı tutulmuş ve 30-35 gün sonra ultrason aracılığıyla gebelik oranı belirlenmiştir. Bu kapsamda 12 ay boyunca işletmede toplam 2943 tohumlama yapılmıştır.

BULGULAR

Çalışmamızdan elde edilen verileri içeren Tablo 1. incelendiğinde en yüksek gebelik oranının kasım ayında (%40) en düşük gebelik oranının ağustos ayında (%18) meydana geldiği görülmektedir. NSİ (sıcaklık nem indeksi) değerinin en yüksek olduğu haziran, temmuz, ağustos ve eylül aylarında gebelik oranlarının (sırasıyla %26,%27,%18,%23) diğer aylara göre düşük olduğu belirlenmiştir. Yılın soğuk veya serin dönemlerine göre sıcak dönemlerinde gebelik oranının düştüğü görülmektedir.

Tablo 1. 2021 yılı içinde yapılan suni tohumlama sayıları ve gebelik oranları

	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık
Tohumlanan inek sayısı (adet)	254	218	228	208	217	227	221	238	270	281	239	342
Gebe inek sayısı(adet)	80	76	81	63	79	60	60	43	61	82	97	104
Gebelik oranı(%)	31	34	35	30	36	26	27	18	23	29	40	30

TARTIŞMA VE SONUÇ

Isı stresi önümüzdeki yıllar içerisinde gerekli tedbirler alınmassa kaçınılmaz olarak etkisini artıracak ve süt sığırı işletmelerinde daha fazla verim kaybına neden olabilecek bir faktördür. Kuşkusuz bu etkiyi uzun vadede sınırlandıracak en önemli çalışma ısı stresine dayanıklı ırkların genetik olarak oluşturulmasıdır. Bunun yanında işletme yönetiminin NSİ değerlerinin kritik değerlerin üzerinde

olduğu aylardan önce hayvanları maksimum sayıda gebe bırakılması şeklinde gebelik planı yapması gerekmektedir. Ayrıca suni tohumlama uygulamaları ile beraber hormon uygulamaları, yalıtımlı maddeden yapılmış gölgelik alanlar, suluklarda daima temiz serin su bulundurulması, serinletici banyo veya püskürtme sistemleri, havalandırma fanlarının kullanımı ve reprodüktif faaliyetlerin günün serin saatlarinde hayvanların vücut ısısını artırmıyacak şekilde planlanması faydalı olacaktır (Çelik, 2021).

Kış ayları ile karşılaştırıldığında, özellikle yaz aylarında yapılan suni tohumlamalarda gebelik oranlarında %30-50 arasında bir kaybın olduğunu bildirilmiştir (Arı, 2015). Çalışmamızda da kış mevsimi ile karşılaştırıldığında yaz aylarında gebelik oranı %30-50 aralağında azalmıştır. Khan, Prasad and Gupta, (2013) sıcaklık-nem indeksinin eşik değerine (<72) yakın olan iklim şartlarında, süt sığırlarındaki gebelik oranının %32.60, eşik değer civarında ise %20.50 olduğu bildirilmişlerdir. Çalışmamızda NSİ değerinin en yüksek olduğu ağustos ayında gebelik oranı % 18 olurken NSİ değerinin kritik eşiğe yaklaştığı haziran ayında % 26 gebelik elde edilmiştir. El- Wishy, (2013) Hollstayn ineklerde NSİ değerinin mayıs ayında 69'dan Temmuz ayında 74'e çıkması durumunda gebelik oranının %34.10'den % 15.70'ye gerilediği bildirmiştir. Çalışmamızda da mayıs ayında gebelik oranı %36 iken temmuz ayında gebelik oranı % 27' e ağustos ayında % 18'e düşmüştür.

Çalışmamızdan sonuç olarak Diyarbakır ilinde yıl içinde yapılan tohumlamalarda en düşük gebelik oranının ağustos ve eylül aylarında elde edildiği belirlenmiştir. Gebelik oranı açısından soğuk ve serin ayların sıcak aylara göre daha avantajlı olduğu dolaysıyla Diyarbakır ilinde kurulu olan sığır işletmelerin suni tohumlama programlarında bu hususların göz önünde bulundurulması ve ısı stresinin etkisini azaltacak tedbirleri uygulaması ekonomik kayıpların azaltılmasında faydalı olabileceği kanısına varılmıştır.

KAYNAKLAR

Alnmier, M., De Rosa, G., Grasso, F., Napolitana, F., Bordi, A. (2002). Effect of climate on the response of three oestrus synchronisation techniques in lactating dairy cows. Animal Reproduction Science, 71, 157-68.

Anonim (2021). T.C. Tarım Ve Orman Bakanlığı Strateji Geliştirme Başkanlığı Tarımsal Yatırımcı Danışma Ofisi Diyarbakır Tarımsal Yatırım Rehberi .

Arı, U.Ç. (2015). Sığırlarda ısı stresinin fizyolojik ve hormonal olarak uremeye etkisi. Turkiye Klinikleri J Reprod Artif Insemin-Special Topics,1(1).

Baran, A., Özdaş, Ö.B. (2015). Sığırlarda ısı stresinin embriyo transferi ve suni tohumlama sonrası gebelik oranları üzerine etkileri. Turkiye Klinikleri J Reprod Artif Insemin-Special Topics, 1(1).

Çelik, R. (2021). Diyarbakır ili süt sığırı yetiştiriciliğinin sıcaklık-nem indeksi yönünden değerlendirilmesi. Dicle Üniversitesi Veteriner Fakültesi Dergisi, 14(2), 96-100.

De Rensis, F., Marconi, P., Capelli, T., Gatti, F., Facciolongo, F., Franzini, S. (2002). Fertility in postpartum dairy cows in winter or summer following estrous synchronization and fixed time A.I. after the induction of an LH surge with GnRH or hCG. Theriogenology, 58, 1675-1687.

De Rensis, F., Scaramuzzi, R. J. (2003). Heat stress and seasonal effects on reproduction in the dairy cow—a review. Theriogenology, 60(6), 1139-1151.

Drew, B. (1999). Practical nutrition and managment of heifers and high yielding dairy cows for optimal fertility. Cattle Practice, 7, 243-48.

El-Wishy, A.B. (2013). Fertility of Holstein cattle in a subtropical climate of Egypt. Iranian Journal Applied Animal Science, 3, 45-51.

Kennedy, J., Dokladny, K., Dongme, Y.E., John, C., Pope, l., Moseley, Thomas, Y.M.A. (2007). Cellular and molecular mechanisms of heat stress-ınduced upregulation of occludin protein

expression: regulatory role of heat shock factor-1. The american journal of pathology. 172(3), 659-670.

Khan, F.A., Prasad, S., Gupta, H.P. (2013). Effect of heat stres on preg-nancy rates of crossbred dairy cattle in Terai region of Uttarakhand, India. Asian Pac. J. Reprod., 2, 277-279.

Koç, H.U., Uğurlu, M. (2019). Süt sığırlarında ısı stresinin verim özellikleri üzerine etkisi. Lalahan Hay. Araşt. Enst. Derg. 59 (1), 30-35.

Koyuncu, M., Nageye, F.I (2020). İklim değişikliğinin sürdürülebilir hayvancılığa etkileri. J. Anim. Prod.,61 (2), 157-167.

Toprak, Z.F., Öztürkmen, G., Yılmaz, S., Dursun, F., Bayar, G., Em A, Ha-midi N. (2009). Diyarbakır kent merkezi için sıcaklık verilerinin istatistiksel analizi, İklim Değişikliği ve Çevre, 1 (2), 49-74.

EFFECT OF HEAT STRESS ON THE REPRODUCTION OF FARM ANIMALS

Dr. Kave Koorehpaz

DVSc Candidate of Theriogenology, Department of Theriogenology,

Faculty of Veterinary Medicine, Urmia University, Iran.

ORCID NO: 0000-0003-1968-9453

ABSTRACT

Global warming and climate change are among the biggest issues facing the world, and their economic impact on dairy farming is a relevant issue. In view *of the fact* that heat stress has a myriad of effects on dairy cattle across the life cycle, the temperature–humidity index (THI) is widely used to predict heat stress events in cattle. heat stress induced changes in growing follicles can be expressed later as compromised maturation and developmental capacity of the ovulating oocyte. Developed follicles when exposed to 40°C suffer a permanent damage and become nonviable. Furthermore, heat stress delays follicle selection and elongates follicular wave interval and follicular steroidogenesis resulting in suppression of the large follicles which, in turn, fails the dominant follicle to exert dominance [1]. Also in modern cows, it is difficult to detect estrus during heat stress due to shorter duration and less intensity. In addition, affects corpus luteum development and its function including lower progesterone secretion during summer and delay in luteolysis. Many investigations have shown to use embryo transfer technique for bypassing embryonic mortality during the first 7 days of development when embryos are much more susceptible to heat stress and can significantly improve pregnancy rates during the summer months. In males, sex hormone levels, spermatogenesis, temporary sterility, libido, ejaculate volume, macroscopic as well as microscopic semen characteristics in an ejaculate are affected, and sperm abnormalities and dead sperm increase by exposure to the heat stress. heat stress also resulted in lower milk and protein yields and feed intake but higher rectal temperature. West et al [2] explained that every additional 1◦C in air temperature above the thermal neutral zone causes a 0.85 kg reduction in feed intake, and that heat stress can cause a considerable reduction in milk production. The reduction in milk yield related to heat stress has led to estimated losses of 5.4% of the monthly income of farmers during summer [3]. Extreme heat waves of early summer are much more devastating when the animals are not acclimatized [4]. Nonetheless, we can reduce the negative effects of heat stress by Various management practices including genetic selection for more heat-tolerant cows, nutritional management, and environmental modification or cow cooling strategies (shade and Evaporative Cooling). In the end, Provision of shade, fans, misters, or any combination of the aforementioned techniques can help alleviate some of the negative effects associated with heat stress.

Keywords: Heat stress, Dairy cows, Heat abatement

REFERENCES

[1] Torres-Júnior JDS, De FA Pires M, De Sa WF, Ferreira ADM, Viana JHM, Camargo LSDA, Ramos ADA, Folhadella IM, Polisseni J, De Freitas C, et al. 2008. Effect of maternal heat-stress on follicular growth and oocyte competence in Bos indicus cattle. Therio. 69:155–166.

[2] West, J.W. Effects of heat-stress on production in dairy cattle. J. Dairy Sci. 2003, 86, 2131–2144.

[3] Hempel, S.; Menz, C.; Pinto, S.; Galán, E.; Janke, D.; Estellés, F.; Müschner-Siemens, T.; Wang, X.; Heinicke, J.;Zhang, G.; et al. Heat stress risk in European dairy cattle husbandry under different climate change scenarios—Uncertainties and potential impacts. Earth Syst. Dynam. 2019, 10, 859–884.

[4] Hansen PJ. 2009. Effects of heat stress on mammalian reproduction. Phil Trans Rsoc.

364:3341–3350.

ELECTRICAL, DIELECTRIC AND OPTICAL PROPERTIES STUDIES OF PYROVANADATES $Li_xCu_{2-x/2}V_2O_7$ (X = 0.05; 0.1; 0.2)

Halima Mortadi

University Chouaib Doukkali, *Faculty of Sciences*,Chemistry Department, El Jadida, Morocco.

Abdelmonim.Assekouri

University Chouaib Doukkali, *Faculty of Sciences*,Chemistry Department, El Jadida, Morocco.

Elmouloudi sabbar

University Chouaib Doukkali, *Faculty of Sciences*,Chemistry Department, El Jadida, Morocco.

Mohammed Bettach

University Chouaib Doukkali, *Faculty of Sciences*,Chemistry Department, El Jadida, Morocco.

ABSTRACT

Pyrovanadate materials are promising materials for different applications where their electrical, dielectric and optical properties must be deeply studied in order to optimize them. The $Li_xCu_{2-x/2}V_2O_7$ compounds (x = 0.05; 0.1; 0.2) were prepared using the ceramic method. The investigated samples are characterized by combining X-ray powder diffraction, infrared Spectroscopy, Diffuse Reflectance Spectroscopy and Impedance Spectroscopy. The Rietveld refinement of the X-ray diffraction (XRD) pattern revealed that these $Li_xCu_{2-x/2}V_2O_7$(x = 0.05; 0.1; 0.2) compounds are indexed in the orthorhombic system with the Fdd2 space group. The Infrared spectroscopy confirmed the presence of $V_2O_7^{4-}$ groups. Their electric and dielectric properties are measured in the frequency 1Hz-1MHz at room temperature using impedance spectroscopy (IS). The impedance spectra were modeled by an equivalent electrical circuit. This modelization allowed us to determine the electrical parameters (resistance, pseudo-capacitance and relaxation time,) and dielectric parameters of the pyrovanadates $Li_xCu_{2-x/2}V_2O_7$. The adjustment of data of conductivity by the double power law allowed the determination of σ_{dc} and other conductivity parameters. The conductivity values are characteristic of semiconductors. These phases are also characterized by reflectance spectroscopy which confirmed that the three compounds are semiconductors with a reduction in the gap energy which passes from 1.79 to 1.73 eV when the lithium content increases from 5 to 20%.

Keywords: Pyrovanadates Copper Lithium, Impedance Spectroscopy, Electrical equivalent circuit, Conductivity (σ_{ac}), Dielectric constant, Optical gap

ADSORPTION STUDIES OF ALIZARIN YELLOW R ONTO PRISTINE AND CALCINED HYDROCALUMITE: COMPARATIVE STUDY

Ilyas CHOUAYBI

Laboratory of Physical-Chemistry of Materials, Department of Chemistry, Chouaïb Doukkali University, Faculty of Science, El Jadida, Morocco.

El Mostafa MOUJAHID

Laboratory of Physical-Chemistry of Materials, Department of Chemistry, Chouaïb Doukkali University, Faculty of Science, El Jadida, Morocco.

Hasna OUASSIF

Laboratory of Physical-Chemistry of Materials, Department of Chemistry, Chouaïb Doukkali University, Faculty of Science, El Jadida, Morocco.

Oumaima MATBOUT

Laboratory of Physical-Chemistry of Materials, Department of Chemistry, Chouaïb Doukkali University, Faculty of Science, El Jadida, Morocco.

Mohammed BETTACH

Laboratory of Physical-Chemistry of Materials, Department of Chemistry, Chouaïb Doukkali University, Faculty of Science, El Jadida, Morocco.

ABSTRACT

Layered double hydroxide materials can provide an efficient removal and rapid separation of pollutant in wastewater treatment. In this work, hydrocalumite a subgroup of hydrotalcite was prepared via co-precipitation method, mixing Ca and Al nitrate solutions in sodium hydroxide (NaOH) solution (pH = 11) with molar ratio Ca/Al = 2 . To achieve the mixed oxide form, hydrocalumite prepared was calcined at 450°C under atmospheric air for 4 hours. The physicochemical properties of the synthesized and activated hydrocalumite were determined using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), UV/Vis Spectrophotometer and Induced Coupled Plasma–Optical Emission Spectroscopy (ICP-OES). In order to optimize the most suitable adsorption conditions, the effects of different parameters, such as initial pH, contact time, adsorbent amount and initial dye concentration were separately studied, and adsorption mechanisms of the pristine and calcined hydrocalumite in the removal of alizarin yellow R from aqueous solution were investigated. For both materials, the optimal pH value is 5.8. Kinetic studies revealed that the adsorption of alizarin yellow R dye follows the pseudo-second-order model and the equilibrium were reached at (120 and 60 min) for pristine and calcined hydrocalumite, respectively. The adsorption isotherm demonstrate that the freundlich model is the most appropriate to describe the adsorption equilibrium of alizarin yellow R on both materials with maximum adsorption capacities of 1381 and 1770 mg g^{-1} for pristine and calcined hydrocalumite, respectively. Overall, both materials elucidate excellent ability on the AYR dye adsorption with a slight superiority of the oxide form, proving to be potential candidate for wastewater treatment.

