MIDDLE BLACK SEA JOURNAL OF

HEALTH SCIENCE

OCTOBER 2023 VOLUME 9 ISSUE 4

ISSN 2149-7796

MIDDLE BLACK SEA JOURNAL OF HEALTH SCIENCE (MBSJHS)

The Middle Black Sea Journal of Health Science, which is international journal, is published by Ordu University Institute of Health Sciences on behalf of the Middle Black Sea Universities Collaboration Platform

e-ISSN 2149-7796

Middle Black Sea Journal of Health Science

Editorial Office

Ordu University

Institute of Health Sciences

Cumhuriyet Campus

52200, Ordu, TURKEY

Tel: +90 (452) 234 5010-6105

Fax: +90 (452) 226 52 28

E-mail: ukaraman@odu.edu.tr

Correspondence Address: Ulku KARAMAN, PhD, Assoc. Prof. Dr.
Institute of Health Sciences,
Ordu University,
Cumhuriyet Campus,
52200 Center/ Ordu TURKEY

Phone: +90 452 234 50 10
Fax: +90 452 226 52 55
Email: ukaraman@odu.edu.tr
ulkukaraman44@hotmail.com

Web site: https://dergipark.org.tr/en/pub/mbsjohs

Sort of Publication: Periodically

*****The 2023/4 issue of our magazine, which will be published in November, will be published on November 29, in commemoration of the 100th anniversary of the Republic.**

Publication Date and Place: 29 /10/ 2023, ORDU, TURKEY

Publishing Kind: Online

Indexing: *Turkey Citation Index, SOBIAD, Rootindexing, Academic Resource ındex, Fatcat index, Researcgate, EuroPub, Gooogle Scholar, Turk Medline, Index Copernicus*

The Middle Black Sea Journal of Health Science, which is international journal, is published by Ordu University Institute of Health Sciences on behalf of the Middle Black Sea Universities Collaboration Platform

Aims and Scope

Middle Black Sea Journal of Health Science is an international journal that publishes original clinical and scientific research. Middle Black Sea Journal of Health Science, published by Ordu University, publishes basic innovations in health education, case reports, reviews, letters to the editor, case reports and research articles.

The aim of the journal is to contribute to the international literature with clinical and experimental research articles, case reports, reviews and letters to the editor in the field of health sciences.

The target audience of the journal is all scientists working in the field of health, graduate students and researchers in this field.

Middle Black Sea Journal of Health Science is an open access, independent and impartial, international journal based on double-blind peer-reviewed principles.

The publication language of the journal is English. The journal is published every three months, in February, May, August and November, and four volumes are completed.

Middle Black Sea Journal of Health Science - adheres to the standards of publication ethics in health science research, Higher Education Council's Scientific Research and Publication Ethics Directive, Committee on Publication Ethics (COPE), Directory of Open Access Journals (DOAJ), Open Access Scholarly Publishers It also adopts the ethical publishing principles published by the Association (OASPA) and the World Association of Medical Editors (WAME).

No fee is charged from the authors for the evaluation and publication of the article.

Publication Ethics Statement

Middle Black Sea Journal of Health Science - adheres to the standards of publication ethics in health science researches, Higher Education Council's Scientific Research and Publication Ethics Directive, Committee on Publication Ethics (COPE), Directory of Open Access Journals (DOAJ), Open Access Scholarly Publishers It also adopts the ethical publishing principles published by the Association (OASPA) and the World Association of Medical Editors (WAME); The address for the principles expressed under the Principles of Transparency and Best Practice in Scholarly Publishing is given below.

https://publicationethics.org/resources/guidelines-new/principles-transparency-and-best-practice-scholarly-publishing

Submitted research is original, has not been published before and should not be in the evaluation process of another journal. Each article is double blinded by one of the editors and at least two referees. Plagiarism, duplication, fraudulent authorship / denied authorship, research / data fabrication, article slicing, slicing publishing, copyright infringement and concealing conflict of interest are considered unethical behavior.

All articles that do not comply with ethical standards are removed from publication even if they are accepted. This situation is valid for articles containing possible irregularities and inconveniences detected after publication.

Research Ethics

• The authors are responsible for the compliance of the articles with the ethical rules.

• Ethical standards of the Declaration of Helsinki must be followed in human studies.

• Attention should be paid to ethical principles in designing, reviewing and conducting the research.

• The research team and the participants should be fully informed about the purpose of the research, the participation rules and, if any, the risks involved.

• Confidentiality of the information and answers given by the research participants should be ensured. Research should be designed in a way that preserves the autonomy and dignity of its participants.

• Participants in the research should take part in the research voluntarily and should not be under any coercion.

• The research should be planned in a way that does not put the participants at risk.

• Be clear about research independence; If there is a conflict of interest, it should be indicated.

• In experimental studies, written informed consent must be obtained from the participants who decide to participate in the research. The legal guardian's consent must be obtained for children, those under guardianship and those with confirmed mental illness.

• If the study is to be carried out in an institution or organization, the necessary approval should be obtained from this institution or organization.

• In studies with a human element, it should be stated in the "method" section that "informed consent" was obtained from the participants and the ethics committee approval was obtained from the institution where the study was conducted.

Authors' Responsibility

The authors are responsible for the compliance of the articles with scientific and ethical rules. The author should provide assurance that the article is original, has not been published elsewhere, and is not being reviewed for publication elsewhere, in another language. Copyright laws and treaties in practice must be observed. Corresponding materials (eg tables, figures or large quotations) should be used with necessary permissions and acknowledgments. Work or sources of other authors, contributors should be appropriately used and cited in references.

All authors should have a direct contribution in academic and scientific terms in the submitted article, accordingly, the "author" is someone who contributes to the conceptualization and design of a published research, obtaining, analyzing or interpreting data, writing the article or reviewing it critically in terms of content. Other conditions for being an author are planning or executing and / or revising the work in the article.

Funding, data collection, or general supervision of the research group alone does not provide authorship rights. All individuals designated as authors must meet all the criteria listed, and any individual who meets the above criteria can be shown as an author. The name order of the authors should be a joint decision. All authors must indicate the author order signed on the

Copyright Agreement Form.

All individuals who do not meet the sufficient criteria for authorship but contributed to the study should be listed in the "thank you" section. Examples of these are people who only provide technical support, help with writing or just provide general support, financial and material support.

All authors must declare financial relationships, conflicts of interest and competition of interest that have the potential to affect the results of the research or scientific evaluation. If writer detects a significant error or inaccuracy in his published manuscript, he / she bears the responsibility to immediately contact and cooperate with the editor for correction or retraction of these inaccuracies.

Editor and Referee Responsibilities

The editor-in-chief evaluates the articles regardless of the authors' ethnicity, gender, sexual orientation, nationality, religious belief, and political philosophy. It ensures that the articles submitted for publication go through a fair double-blind peer review. It guarantees that all information about the submitted articles will remain confidential until the article is published. The editor-in-chief is responsible for the overall quality of the content and publication. It should publish an error page or make a correction when necessary.

Editor in Chief; It does not allow any conflict of interest between authors, editors and referees. It has full authority to appoint a referee and is responsible for making the final decision on the articles to be published in the journal.

Reviewers should not have conflicts of interest with the authors and / or financial supporters of the research. They should reach an impartial judgment as a result of their evaluation. They must ensure that all information regarding submitted articles is kept confidential and report to the editor if they notice any copyright infringement or plagiarism on the part of the author. In cases where the subject of the article is not his area of expertise or cannot return on time, the referee should inform the editor of this situation and state that he cannot be a referee.

Referees and editorial board members cannot discuss articles with other people. Care should be taken to keep the identity of the referees anonymous. In some cases, with the decision of the editor, the relevant referees' comments on the article may be sent to other referees who interpret the same article.

Publication Policy

Authors undertake that their publications are created in accordance with all universal ethical rules and research is accepted accordingly.

Authors are responsible for all statements in their work. Submitted studies should be prepared in line with the journal's writing rules. Studies that do not comply with the spelling rules are rejected or sent back to the authors for correction.

The journal has the right to make corrections in the accepted works without changing the content and meaning.

The journal accepts the research provided that it has not been published in another journal or publication.

All authors should indicate their relationships with individuals or organizations that may have conflicts of interest. Support received for the study, if any, should be stated in detail. Conflicts of interest should also be indicated on the title page.

In the management and publication processes of the journal, attention is paid to the publishing principles of "International Committee of Medical Journal Editors (ICMJE)" and "Committee on Publication Ethics (COPE)".

Evaluation process

-Only articles uploaded to the journal's system are evaluated. Studies sent via e-mail are not considered.

- All submitted studies go through pre-evaluation, language editor, statistical editor and referee evaluation processes. The evaluation process is carried out by the editor of the journal.

Pre-Evaluation Process

After the article is uploaded to the journal, the pre-evaluation process begins. At this stage, the editor examines the article in terms of content, form, purpose and scope of the journal. As a result of this thinning

• Decides that the work is not suitable for the journal and declines the work.

• Resend the work to the responsible author for corrections.

• The study sends to the language editor and can request a correction.

• The study is evaluated by sending it to a statistics advisor. After this evaluation, the author may ask for a correction.

• Can direct the article to the referees and initiate the referee evaluation process.

Referee Evaluation Process

All articles in the journal are double-blind peer-reviewed. In order to ensure the impartial evaluation process, each article is evaluated by at least two independent referees who are experts in their fields. If there is no consensus among the referees, the article is evaluated by the third referee. The editor in chief makes the final decision in the decision-making process of all articles.

Revision

Authors should mark the changes they made in the main text in color while submitting the article revision files. The responses to the referees should be specified in a separate Word file. Revised articles should be submitted to the journal within one month following the decision letter. If the revised version of the article is not uploaded within the specified time,

the revision option can be canceled. If the authors need additional time for revision, they must submit their publication requests to the journal before the end of one month.

Articles accepted for publication are checked again for grammar, punctuation and format.

Accepted articles are edited in accordance with the journal's publication format and the final version is sent to the responsible author in pdf format before publication, and approval is obtained for publication. Authors should review the article and approve for publication. If the article requires any correction other than the publication format, the request for correction is notified to the editor at ulkukaraman44@hotmail.com. Requests for correction are evaluated by the editor and notified to the responsible author. Articles that are not approved by the corresponding author are not published.

Plagiarism

The similarity rate of the articles should be made over iThenticate and should be at most 20%, excluding the "References" section.

The journal is published online only.

The journal is free and does not require any publication fee from researchers.

GENERAL RULES

Middle Black Sea Journal of Health Science publishes experimental and observational research articles, clinical reviews, case reports and review articles on health science. Manuscripts must be submitted online at https://dergipark.org.tr/en/login

All submissions must be accompanied by a signed statement of scientific contributions and responsibilities of all authors and a statement declaring the absence of conflict of interests.

Any institution, organization, pharmaceutical or medical company providing any financial or material support, in whole or in part, must be disclosed in a footnote. Manuscripts must be prepared in accordance with ICMJE-Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals (updated in December 2013 - http://www.icmje.org/icmje-recommendations.pdf).

An approval of research protocols by an ethical committee in accordance with international agreements (Helsinki Declaration of 1975, revised 2002 - available at http://www.vma.net/e/policy/b3.htm, “Guide for the care and use of laboratory animals - www.nap.edu/catalog/5140.html/) is required for experimental, clinical and drug studies. A form stating that the patients have been informed about the study and consents have been obtained from the patients is also required for experimental, clinical and drug studies. All

submissions must be accompanied by a letter that states that all authors have approved the publication of the paper in the Middle Black Sea Journal of Health Science.

Submission of the studies requiring ethical committee decision must be accompanied by a copy of the submission to the ethical committee.

SUBMISSION POLICY

Submission of a paper to Middle Black Sea Journal of Health Science is understood to imply that it deals with original material not previously published and is not being considered for publication elsewhere. Manuscripts submitted under multiple authorships are reviewed on the assumption that all listed Authors concur with the submission and that a copy of the final manuscript has been approved by all Authors. After acceptation of an article, it should not be published elsewhere in the same form, in either the same or another language, without the written consent of the Editors and Publisher.

If excerpts from other copyrighted works are included, the Author(s) must obtain written permission from the copyright owners and credit the source(s) in the article.

The layout and style should adhere strictly to the instructions. No revisions or updates will be incorporated after the article has been accepted and sent to the Publisher (unless approved by the Editors).

SUBMISSION PROCEDURE

The Middle Black Sea Journal of Health Science welcomes submitted manuscripts online at http://dergipark.gov.tr/login Manuscripts submitted online are received on the day of submission and quickly assigned to reviewers. Through individual Author Centers on this website, authors can view the status of their manuscripts as they progress through the review process. Notification of the disposition of each manuscript will be sent by e-mail to the corresponding author on the day of decision.

To establish your account for online submission, go to http://dergipark.gov.tr/register/ Authors are encouraged to check for an existing account. If you are submitting for the first time, and you do not have an existing account, then you must create a new account. If you are unsure about whether or not you have an account, or have forgotten your password, enter your e-mail address into the Password Help section on the log-in page. If you do not have an account, click on the Create Account link on the top right of the log-in page. You then will be able to submit and monitor the progress of your manuscripts. Once you have logged

in, you will be presented with the Main Menu and a link to your Author Centre. Submit your manuscript from the Author Centre. At the end of a successful submission and you will receive an e-mail confirming that the manuscript has been received by the journal. If this does not happen, please send an e-mail to ulkukaraman44@hotmail.com

To submit your manuscript online, please prepare the text and illustrations according to the instructions listed below. You may enter and exit the manuscript submission process at the completion of each step. After submission of the manuscript, however, you will not be able to edit it.

Web submission is required- instructions are available for downloading on the website https://dergipark.org.tr/en/pub/mbsjohs/writing-rules

COPYRIGHT TRANSFER AGREEMENT

A signed COPYRIGHT RELEASE FORM by all authors of the manuscript should be sent during manuscript submission. http://mbsjohs.odu.edu.tr/files/copyright_transfer_form_1.pdf

Middle Black Sea Journal of Health Science

Editorial Office

Ordu University, Institute of Health Sciences

Cumhuriyet Campus

52200, Ordu, TURKEY

Tel: +90 (452) 226 52 14-5234

Fax: +90 (452) 226 52 28

E-mail: ulkukaraman44@hotmail.com

Authors should write their information exactly (Full address, telephone and fax numbers, e-mail address).

PREPARING ELECTRONIC MANUSCRIPTS

In the writing of words for the studies, "Oxford English Dictionary (https://www.oed.com)" should be taken as a reference. The symbols of the units used in the text should be given according to the http://www.bipm.org/en/si/

Author should submit manuscript in both ways as explain in below:

1- The text must be single-spaced, 12-point font (except with URL addresses); and all illustrations, figures, and tables must be placed within the text at the appropriate points, rather than at the end.

2- Files you need to add:

Title Page,

Full Text,

Tables,

Figures,

Images,

Copyright Form,

Similarity Report (Similarity should be at most 20%.).

Cover Letter

Ethics Committee Approval.

3- Please insert all attachments that are tables, figures and graphics into the text file in appropriate place.

When mentioning parasites, bacteria, virus and fungi in the main text and references, the genus and species names must be italicized, and the genus name must be written with an initial capital letter.

Abbreviations should be expanded at first mention and used consistently thereafter.

Graphic files: Each figure should be a separate file.

All figure files must be submitted in sufficiently high resolution.

Electronic submission of articles via the Web

http://dergipark.gov.tr/mbsjohs

Full instructions for uploading data and files etc. are given on the website when submitting a manuscript. It is the responsibility of the Authors to create the proper files as instructed above for the electronically submitted manuscript. The editorial office cannot make conversions beyond the supported file types.

ORGANIZATION OF THE ARTICLE

Manuscripts should be prepared electronically using "Time News Roman" font, formatted according to A4 page size, single-spaced from beginning to end, 2.5 cm margins on all sides and 12-point font. Words should not be hyphenated to fit on a line. Pages should be numbered.

Title page: A separate title page should be submitted with all submissions and this page should include:

The title page should include full and short title English.

Meeting and congress presentations of the manuscript must be stated, if any.

Name(s), affiliations, highest academic degree(s) and ORCID ID's of the author(s),

Example: Ulku Karaman[1], Yeliz Kasko Arici[2], Cemil Colak[3]

[1]Institution of the first author, e -mail, orcid no

[2]Second Author's Institution, e -mail, orcid no

[3]Third Author's Institution, e -mail, orcid no

Name, address, telephone (including the mobile phone number) and fax numbers, and email address of the corresponding author,

Ethics Committee Approval: Ethics committee approval was received for this study from ……. Clinical Research Ethics Committee of …… University (No…….).

Author Contributions: Concept: …….., Design: …….., Literature search:……..... Data Collection and Processing: ……..., Analysis and Interpretation:……, Writing - …….

Acknowledgements:

Conflict of Interest:

Financial Disclosure:

Note: Kongress participation……..

In the article sent, the sections that should be below are listed.

1. Abstract, 2. Keywords, 3. Introduction, 4. Methods, 5. Results, 6. Discussion, 7. Conclusion, 8. References, Tables and Figures sections.

1. Abstract Page: The first page should include abstracts written English, and key words. The abstract of Original Articles should be structured with subheadings (Objective, Methods, Results, and Conclusion) (average 200-400 word).