Keywords: Hydrocalumite, Alizarin yellow R dye, Layered double hydroxide, Co-precipitation, Adsorption.

IMPEDANCE SPECTROSCOPY STUDY OF MAP FERTILIZERS ENRICHED WITH DIFFERENT LEVELS OF IRON (III) OXIDE IMPURITIES

Assekouri Abdelmonim

Faculty of Science –University Chouaib Doukkali, Chemistry Departement, Laboratory Physico – Chemistry of Materials, El Jadida–Morocco

Nacira LEBBAR

Faculty of Science –University Chouaib Doukkali, Chemistry Departement, Laboratory Physico – Chemistry of Materials, El Jadida–Morocco.

Elmouloudi SABBAR

Faculty of Science –University Chouaib Doukkali, Chemistry Departement, Laboratory Physico – Chemistry of Materials, El Jadida–Morocco

Mehdib KHOULOUD

Fertilizer Laboratory, Direction of research and developpement, OCP group.SA, El Jadida-Morocco.

Rachid BOULIF

Fertilizer Laboratory, Direction of research and developpement, OCP group.SA, El Jadida-Morocco.

ABSTRACT

For several years, researchers and industrialists have devoted a lot of effort to define and control the effect of impurities in phosphoric acid on the physicochemical properties of fertilizers. So, many studies have been carried out, more particularly, on the effect of iron and aluminum, and in a less pronounced manner on other elements such as magnesium, fluorine, calcium and silicon.

This work has shown that the addition of impurities can have important effects on the quality of the slurry and the ammonium phosphate fertilizers produced. But the exact description of these effects remains a field of divergence between researchers.

In this work we propose an original study involving the impedance spectroscopy of the solid, to analyze the effect of the addition of impurities based on iron oxide in phosphoric acid, on the electrical and dielectric properties of fertilizers, Mono Ammonium Phosphate (MAP). Indeed, the variation in the rate of impurities is clearly manifested in the electrical and dielectric behavior of the fertilizer obtained after addition, via electrical modeling, ionic conductivity, permittivity and loss tangent. The choice of solid impedance spectroscopy as the analysis method essentially comes down to its non-destructive nature and its speed (the measurement lasts only one minute).

Keywords: Fertilizers, MAP, Iron oxide, Impedance Spectroscopy and Electrical Circuit.

REMOVAL OF A TOXIC POLLUTANT (PHENOL) BY ADSORPTION ON THE FAUJASITE ZEOLITE

Abdrrazek EL-KORDY

Laboratory of Materials, Membranes, and Nanotechnology: EMaMeNaT "Faculty of Science, Moulay Ismail University, Zitoune, Meknes P. O. Box 11201.

Najib TIJANI

Laboratory of Materials, Membranes, and Nanotechnology: EMaMeNaT "Faculty of Science, Moulay Ismail University, Zitoune, Meknes P. O. Box 11201.

Abdelaziz ELGAMOUZ

Pure and Applied Chemistry Group, Department of Chemistry, College of Sciences, University of Sharjah, Sharjah P.O. Box 27272, United Arab Emirates

ABSTRACT

This paper aims to set forth the changes in the feelings, thoughts and behaviours of people, during the pandemic. To this end, studies on religion or pietism and Covid-19 pandemic in Turkey were tried to be collected. Firstly, articles, theses and books drafted in this field were analysed. In the research period, concepts and phrases like coronavirus, coronavirus and religion, coronavirus and sprirutualism, coronavirus and pietism, etc. were searched in the search engines. However, when the related literature in Turkey is reviewed, no books or theses based on empirical research, covering the concepts of both coronavirus and religion were found out. Some non-empirical books partially mention the effects of pandemic on religious emotions, thoughts and behaviours of people. However, 9 articles on the subject were identified, 4 of which were theoretical and 5 were empirical. Data for 4 empirical researches were obtained through quantitative method while data for 1 of them were obtained through qualitative method. The researcher carried out the study by categorizing the concerned studies dated 2020 according to their subjects, objectives, methods, findings and results. In this study, meta analysis method was applied and the data were analysed through content analysis. According to the results of the research, it was determined that the pandemic has an important effect on the religious emotions, thoughts and lives of people and even that there has been an increase in people's tendency towards religion in such pandemic periods.

Keywords: Coronavirus Pandemic, Religion, Pietism, Morale.

PERSONALITY TRAITS: A PIVOTAL PREDICTOR OF ACADEMIC PERFORMANCE IN UNIVERSITY STUDENTS

Rohma Ashraf, Ifzonia Babar, Sana Fatima

Department of Clinical Psychology, University of Management and Technology, Lahore, Pakistan

ABSTRACT

Personality is the combination of a number of traits. Personality determines a set of important characteristics and personality traits affect academic performance in students, either positively or negatively. The study was aimed to explore the relationship between academic performance, and personality traits (Openness, Agreeableness, Conscientiousness, Neuroticism, Extroversion). It was a cross sectional research design. The sample of the study was comprised of graduate and undergraduate University students (male and female) and age range of participants from 18 to 25 years by using convenient sampling technique. The study variables were measured by using Academic Performance Rating Scale and Big Five Personality Traits Scale in this research. Results were statistically analyzed through SPSS version 20. The Results revealed the personality trait (extroversion and openness) are positively predicting the academic performance. Moreover, there were found a strong relationship among extroversion and academic performance. Hence, this research can help to identify the personality strengths, also to spread awareness for the personality grooming and key role of traits in academic performance.

Keywords: Academic Performance, Personality Traits (Openness, Agreeableness, Conscientiousness, Neuroticism, Extroversion)

INFLUENCE OF MATERNAL EDUCATION ON CHILD HEALTH STATUS IN SINDH, SECONDARY DATA ANALYSIS FROM PDHS 2017-18

Faryal Nawab, Sanowar Ali, Kiran Fatima

Dept, of Community Health Sciences, Jinnah Medical and Dental College

ABSTRACT

The objective of this paper was to determine the influence of maternal education on childhood under-nutrition, timely vaccination, breastfeeding and weaning practices among children under 5 years of age, Sindh, Pakistan. A secondary data analysis was conducted by using the data from Pakistan Demographic Health Survey 2017-18. About 1691, mothers between ages of 15-49, who had at least one living child in the past five years, were included. The education of these mothers was the independent variable while the dependent variables were child mortality, immunization, nutrition status, breastfeeding and weaning practices. SPSS version 26 was used to analyze the data. Frequencies and percentages were calculated for numerical and categorical data. Regression analysis was performed, Un-adjusted odds ratio were calculated. P-value of less than 0.5 was considered significant and 95% Confidence intervals were also measured. We found that mean age of children were 2.82 ± 1.8 SD. About 96% of children were found to be vaccinated. Children of educated mothers had 1.8 times higher odds of being fully vaccinated (p= 0.058), 1.3 Odds of starting weaning at 6 months of age (p=0.033), 30 times higher odds to be not stunted (p=0.001) and a 1.2 times higher odds of immediate initiation of breast feeding (p=0.003). This study concluded that maternal education plays an essential role in a child's health since children of educated mothers had far better health outcomes than of those who were not educated. Therefore, maternal education is considered as one of the most important factor in child's health.

Keywords: Maternal Education, Vaccination Status of Child, Exclusive Breastfeeding, Weaning, Nutritional Assessment

NEW ECO-FRIENDLY MAGNETIC NANOCOMPOSITE FOR EFFICIENT REMOVAL OF TOXIC DYES FROM WASTEWATER: EQUILIBRIUM AND THERMODYNAMIC STUDIES

Hamza Ighnih*[1], Brahim Ennasraoui [1] , Redouane Haounati [1], Hassan Ouachtak [2], Naima Hafid [3], Amane Jada [4], Abdelaziz Ait Addi [1].

[1]Physical Chemistry and Environment Team (ECPE), Faculty of Sciences, Ibn Zohr University, Agadir, Morocco.

[2]Laboratoire de Chimie Appliquée & Environnement, Equipe Bio-organique Appliquée, Faculté des sciences, Université Ibn Zohr, Agadir, Morocco.

[3]Centre Régional des Métiers de l'Education et de la Formation Souss Massa, Morocco

[4]Institut de Sciences Des Matériaux De Mulhouse (IS2M-CNRS), Université de Haute Alsace (UHA), F-68100 Mulhouse, France

ABSTRACT

The industrial effluents resulting from the textile activities of the tannery or the printing industry often present an important dyes pollutant load which is difficult to biodegrade. Their removal from aqueous solutions by conventional techniques proves in certain cases ineffective. In this work, we studied the adsorption process in batch system for removal a cationic and anionic dye using a new nanocomposite based on clay mineral and iron oxide. The iron oxide are synthesized by co-precipitation and nanocomposite adsorbent are synthesized utilizing a simple technique involving a sonication-induced exfoliation process, followed by chemical scrolling reactions The synthesized adsorbent was characterized by various analytical techniques such as X ray diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), X-ray Energy Dispersive Spectroscopy (EDS), Scanning Electron Microscopy (SEM), high-resolution transmission electron microscopy (HRTEM) and BET. The batch adsorption test was applied to study the ability of the adsorbent to remove malachite green (MG) dye from aqueous solution. The obtained results revealed that the adsorption process was highly dependent on physicochemical parameters such as the mass of adsorbent, flow rate, concentration and pH of the solution. The adsorption process of MG dye by nanocomposite based clay mineral adsorbent was described by the kinetic model pseudo-second order and Langmuir isothermal model. Thus, these results show that the clay nanocomposite can be used as a superb adsorbent of hazardous dyes in wastewater.

Keywords: Adsorption, nanocomposite, clay mineral, MG, malachite green, kinetics

PERCEPTION AND DETERMINANTS OF NURSING INVOLVEMENT IN POLITICS AND POLICY MAKING PROCESS IN KWARA STATE, NIGERIA

Mohammed Jimoh SAKA[1], Elisha Taye IGE[2], Shuadat Oluwakemi DANZAKI[3]

[1]Department of Epidemiology and Community Health, University of Iloirn, Ilorin, Kwara State, Nigeria

[2]Department of Epidemiology and Community Health, University of Iloirn Teaching Hospital, Ilorin, Kwara State, Nigeria

[3]Department of Nursing Service, General Hospital, Ilorin, Kwara State, Nigeria

Background

It is the moral and professional obligation of nurses to be engaged in legislation that impacts their patients. Over the years delivery of health care has become largely polarized along political and partisan lines. When Nurses influence the politics that improve the delivery of healthcare, they are ultimately advocating for their patients. Unfortunately, Nurses have historically had little involvement in policy that affects healthcare delivery. This study examined "the perception and determinants of Politics and policy making among Nursing students in the College of Nursing and Midwifery in Kwara State".

Methodology

A descriptive cross-sectional study was conducted among 154 nursing students using simple random sampling techniques. Data were collected using questionnaire after content validity of the instrument. Data generated was presented and analyzed using frequency and percentage.

Results

Findings shows that majority of the Nursing Students have adequate knowledge on politics and policy making and have what it takes to be involved in politics and policy making. Approximately two-third(65.6%) of the respondents said it is time consuming, 16.2% said it is not important for professional growth, about half(51.3%) said gender while two-third(65.6%) of the respondents said it is dangerous to be politically involved and also due to their perception about politics and policy making. However, 59.7% of the respondent don't have an individual passion for politics and policy making and 10.4% of the respondents said politics and policy making is for some selected group of profession.

Conclusion

Majority of the Nursing Students had adequate knowledge and what it takes to be involved in politics and policy making but some of the respondents are not ready to be politically involved due to the various reasons such as lack of motivation, not important for professional growth and issue of environmental factors. However, the respondents had negative perception on politics and policy making for health care delivery.

Recommendation

Nurses should be encouraged to be politically involved and to play active roles so that their potentials can be nurtured toward becoming a voice in the decision making and so that the benefit of politics and policy making can be enjoyed by nursing profession and Nurses.

Key world: Nursing, Perception, Politics, Policy-making, Nigeria

EMOTIONAL BURNOUT, WORK-FAMILY CONFLICT AND MARITAL SATISFACTION AMONG PROFESSIONALS

Aliza Ali

Student, Department of Applied Psychology, School of Professional psychology, University of Management and Technology, Lahore, Pakistan

Hifza Imran

Faculty, Department of Applied Psychology, School of Professional psychology, University of Management and Technology, Lahore, Pakistan

Saira Iftikhar

Student, Department of Applied Psychology, School of Professional psychology, University of Management and Technology, Lahore, Pakistan

Mubashera Habib

Student, Department of Applied Psychology, School of Professional psychology, University of Management and Technology, Lahore, Pakistan

ABSTRACT

The present study aimed to investigate the relationship between emotional burnout, work-family conflict, and marital satisfaction among professionals, furthermore it was also aimed to investigate the predictive role of emotional burnout and work-family conflict on marital satisfaction. The scales Maslach Burnout Inventory (MBI) (Horn & Schaufeli, 1998), Work-family Conflict Scale (WFCS) (Netemeyer, 1996), and Enrich Marital Satisfaction Scale (EMS) (Blaine & David, 1993) were used in the present study. The purposive sample was used with N=200 professionals for data collection. Descriptive analysis was organized separately i.e. mean, and standard deviation. Pearson product moment correlation, and Multiple Hierarchical regression analysis was used for results. The results indicated that work-family conflict was positively correlated with emotional burnout, reduced personal achievement, and depersonalization. Whereas marital satisfaction showed a significant negative relationship with work-family conflict and emotional burnout. The results of regression analysis showed that work-family conflict and emotional burnout predicted marital satisfaction. The study holds its implication in cultural, counseling and therapeutic interventions to give the suggestions to manage their roles effectively.

Key words: work-family conflict, emotional burnout, marital satisfaction, professionals.

EMOTIONAL RECOGNITION THROUGH SPEECH AND COGNITIVE IMPAIRMENT A PRELIMINARY STUDY

PhD. Cristina Guerrero Rodríguez

Laura González Verde

University of Cádiz, Department of Psychology

PhD. Consolación Gómez Íñiguez

University Jaime I of Castellón, Department of Experimental, Clinical Psychology and Psychobiology

ABSTRACT

The present study aims to evaluate the recognition of emotions through speech in patients with Mild Cognitive Impairment (MCI), compared with that of healthy people. Specifically, the emotions of happiness, anger, sadness, fear, disgust and a neutral state were evaluated. The sample consisted of 36 participants, 20 without cognitive impairment and 16 with MCI, and the psychometric test Mini-Mental State Examination (MMSE) was used to classify them in each group. On the other hand, an ad hoc task was used to carry out the study, which included several sentences extracted from the Berlin Emotional Voice Database (EMO-DB). All this was done in order to obtain different acoustic parameters of voice and speech, analyzed using the Praat 6.1.12 software (Boersma and Weenink, 2020) and, thus, to check if there were differences in the recognition of emotions between the two groups. SPSS v.24 was used to perform the statistical analysis of the data. It was expected that people with MCI would obtain lower scores in the emotion recognition task in speech than healthy or non-impaired people. The results showed statistically significant differences, between certain voice and speech parameters, that pointed in that direction. The repercussions and implications of these findings are discussed in the field of nonverbal communication of emotions and, in relation to the cognitive impairment that is occurring to an increasing extent due to an aging population.

Keywords: Emotional recognition, speech, cognitive impairment.