2. Keywords: Provide at least 3-6 keywords and avoiding general and plural terms and multiple concepts. These keywords will be used for indexing purposes. Key words in should follow the abstract. Please select keywords in Turkish Science Terms (http://www.bilimterimleri.com).

3. Introduction: The objectives of the research should be clearly stated in this section. Relevant background information and recent published studies should be described concisely and be cited appropriately.

4. Methods: This section should contain all the details necessary to reproduce the experiments. Avoid re-describing methods already published; only relevant modifications should be included in the text. Experimental subjects when human subjects are used, manuscripts must be accompanied by a statement that the experiments were undertaken with the understanding and written consent of each subject.

When experimental animals are used, the methods section must clearly indicate that adequate measures were taken to minimize pain or discomfort.

5 Results: These sections should present the results and interpret them in a clear and concise manner. Results should usually be presented descriptively and be supplemented by figures.

6. Discussion: Extensive citations and discussion of published literature should be being used.

7. Conclusion: In this section, the results obtained from the article should be written.

8. Literature references:

Care should be taken to cite Turkey-based studies and journal of national during the granting of resources (www.atifdizini.com).

References should be listed according to the order of appearance in the text, and "in parentheses" should be indicated in the relevant places. References should be written according to the "Vancouver" system of the American National Library of Medicine (U.S. National Library of Medicine; http://www.nlm.nih.gov/).

Examples: Hypotension is one of the most common and critical problems in hemodialysis patients (1,2).

References

While citing publications, preference should be given to the latest, most up-to-date publications.

If an ahead-of-print publication is cited, the DOI number should be provided.

The accuracy of references is the responsibility of the author. The references should include only articles that are published or in press.

Unpublished data, submitted manuscripts, or personal communications should be cited within the text only. Personal communications should be documented by a letter of permission.

All items in the list of references should be cited in the text and, conversely, all references cited in the text must be presented in the list.

The abbreviations of journal titles should conform to those adopted by the List of Serial Title Word Abbreviations, CIEPS/ISDS, Paris, 1985 (ISBN 2-904938-02-8).

Journal titles should be abbreviated in accordance with the journal abbreviations in Index Medicus/ MEDLINE/PubMed.

For citation of references with one to six authors, the names of all authors should be included, and for the articles with more than six authors, “et al.” should be written after typing the six names. The surnames of authors should be written exactly, and the initials of their names should be indicated with capital letter without any punctuation mark.

Please use the following style for references:

Examples

Journal: Stephane A. Management of Congenital Cholesteatoma with Otoendoscopic Surgery: Case Report. J Med Sci 2010;30(2): 803-7.

Levine WC, Pope V, Bhoomkar A, Tambe P, Lewis JS, Zaidi AA, et al. Increase in endocervical CD4 lymphocytes among women with nonulcerative sexually transmitted diseases. J Infect Dis. 1998;177(1):167–174.

Chapter in Edited Book: Hornbeck P. Assay for antibody production. In: Colign JE. Kruisbeek AM, Marguiles DH, editors. Current Protocols in Immunology. New York: Greene Publishing Associates; 1991. p. 105-32.

Book with a Single Author: Fleiss JL. Statistical Methods for Rates and Proportions. Second Edition. New York: John Wiley and Sons; 1981. p. 105-32.

Editor(s) as Author: Balows A. Mousier WJ, Herramaflfl KL, editors. Manual of Clinical Microbiology. Fifth Edition. Washington DC: IRL Press. 1990. p. 105-32.

Conference Paper: Entrala E, Mascaro C. New structural findings in Cryptosporidium parvum oocysts. Eighth International Congress of Parasitology (ICOPA VIII); October 10-14; Izmir-Turkey: 1994. p. 1250-75

Thesis: Erakinci G. Searching for antibodies against parasites in donors. Izmir: Ege University Health Sciences Institute. 1997.

Article in Electronic Format: Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis (serial online) l995 Jan-Mar (cited 1996 June 5): 1(1): (24 screens). Available from: URL: http:/ www.cdc.gov/ncidodlElD/cid.htm.

ILLUSTRATIONS AND TABLES

Illustrations:

The illustrations should be numbered in Arabic numerals according to the sequence of appearance in the text, where they are referred to as Figure. 1, Figure. 2, etc.

If illustrations (or other small parts) of articles or books already published elsewhere are used in papers submitted to MBSJHS, the written permission of the authors and publisher concerned must be included with the manuscript. The original source must be indicated in the legend of the illustration in these cases.

Like the rest of the submission, the figures too should be blind. Any information within the images that may indicate an individual or institution should be blinded. To prevent delays in the evaluation process, all submitted figures should be clear in resolution and large in size (minimum dimensions: 100 × 100 mm).

Tables: Tables should be so constructed together with their captions and legends.

Tables should be included in the main document, presented after the reference list, and they should be numbered consecutively in the order they are referred to within the main text. Tables of numerical data should each be typed (with one-spacing) and numbered in sequence in Arabic numerals (Table 1, 2, etc.). They are referred to in the text as Table 1, Table 2, etc. The title of each table should appear above it. A detailed description of its contents and footnotes should be given below the body of the table.

Revisions: Authors should mark the changes they made on the main text in color while submitting their article revision files. The responses to the referees should be specified in a separate Word file. Revised articles should be sent to the journal within one month following the decision letter. If the revised version of the article is not uploaded within the specified time, the revision option may be canceled. If the authors need additional time for revision, they are required to submit their extension requests to the journal before the end of one month.

PROOFS, OFFPRINTS, MISCELLANEOUS

Proofs

Proofs will be sent by e-mail, as a pdf. Only printer's errors may be corrected; no change in, or additions to, the edited manuscript will be allowed at this stage. It should be kept in mind that proofreading is solely the authors' responsibility. A form with queries from the copyeditor may accompany the proofs. Please answer all queries and make any corrections or additions required. Corrections to the proofs must be returned by e-mail within 48 hours after receipt. If the publisher receives no response from the authors after 3 days, it will be assumed that there are no errors to correct and the article will be published.

Page charges

The journal is free and does not require any publication fee from the authors.

The journal is only published online.

The similarity rate of the articles should be done through iThenticate and should be at most 20% excluding the "References" part.

The editorial board has the authority to make necessary revisions in the format of the manuscript (without making any revision in the context) that does not comply with the above-mentioned requirements.

TYPES OF ARTICLES

The studies submitted to the Journal are accepted in Original research, Short papers, Case report, Review articles,

a) Original research: Prospective, retrospective and all kinds of experimental studies

Structure

Title

Abstract should be structured with subheadings (Objective, Methods, Results, and Conclusion) (average 200-400 word)

Key words

Introduction

Methods

Results

Discussion

Conclusion

Acknowledgements

References (most 40)

Whole text should not exceed 4500 words except for resources and English summary.

b) Short papers: Prospective, retrospective and all kinds of experimental studies

Structure

Title

Abstract should be structured with subheadings (Objective, Methods, Results, and Conclusion) (average 200-400 word)

Key Words

Introduction

Methods

Results

Discussion

Conclusion

Acknowledgements

References (most 20)

Whole text should not exceed 2700 words except for resources and English summary.

c) Case Report: They are rarely seen articles which differs in diagnosis and treatment. They should be supported by enough photographs and diagrams.

Structure

Title

Abstract (average 100-300 word)

Key words

Introduction

Case report

Discussion

Conclusion

Acknowledgements

References (most 20)

Whole text should not exceed 2200 words except for resources and English summary.

d) Review articles

Structure

Title

Abstract (average 200-400 word)

Key words

Introduction

The compilation text also including appropriate sub-headings,

Conclusion

Acknowledgements

References (most 50)

Whole text should not exceed 6550 words except for resources and English summary.

OCTOBER 2023 **VOLUME 9** **ISSUE 4**

CONTENTS

EDITORIAL

REPUBLIC, THE WAY OF LIGHTNESS…

Republic means walking in the light of science, developing with every success gained while walking on this path, and becoming free as you develop. With this in mind, the Great Leader Atatürk said, "If one day what I say contradicts science, choose science."

Being able to proudly convey our 100-year-old story of existence to new generations, the progress we will make today, our achievements in medicine and all other fields will be possible with the effort we will make to develop in every aspect under the leadership of science.

We are proud to share with you another full issue of our magazine, which we believe serves this purpose, on such a meaningful day as October 29, Republic Day.

On this occasion, we congratulate all our valuable readers on the 29 October Republic Day with our sincerest wishes, and we bow with gratitude and respect to the spiritual presence of all our martyrs and veterans, especially Gazi Mustafa Kemal Atatürk, the founder of our Republic.

Prof. Dr. Ülkü KARAMAN

Editor

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 550-562**

RESEARCH ARTICLE **DOI:** DOI: 10.19127/mbsjohs.1242118

Analysis of Risk Factors and Risky Pregnancies Among Pregnant Women Who Admitted to Hospital for Prenatal Care

Hasan Ulubaşoğlu[1](ID), Saime Şahinöz[2](ID), Turgut Şahinöz[3](ID), Pınar Ulubaşoğlu[4](ID)

[1]T.R. Ministry of Health Ankara City Hospital, Gynecology Hospital, Gynecology Clinic, Ankara, Turkey
[2]Ordu University, Faculty of Medicine, Department of Public Health, Ordu, Turkey
[3]Ordu University, Faculty of Health Sciences, Department of Health Management, Ordu, Turkey
[4]T.R. Ministry of Health Ankara City Hospital, General Hospital, Clinic of Internal Medicine, Ankara, Turkey

Received: 25 January 2023, Accepted: 26 July 2023, Published online: 29 October 2023

Abstract

Objective: Every woman wants to have a healthy pregnancy and have a healthy baby, but it brings important risks. Risky pregnancies are with many different dimensions that negatively affect maternal and infant health. The aim of this study is to determine the frequency of risk factors leading to risky pregnancies which are important for public health, to reveal the reasons and to offer solutions.

Methods: This is a cross – sectional study of 409 married women who applied to the hospital for prenatal care. A questionnaire prepared by the researchers was used for data collection by face-to-face interview technique. Percentage, mean, and chi-square test were used to evaluate the data.

Results: Although pregnancy is a physiological process, 67.7% of the pregnant women had at least one risk factor and 27.6% had more than one risk factor. Risk factors such as having caesarean section, having four or more pregnancies, being 35 and over age, unwanted pregnancy status and having less than two years between the last two pregnancies were found to be the most common risk factors seen in pregnant women.

Conclusion: Because risky pregnancies are an important public health problem and most of them are preventable; preconceptional care should be expanded to control the mother and baby before threatening their health.

Keywords: Risk factors, pregnancy, risky pregnancy, Turkey

Suggested Citation: Ulubaşoğlu H, Şahinöz S, Şahinöz T, Ulubaşoğlu P, Analysis of Risk Factors and Risky Pregnancies Among Pregnant Women Who Admitted to Hospital for Prenatal Care Mid Blac Sea Journal of Health Sci, 2023;9(4):550-562.

Address for correspondence/reprints:

E-mail: drsaime@hotmail.com;

Saime Şahinöz

Telephone number: +90 (536) 433 47 82

INTRODUCTION

Every woman wants to have a healthy pregnancy and have a healthy baby. Pregnancy is a physiological condition, but it brings important risks. Risky pregnancies are defined as high-risk pregnancies with many different dimensions that negatively affect maternal and infant health (1). The conditions that the mother and babies' life is in high risk are defined as high-risk pregnancies (2).

Risk is the probability of occurrence of undesirable conditions with the presence of one or more risk factors, while "risk for pregnancy" is the possibility of some pre-existing or possible complications that may occur during pregnancy (3).

According to the Turkey Demographic and Health Survey (TDHS-2018) report; 65.70% of pregnancies occurred in Turkey in the past five years, had at least one risk factor, and the order of frequency of the most common risk factors were birth interval (less than 24 months), age of mother (above 34 or below 18) and number of pregnancies (more than three) (4).

Risky pregnancies may develop due to a woman's existing health problem or may occur due to pregnancy-related reasons. Close monitoring and care are needed to reduce the negative effects of risky pregnancies on maternal and child health. Care before and during pregnancy reduces risky pregnancies and ensures that the mother and the baby have a healthy pregnancy and delivery process in a healthy way (2).

There are many risk factors that cause risky pregnancies. These factors can be analysed under four headings. These are (2, 6):1. Risks existing before pregnancy, 2. Mother's existing diseases, 3. Risks during pregnancy, 4. Risks arising from the baby.

It is the duty and responsibility of primary health care services to diagnose the risk factors in pregnancy at the earliest stage, to prevent the damages caused by the risks and to protect the health of mother and baby. For this purpose, the services carried out in our country are known as prenatal care (PC) services and midwives have important duties in carrying out this service (5).

The PC provided to pregnant women by the Ministry of Health consists of four follow-ups. First one of this follow-ups is carried out before the first 14 weeks of pregnancy, the second between 18-24 weeks, third follow-up between 28-32 weeks and final follow-up at between 36-38 weeks (6). According to the results of Turkey Demographic and Health Survey (TDHS-2018); the rate of women receiving PC at least once during pregnancy was 90.30%, the rate of women receiving four times of PC was 88.90% in Turkey (4).

It is accepted that the most important way of reducing risky pregnancies is preconceptional care (7, 8). Preconceptional care is a preventive health service aimed to protecting maternal and child health which was introduced in 1980s.

The aim of preconceptional care is to determine risky pregnancies in the early period and to take necessary precautions. In short, primary prevention is to prevent maternal and infant mortality by reducing the factors that will adversely affect maternal and child health (9).

The Ministry of Health has established "Risky Pregnant Units" in Community Health Centers to perform prenatal care of risky pregnant women identified in primary health care facilities. This unit evaluates risky pregnant women by visiting them at home (10). As the outcome of high-risk pregnancies cannot be predicted, follow-up should be performed by specialist physicians (perinatology or gynaecology) in tertiary health care institutions and if necessary, the patients should be hospitalized (2).

Very few scientific studies have been conducted in Turkey about risky pregnancies. This research completes this deficiency for our country. It also provides a current, cultural, and regional perspective on risky pregnancies in terms of world literature.

The aim of this study is to determine the frequency of risk factors leading to risky pregnancies which are very important for public health, to reveal the reasons and to offer solutions.

METHODS

This is a cross-sectional study conducted on 409 married volunteer pregnant women who applied to the hospital for prenatal care. All married pregnant women who applied to Gümüşhane State Hospital and Samsun Training and Research Hospital between 01.11.2018-31.12.2018 and who accepted to participate in the study were included in the study and a sample was not selected. Before starting the research, the ethics committee approval dated 30.10.2018 and numbered 2018/8 was obtained from Gümüşhane University Scientific Research and Publication Ethics Committee and all procedures were applied in conformity with the Declaration of Helsinki. All participants provided their informed consent.

Data collection

A questionnaire prepared by the researchers was used for data collection. The research data were obtained by the researchers by filling in the "pregnant questionnaire" to pregnant women by face-to-face interview technique. Before filling out the questionnaire, pregnant women who accepted to take part in the research were informed about the purpose of the study.

Statistical Analysis

Percentage, mean, and chi-square test were used to evaluate the data. P value ≤0.050 (95% confidence interval) was considered significant. Risk groups were determined according to the literature.

RESULTS

It was found that 75.3% of the 409 pregnant women included in the research group were in

the 18-34 age range, 75.7% were housewives and 29.8% had primary and lower education levels.

When the current risk analysis of pregnant women was considered; it was found that 32.3% of pregnant women did not have any risk factors, 67.7% had at least one risk factor and 27.6% had more than one risk factor.

When the risk factors in pregnant women were examined; having undergone caesarean section (38.1%), having four or more pregnancies (30.6%), those who were 35 years old and above (23.2%), unwanted pregnancy status (23.2%), and less than two years between the last two pregnancies (20.30%) were the most common risk factors in pregnant women respectively (Table 1).

Table 1: Risk factors determined in pregnant women participating in the study (n = 409)

Risk Factors	Number (%*)
Pregnant women with at least one risk factor	277 (67.70)
Pregnant women with multiple risk factors	144 (35.20)
Having undergone caesarean section	153 (37.40)
Having 4+ pregnancy	125 (30.60)
Age of the pregnant woman (over 35+ and under 18)	106 (25.90)
Unwanted pregnancy	95 (23.20)
Less than two years between the last two pregnancies	83 (20.30)
Having a baby below 2500 grams at the last birth	47 (11.50)
Cigarette, alcohol, or other substance abuse	35 (8.60)
Having a baby more than 4500 grams in the last birth	33 (8.10)
Hypertension	29 (7.10)
Premature birth in previous pregnancies (22-37 weeks)	28 (6.80)
Multiple pregnancy	21 (5.10)
Abnormalities of placenta	18 (4.40)
3 or more consecutive spontaneous abortions	14 (3.40)
Anaemia	14 (3.40)
Urinary tract infection	12 (2.90)
Diabetes (Insulin dependent)	9 (2.20)
Trauma (such as falls, accidents)	9 (2.20)
Termination of previous pregnancy with stillbirth	8 (2.00)
Blood (Rh) mismatch	8 (2.00)
Having a febrile rash disease	7 (1.70)
Pregnancy toxaemia (preeclampsia, eclampsia) history	6 (1.50)
History of giving birth to a baby with anomaly	5 (1.20)
Pelvic mass	2 (0.50)

** Rate among risky pregnancies*

When the distribution of risky pregnancies in the research group according to age groups was examined; risky pregnancies were found to the groups was significant (p <0.010) (Table 2).