INVESTIGATING THE MOST IMPORTANT ECONOMIC AND SOCIAL FACTORS AFFECTING THE SUSTAINABLE DEVELOPMENT OF RURAL COMMUNITIES (CASE STUDY: MAZANDARAN PROVINCE, IRAN)

Fatemeh Montazeri

PhD Graduated, Sari Agricultural Sciences and Natural Resources University, Iran

ORCID NO: 0000-0001-8602-4721

ABSTRACT

Sustainable rural development can be considered as a process of change and transformation, with the aim of improving and improving the quality and quantity of living in rural areas. The process that leads to the creation of balance, the biological balance between urban and rural spaces, and mainly seeks to create the necessary power and efficiency for the low-income and poor rural population who are less able to be able to stand on their own two feet and stand on their own two feet. Not paying attention to rural spaces and not paying attention to the power and production facilities of rural areas, in terms of environmental data and manpower, is very harmful. Therefore, to achieve sustainable development, rural planning and management is essential. This research is descriptive-analytical and based on collecting information from available sources and identifying economic and social problems in rural areas, has pointed to some necessary strategies to achieve sustainable development of these areas. The study was done the villages of Mazandaran province. The results of this study showed that these problems mainly include economic and social barriers such as poverty, technology, participation and migration. Understanding the real needs of the people of different areas, determining the goals of the project based on prioritizing their needs by allocating the minimum costs, tailoring planning to the social, cultural and economic conditions of the villagers and employing local people in the project using local knowledge of One of the effective strategies in removing these obstacles was determined.

Keywords: Sustainable Development, Economic Factors, Social Factors, Iran

ACCUMULATION OF N-ALKANES IN PLANT SPECIES OF WEST QURNA-1 OIL FIELD IN BASRA CITY, SOUTHERN IRAQ

Hamid T. AL-Saad* Hamzah A. Kadhim** and Makia M.Al-Hejuje***

*College of Marine Science, University of Basrah, Basrah, Iraq**.**

**Department of Geology – College of Science Universityof Basrah .Basrah, Iraq .

***Department of Ecology - college of Science –Basrah University.Basrah , Iraq.

ABSTRACT

Leaves of three plant species (*Conocarpus lancifolius ,Eucalyptus camaldulensis* and *Suaeda vermiculata*) were collected seasonally from three stations (DS6, DS7 and DS8) located at West Qurna-1 Oil Field in Basra city, Southern of Iraq to determine the N-alkanes compounds accumulated in it. The result showed that the highest mean concentration of n-alkanes in plant species leaves was in Summer (14.194 µg/g dry weigh) in *S. vermiculata*. While the lowest mean concentration was in Winter (7.792µg/g dry weigh) in *C. lancifolius.* Also, results showed that the plants differ in their accumulation of n-alkanes compounds in thier bodies which depend on the type of plant or/and may be attributed to temporal or spatial variations .

Keywords: N-Alkanes, Plants. West Qurna-1 Oil Field , Basra city

CAN WOUND SURFACE PH AND TEMPERATURE PREDICT WOUND HEALING IN DIABETIC FOOT ULCER

Dr.Farhanul Huda

Dr.Manisha Naithani

Dr.Bhavaniprasad

Faculty in Department of General Surgery AIIMS Rishikesh,India

ABSTRACT

Introduction: Diabetic foot ulcer (DFU) is dreaded and one of the most intricate medical condition in diabetes.[1-3] India ranked first in the list of top ten countries with 42 million cases to be affected with diabetes.[4, 5] Forthcoming evidences illuminate the increased premature mortality rates associated with diabetic foot disease.[6] Improving the healing of DFU is imperative for improved patient outcomes. To consider a biomarker of comprehensive value to patients and health care professionals, it should be cost effective, user friendly, reliable, acceptable, and it should be transferable among various health care settings.

Aim: To analyze wound surface pH and wound surface temperature as predictors of healing of DFU.

Methods: DFU patients (n=54) were assessed in terms of non-healing while evaluating them routinely. The patient's wound was examined every week and was be given score according to Leg ulcer measurement tool (LUMT). Temperature of wounds was measured by "handheld Infrared thermometer" at room temperature. Wound surface pH was also measured by hand held Potentiometric pH meter. All these parameters were concurrently compared with healing status of the wound which was assessed clinically with the LUMT score.

Results: Wound surface temperature values ranged from 89-92°F (baseline) and 84-88°F (Week4), Leg ulcer measurement tool(LUMT) score was ranging from 43-56(baseline) and 12-29(week4) and wound surface pH was ranging from 7.40-8.10(baseline) and 7.20-7.40(week4). However, correlation studies among them were statistically insignificant.

Conclusions: Keeping in mind the rapid and intimate interactions between wound surface parameter s like pH and temperature and relative ease with wound surface pH and temperature can be measured during routine dressing and debridement such analyses may be of considerable value. The possible advantages offered by objective, chair side methods for quick, precise, and sensitive monitoring of wound healing status, suggest that this process will become an important tool in wound healing surveillance and clinical decision making in resolution of non-healing of DFU in future.

Keywords: Coronavirus Pandemic, Religion, Pietism, Morale.

REFERENCES

1. Gethin G, O'Connor GM, Abedin J, Newell J, Flynn L, Watterson D, et al. Monitoring of pH and temperature of neuropathic diabetic and non-diabetic foot ulcers for 12 weeks: An observational study. Wound Repair Regen. 2018 Mar 1;26(2):251–6.
2. Gregg EW, Gu Q, Williams D, de Rekeneire N, Cheng YJ, Geiss L, et al. Prevalence of lower extremity diseases associated with normal glucose levels, impaired fasting glucose, and diabetes among U.S. adults aged 40 or older. Diabetes Res Clin Pract. 2007 Sep;77(3):485–8.
3. Lauterbach S, Kostev K, Kohlmann T. Prevalence of diabetic foot syndrome and its risk factors in the UK. J Wound Care [Internet]. 2010 [cited 2021 Jun 19];19(8):333–7. Available from: https://pubmed.ncbi.nlm.nih.gov/20852505/

4. Ramachandran A, Wan Ma RC, Snehalatha C. Diabetes in Asia [Internet]. Vol. 375, The Lancet. Elsevier B.V.; 2010 [cited 2021 Jun 19]. p. 408–18. Available from: https://pubmed.ncbi.nlm.nih.gov/19875164/

5. Shankhdhar K, Shankhdhar LK, Shankhdhar U, Shankhdhar S. Diabetic foot problems in India: An overview and potential simple approaches in a developing country [Internet]. Vol. 8, Current Diabetes Reports. Curr Diab Rep; 2008 [cited 2021 Jun 19]. p. 452–7. Available from: https://pubmed.ncbi.nlm.nih.gov/18990301/

6. Chammas NK, Hill RL, Edmonds ME. Increased mortality in diabetic foot ulcer patients: the significance of ulcer type. Journal of diabetes research. 2016 Oct;2016.

COMPETITIVE ANXIETY IN UNIVERSITY ATHLETES: A PSYCHOMETRIC STUDY

Sibgha Farooqi

Alumni, School of Professional Psychology, Department of Clinical Psychology, University of Management and Technology, Lahore, Pakistan.

Rabia Khadim

Lecturer, School of Professional Psychology, Department of Clinical Psychology, University of Management and Technology, Lahore, Pakistan.

ABSTRACT

The present study investigated the manifestation of competitive anxiety and psychosocial issues in university athletes. The sample size consisted of 163 university athletes (men and women) with a mean age of 22 years (M=22.53, SD=1.95). The sample was collected from private universities in Lahore using a purposive sampling strategy. University athletes were given the Competitive Anxiety in University Athletes Scale (CAUAS) and adapted version of psychosocial problems of university cricketers. The indigenous scale of Competitive Anxiety in University Athletes was developed in the current study by following four steps naming exploring phenomenology, establishing expert validation, pilot study, and psychometric properties. The scale was based on both genders for the age range of 19-26. Factor analysis through principle component factor analysis method using Varimax Rotation showed two sub-factors of CAUAS including somatic problems and preoccupation with performance. The scale was found to have good psychometric properties as the Cronbach's Alpha was found .85α. A positive correlation was found between competitive anxiety and psychosocial issues in university athletes. The strength of the relationship as strong as the value of correlation was .62***. The result was supported by the literature. The research would help the concerned authorities to counsel university athletes suffering from similar issues in a better way.

Keywords: competitive anxiety, psychosocial issues, university athletes.

FACTORS INFLUENCING EATING HABIT OF RURAL DWELLERS DURING COVID-19 ERA IN DELTA STATE, NIGERIA

Oyewole M. F and Odioko .B. O

University of Ibadan, Nigeria

ABSTRACT

People with weakened immune systems are at greater risk for Covid-19 infection therefore; optimizing public health during this pandemic requires not only knowledge from the medical sciences, but also from dietary habits and lifestyle.

Proportionate sampling technique was used to select 160 respondents for the study. Structured questionnaires were used to elicit information from respondents on available food for consumption, contributing factors and their eating habits. Data collected were analyzed with the aid of descriptive and inferential statistics.

Food i available were (Grains= 0.97, Animal produces=1.07, Fruits=; 1.01), factors influencing respondents eating habit were taste (52.5%), hunger(48.4%), income (47.5%) and availability (46.9%)., There is a significant relationship between available foods for consumption (r=0.242; p=0.002) and eating habits. Therefore, It is recommend that public health's officials should sensitize people on food nutritional education, so that people can develop good eating habit.

Keywords: Factors, Eating habits, rural dwellers, Covid-19

APPROXIMATE ANALYTICAL SOLUTIONS FOR FRACTIONAL EUROPEAN OPTIONS

Shiva Eshaghi

Department of Mathematics, Faculty of Mathematical Sciences, Alzahra University, Tehran, Iran

ABSTRACT

The Black-Scholes model is the most well-known mathematical model for pricing financial derivatives. It was introduced by Black and Scholes in the year 1973 as a partial differential equation and became so popular and almost universally accepted by the option traders for the estimating and valuing European or American options over time. This equation is widely used in global financial markets by traders and investors and is used to calculate values of both call and put options. It is also applied to determine a fair price for a call or put option based on factors such as underlying stock volatility, days to expiration and others.

From another general point of view, with the developments of theory of fractional calculus in various fields of science and engineering, the problem of the fractional Black-Scholes equation has been surveyed by some researchers.

In the present paper, we introduce a fractional type Black-Scholes model in European options including regularized Prabhakar derivative. We apply the reconstruction of variational iteration method to get the approximate analytical solutions for some models of generalized fractional Black-Scholes equations in terms of the generalized Mittag-Leffler functions.

Keywords: European Options, Fractional Derivative.

SIEM – SECURITY INFORMATION EVENT MANAGEMENT IMPROVEMENT USING PARACONSISTENT ANNOTATED EVIDENTIAL LOGIC Eτ

Liliam Sayuri SAKAMOTO

Msc., Graduate Program in Production Engineering-Paulista University-UNIP

Jair Minoro ABE

Dr., Graduate Program in Production Engineering-Paulista University-UNIP

Luiz Antonio de LIMA

Msc., Graduate Program in Production Engineering-Paulista University-UNIP

ABSTRACT

Currently, everyone is exposed to cyberattacks by which hackers want to steal our most important assets, which are our personal data. All companies also suffer from this situation no matter their size, so most of them try to protect their customers' data, which are mostly sensitive and possible to digital crimes with their malicious use. This study presents the use of Evidential Annotated Paraconsistent Logic Eτ to improve a SIEM - Security Information Event Monitoring, that is, contradictory information will be collected on the analysis of event monitoring that may arise from threats that exploit vulnerabilities found on the Internet, to prevent the spread of malware or phishing through spam before this situation contaminates the personal data of a company's customers. Generally, there are several processes that use automated market tools, however they do a data screening at a basic or initial level, as well as at secondary levels, but when detecting doubtful situations or situations that need further evaluation, they need an opinion from an engineer of data. It is at this point that this study presents an exploratory analysis using an interpretation through an artificial intelligence that uses the experiences of various experts in the field of Information Technology on these vulnerabilities related to cybersecurity and privacy of personal data.

Keywords: Paraconsistent Logic Evidential Annotated Eτ, SIEM - Security Information Event Monitoring, Non-classic Logic, cybersecurity.

THERMAL RADIATION, CHEMICAL REACTION AND VISCOUS DISSIPATION EFFECTS ON MHD MICRO POLAR BLOOD FLOW WITH STRETCHING CAPILLARY IN THE PRESENCE OF HEAT GENERATION/ ABSORPTION

Dr. Binyam Zigta

Wachemo University College of Natural and Computational Science

ETHIOPIA

ABSTRACT

Numerical and theoretical analysis of mixed convection flow of MHD micropolar fluid with stretching capillary in the presence of thermal radiation, chemical reaction, viscous dissipation and heat generation/ absorption have been studied. The governing non linear partial differential equations of momentum, angular velocity, energy and concentration are converted into ordinary differential equations using similarity transformations which can be solved numerically. The dimensionless governing equations are solved by using Runge Kutta fourth fifth order along with shooting method. The effect of physical parameters viz., micropolar parameter, unsteadiness parameter, thermal buoyancy parameter, concentration buoyancy parameter, Hartmann number, spin gradient viscosity parameter, microinertial density parameter, thermal radiation parameter, Prandtl number, Eckert number, heat generation or absorption parameter, Schmidt number and chemical reaction parameter on flow variables viz., velocity of micropolar fluid, microrotation, temperature and concentration has been analyzed and discussed graphically. MATLAB code is used to analyze numerical and theoretical facts. From the simulation study it can be concluded that an increment of micropolar parameter, Hartmann number, unsteadiness parameter, thermal and concentration buoyancy parameter results in decrement of velocity flow of micropolar fluid; microrotation of micropolar fluid decreases with an increment of micropolar parameter, unsteadiness parameter, microinertial density parameter and spin gradient viscosity parameter; temperature profile of micropolar fluid decreases with an increment of thermal radiation parameter, Prandtl number, micropolar parameter, unsteadiness parameter, heat absorption and viscous dissipation parameter; concentration of micropolar fluid decreases as unsteadiness parameter, Schmidt number and chemical reaction parameter increases. Furthermore, computational values of local skin friction coefficient, local wall coupled coefficient, local Nusselt number and local Sherwood number for different values of parameters have been investigated.

Keywords: Thermal radiation, chemical reaction, viscous dissipation, heat absorption/ generation, similarity transformation**.**

EVALUATION OF GENETIC DIVERSITY AND GENOME FINGERPRINTING OF BITTER GOURD GENOTYPES(*MOMORDICA CHARANTIA*) BY MOLECULAR MARKER

[1]Waqas Ahmad and [2]Noshaba Ashraf

Faculty of Agricultural Sciences and Technology

Bahauddin Zakariya University Multan

ABSTRACT

The present study was conducted to estimate the genetic relationship among selected genotypes of bitter gourd. Random Amplified Polymorphic DNA (RAPD) was used to evaluate such relationship among three genotypes of bitter gourd. Amplification of the genomic DNA from each of the three genotypes of bitter gourd using all the 10 decamer primers revealed a variety of RAPD patterns. Out of these 10 primers, five showed stable pattern with a set of major DNA fragments and were the most effective in detection of genetic polymorphism in the studied populations of Bitter gourd. The 10 decamer oligonucleotides on an average generated 244 fragments, of which 85 (34.8%) were polymorphic. A range of 15 to 47 bands was amplified from RAPD primer used in the study. The degree of polymorphism among primers was different. The approximate size of the amplified fragments ranged from 250 to 1000 bp. Coefficients were utilized to generate dendrogram by using an unweighted pair group method with arithmetic average (UPGMA) tree. According to the genetic similarity dendrogram constructed for all 244 traits for three genotypes detected using 10 primers, all studied Bitter gourd from the three different varieties of Bitter gourd can be subdivided into two clusters, of which cluster one comprises of two varieties of Bitter gourd (CBT-36 & PKBT-1), and cluster two comprises of one variety (BG-7017). The mean genetic distance between varieties of Bitter gourd within cluster 1 is 0.3232 (32 %), within cluster 2 is 0.4419 (44 %). The genetic distance between clusters 1 and 2 is 0.1187 (11.8%).

Keywords: *Momordica charantia*, genetic diversity, RAPD

MODELING THE IMPACT OF LAND USE AND MANAGEMENT OPTIONS ON RUNOFF AND SEDIMENT LOSS IN THE ETHIOPIAN HIGHLANDS

Mulatu Liyew Berihun[1,2,] *, Atsushi Tsunekawa[1], Nigussie Haregeweyn[3], Mitsuru Tsubo[1], Ayele Almaw Fenta[1], Kindiye Ebabu[1, 4], Dagnenet Sultan[1, 2]

[1]Arid Land Research Center, Tottori University, 1390 Hamasaka, Tottori 680-0001, Japan

[2]Faculty of Civil and Water Resources Engineering, Bahir Dar Institute of Technology, Bahir Dar University, P.O. Box 26, Bahir Dar, Ethiopia

[3]International Platform for Dryland Research and Education, Tottori University, 1390 Hamasaka, Tottori 680-0001, Japan

[4]College of Agriculture and Environmental Sciences, Bahir Dar University, P.O. Box 1289, Bahir Dar, Ethiopia

ABSTRACT

Land degradation by soil erosion is a serious challenge in the Ethiopian highlands. Land capability-based alternative land use and management options are needed to tackle this challenge in the region. This study, therefore, evaluated the impacts of five alternative land use and management options in reducing runoff and sediment loss in the drought-prone sub-humid highlands of Ethiopia by integrating observed plot- and watershed-scale data with the Soil and Water Assessment Tool. Land capability classification was used to produce five alternative land use options for the watershed. We modified flow- and sediment-sensitive model parameters based on runoff and soil loss findings from the six best-performing plot-scale land management practices *(i.e., bund+grass, polyacrylamide lime, row planting, and reduced tillage on cropland; exclosure+trench on grassland and bushland; and improved forage grass on cropland and grassland)* to simulate watershed-scale runoff and sediment loss under the different options. The results revealed that alternative land use options could reduce runoff and sediment loss by about 21–30% (from 740 to 517 mm) and 32–83% (from 101 to 18 t/ha), respectively, compared to the baseline data. The simulations of best alternative land management options also decreased runoff by 10–41% and sediment loss by 40–89%. Runoff and sediment loss reductions were estimated to be as high as 72% (from 740 to 210 mm) and 95% (from 101 to 5 t/ha), respectively, when land use and land management options are combined. These results indicate that implementing suitable land use and management practices has the potential to rehabilitate degraded watersheds in the sub-humid Ethiopian highlands and similar environments elsewhere. Moreover, the best options will help to achieve one of the UN's Sustainable Development Goals by reducing land degradation in the region. However, additional research should also be conducted on other impacts of land use and management practices as well as on socioeconomic issues related to these alternative options.

Keywords: Soil erosion; Land capability; Land use plan; Upper Blue Nile basin; SWAT

ENHANCED DATA AGGREGATION SCHEME FOR INTERNET OF THINGS (IoT) DATA IN HETEROGENEOUS NODES

KAWURE, JIBRIL HUSSEIN

Centre Director, Professor Iya Abubakar Community Resources Centre

AMINU ADAMU AHMED

ICT Programme Analyst, Federal Polytechnic Kaltungo

ABSTRACT

Internet of Things (IoT) as a new interesting subject in information technology enables receiving and sending business data for each creature through the communication network. The scale and variety of devices, communication networks, and protocols involved in the collection of business data present critical challenges for data processing and analyses. In wireless sensor networks, a balanced data aggregation plays an important role in reducing energy consumption. The main issue in Wireless Sensor Networks (WSN) applications in an IoT environment is the limited lifetime of sensors and the distance between nodes. The best approach to create a balanced cluster that is able to adapt to this environment remains a challenge to recent studies. A technique and mechanism to deal with heterogeneous sensor nodes in an IoT environment based on residual energy and computation power to address this issue is proposed. The objective is to improve throughput while saving energy and extending network lifetime. An enhanced data aggregation scheme emanating from a modified model of cluster-based data aggregation protocol is developed in a simulation model using OMNeT++ to compare the performance of the proposed approach (PLEACH) with the pioneer clustering approach, LEACH protocol. Simulation results show that the proposed approach has improved overall performance in terms of energy efficiency, throughput, and network lifetime.

Keywords: Data aggregation, Internet of Thing, Wireless Sensor Networks, Performance, Energy consumption, Heterogeneous sensor nodes.

EVALUATION OF ANTIOXIDANT ACTIVITY OF PARSLEY (*PETROSELINUM CRISPUM*) ESSENTIAL OIL GROWING IN THE NORTH REGION (MOROCCO) AND IDENTIFICATION OF ITS ANTIOXIDANT CONSTITUENTS

NOUIOURA Ghizlane

Laboratoire des Substances Naturelles, Pharmacologie, Environnement, Modélisation, Santé & Qualité de Vie (SNAMOPEQ). Faculté des Sciences Dhar Mahraz, Université sidi Mohammed ben Abdellah, Fès, Maroc.

TOURABI Maryem

Laboratoire des Substances Naturelles, Pharmacologie, Environnement, Modélisation, Santé & Qualité de Vie (SNAMOPEQ). Faculté des Sciences Dhar Mahraz, Université sidi Mohammed ben Abdellah, Fès, Maroc.

DERWICH El houssine

Laboratoire des Substances Naturelles, Pharmacologie, Environnement, Modélisation, Santé & Qualité de Vie (SNAMOPEQ). Faculté des Sciences Dhar Mahraz, Université sidi Mohammed ben Abdellah, Fès, Maroc.

ABSTRACT

Free radicals cause the oxidation of biomolecules (e.g., protein, amino acids, lipid, and DNA), which leads to cell injury and death. For example, reactive oxygen species (ROS) markedly alter superoxide dismutase's physical, chemical, and immunological properties (SOD), which further exacerbates cell oxidative damage. This has raised the possibility that antioxidants could act as prophylactic agents. It has long been recognized that naturally occurring substances in higher plants have antioxidant activities.

Antioxidants are also crucial to the food industry. Manufacturers have strived to produce high-quality food with superior texture, color, flavor, and nutritional values in the shelf-life period. However, many foods are subject to many factors that lead to quality deterioration. Among these undesirable factors, lipid autooxidation is one of the most concerned. Protecting food against oxidative degradation has prompted the wide usage of food additives. However, some synthetic antioxidant compounds such as butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA) are associated with side effects. Many studies have shown that the presence of natural antioxidants from various aromatic and medicinal plants is closely related to reducing chronic diseases such as DNA damage, mutagenesis, and carcinogenesis. Therefore, there has been a growing interest in research concerning alternative antioxidant active compounds, including plant extracts and essential oils that are less damaging to the mammalian health and environment.

Essential oils possess multifunctional properties other than their classical roles as natural food additives and fragrances. Besides the antibacterial, antifungal, and anti-inflammatory activities, many essential oils also have been confirmed to possess antioxidant activity.

In this study, the antioxidant capacity of PO was investigated using three complementary in vitro assays: β-carotene bleaching assay, 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay, and the Fe2+-metal chelating assay. The β-carotene bleaching and the radical scavenging activity of the crude PO were compared with that of the commercial standard antioxidants, butylated hydroxytoluene (BHT), and R-tocopherol, through the β-carotene bleaching assay and the DPPHradical dot free radical scavenging assay. Meanwhile, the metal chelating capacity between PO and ethylenediaminetetraacetic acid (EDTA) was compared. Moreover, some PO components showing antioxidant activity were further separated from the crude PO by silica gel column chromatography and Spherisorb silica HPLC and identified by GC–MS.

Keywords: Essential oils; butylated hydroxytoluene (BHT), 2,2-diphenyl-1-picrylhydrazyl (DPPH); β-carotene bleaching; HPLC; GC–MS.

ENHANCED NETWORK LIFE TIME USING SECURE ACKNOWLEDGEMENTS WITH CRYPTOGRAPHY

K. Thamizhmaran

Dept. of Electronics and Communication, Government College of Engineering, Tamilnadu, India

ORCID ID: 0000-0001-7813-8163

ABSTRACT

Emerging year of one recent technology is that help and used to such as critical time successful design called Mobile Ad hoc Network (MANET) that allows to the users to access information and services anywhere regardless of their geographic location. MANET is the significant technologies used to more flowing more application conference, meeting, short time connection, natural issues like (flooding, forest fire, agriculture and military) ect., among various un-wired communication technologies where all the mobile nodes are mobile and which can be connected to random dynamically using wireless link in the random manner. But it stream including critical issue and challenges such as security, energy, delay, packet drop quality of service ect., In this research paper proposed Secure Two Acknowledgement method with MARS4 (STACK) that implement for new intrusion detection system for on-demand wireless networks. MARS4 can improve a best performance of trusted quality output to reduce transmission delay, transmission time and also increase network communication throughput help of Network Simulator-2.34 (NS2) to implement it.

Keywords: Ad hoc, Security, Routing, STACK, MAJRS4.

INTRODUCTION

The need for wireless temporary communication facilities is rapidly increasing, because the mobile ad-hoc communication service is synonymous with an ideal communication style realizing communication anytime, anywhere in the world with anyone. The accessibility of a route depends on the number of connections and the reliability of each link forming the route. Many routing metrics in terms of number of links have been proposed, such as the SPA. SPA finds a path having minimum weights to forward the packets to the destination node. SPA selection depends on direct traffic form source to destination, maximizing the network performance and minimizing the cost. Performance of the network can be enhanced through shortest path routing but it also depends upon the functionality of the routing protocol and the parameters that are selected for the shortest path routing. MANET is the one of emerging need part of natural issues in this type of network is non-fixed connect all the mobile nodes dynamically to communicate from source to destination using different types of routing protocols show in figure 1 Mobile Ad hoc Network.

Fig 1 Mobile Ad-hoc Networks

ROUTING

The routing protocols are vital role and it has to adapt quickly to the repeated changes in the ad-hoc network topology. MANET routing protocols Figure 2 are categorized into following three types. Table driven routing protocols: these kind of routing protocols are retains the network topology information in routing tables contains a updated list of destinations and their routes by time to time swapping their routing information with nearby nodes. Routing information is usually flooded in the entire network. At any time a node wants a route to the destination it runs a suitable path finding algorithm on the topology information it retains. On-demand routing protocols: These kinds of protocols are not maintaining topology information of the network, with the help of connection establishment process nodes can obtain necessary route when it is required, and therefore this type of protocols is not exchanging the routing information time to time. Hybrid routing protocols: In this protocols both table driven, on-demand routing advantages are combined. The routing is in the beginning established with certain proactively prospected routes then it serves the demand from additionally activated nodes through reactive flooding.

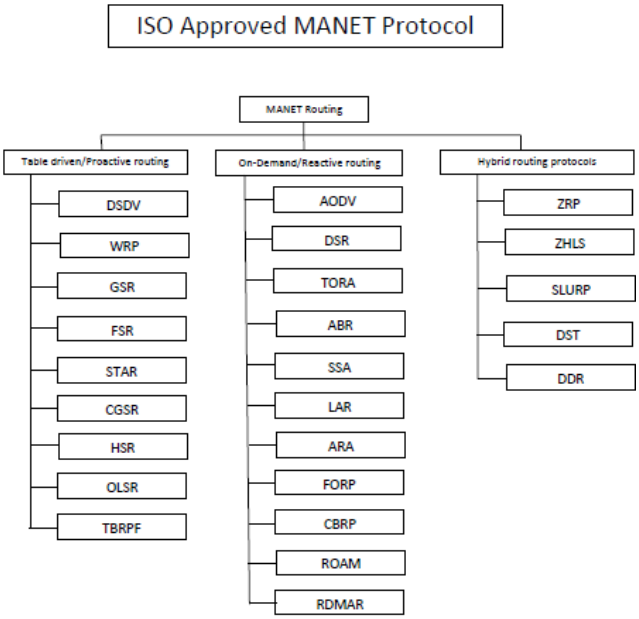


Figure 2 MANET routing protocols

Background

Secure routing and intrusion detection in ad-hoc networks was taken up by Anand Patwardhan et al (2005). Malicious nodes detection in AODV-based mobile ad-hoc networks was addressed by Jongoh Choi et al (2005). An acknowledgment-based approach for the detection of routing misbehaviour in MANETs was discussed by Liu et al (2007). The detection of packet dropping attack using improved acknowledgement based scheme in MANETs was done by Aishwarya Sagar et al (2010). The impact of security attacks on a new protocol for mobile adhoc networks was analysed by Sahadevaiah et al (2010). Adaptive acknowledgment intrusion detection for MANETs with node detection enhancement was analyzed by Al-Roubaiey et al (2010). Secure routing for wireless mesh network was discussed by Celia li et al (2011). Performance analysis of secure routing protocols in MANET dicussed by K.Thamizhmaran et al (2012). Secure routing protocol in MANET – A survey taken by K.Thamizhmaran et al (2012). Secure intrusion detection system for MANETs was found by Shakshuki et al (2013). Implementation of A3ACK's intrusion detection system under various mobility speeds was highlighted by Abdulsalam Basabaaa et al (2014). Energy efficient routing in MANETs through edge node selection using ESPR algorithm was discussed by Prabu and subramani (2014). Performance evaluation of EA3ACK in different topology's using EAACK for MANET highlighted by K.Thamizhmaran (2016). Performance analysis of energy efficient enhanced adaptive 3-acknowledgement (EE-EA3ACK) using ECC in MANET analyzed by K.Thamizhmaran et al (2017).

Comparison and parameter adjustment of topology based (S-EA3ACK) for MANETs done by K.Thamizhmaran et al (2017). Performance analysis of on-demand routing protocol for MANET using EA3ACK algorithm addressed by K.Thamizhmaran et al (2017). Reduced end-to-end delay for MANETs using SHSP-EA3ACK algorithm proposed by K.Thamizhmaran et al (2017). However, all these algorithms address only the security problem because misbehavior attacks due to topology changes rapidly in MANETs due to the characteristics of wireless networks. The proposed approach scheme STACK with help of MARS4 hybrid cryptography is also based on this assumption to provide secure transmission with minimum delay.

Problem Identification

The dynamic nature of MANETs requires the routing protocols to refresh the routing tables frequently and suffer from transmission contention time delay and congestion with packet dropping that are the results of the broadcasting nature of radio transmission since a node in MANETs cannot directly communicate with the nodes outside its communication range, a packet may have to be routed through intermediate nodes to reach the destination. Hence it becomes essential to monitor the constraints in intermediate nodes. Consequently, an efficient routing approach may generate route delay, packet dropping and route failures. The simplest scheme routing in MANETs is the one in finding a route without malicious nodes in the shortest path. This paper aims to provide unbreakable route for secure transmission with the shortest path. So a new routing algorithm named STACK using ACK with hybrid cryptography is proposed. This STACK provides better performance compared to the existing ACK and also reduces routing delay and packet dropping without any misbehavior at intermediate nodes.