When the distribution of risky pregnancies according to education groups was examined; it was found that risky pregnancies were inversely proportional to education level and risk ratio decreased significantly (p <0.010) as education level increased (Table 2).

When the distribution of risky pregnancies according to their job status was examined; be the highest in the 35 and above age group, secondly in the 15-19 age group, increasing after the age of 20 and the difference between since retired individuals are naturally 35 years and older, risky pregnancies were highest, and secondly, they were higher in the housewife's group and the difference between the groups was significant (p <0.010) (Table 2).

No significant relationship was found between risky pregnancies and the place of residence and the economic level of women (Table 2).

Table 2: Risky pregnancies according to some demographic characteristics of pregnant women in the research group

Characteristic		Healthy Pregnancy	Risky Pregnancy	Total (409)	
		n (%[a])	n (%[a])	N (%[b])	x^2
Age groups	15-19	3 (20.00)	12 (80.00)	15 (3.70)	**70.09***
	20-24	33 (47.80)	36 (52.20)	69 (16.80)	
	25-29	65 (48.50)	69 (51.50)	134 (32.70)	
	30-34	31 (32.30)	65 (67.70)	96 (23.40)	
	35+	0 (0.00)	95 (100.00)	95 (23.40)	
Educational Status	Primary School	28 (23.00)	94 (77.00)	122 (29.80)	**10.57***
	Secondary School	27 (30.30)	62 (69.70)	89 (21.80)	
	High School	53 (42.10)	73 (57.90)	126 (30.80)	
	University Associate Degree +	24 (33.30)	48 (56.70)	72 (17.60)	
Occupational status	Housewife	80 (31.00)	178 (69.00)	258 (63.10)	**22.45***
	Public sector	48 (46.60)	55 (53.40)	103 (25.20)	
	Retired	4 (8.30)	44 (91.70)	48 (11.70)	
Residential Place	Rural	20 (34.50)	38 (65.50)	58 (14.20)	0.15
	Urban	112 (31.90)	239 (68.10)	351 (85.80)	
Economic Status	Bad	8 (30.80)	18 (69.20)	26 (6.40)	0.74
	Medium	114 (31.80)	244 (68.20)	358 (87.50)	
	Good	10 (40.00)	15 (60.00)	25 (6.10)	
Total		132 (32.30)	277 (67.70)	409 (100.00)	

[a] row percentage, [b]column percentage, *p<0.001

In addition to these findings, 33.00% of pregnant women stated that they were extremely stressed during pregnancy and 13.20% stated that they had had medical abortion before.

When the complaints of pregnant women were examined; it was found that 7.80% had complaints of oedema, 6.60% had bad smelling vaginal discharge, 3.70% had excessive weight gain, 2.90% had not gained weight and 2.90% had decreased baby movements.

When the distribution of risky pregnancies in the research group according to the desired pregnancy was examined; it was found that the rate of risky pregnancies (81.10%) was

significantly higher in women who unwantedly became pregnant (Table 3).

When the distribution of risky pregnancies was examined according to the woman's desire for another child; it was found that the rate of risky pregnancies (81.10%) was significantly higher in women who did not want another child (p <0.010) than those who wanted another child (Table 3).

When the distribution of risky pregnancies according to the total number of pregnancies was examined; it was found that risky pregnancies were directly proportional to the number of pregnancies and the risk of pregnancy increased significantly (p <0.010) as the number of pregnancies increased. Risky pregnancy rate was 37.80% at the first-time pregnant women (primigravida), while this rate was found to increase to 80.80% in women with four and more pregnancies (Table 3).

It was found that the risky pregnancy rate (74.10%) was significantly higher in women who stated that they were over-stressed during pregnancy (p <0.010) (Table 3).

Table 3: Risky pregnancies according to some characteristics of pregnant women in the research group

Characteristic		**Healthy Pregnancy n= 132**	**Risky Pregnancy** n=277_	**Total n=**	
		n (%[a])	n (%[a])	N (%[b])	x^2
Those who wanted to become pregnant	Unwanted Wanted	18 (18.90) 114 (36.30)	77 (81.10) 200 (63.70)	95 (23.20) 314 (76.80)	**10.05****
To want another child	Wants Does not want	106 (43.10) 26 (16.00)	140 (56.90) 137 (84.00)	246 (60.10) 163 (39.90)	**33.03****
Total number of pregnancies	1 2-3 4+	56 (62.20) 52 (26.80) 24 (19.20)	34 (37.80) 142 (73.20) 101 (80.80)	90 (22.00) 194 (47.40) 125 (30.60)	**49.36****
History of extreme stress during pregnancy	Yes No	35 (25.90) 97 (35.40)	100 (74.10) 177 (64.60)	135 (33.00) 274 (67.00)	**3.72***
Total number of abortions	0 1-2 3+	103 (35.20) 26 (27.10) 3 (15.00)	190 (64.80) 70 (72.90) 17 (85.00)	293 (71.60) 96 (23.50) 20 (4.90)	5.03
Time between last two pregnancies	Less than two years 2+ year	14 (23.00) 118 (33.90)	47 (77.00) 230 (66.10)	61 (14.90) 348 (85.10)	2.85
Perception of health status	Good Medium Bad	79 (29.30) 52 (38.50) 1 (25.00)	191 (70.70) 83 (61.50) 3 (75.00)	270 (66.00) 135 (33.00) 4 (1.00)	3.63

[a] row percentage, [b] column percentage, *p<0.050, **p<0.001

The risky pregnancy rate increased in direct proportion to the number of abortions, but the relationship was not significant; again, it was found that the risky pregnancy rate (77.00%) was higher in pregnant women whose duration between the last two pregnancies was less than two years, but the difference was not significant.

No significant relationship was found between the pregnant women's own perception of health and risky pregnancy (Table 3).

DISCUSSION

Factors leading to risky pregnancies in the literature in the simplest way are listed as; maternal age, number of births, frequency of birth, caesarean section, maternal alcohol and

tobacco consumption, maternal diseases, pregnancy complications, unwanted pregnancies and abortions and low socio-economic level (2, 6).

It was found that 32.30% of 409 pregnant women included in the research group did not have any risk factors, 67.70% had at least one risk factor and 27.60% had more than one risk factor.

Turkey Demographic and Health Survey (TDHS-2018) report; 65.70% of pregnancies are in any risk category and the most common risk factors are that the birth interval is less than 24 months (10.10%) according to the frequency order, the mother's age is over 35 or under 18 possible (9.50%) and having four or more pregnancies (7.10%) (4).

When the risk factors of 277 pregnant women who have at least one risk factor were examined; the first factor causing risky pregnancies was caesarean section (37.40%). The rate of pregnant women who stated that they had delivered previously by caesarean section was found to be 51.70%. In another study in which 2649 pregnant women who delivered in a university hospital in the same year were examined, the rate of pregnant women (56.30%) who stated that they had delivered by previous caesarean section was reported to be close to the rate in our study (11).

In the 2017 Statistical Yearbook of the Ministry of Health, it was announced that the country-wide caesarean rate was 53.10% (12). In another study which 57,402 births were examined in our country in 2019; the rate of caesarean section was 42.20% and this rate increased to 66.10% in risky pregnant women (25.10%) followed in perinatology clinic (13).

Caesarean section rate is increasing all over the world. The World Health Organization (WHO) states that the ideal caesarean rate should be between 10.00-15.00%. According to World Health Organization (WHO) data caesarean rates are; 41.30% in Brazil, 37.70% in Korea, 37.40% in Italy, 36.10% in Mexico, 30.20% in the United States, 28.90% in Switzerland, 27.80% in Germany (14). As it has been detected caesarean rates in these countries are considerably higher than the 15.00% caesarean section recommended by the World Health Organization.

Caesarean section is a surgical operation that poses a risk to the health of the mother and baby (15). The fact that caesarean delivery rate is quite common in our country increases the risk of pregnancy by making subsequent pregnancies risky.

In a study examining the causes of caesarean delivery in our country; the most common reason (50.00%) was due to the desire of the physician, then the mother's own request (28.30%), lack of term delivery (9.40%), fear of birth (7.50%), and caesarean section were thought to be healthier (%4.70) (16).

Most women want to give birth by caesarean section to avoid labour pain (17, 18). This

arbitrary procedure is the most important risk factor that increases risky pregnancies with many complications.

In our research, it was found that having four or more pregnancies (30.60%) was the second most common risk factor leading to risky pregnancies. In relation to this, risk factors such as unwanted pregnancy (23.20%) and the duration between the last two pregnancies being less than two years (20.30%) were found to be the most common risk factors in pregnant women. In addition, it was found that the ratio of risky pregnancies increased in proportion to the number of pregnancies and this rate which was 37.80% in first-time pregnant women (primigravida) increased to 80.8% in women with four and more pregnancies. It was also found that the risky pregnancy rate was significantly higher in pregnant women who did not want another child (84.00%) and unwanted pregnancies (81.10%).

In unwanted pregnancies, it is known that negative conditions like abortion, depression, stress, smoking, and drug use are seen at a high rate (19, 20).

It is known that pregnancy interval less than two years cause; anaemia, premature rupture of membranes, endometritis, uterine rupture, foetal growth retardation and abortion (21-23).

Over-fertility is an important public health problem and adversely affects maternal and child health. As more than three births increase risky pregnancies, unwanted pregnancies (23.20%) and birth interval less than 24 months (20.30%) are risk factors for risky pregnancies. These three risk factors are interrelated, and all are indicative of inadequate or improper use of family planning services. Research show that there will be a 30.00-40.00% decrease in maternal and infant mortality rates with risky pregnancies that can be prevented by bringing family planning services to the desired level (1, 9, 24).

In our study, the third risk factor that causes risky pregnancies is that the age of the pregnant woman is inappropriate (over 34 years or under 18 years) (25.90%). Risky pregnancies were found to be the highest in the 35 years and above age group, secondly in the 15-19 age group, and increased gradually after the age of 20 years. In a study conducted in Pakistan in 2017, the rate of pregnancies under the age of 18 was reported to be 14.00% and the proportion of pregnancies over the age of 34 was 18.00% (25).

It is known that if maternal age is over 34 and under 18 it is a risk during pregnancy. Many research show that; advanced maternal age increases complications like, hypertension, gestational diabetes, preeclampsia, malpresentation, placenta adhesion anomalies and bleeding, fetal distress, low or high birth weight, preterm birth, fetal anomaly, intrauterine growth retardation and stillbirth (3, 26-28).

The presence of diseases such as hypertension (7.10%), anaemia (3.40%) and insulin-dependent diabetes (2.20%) in the pregnant women in the study group were also among the top risk factors. In a study on risky pregnancies in our country; there was cardiovascular diseases in 19.30% of pregnant women, hypertension in 13.70%, diabetes mellitus in 17.20%, neurological diseases in 4.60%, urinary tract infection in 9.10% and anaemia (haemoglobin <7 g / dl) in 4.30% (29). In another study in which 2649 pregnant women were examined in the same year with our study, it was reported that 15.50% of pregnant women had at least one chronic disease (11). In a study conducted in Pakistan in 2017 anaemia (37.00%) and hypertension (20.00%) took the first place among the existing diseases detected in pregnant women (25).

Hypertension occurs in 12.00-15.00% of pregnant women. The underlying cause of hypertension is preeclampsia in about 70.00% of pregnant women (30). Preeclampsia and eclampsia, which is seen in 5.00% of developed countries, is responsible for approximately 15.00% of maternal deaths (31-33). The prevalence of hypertension in pregnancy has been reported to be 3.90-15.10% in our country (34).

Anaemia during pregnancy is usually iron deficiency anaemia and its prevalence varies between 12.00-43.00%. Anaemia in pregnancy, causes poor physical and mental performance, decreased immune resistance, fatigue, premature or stillbirths (35).

Chronic and metabolic diseases of the mother constitute important risks for the health of the mother and the baby during pregnancy. Some drugs used for the treatment of these diseases may cause congenital defects by showing teratogenic effect (3).

In our study, smoking, alcohol, or other substance abuse (8.60%) of the pregnant women was in the seventh place among the risk factors. In another study conducted in the same year with our study, the rate of pregnant women who smoked cigarettes (8.90%) was reported to be near to our rate (11). However, there are also studies in which this rate is reported to be higher (17.50-19.00%) (36, 37).

Finally, the risky pregnancies were inversely proportional to the education level of the women and when the education level increases, the risky pregnancy rate decreases significantly and retired women (naturally 35 years and older) were found to be at the highest level of risky pregnancies, the second was found to be higher in the housewives' group than others.

CONCLUSION

Although pregnancy is a physiological process, 67.70% of the pregnant had at least one risk factor and 27.60% had more than one risk factor.

Risk factors such as having caesarean section, having four or more pregnancies, being 35 and over age, unwanted pregnancy status

and having less than two years between the last two pregnancies were found to be the most common risk factors seen in pregnant women.

Age, education level, number of pregnancies, unwanted pregnancy, unwillingness of another child, and stress in pregnancy were found to be significantly correlated with risky pregnancies.

Because of the high caesarean section rate determined in Turkey is higher than the caesarean birth rates in most of the other countries of the world and the maximum rate of 15% determined by WHO; the first risk factor causing risky pregnancies is to have delivered by caesarean section before. For this reason, we think that urgent review and updating of health policies already implemented to reduce caesarean rate are necessary.

Because risky pregnancies are an important public health problem and most of them are preventable; preconceptional care should be expanded to control the mother and baby before threatening their health.

Ethics Committee Approval: The ethics committee approval dated 30.10.2018 and numbered 2018/8 was obtained from Gümüşhane University Scientific Research and Publication Ethics Committee.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: HU, SŞ, TŞ, PU; Design: HU, SŞ, TŞ, PU; Data Collection and Processing: HU, SŞ, TŞ, PU; Analysis and Interpretation: HU, SŞ, TŞ, PU; Writing: HU, SŞ, TŞ, PU;

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Price S, Lake M, Breen G, Carson G, Quinn C, & O'Connor T. The spiritual experience of high-risk pregnancy. JOGNN. 2007;36(1): 63-70.
2. World Health Organization, World Health Organization. Reproductive Health, & World Health Organization. Department of Reproductive Health. (2003). Pregnancy, childbirth, postpartum, and newborn care: a guide for essential practice. World Health Organization. Geneva; 2003. p.35-48.
3. World Health Organization. Preconception care: Maximizing the gains for maternal and child health. Geneva; 2013. p.26-37.
4. Hacettepe University Population Studies Institute. 2018 Türkiye Population and Health Survey. Hacettepe University Population Studies Institute, T.R. Presidency Strategy and Budget Directorate and TÜBİTAK, Ankara; 2019. pp. 23-71.
5. Aydemir H, Uyar Hazar H. Aydemir H, Uyar Hazar H. Low risk, risk, and high risk pregnancies and the role of midwives. Gümüşhane University Journal of Health Sciences, 2014; 3(2): 815-833.

6. T.R. Ministry of Health, Turkish Public Health Institution, Department of Women's and Reproductive Health. Prenatal Care Management Guide, Publication No: 924. Ankara; 2014. pp.13-42.
7. Doğan Pekince G, Ertem G. Prenatal period. In: Sevil Ü, Ertem G. editors. Perinatology. 1st ed. Ankara: Nobel Medical Bookstore; 2016. p. 127-68.
8. Baysoy NG, Özkan S. Preconception Care: A Public Health Perspective. Gazi Medical Journal. 2012; 23(3):77-90. doi:10.5152/ gmj.2012.25
9. Aksoy A, & Yılmaz D.V. A New Service Model To Increase Community Health: Preconceptional Care And The Nurse's Role. Journal of Education and Research in Nursing (JERN). 2019; 16(1): 60-67.
10. Tekin Ö.F, Tellioğlu M, Arıkan İ, & Akça M.E. Descriptive characteristics of risky pregnant women followed in a community health center. In 3. International 21. National Public Health Congress, September 2019.
11. Kıssal A, & Kartal B. The Evaluation of Prenatal Care Content of Women Who Gave Birth in A University Hospital. Journal of Health Sciences of Kocaeli University. 2019; 5(1): 35-41.
12. T.R. Ministry of Health General Directorate of Health Information Systems. Health Statistics Yearbook 2017. Ankara; Kuban Printing and Publishing. 2018. pp. 15-47.
13. Kıyak H, Bolluk G, Canaz E, Yüksel S, Gedikbaşı A. The evaluation of cesarean section rates in accordance with Robson Ten-Group Classification System and the data of perinatology (tertiary center). Perinatal Journal. 2019;27(2):89–100.
14. World Health Organization. Global status report on alcohol and health 2018. Geneva; 2019. p.28-47.
15. Souza J.P, Betran A.P, Dumont A, De Mucio B, Gibbs Pickens C.M, Deneux-Tharaux C, et al. A global reference for caesarean section rates (C-Model): a multicountry cross sectional study. BJOG: An International Journal of Obstetrics & Gynaecology. 2016; 123(3):427-36.
16. Karabulutlu Ö. Identifying The Women`s Choice of Delivery Methods of and The Factors That Affect Them. Florence Nightingale Journal of Nursing. 2012; 20(3): 210-218.
17. Duman Z. The opinion of health workers regarding vaginal labor and cesarean section. Afyon Kocatepe University Institute of Health Sciences, Master's thesis. Afyonkarahisar, Türkiye, 2006.
18. Ghaffari S, Dehghanpisheh L, Tavakkoli F, & Mahmoudi H. The effect of spinal and general anesthesia on quality of life in women with cesarean delivery. Cureus. 2018;10(12): e3715