Proposed work

In STACK mode, the three consecutive nodes (i.e., A, B, C) work in a group to overcome the drawbacks of watchdog scheme in the network. Node A first sends out STACK data packet P1(S) to node B. Then, node B forwards this packet to node C. When node C receives P1(S), as it is the third node in this three-node group, node C is required to send back a STACK acknowledgement packet P1 (A) to node B. Node B forwards this P1 (A) back to node A. If node A does not receive this acknowledgement packet within a predefined time period, both nodes B and C are reported as malicious. This process is shown in Figure 3.

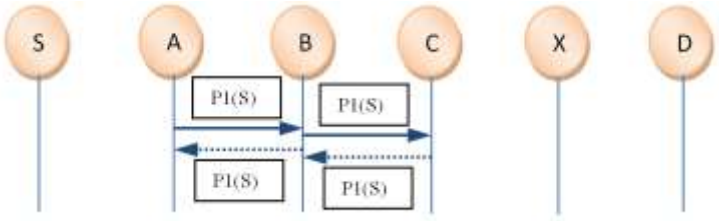


Fig. 3 STACK

Procedural Steps of STACK Algorithm

- STACK processing starts with hybrid cryptography.
- Hello packet transmission from source to destination through intermediate nodes.
- Destination node sends ACK message to source node in same route through intermediate nodes.
- If source node receives this acknowledgement packet within a predefined time period, then data transmission will be start.
- If node A does not receive this acknowledgement packet within a predefined time period, then the intermediate nodes are marked as malicious nodes.
- Switch to TACK. Send acknowledgement packet through intermediate node, this model to detect if there are any receiver collision, false misbehaviour nodes and limited transmission power in the route.

- Out of the three consecutive nodes in the TACK, the third node is required to send an ACK packet to the temporary source node same rout with opposite direction.
- If node A receives this acknowledgement packet within a predefined time period, then data transmission will be start, otherwise both nodes B and C are reported as malicious. when malicious report is received to the source node than, source node switch to MRA.
- MRA checks authentication (secure value) to all nodes and if MAR receives this acknowledgement packet within a predefined time period, then the data transmission will be start, otherwise marked as misbehaviour node.
- Transmit the data in the alternate path to the destination, and go to step1.

Procedural Steps of Hybrid Cryptography (MARS4 Algorithm)

- Now MAJE4 and RSA can be combined to have MARS4 as a very efficient security solution. It is assu
- med that A is the sender of a message and B is the receiver. MARS4 is designed to work as follows.
- A encrypts the original message (PT) with the help of MAJE4 and the symmetric key (K1) and forms the cipher text (CT).
- Again encrypt symmetric key K1 to (K2) of B using RSA.
- B now uses the RSA algorithm and its private key (K3) to decrypt symmetric key K1.

Then B uses K1 and the MAJE4 algorithm to decrypt the CT for the original plain text (PT).

STACK consists of three major parts, namely, ACK, 2-ACK, Misbehaviour Report Authentication (MRA). With the introduction of hybrid cryptography algorithm MARS4 prevents the attacker from forging acknowledgement packets and also simulate help of following simulator called NS 2.34 is used to test the Intrusion Detection System's (IDSs) performance when the attackers are smart enough to forge acknowledgement packets claiming positive result while, in fact, it is negative. As watchdog is not an acknowledgement-based scheme, and as shown in Table 1, the following are the simulation parameters used for the analysis of routing protocol with hybrid shortest path algorithm.

Table 1 Simulation parameters

Parameter	Values
Examined protocol	STACK-MARS4
Application traffic	CBR
Transmission range	1000m
Packet size	512 bytes
Maximum speed	25m/s
Simulation time	900s
Number of nodes	60
Area	1000x1000m
Maximum number of malicious nodes	18

Result and Discussion

In this work, the malicious nodes are provided the ability to forge acknowledgment packets. This way, malicious nodes simply drop all the packets that they receive and send back forged positive acknowledgment packets to their previous nodes whenever necessary. This is a common method for

attackers to degrade network performance while still maintaining their reputation. The proposed approach STACK is designed to tackle four of the six weaknesses of watchdog scheme, namely, receiver collision, limited transmission power, false misbehaviour, and partial dropping.

Table 2 Results of Parameter Values

End–to–End Delay						
Delay / NN	10	20	30	40	50	60
TACK	0.57	0.52	0.47	0.41	0.33	0.24
STACK-MARS4	0.48	0.44	0.39	0.31	0.24	0.17
Malicious Node						
Delay / MN	3	6	9	12	15	18
TACK	0.33	0.36	0.40	0.44	0.45	0.47
STACK-MARS4	0.23	0.27	0.32	0.34	0.35	0.37
Transmission Range						
Delay / TR	0	250	400	600	800	1000
TACK	0	0.69	0.63	0.57	0.54	0.52
STACK-MARS4	0	0.46	0.42	0.37	0.30	0.28
Packet Drop						
Delay / PD	5%	10%	15%	20%	25%	30%
TACK	0.12	0.18	0.24	0.28	0.33	0.38
STACK-MARS4	0.05	0.07	0.14	0.19	0.21	0.23
Routing Overhead						
RO / NN	10	20	30	40	50	60
TACK	0.06	0.20	0.33	0.39	0.48	0.57
STACK-MARS4	0.05	0.16	0.27	0.35	0.41	0.43

End–to–end delay when the number of nodes is increased from 10 to 60. According to table 2, it is clear that in all acknowledgement-based IDSs, the proposed scheme STACK-MARS4 surpassed the performance of TACK in minimizing end-to-end delay by 8.5% when there are 10 to 60 nodes in the network. As the proposed algorithm finds different short routes frequently, it is possible to minimize the delay. It is observed from Table 2 that when compared with TACK algorithm, STACK-MARS4 decreases the delay by 9.5% with increase in the number of malicious nodes from 3 to 18 out of 60 nodes. If malicious node is detected, immediately the STACK-MARS4 algorithm finds alternate shortest route in between the sender and receiver.

Transmission range is varied from 250 to 1000 meters and simulation is carried out to calculate the end–to-end delay using TACK & STACK-MARS4 methods. The obtained results are given in table 2. It is clear from the simulation results that the DSR scheme achieves the best performance, as it does not require acknowledgment scheme to detect misbehaviours. In case of the IDSs, STACK-MARS4 has the lowest delay in comparison with TACK, when there are 250 to 1000 meters of transmission ranges. When transmission range increases, connectivity among the nodes also increases, which enables the proposed method to identify more number of alternate paths which in turn reduces the delay.

Finally routing overhead is analyzed using the two algorithms when the total number of nodes is varied from 10 to 60 and the simulation results are shown in table 3. Simulation results reveal that the proposed algorithm reduces the routing overhead by 6% than TACK algorithm. If any of the intermediate nodes

is found to be busy, then the proposed algorithm is able to find alternate hybrid shortest path from the previous node itself which reduces the delay.

From the entire above table 2, it is clear that the comparison of the STACK-MARS4 illustrate that the proposed algorithm outperforms the TACK by providing lowest end-to-end delay, packet drop and routing overhead with increase in the number of nodes.

Conclusion & Future Work

In the recent research years, there has been a lot of interest in the field of acknowledgement in MANETs, because during the transmission, there is drop (or) delay in the packet if it is sent without acknowledgement. In this paper, the new routing protocol named STACK-MARS4 using TACK is proposed to address the problem. Acknowledgement based transmission is highly secure with the lowest delay and packet dropping. This STACK-MARS4 provides better performance compared to the existing TACK routing protocol by decreasing end-to-end delay by 8.5% lowering routing overhead by 6% and reducing packet drop by 10.7% compared to the existing TACK routing protocol. To enhance the merits of this research work, there is a plan to investigate the following issues in the future. However, the same concept can be applied in satellite to reduce end-to-end delay in the route and reduce packet loss, Possibilities of adopting secure quality oriented techniques to further improve the network performance of quality.

Reference

1. Anand Patwardhan and Iorga, Secure routing and Intrusion Detection in Ad-hoc networks, in Proc. 3rd Int. Conf. Pervasive Computer Communication, pp.191–199 (2005).
2. Balakrishnan, et al, TWOACK: preventing selfishness in mobile ad hoc networks, Proc. Int. Conf. on Wireless Communications and Networking, vol.4, no.10, pp. 2137-2142 (2005).
3. Jongoh Choi, et al, Malicious Nodes Detection in AODV- Based Mobile Ad Hoc Networks, GESTS Trans. Comp. Science and Engg, vol.18, no.1, pp.49-55 (2005).
4. Liu, et al, An acknowledgment-based approach for the detection of routing misbehaviour in MANETs, IEEE Trans. Mobile Comput., vol.6, no.5, pp.536–550 (2007).
5. Aishwarya Sagar and Meenu Chawla, Detection of Packet Dropping Attack Using Improved Acknowledgement Based Scheme in MANET, IJCSI, vol.7, iss.4, no.1, pp.12-17 (2010).
6. K. Sahadevaiah, et.al, Impact of Security Attacks on a New Security Protocol for Mobile Ad Hoc Networks, in Proc. 3rd Int. Conf. Network Protocols and Algorithms, vol.3, no.4, pp.122-128 (2010).
7. Prabu, K. and Subramani, A. Performance comparison of routing protocol in MANET, Int. J. of Adv. Research in Com. Sci. and Soft Engg., Vol. 2, No. 9, pp.388–392 (2012).
8. K. Thamizhmaran, R. Santosh Kumar Mahto, and V. Sanjesh Kumar Tripathi, “Performance Analysis of Secure Routing Protocols in MANET”, International Journal of Advanced Research in Computer and Communication Engineering, Vol. 1, No. 9, pp. 651-654 (2012).
9. D. Raj Vikram Singh1, S. Subhash Kumar Kesarwani and K.Thamizhmaran “Secure Routing Protocol in MANET – A Survey”, International Journal of Engineering Journals and Tech, Vol. 3, No. 3, pp. 22-29, (2012).
10. Shakshuki, et al, EAACK — A Secure Intrusion: Detection System for MANETs, IEEE Trans on industrial electronics, vol. 60, no. 3, pp. 1089-109 (2013).
11. Prabu, K. and Subramani, A. Energy efficient routing in MANET through edge node selection using ESPR algorithm, Int. J. Mobile Network Design and Innovation, vol. 5, no. 3, pp.166–175 (2014).

12. Abdulsalam Basabaaa, et al, Implementation of A3ACKs intrusion detection system under various mobility speeds, in Proc. 5th Int. Conf. on Ambient Systems, Networks and Technologies, pp.571-578 (2014).

13. K. Thamizhmaran "Performance Evaluation of EA3ACK in different topology's Using EAACK for MANET, I - Manager Journal of information technology , Vol. 5, No. 4, pp. 5-10 (2016).

14. K.Thamizhmaran, M.Anitha and Alamelunachippan "Performance Analysis of energy-Efficient Enhanced Adaptive 3- Acknowledgement (EE-EA3ACK) Using ECC in MANET" ARPN, Vol. 12, No. 9, pp. 2901-2912 (2017).

15. K.Thamizhmaran, M.Anitha and Alamelunachippan "Comparison and Parameter Adjustment of Topology Based (S-EA3ACK) for MANETs", International Journal of Control Theory and Application, Vol. 10, No. 30, pp. 423-436 (2017).

16. K.Thamizhmaran, M.Anitha and Alamelunachippan "Performance Analysis of On-demand Routing Protocol for MANET Using EA3ACK Algorithm", International Journal of Mobile Network Design and Innovation (Inderscience), Vol. 7, No. 2, pp. 88-100 (2017).

17. K.Thamizhmaran, M.Anitha and Alamelunachippan "Reduced End-to-End Delay for MANETs using SHSP-EA3ACK algorithm", Journal on Communication Engineering and System, Vol. 7, No. 3, pp. 8-15 (2018).

SEASONAL VARIATIONS IN PHYSICO-CHEMICAL PARAMETERS OF THE GORAI CREEK, WESTERN MUMBAI, INDIA

***Vidya Padmakumar*[1*], *Shine P Joseph*[2]**

Department of Studies and Research in Biosciences, Mangalore University, Mangalagangotri, Mangalore, Dakshina Kannada, Karnataka, India

ABSTRACT

This paper presents the analysis of Physico-chemical parameters of the estuarine region of Gorai Creek zone, Mumbai, Maharashtra, India. The study was conducted for a period of 2 years between May 2017 to May 2019 to determine the factors affecting the water quality and biodiversity of the area. Gorai Creek is known for its margin of thick lush mangrove vegetation housing a large variety of birds and other fauna. For the study, nutrients, chlorophyll-a, and environmental parameters were investigated during the 24 months. The physical, chemical and biological parameters of this estuarine water followed a seasonal rhythm and were induced by the annual cycle of the monsoon. Surface water temperature ranged from 27.4°C to 32.2°C with a wide range of salinity from 1.20 PSU to 27.10 PSU followed by Dissolved Oxygen (DO) from 2.11 to 4.57 g/L. The concentration of chlorophyll-a was found to be varying from 0.02 to 0.15 mg/m^3. Nitrate, phosphate and ammonium concentrations ranged between 0.40 to 3.53 mg/L, 0.01 to 1.92 mg/L and 0.06 to 1.24 mg/L, respectively. Pearson correlation coefficients showed a significant relationship between nitrate and TDS, nitrate and pH, ammonium and salinity, temperature and salinity, temperature and TDS, phosphate and light attenuation in the estuarine environment. The estuary was found to be mesohaline in nature. Estuarine Water Quality Index (EWQI) calculated from phosphate (PO_4), suspended matter (SM), and dissolved oxygen (DO) indicate very good water quality (4.95). The significantly seasonal difference for salinity, water temperature and, TDS was observed probably related to tidal flow and upstream river runoff.

Keywords: Estuary, Physico-chemical parameters, Nutrients, Chlorophyll a, Gorai Creek

COMPRESSIBLE NAVIER-STOKES EQUATIONS WITH HEAT TRANSFER BY FINITE ELEMENT METHOD

Salman Ahmad

Department of Mathematics, The Chinese University of Hong Kong

ABSTRACT

In the real world, most fluid flow situations are described by Navier-Stokes equations, which are models of nonlinear partial differential equations. The nonlinearity is caused by convective acceleration, which is an acceleration associated with the change in velocity in time. It is very difficult to describe and analyze most problems because of nonlinearities that make them impossible to solve. However, if the Navier-Stokes equations are solved, it can also be used to describe and analyze more complex materials and fluid flow problems. The numerical solution of Navier-Stokes equations can be carried out using a number of different approaches at present, including finite difference, finite volume, and finite element methods.

In this work, we intend to study the Taylor vortex flow of compressible viscous fluid with heat transfer in a unit square cavity. For simplicity, assumed that pressure satisfy isentropic state equation. The governing partial differential equations system is solved by finite element method with periodic boundary conditions. Time evolution of the density, velocity components and temperature are examined in the form of contour.

Key words: Compressible Navier-Stokes equations; Weak formulation; Finite element approximation; Taylor vortex flow; Heat transfer.

KAFE VE HİDROKİNON KOMBİNASYONUNUN MELANOM HÜCRELERİ ÜZERİNDEKİ ANTİ-KANSER AKTİVİTESİNİN DEĞERLENDİRİLMESİ

EVALUATION OF ANTI-CANCER ACTIVITY OF CAPE AND HYDROQUINONE COMBINATION ON MELANOMA CELLS

***Ezgi Avşar Abdik*[1,2]**

[1]Istanbul Kültür University, Faculty of Science and Letters, Department of Molecular Biology and Genetics, Istanbul, Turkey

[2]Yeditepe University, Faculty of Engineering and Architecture, Department of Genetics and Bioengineering, Istanbul, Turkey

ORCID ID: 0000-0003-0132-3234

ÖZET

Melanom, cilt kanserinin agresif ve en ölümcül türüdür. Melanom tedavisi için cerrahi, kemoterapi, fotodinamik tedavi, immünoterapi ve hedefe yönelik tedavi gibi çeşitli terapötik yaklaşımlar bulunmaktadır. Ancak, geleneksel tedavi yöntemlerindeki bazı kısıtlamalar nedeniyle yeni tedavi seçeneklerine ihtiyaç duyulmaktadır. Son yıllarda yapılan çalışmalarda doğal ürünler ve onların bileşenlerinin kanser hücreleri üzerine etkisi ile ilgili çalışmalar yapılmaktadır. Kafeik asit fenetil ester (KAFE), doğal bir ürün olan propolisin aktif bileşenlerinden birisidir. KAFE; anti-inflamatuar, anti-oksidan, immünomodülatör, anti-bakteriyel, anti-mitojenik, kriyoprotektan, antikanser ve nöroprotektan gibi özelliklere sahiptir. Hidrokinon (HQ, 1,4-benzendiol) bir benzen türevidir ve doğal çevrede bulunabilir. Anti-oksidatif, immünomodülatör ve anti-kanser gibi çeşitli biyolojik aktivitelere sahiptir. Ancak, HQ'nun anti-kanser aktivitesi iyi bilinmemektedir. Bu özelliklerden yola çıkarak yapılan çalışmada; CAPE ve HQ kombinasyonunun melanom hücreleri üzerindeki sitotoksik etkileri değerlendirildi. Sitotoksisite, MTS (3-(4, 5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium) analizi yapılarak belirlendi. Elde edilen sonuçlara göre; kontrol grubuyla karşılaştırıldığında HQ tek başına B16F10 melanom hücrelerinin canlılığını önemli ölçüde azalttı, ancak KAFE hücrelerin canlılığını etkilemedi. KAFE ve HQ kombinasyonu ise B16F10 hücreleri üzerinde sinerjik etki gösterdi. Kombinasyon tedavisi, tek başına HQ ve KAFE ile karşılaştırıldığında hücre canlılığını önemli ölçüde azalttı. Bu çalışma, KAFE ve HQ kombinasyonunun *in vitro* anti-kanser aktivitesine sahip olduğunu gösterdi. Bu bulgular, kombinasyon tedavisinin melanom tedavisi üzerindeki etkisini değerlendirmek için yapılacak olan *in vitro* ve *in vivo* çalışmalar için cesaret vericidir. KAFE ve HQ kombinasyonu, melanom tedavisi için umut verici bir terapötik ajan olabilir.

Anahtar Kelimeler: Melanom, KAFE, Hidrokinon, Kombinasyon Terapisi

ABSTRACT

Melanoma is an aggressive and most deadly form of skin cancer. There are various therapeutic approaches for melanoma treatment such as surgery, chemotherapy, photodynamic therapy, immunotherapy, and targeted therapy. New treatment options are needed due to the limitations in current treatment methods. There are studies on the effect of natural products and their components on cancer cells. Caffeic acid phenethyl ester (CAPE) is a resinous natural chemical product found in honey hive propolis. It has several beneficial properties; anti-inflammatory, anti-oxidant, immunomodulatory, anti-bacterial, anti-mitogenic, cryoprotectant, anticancer, and neuroprotectant. Hydroquinone (HQ, 1,4-benzenediol) is a derivative of benzene and can be found in the environment. It has several biological activities, such as anti-oxidative, immunomodulatory, and anti-cancer. The anti-cancer activity of HQ is not well understood. In this study, the cytotoxic effects of CAPE and HQ combination on melanoma cells were evaluated. The cytotoxicity was assessed by MTS (3-(4, 5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium) assay. HQ significantly decreased the

viability of B16F10 cells, however CAPE did not effect cell viability compared to control group. CAPE and HQ combination showed synergistic effect on B16F10 cells. Combination therapy significantly reduced cell viability compared to HQ and CAPE alone. This study strongly suggests that CAPE and HQ possesses in vitro anti-cancer activity. These findings are encouraging for further in vitro and in vivo studies to evaluate the effect of combination therapy on melanoma treatment. Overall, the combination of CAPE and HQ may be a promising therapeutic agent for melanoma treatment.

Keywords: Melanoma, CAPE, Hydroquinone, Combination therapy

EFFECTS OF PHASE TRANSFORMATIONS IN NEMATIC LIQUID CRYSTAL MATERIALS ON ELECTROOPTICAL PROPERTIES

NEMATİK SIVI KRİSTAL MALZEMELERDEKİ FAZ DÖNÜŞÜMLERİNİN ELEKTROOPTİK ÖZELLİKLER ÜZERİNDEKİ ETKİLERİ

Assistant Professor Mehriban EMEK

Adıyaman University, Gölbaşı Vocational School, Department of Computer Technologies, Gölbaşı, Adıyaman-Türkiye

ORCID: 0000-0001-7322-9808

Professor Emirullah MEHMETOV

Bilkent University, NANOTAM, Bilkent, Ankara, Türkiye

Professor Süleyman YILMAZ

Aksaray Unıversıty , Faculty of Educatıon , Department of Mathematics and Science Education, Department of Science Education, Aksaray-Türkiye

ORCID: 0000-0002-2995-7936

Dr. Ethem İlhan ŞAHİN

Adana Alparslan Türkeş Science and Technology University, Advanced Technology Research and Application Center, Adana-Türkiye

ORCID: 0000-0001-7859-9066

ABSTRACT

In this research, optical transmittance in nematic liquid crystal (NSK); electrooptic effect in constant electric field (DC); The electrooptic effect in the electric field (AC) at 50 Hz frequency was investigated. The measurements were carried out in the temperature range including the phase transitions of the NSKs. Images in the temperature range at which phase transformations of the liquid crystal material take place were obtained by polarization microscopy. In addition, the formation and destruction of the domain structures in which phase transformations take place were observed. The optical properties (optical transmittance) of the liquid crystal material in the temperature region where phase transformation takes place were investigated. In these regions, the optical transmittance first decreases and liquid crystals became transparent after passing from the nematic phase to the isotropic phase. When an electric field (DC/AC) is applied to the liquid crystals, it is understood that the transition from the nematic phase to the isotropic phase occurs in different temperature ranges and the liquid crystals show different properties in this temperature range. It was observed that when the transition from the nematic phase to the isotropic phase started, the optical transmittance of the system first increased according to the magnitude of the applied electric field, and then the optical transmittance decreased to zero depending on the increase in temperature. After the full transition to the isotropic phase, the system became transparent again.

Keywords: Nematic liquid crystal, Electrooptic effect, Phase transformations, Optic transmittance.

ÖZET

Bu araştırmada, nematik sıvı kristalde (NSK) optik geçirgenlik; sabit elektrik alanında (DC) elektrooptik etki; 50 Hz frekansta elektrik alanındaki (AC) elektrooptik etki araştırıldı. Ölçümler NSK'ların faz geçişlerini içeren sıcaklık aralığında gerçekleştirildi. Sıvı kristal malzemenin faz dönüşümlerinin gerçekleştiği sıcaklık aralığındaki görüntüler polarizasyon mikroskobu ile elde edildi. Ayrıca faz dönüşümlerinin gerçekleştiği alan yapılarının oluşumu ve yıkımı da gözlemlendi. Sıvı

kristal malzemenin faz dönüşümünün gerçekleştiği sıcaklık bölgesindeki optik özellikleri (optik geçirgenlik) araştırıldı. Bu bölgelerde nematik fazdan izotropik faza geçtikten sonra öncelikle optik geçirgenlik azalır ve sıvı kristaller şeffaf hale gelir. Sıvı kristallere elektrik alanı (DC/AC) uygulandığında nematik fazdan izotropik faza geçişin farklı sıcaklık aralıklarında gerçekleştiği ve sıvı kristallerin bu sıcaklık aralığında farklı özellikler gösterdiği anlaşılmaktadır. Nematik fazdan izotropik faza geçiş başladığında, uygulanan elektrik alanın büyüklüğüne göre önce sistemin optik geçirgenliğinin arttığı, daha sonra sıcaklığın artışına bağlı olarak optik geçirgenliğin sıfıra düştüğü gözlendi. İzotropik faza tam geçişten sonra sistem tekrar şeffaf hale gelmiştir.

Anahtar Kelimeler: Nematik sıvı kristal, Elektrooptik efekt, Faz dönüşümleri, Optik geçirgenlik.

1. Introduction

Common properties of liquid crystal materials; they have a rod-shaped molecular structure, and they are also strong dipoles or easily polarizable. The characteristic that makes the liquid crystalline state different is the tendency of the molecules to orient along the common axis, which is called the directing. Molecules in liquids are disordered. In solids, the molecules are arranged very regularly and have very few degrees of freedom.

The characteristic orientational patterns of liquid crystals lie between the conventional solid and liquid phases. The orientation of the molecules for each phase is given in the diagram below. Thermotropic liquid crystals are the most widely used liquid crystals due to their linear as well as non-linear optical properties (Khoo, 1995).

They exhibit various liquid crystalline phases as a function of temperature. These solid rods interact with each other to form distinct, ordered structures. These are the three main classes of thermotropic liquid crystals: nematic, cholesteric, and smectic (Figure 1).

Smectic liquid crystals have some subclassifications depending on the positional and orientational arrangement of the molecules. These mesophases have been identified and characterized by a large number of physical parameters such as long- and short-range order, orientational distribution function (Emek, Mehmetov, Yılmaz, 2007; Kocakülah, 2018)

Nematic liquid crystals have molecules that do not have any positional order, but are identical. That is, they are materials that tend to be in the direction of the router (orientational order). Nematic liquid crystal droplets are widely used for molecular species detection (Şengül, 2021). In nematic liquid crystals, the molecules have only an orientational order, but they do not have a positional long-range order. (The word nematic comes from the Greek word νεμοσ=yarn). The reason why these liquid crystals are called nematic is due to the filamentous appearance of their structure under a polarized microscope. The preferred direction n can be defined by a unit vector called the nematic guide. Liquid crystals are anisotropic materials and the physical properties of the system vary according to the average arrangement. If the array is large, the material is anisotropic (Emek, Mehmetov, Yılmaz, 2007).

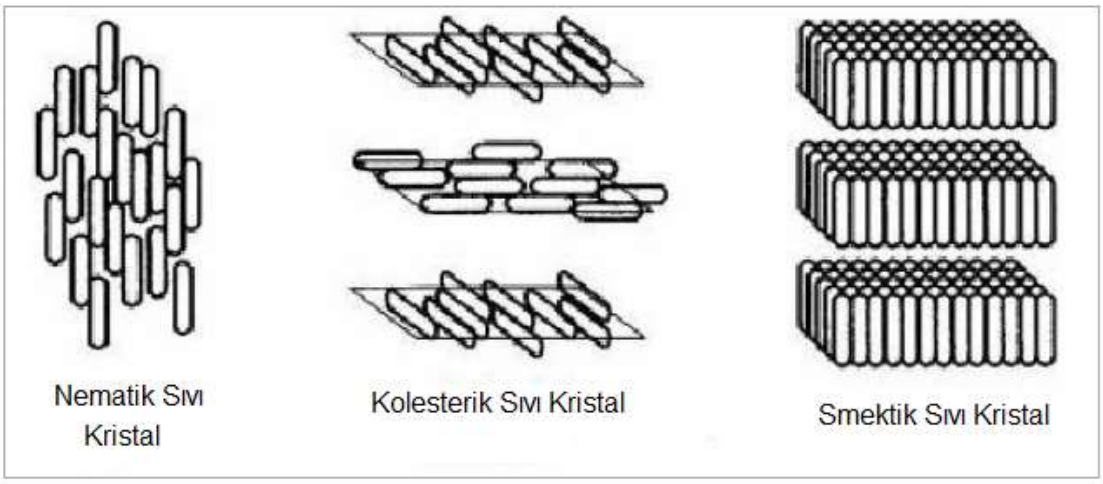


Figure 1. Liquid crystal phases

Similarly, if the arrangement is small, the material is isotropic. In general, nematic molecules have center symmetry; their physical properties are the same in the + n and – n directions. In other words, if the molecules have a permanent electric dipole (usually polar), they are arranged in such a way that the volumetric dipole moment is zero. If the nematic crystal is composed of chiral molecules, the molecules will be different from their mirror images and cholesteric liquid crystal will be formed. Locally, cholesteric liquid crystals are indistinguishably similar to nematics. But the preferred direction is the helix structure, where the helix axis is perpendicular to the steerer (Emek, Mehmetov, Yılmaz, 2007).

A special class of nematic liquid crystals are called chiral nematic liquid crystals. Chiral refers to the ability to selectively reflect a component of circularly polarized light. The terms chiral nematic and cholesteric are used interchangeably (Khoo, 1995).

1.1. Chemical Properties of Liquid Crystals

Thermotropic and lyotropic liquid crystals differ, but are similar in many ways. Thermotropic behavior takes place in many liquid crystals. These materials are defined by the thermal transition to the liquid crystal state. These mean: by raising the temperature of the solid or lowering the temperature of the liquid, the liquid crystal state can be reached. Thermotropic liquid crystals are divided into two types: Enantiotropic liquid crystals, monotropic liquid crystals (Emek, Mehmetov, Yılmaz, 2007; Khoo, 1995).

Enantiotropic liquid crystals are liquid crystals that can transition to the liquid crystal phase when the temperature of the solid is raised and the temperature of the liquid is lowered. The same is true for monotropic liquid crystals, but these liquid crystals can be obtained either by raising the temperature of the solid or by lowering the temperature of the liquid.

1.2. Physical Properties of Nematic Liquid Crystals

The physical properties of liquid crystals can be classified into two types: the first belongs to the ordered phase and is characterized by physical properties of long-range order and crystallinity; the other belongs to the disordered phase and is characterized by short-range order and fluidity properties. Both of these order parameters exhibit a critical dependence on temperature when the temperature approaches the phase transition temperature TC from the right or left (Khoo, 1995). Nematic liquid crystals are the most studied liquid crystal type. They are also the most used liquid crystals. This is because nematics is the best example of the dual nature of liquid crystals fluidity and crystallinity. They exhibit fluidity properties like liquids and hydrodynamic theories are required to describe this property (Emek, Mehmetov, Yılmaz, 2007; Khoo, 1995).

On the other hand, their crystalline properties require the theoretical formalism of solids or crystals: continuum theory. In order to examine its optical properties, it is necessary to refer to electronic structures and their properties (Khoo, 1995).

1.3. Structural Properties of Nematic Liquid Crystals

The average orientation of the nematic liquid crystal molecules is called the directional axis or directing. The amount of orientation pattern in nematic liquid crystals can be obtained by averaging the macroscopic molecular orientation with respect to that direction. The θ and θ + □□orientations are equivalent. This means that their physical properties are the same in the +n and –n directions. Therefore, the energy of the system is the same. This shows that the nematic order parameter should be an even function of the angle θ (Kumar, 2001). The order parameter can be obtained as the mean of the second-order Legendre polynomial (Klysubun, 2002):

$$S = \langle P_2(\cos\theta) \rangle = \frac{1}{2} \langle 3\cos^2\theta - 1 \rangle$$

On the other hand, learning the refractive index is of primary importance in order to understand the optical properties of liquid crystals. When examining the liquid crystal under the polarization microscope, colorful structures are observed. This is because the speed of light depends on the wavelength and how the polarization plane is oriented relative to the router. The first of these events is called dispersion, and the second is called birefringence. For transparent isotropic material at optical frequencies (around 10^{15} Hz), the square of the refractive index is equal to the material's high-frequency electrical permittivity (Emek, Mehmetov, Yılmaz, 2007).