19. McCrory C, McNally S. The effect of pregnancy intention on maternal prenatal behaviours and parent and child health: results of an Irish cohort study. Pediatric and Perinatal Epidemiology. 2013; 27:208–15. http://dx.doi.org/10.1111/ppe.12027.
20. Messer L.C, Dole N, Kaufman J.S, & Savitz D.A. Pregnancy intendedness, maternal psychosocial factors and preterm birth. Maternal and Child Health Journal. 2005; 9:403-12. http://dx.doi.org/10.1007/s10995-005-0021-7.
21. Stanilio DM, DeFranco E, Paré E, Odibo A. O, Peipert J.F, Allsworth J.E, et al. Short interpregnancy interval: Risk of uterine rupture and complications of vaginal birth after cesarean delivery. ObstetGynecol. 2007;110(5):1075-82. doi: 10.1097/01.aog.0000286759.49895.46
22. Conde-Agudelo A, Belizan JM. Maternal morbidity and mortality associated with interpregnancy interval: cross sectional study. BMJ. 2000;321(7271):1255-9. doi: 10.1136/bmj.321.7271.1255
23. Fuentas-Afflick E, Hessol NA. Interpregnancy interval and risk of premature infants. Obstetrics and Gynecology. 2000;95(3):383-90.
24. Karaoğlu L, Çetin F, Ilgar M, Tekiner S, Güneş G, Eğri M, et al. Fertility Characteristics and Contraceptive Use of the Married Women Working at Turgut Özal Medical Center. Journal of Turgut Ozal Medical Center; 12 (2):93–97.
25. Ahsan J, Ayub R, Gul R, Khan U.A, & Zafar U. Assessment of risk factors for high-risk pregnancy. J Med Sci. 2017; 25: (1) 41-44.
26. Hillemeier ML, Weisman CS, Chase G.A, Dyer A.M, & Shaffer M.L. Women's preconceptional health and use of health services: Implications for preconception care. HSR: Health Services Research. 2008;43(1):54-75. doi: 10.1111/j.1475-6773.2007.00741. x.
27. Aynıoğlu Ö. Evaluation of Demographic Variables of Mothers Giving Birth Over 35 Years of Age. Kocatepe Medical Journal. 2014;15(2):152-5.
28. Şekeroğlu M, Baksu A, Ince Z, Gültekin H, Göker N, Özsoy S. Adolescent and old age pregnants obstetric results. The Medical Bulletin of Sisli Etfal Hospital. 2009;43(1):1-7.
29. Turan T, Ceylan S.S, & Teyikçi S. Influencing Factors and Situation of The Mothers To Take Regular Prenatal Care. Fırat Sağlık Hizmetleri Dergisi (Fırat Health Services Journal). 2008; 3(9): 157-172.
30. Oskay Ü. Risky Situations Where Pregnancy Complications Occur and Nursing Approach. Kızılkaya NB, editor. Women's Health and Diseases. Nobel

Medical Bookstore, Istanbul, 2015; 447-472.

31. Shamsi U, Saleem S, & Nishter N. Epidemiology, and risk factors of preeclampsia; an overview of observational studies. Al Ameen J Med Sci. 2013; 6(4):292-300.
32. Turner AJ. Diagnosis and management of preeclampsia: An update. Int J Womens Health. 2010; 2:327-337.
33. Park M, Brewster U. Management of preeclampsia. Hospital Physician. 2007; 11:25-32.
34. Çulha G, Ocaktan M.E, & Çöl M. Hypertension Study in Pregnant Women Demanding Services of Ankara University School of Medicine Obstetrics and Gynecology Department Outpatient Clinic. Türkiye Klinikleri Journal of Medical Sciences 2010; 30(2):639-649.
35. Günalp S., Tuncer S. Gynecology and Obstetrics, Diagnosis and Treatment. Ankara: Pelikan Publications; 2004. p. 29-56.
36. Köse S, Tosun G, Basok B.I., & Altunyurt S. A look at the obstetric outcomes in smoking pregnants through the first trimester screening window. Kocaeli Medical Journal. 2019; 8(1), 51-59.
37. Barut A, Gültekin İ.B, Yılmaz E.A, Sabancı M, Karslı F, Kara O.F, et al. Neurodevelopmental problems of late preterm fetuses and the factors affecting neurological morbidity. Perinatal Journal. 2015; 23(3): 141-147.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 563-571**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1258505

The Relationship Between Preoperative Examination and High Phimosis Complication in Thermocautery Assisted Circumcision in Infancy

Aybegüm Kalyoncu Aycenk[1](ID)

[1]Department of Pediatric Surgery, Ordu University School of Medicine, Ordu, Turkey

Received: 2 March 2023, Accepted: 5 October 2023, Published online: 29 October 2023

Abstract

Objective: To this study, we presented our experience with thermocautery assisted guillotine/clamp (TAG) method circumcisions on infant age and to share high rate of penile adhesions/phimosis complications that we found at the end of study.

Methods: A retrospective review between July 2020 and October 2022, 80 patients under the age of 1 who were circumcised by a single surgeon using the thermocautery assisted guillotine/clamp method, under the local anesthesia were included in the study (Thermo-Med TM 802B device; Thermo Medikal, Adana, Turkey).

Results: 80 patients were divided into 2 groups. Group 1 was 0-6 months old, group 2 was 6-12 months old. According to the weight percentile in group 1, 44.4% of the patients were above 75. percentile (p), in group 2, 34% of the patient were 25-50.p. In the preoperative evaluations, the presence of pubic fatty tissue was found in 24% of the patients in group 1 and 30% in group 2. Early complications occurred in 7 patients. Late complications were seen in 22 patients (27,5%). The presence of excess penile tissue was observed in 12 of them.

Conclusion: The TAG method is cheap, fast operation time and has a very good bleeding control. However, its use in infant group affects complication rates due to infant anatomical features. In the decision of circumcision in infant age, if there is a pubic fatty tissue in the preoperative examination, the high probability of complications should be taken into account when choosing the TAG method.

Keyword: Thermocautery, Circumcision, İnfant, Complication, Phimosis

Suggested Citation: Aybegüm Kalyoncu Aycenk, The Relationship Between Preoperative Examination and High Phimosis Complication in Thermocautery Assisted Circumcision in Infancy Mid Blac Sea Journal of Health Sci, 2023;9(4):563-571.

Address for correspondence/reprints: **E-mail:** aybegumkalyoncu@gmail.com

Aybegüm Kalyoncu Aycenk

Telephone number: +90 (505) 504 83 33

INTRODUCTION

Circumcision is an operation that has been practiced mostly on boys since ancient times, for religious, cultural and personal reasons. The World Health Organization recommends circumcision in early infancy age because of the rapid recovery, low complication rate and low cost (1). Considering the complication rates of circumcision performed in the infant period, there are studies in the literature ranging from 1.5% to 71%. The most common early period problems are minor bleeding, infections, urinary retention, pain, allergic reactions and the most common late period is penile adhesions/phimosis, removal of excessive or inadequate foreskin, meatal stenosis. Late complications (circumcision revision) are the most serious problem in all infant circumcision data (2,3,4).

Thermocautery is a U-shaped device that does not directly transmit electricity to the tissue, but only incision the foreskin with the high-temperature technique. Thermocautery device cutting tip consists of chromium-nickel alloy. The working principle of the device is to cut the tissue by converting electrical energy to thermal energy. When the metal bar on the device is pressed, the device becomes active and the cautery tip starts to heat up. The temperature of the thermocautery device was used as low and high energy modes nearly $100C^0$ and $250C^0$ in all patients as a standard. This method is an assistant technique to the classical guillotine circumcision method. The most important reason why circumcision incision is frequently preferred with this method is that, it has very good bleeding control, easy to use, the circumcision time is 5 to 10 minutes on average, and it can be done easily under local anesthesia (5). Thermocautery device have been also used for dermatological excisions (6). It has been shown to be superior to bipolar and monopolar cautery in histological evaluation in terms of cellular damage, wound healing and burn formation on circumcision (7).