1.4. Electrooptic Effects in Nematic Liquid Crystals

One of the important properties of liquid crystals is that their optical properties (refractive index, etc.) change as a result of the application of an electric field. This is called the electrooptic effect. The applied external electric field deforms the initial states of the liquid crystal diverters and thus changes the phase or amplitude of the penetrating light beam. When the external electric field disappears, the diverters will either return to their original state or continue to maintain their final state, depending on the type and physical mechanism of the liquid crystal. Dynamic scattering, guest-host effect, field-induced nematic-cholesteric phase transition, light scattering from micron-scale droplets, and the twisted nematic effect are electrooptical effects in nematic liquid crystals (Emek, Mehmetov, Yılmaz, 2007).

Materials and Methods

Polarization Microscopy for characterization of mesophases microscope accessories required:

1. The heating stage can withstand temperatures up to 350°C;

2. The microscope has enough working space for the heating table and

large lens can focus on it;

3. Rotating lenses;

4. Five lenses (10x, 20x, 25x, 40x and 63x);

5. CCD camera.

After the liquid crystal sample was prepared, phase transformations during heating and cooling in the liquid crystal were observed with a CCD camera during the heating-cooling process on the heating table of the polarization microscope, and images were taken and recorded in different phases.

The He-Ne laser (PHYWE), which emits light with a power of 1mW and a wavelength of 632.8 nm, was used in the measurements. The mechanical modulator is used to convert the fixed light beam from the laser source into a sinusoidal light beam. The SR540 mechanical modulator handles all optical cutting requirements, from simple measurements to single-beam, double-beam and intermodulation experiments. The SR540 has a four-digit frequency display, front-panel frequency controller, analog voltage frequency controller, and two reference outputs with selectable operating modes (Emek, Mehmetov, Yılmaz, 2007).

The mechanical modulator has two aluminum blades: 5/6 slotted blades for frequencies above 400 Hz and 25/30 slotted blades for frequencies above 3.7 kHz. The reference outputs provide the frequencies

corresponding to each set of long, narrow slits, as well as the sum and difference of frequencies. In single-beam experiments, the light beam is interrupted by the outer array of narrow, long slits, and the reference output from the right BNC is used to lock the frequency of the lock-in amplifier to the frequency of the light-breaker. The index of the inner long, narrow slits can also be used where the left BNC is the reference output. In both cases, the REFERENCE MODE is in the "up" position.

Choosing the mechanical modulator frequency at frequencies that are not exactly a multiple of 50 Hz (network frequency), such as 225~330 Hz, ensures that the measurements are healthy (Emek, Mehmetov, Yılmaz, 2007).

The sample holder, which is in the form of a two-armed frame that opens and closes, was prepared to insulate the sample so that it is not affected by environmental conditions while heating the sample and applying the electric field. Antimony alloy was used in order to be resistant to high temperatures while making the sample holder (Emek, Mehmetov, Yılmaz, 2007).

During the preparation of liquid crystal samples, a spacer material is placed between the edges so that there is a gap in the middle of the lamellas (thickness $0.085x10^{-3}$). Therefore, the total thickness of the two lamellas glued on top of each other is approximately $4.665x10^{-3}$ m. The liquid crystal material is added over the protruding edge of one of the lamellae. After adding the liquid crystal, the liquid crystal will flow into the region between the two lamellas under the influence of the cohesion force (the force of the surface tension of the liquids). Then, in order to prevent the liquid crystal material from evaporating or flowing out through the lamellae, its edges were glued with wood glue (to avoid interaction with the sc).

After the sample was prepared, the following microscope operation was performed to observe the different phases and phase transitions of liquid crystal materials (Şahin, Emek, Ibrahim, 2023):

1. The prepared samples were placed one by one on the heating plate at room temperature.

2. A current of 0.5 A was applied to heat the samples at a rate of 2°C/min. Images were taken while the materials were in the crystalline and nematic state.

3. The samples were allowed to cool.

4. The process of heating the samples at 2°C/min and allowing them to cool was repeated 3 times.

Findings and Discussion

4'-(Octyloxy)-4-biphenylcarbonitrile sample was used in the experiment, it is given in figure 2. Also, at the end of this section, optical transmittance curves of (4'-isothiocyanatophenyl-4-pentylbicyclo[2.2.2]octane-1-carboxylate)" material at different polarization angles at 9V value of external electric field (AC) are presented (Emek, Mehmetov, Yılmaz, 2007).

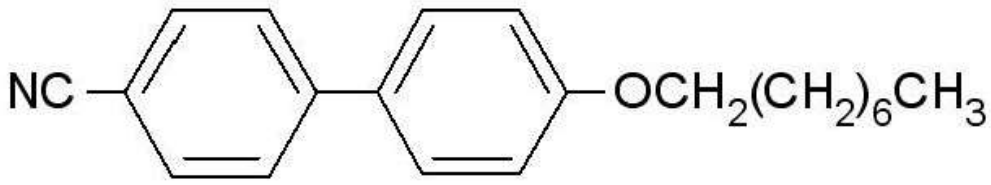


Figure 2. 4'-(Octyloxy)-4-biphenylcarbonitrile

In addition, the phase transition temperatures of the liquid crystal are shown in figure 3 below (Khoo, 1993).

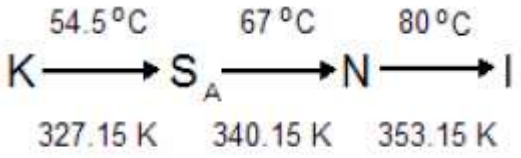


Figure 3. Phase transition temperatures of liquid crystal material (4'-(Octyloxy)-4-biphenylcarbonitrile)

As it is known, the widest application areas of nematic liquid crystals include optical and optoelectronic systems. In this respect, optical and electrooptical properties are the most important physical properties of NSKs. In our study, optical transmittance, electrooptic effect in constant electric field (DC) and electrooptic effect in variable electric field (AC) were measured. As a material, 4-(Octyloxy)-4-biphenylcarbonitrile was used. All these studies were carried out in the temperature range including the NSK phase transitions. At the same time, how the polarization of the light passing through the system changes depending on external factors has been examined (Figure 4-5) (Emek, Mehmetov, Yılmaz, 2007).

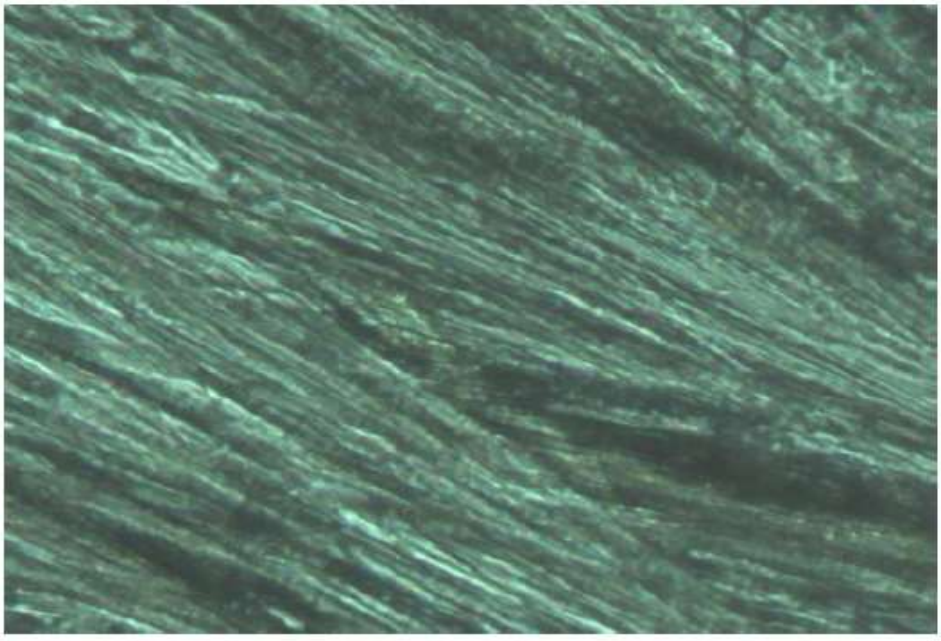


Figure 4. Crystalline state of 4-(Octyloxy)-4-biphenylcarbonitrile material, image taken with CCD camera

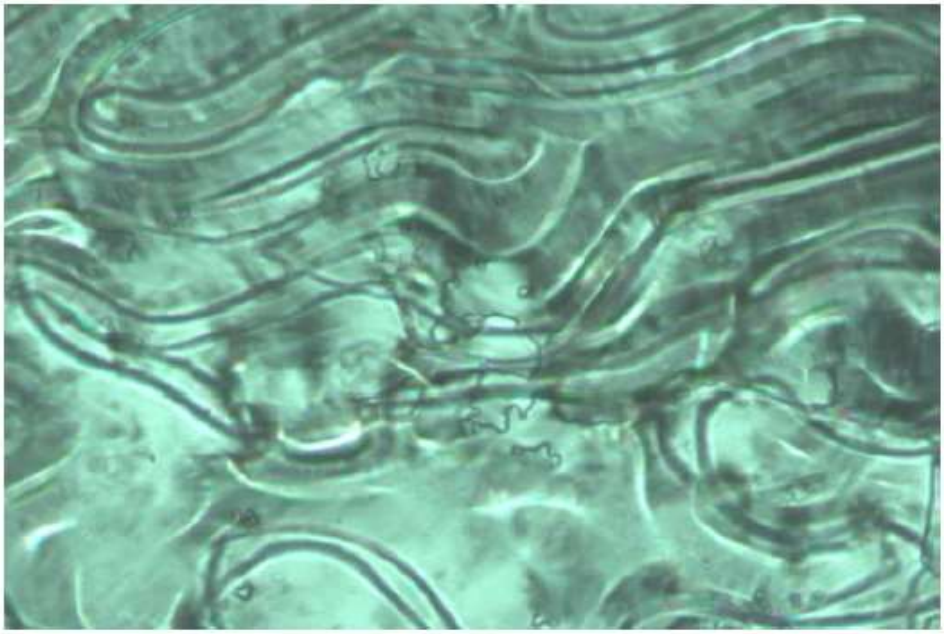


Figure 5. Nematic state of 4-(Octyloxy)-4-biphenylcarbonitrile material, image taken with CCD camera

Measurements for this material were made in the temperature range of 335 K (62°C) to 360 K (87°C). The optical transmittance was measured as a function of temperature by increasing the angle between the polarizer and the analyzer, which were initially parallel to each other, in 10° steps.

The results of the measurements are given in the graph in figure 6. As can be seen from the graph, when our sample is heated, the intensity of the light passing through the system decreases starting from T_1=336 K. It reaches its minimum value at T_2=337.5 K and it increases sharply starting from T_3=342.5 K and after T_4=350 K, the optical transmittance reaches saturation. As a result of this study, we can say that the decrease of the signal and its minimum occurrence in a certain temperature range depends on the phase transformation in this temperature range and then we observe that the optical transmittance increases with the transition of our system to the isotropic phase.

When the system passes from the nematic phase to the isotropic phase and the phase transformation occurs in the temperature range, the deformation in the system increases the scattering in the system and therefore the optical transmittance remains at a minimum level. It should also be noted that when the angle of the analyzer is changed (from 0° to 90°), the optical transmittance of the system is at a minimum level in the phase transformation temperature range, and it follows optical transmittance values close to each other. When the isotropic phase is passed, the maximum values of the optical transmittance differ. In other words, the change of the light passing through the Polarizer-NSK-Analyzer system in isotropic phase according to the polarization angle varies from the maximum to the minimum value. This is proof that the isotropic phase is fully realized. We can see this better in figure 7 (Emek, Mehmetov, Yılmaz, 2007).

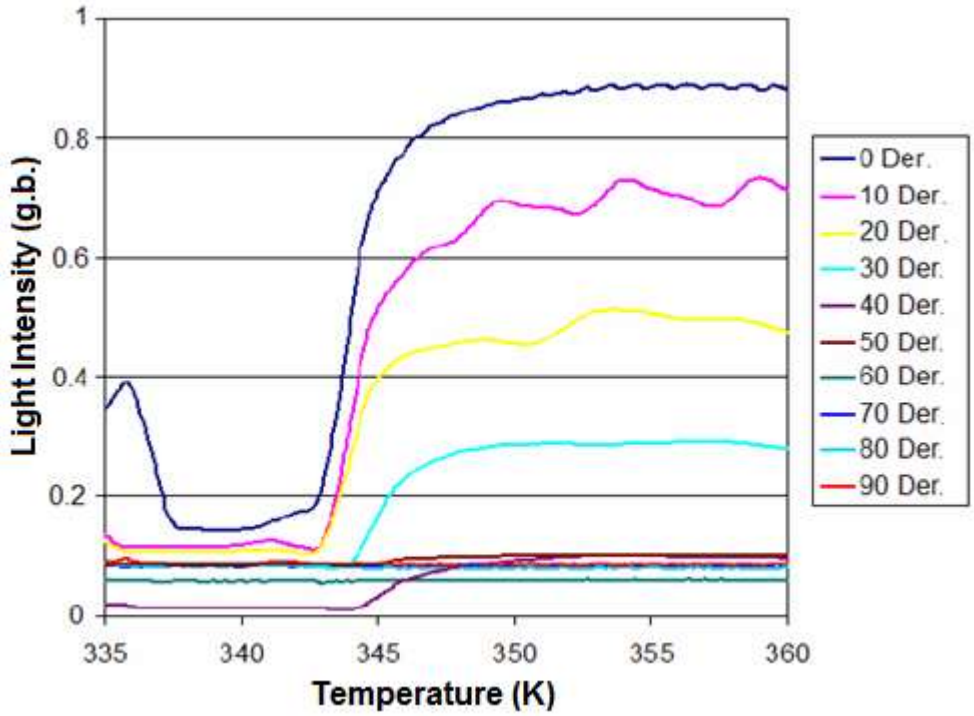


Figure 6. 4-(Octyloxy)-4-biphenylcarbonitrile liquid crystal material, optical transmittance curves at different polarization angles in the temperature range of 335 K to 360 K

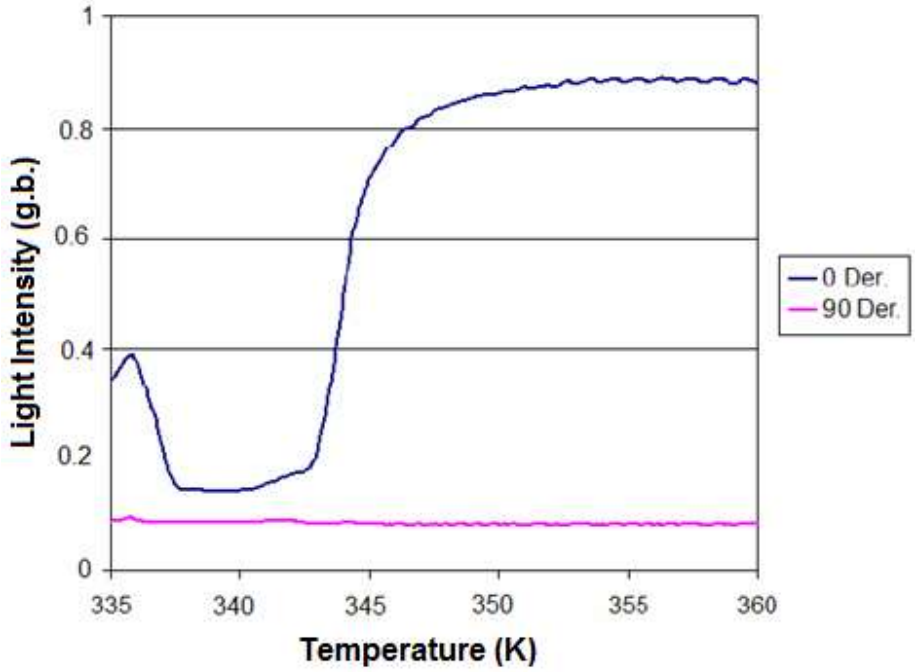


Figure 7. 4-(Octyloxy)-4-biphenylcarbonitrile liquid crystal material, optical transmittance curves when polarizer and analyzer are oriented parallel and perpendicular to each other

In figure 8, the variation of optical transmittance at different temperatures (334 K; 339 K and 349 K) according to the polarization angle is given. Selected temperatures indicate the nematic phase, phase transformation temperature and isotropic phase. In this graph, the transparency is at a minimum level due to high scattering at phase transformation temperatures where the transparency is higher in the isotropic phase than in the nematic phase.

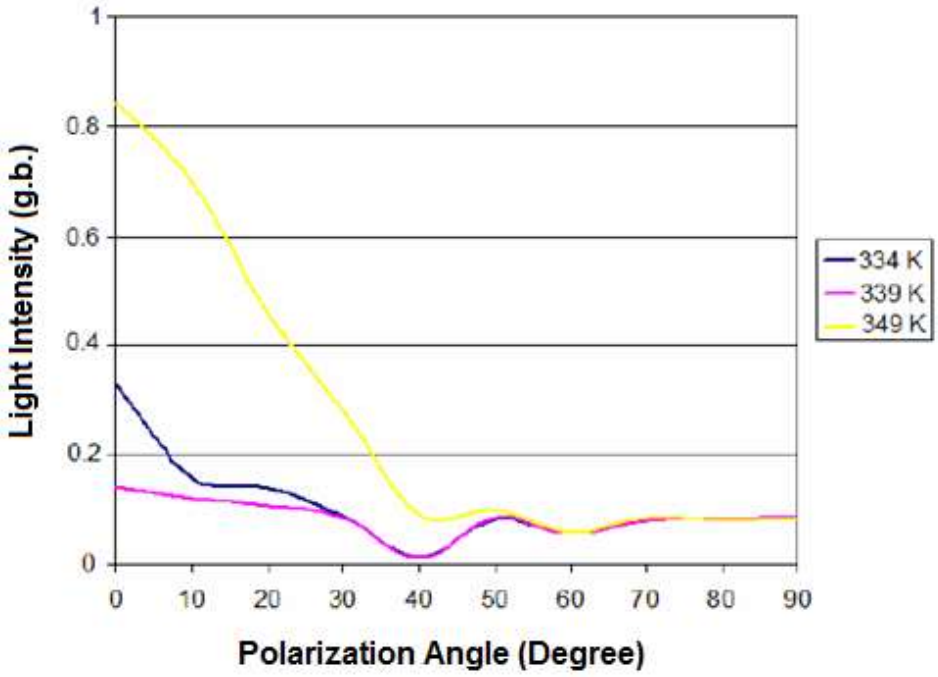


Figure 8. Optical transmittance , variation curves according to polarization angle with in the 334 K, 339 K and 349 K temperature values

In order to see the change of the transparency of the system according to the temperature more clearly, we have given the modulation spectrum in the graph in figure 9.

In this graph, we can see at which point the optical transmittance of the system reaches its minimum and maximum values. The zero point occurs at a temperature of 336 K to 338 K (The phase transition temperature in the literature is between 328 K and 353 K).

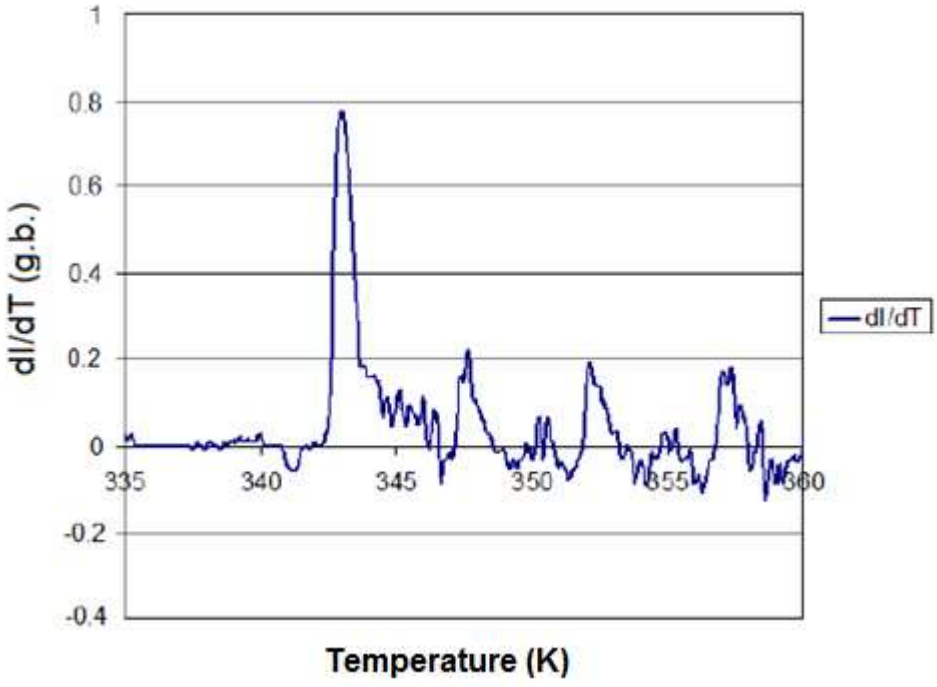


Figure 9. 4-(Octyloxy)-4-biphenylcarbonitrile liquid crystal material, variation of optical transmittance with temperature in the temperature range of 335 K to 360 K

Another material, (4'-isothiocyanatophenyl-4-pentylbicyclo[2.2.2]octane-1-carboxylate) liquid crystal material, in the temperature range of 335 K (62°C) to 360 K (87°C) and the changing, external electric field (AC) we examined at 9V.

At the beginning, the angle between the polarizer and the analyzer oriented parallel to each other was increased in 10° steps and the intensity of the transmitted light was measured as a function of temperature.

The results of the measurements are given in the graph in figure 10. As can be seen from the graph, when our sample is heated, the intensity of the light passing through the system decreases starting from T_1=342 K.

It reaches its minimum value at T_2=347 K. Starting from T_3=350 K, it increases sharply and after T4=353 K, the optical transmittance reaches saturation.

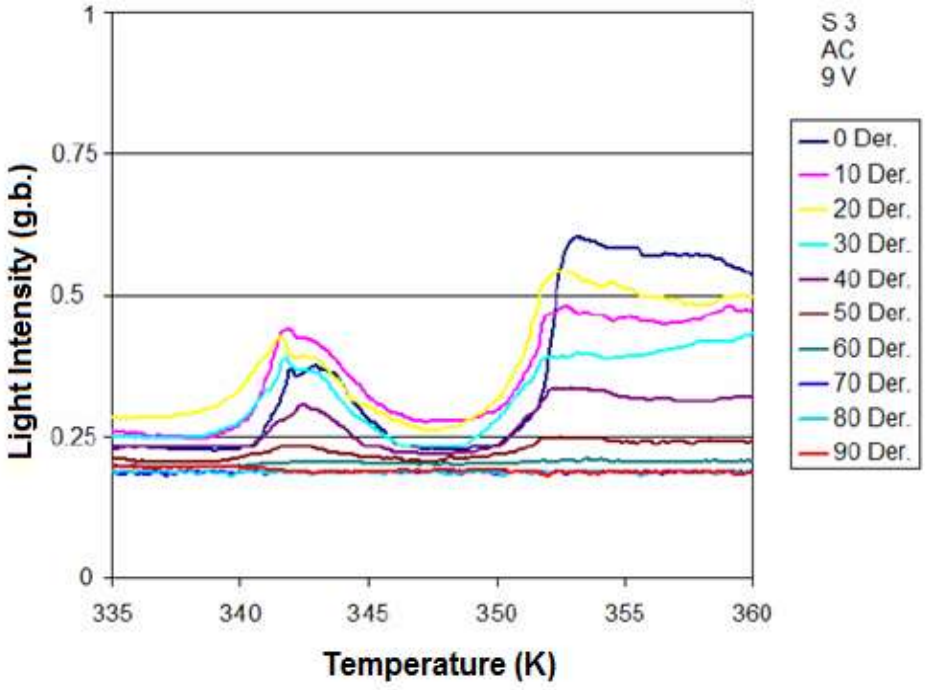


Figure 10. (4'-isothiocyanatophenyl-4-pentylbicyclo[2.2.2]octane-1-carboxylate) liquid crystal material in the temperature range of 335 K to 360 K and optical transmittance curves at different polarization angles of varying, external electric field (AC) at 9V

Experiments in the AC electric field show that there is not much change in the optical transmittance of the system with the increase in voltage, but the transition temperature range from the nematic phase to the isotropic phase narrows and causes a change in transparency in the isotropic phase.

Generally, electrooptical measurements made with this material do not differ from electrooptical measurements made with other materials.

At 3V values of constant and changing external electric fields (DC and AC) and in the temperature range of 335 K (62°C) to 360 K (87°C), the permeability of (4'-isothiocyanatophenyl-4-pentylbicyclo[2.2.2]octane-1-carboxylate) liquid crystal material was measured and plotted comparatively in figure 11.

Unlike the DC electrooptic effect, the system first becomes transparent at temperatures where phase transformation should occur (T > 340 K), then as in the DC electrooptic effect, it increases by passing through the minimum of the optical intensity.

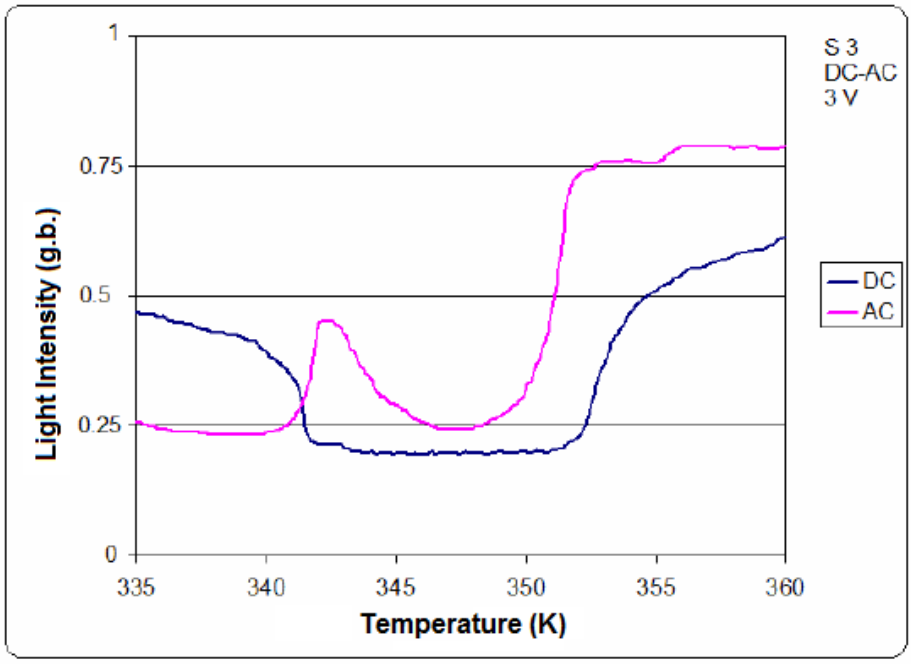


Figure 11. (4'-isothiocyanatophenyl-4-pentylbicyclo[2.2.2]octane-1-carboxylate) liquid crystal material in the temperature range of 335 K (62°C) to 360 K (87°C), at 3V of constant and varying external electric fields (DC and AC) comparatively plotted optical transmittance curves

Conclusion and Recommendations

In conclusion, optical transmittance and electrooptical effect of 4-(Octyloxy)-4-biphenylcarbonitrile materials were investigated and the optical properties of these materials were investigated.

The dependence of its properties on temperature, polarization of light and applied external electric field is shown. In the polarization microscope, images were obtained in the temperature range where phase transformations of 4-(Octyloxy)-4-biphenylcarbonitrile liquid crystal materials occurred, and the formation and destruction of the domain structures in which phase transformations took place were observed. In the temperature region where phase transformation occurs by optical methods, 4-Octyloxy)-4-biphenylcarbonitrile; the optical properties (optical transmittance) of liquid crystal materials were investigated.

On the other hand, optical transmittance curves for the material (4'-isothiocyanatophenyl-4-pentylbicyclo[2.2.2]octane-1-carboxylate) are provided for various polarization angles and 9V external electric field (AC) value.

It was observed that the optical transmittance decreased in these regions and the liquid crystals became transparent after passing from the nematic phase to the isotropic phase. We think that this is due to the structural properties of liquid crystals. The electrooptic effect was investigated in the same liquid crystals.

Our studies have shown that when we apply an electric field (DC/AC) to liquid crystals, the transition from the nematic phase to the isotropic phase occurs at different temperature ranges, and our liquid crystals exhibit different properties in this temperature range. When the transition from the nematic phase to the isotropic phase begins, the optical transmittance of the system first increases and then decreases to zero with the increase in temperature, depending on the magnitude of the applied electric field. After the full transition to the isotropic phase, the system becomes transparent again.

When the electrooptic effect is examined, the anomaly (increased optical transmittance) observed during the transition from the nematic phase to the isotropic phase has been interpreted by us. When the system is more sensitive to external factors (electric field) at the starting point of the phase

transformation, the electric field applied to the liquid crystals makes the liquid crystal structure regular and the direction of the domains is directed in the same direction.

As the temperature increases, the effect of the electric field decreases and the system transparency remains at minimum levels until it reaches the isotropic phase.

Information and thanks note

This article was derived from phd thesis of Mehriban Emek. Thanks for advisors and contribotor authors

References

Emek, M. 2007. Faz Dönüşümlerinin Nematik Sıvı Kristallerin Elektro-Optik Özelliklerine Etkisi, Doktora Tezi, Çukurova Üniversitesi, Fen Bilimleri Enstitüsü, Adana.

Khoo, I. C. (1995). *Liquid Crystals: Physical Properties and Nonlinear Optical Phenomena*. New York: John Wiley & Sons, Inc.

Khoo, I.C., and Wu, S.T. (1993). *Optics and Nonlinear Optics of Liquid Crystals*. New Jersey: World Sientific, , p.90.

Klysubun, P. 2002. Nonlinear Optical Studies of Dye-Doped Nematic Liquid Crystals, Dissertation for the degree of Doctor of Phylosophy in Physics, Virginia, 150.

Kocakülah, G. (2018). CdseS/ZnS Kuantum Nokta Katkılı 5CB Nematik Sıvı Kristalinin Elektro-Optik ve Dielektrik Özelliklerinin İncelenmesi, Yüksek Lisans Tezi, Düzce Üniversitesi, Fen Bilimleri Enstitüsü, Düzce.

Kumar, S. (2001). *Liquid Crystals: Experimental Study of Physical Properties and Phase Transitions*. Cambridge: Cambridge University Pres.

Şahin, E.İ., Emek, M., Ibrahim, J.E.F.M. (2023). *Instrumental measurements laboratory* (1st ed.). Iksad Publishing House.

Şengül, S. (2021). Experimental Characterizations of The Response of Nematic Liquid Crystal Droplets Upon Adsorption of Nanoparticles From Aqueous Media, Master Thesis, Orta Doğu Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Ankara.