In this study, age/weight, percentile ratio, preoperative pubic fatty tissue examination (PPFT)and penile adhesions/phimosis, postoperative early and late complications in infants who circumcised with thermocautery assisted guillotine/clamp (TAG) method between July 2020 and October 2022, complications, treatment and analysis were planned.

METHODS

This study was established between July 2020 and October 2022, using the retrospective cohort method. In the study, male gender, under 1 age old who were circumcised by a single surgeon, under the local anesthesia, assisted thermocautery device (fig.1) guillotine/clamp method circumcision patient files were

scanned. Oral and written consent forms were obtained from all patients before the procedure.

Figure 1 A.Thermocautery Device, B. Handle of the device

In the technique we used in circumcision; dorsal penile nerve block was prepared with bupivacaine 0.5%, dosed 2mg/kg and diluted 1ml. to 1ml. with saline in all patients. Waited half an hour after the injection. All operations were started with anesthesia pain control. Additional doses were given to the patients who felt pain and waited after injection. İn the sterile conditions, after the foreskin retracted and cleaned, it was clamped at a suitable placewithprotection of glans and cut through the clamp over with a thermocautery device (Thermo-Med TM 802B device; Thermo Medikal, Adana, Turkey).In all the patients except the neonatal period, the device was operated in high energy mode. It was sutured at 4 or 6 corner lines with using 5.0polyglactin 910 (Vicrly) sutures. Circumcision operation time in all patients 5-10 minutes on average.

80 patients were included in the study. There were 54 patients in group 1 and 26 patients in group 2. Group 1 consists of infants under 6 months, group 2 consists of infants between 6-12 months. The age, weight, child's weight percentile based on age (p), PPFT, early (pain, bleeding, dysuria, infection, allergic reactions) and late complications (penile adhesions/phimosis, meatal stenosis, excess penile tissue), penile adhesion grades (Table 1), treatment for complications and results were evaluated.

Statistical Analysis

SPSS program (SPSS version 25.0; IBM, NY, USA) was used for statistical evaluation. The chi-square test was used to measure the statistical difference between the 2 groups of PPFT, phimosis relation. A p value < 0.05 was considered statistically significant.

Ethical approval was obtained with the decision of Ordu University clinical research ethics committee with the decision number 2022/229.

Table 1: Lee Ponsky et. al Penile Adhesion Grades (4)

Grade 0	**No adhesion**
Grade 1	Preputium is connected to the corona by a thin film.
Grade 2	Adhesion covers less than 50% of the glans.
Grade 3	Adhesions develop when the preputium is not peeled off the glans or is incompletely excised during the circumcision

Local 2% mupirocin pomade was recommended to be used twice a day for 1 week after circumcision. Starting on the 3rd day after circumcision, warm sitz bath was recommended, 3 times a day for 10 minutes for 1 week. Parents were taught to perform gentle backward massage in their post-circumcision care advice. All patients were evaluated at the outpatient clinic controls at the 10th day, 1st month and 6th month after circumcision.

PPFT examination data were noted by the same surgeon. In this examination, if the majority of the visible part of penis consists of the foreskin, it was accepted that there was excess pubic fatty tissue (Figure 2). The possibility of high complication risk was discussed with the family in all patients with a positive examination. Before the procedure in these patients, the importance of postoperative care was explained to the families against the risk of penile adhesions.

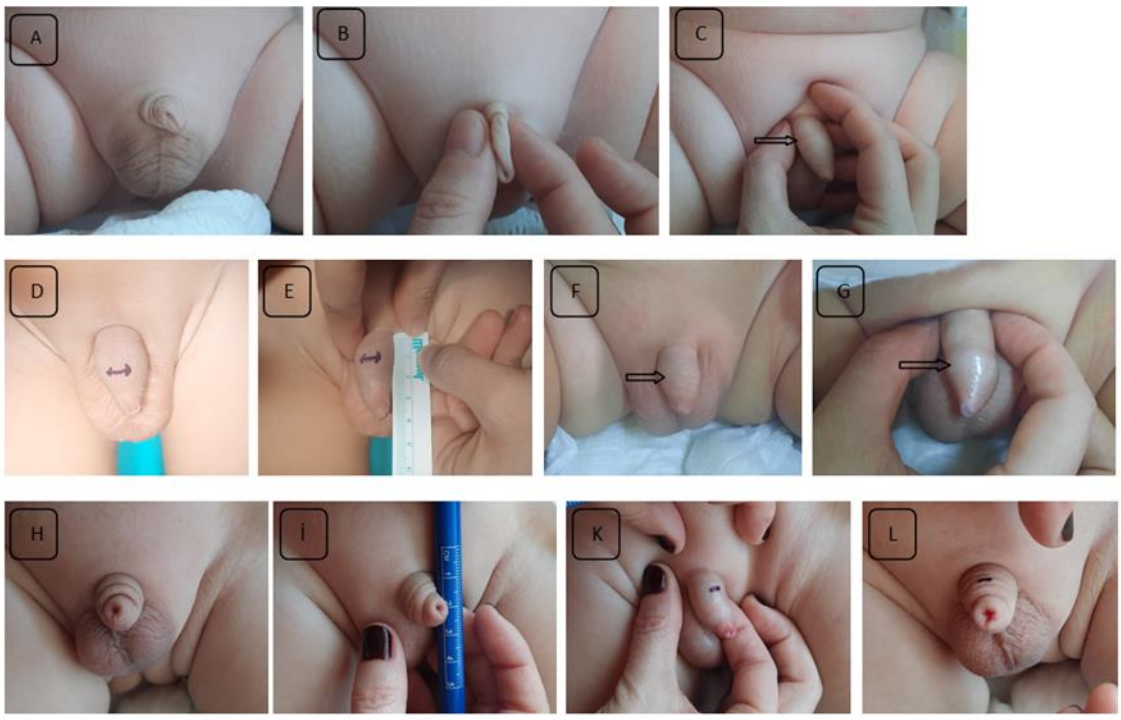

Figure 2: A, B, C was the same patients penile view, PPFT (+). B. Almost all of the visible tissue consists of foreskin. C, the arrow was the line where the foreskin started. D, E was the same patients penile view, PPFT (+). D, the marked line was where the foreskin begins. E, when the penis was retracted, the foreskin was 3cm. and the penile skin was 1cm. F, G was the same patients penile view, PPFT(-). The foreskin and penile skin levels appear to be almost equal in length. H, I, K, L was the same patients view, PPFT (+). I, the length of the foreskin was 2 cm, and the penile skin length was 1 cm. K, marked line was foreskin line when the penis retracted. L, marked line was foreskin line, natural appearance.

RESULTS

The mean age of the patients was 4.86 months old. The average circumcision operation time was 7,5 minutes. The mean weight of these patients was 7 kilograms. According to the child's weight percentile based on age scale, it was found that mostly seen above 75p. in group 1 (44%) and 25-50p. in the group 2 (38%). The number of patients who

were found to have PPFT was 21(%26). Of these patients, 13 were from the first group (%16) and 8 were from the second group (10%). Early complications occurred in 7 patients (8,75%). İt was observed that early complications were significantly higher in group 1 patients. Five of these complications were oozing bleeding, and all of them were in the 1 month old newborn group. Allergic rash was observed in 2 patients, both from group 2. None of the patients had dysuria, infection, or serious pain.

Late complications (penile adhesions/phimosis, skin bridges, meatal stenosis, excess penile tissue) were observed 22 patients (27,5%), 14 were group 1 (25,9%) and 8 were group 2 patients (30,7%). When we looked at 22 cases with secondary phimosis, it was seen that the statistical relationship between percentile and seconder phimosis was not significant. Penile adhesion grading was performed (Table.1), it was observed that 8 of 22 patients were grade 2 adhesion and 14 were grade 3 adhesion. Postoperative phimoses were observed in 12 (%57) of 21 patients who were examined preoperatively and had a pubic fatty tissue. Phimosis complication was observed in 10 (16,9%) of 59 patients who did not have preoperative pubic adipose tissue examination. This relationship was found to be significant in statistical data analysis with the chi-square test. The p-value was0.00396. Significant at $p < .05$. (Table. 2)

Of the patients with secondary phimosis, 14 were dilated with a gentle backward massage, 2 with massage after using prednisone cream for 10 days, twice a daily and 6 were dilated with the help of clamps under local anesthesia and their phimosis was corrected. Penile adhesions, which were treated with gentle backward massage, recurred in 3 patients and were treated with massage for the second time. Of the 22 patients with secondary phimosis, 12 had the appearance of excess penile tissue as a long-term complication (15%).

Table 2: The Chi-square statistics for the contribution of patients with preoperative fatty tissue to the complication of secondary phimosis was significant

	Phimosis +	Phimosis -	*Marginal Row Totals*
preoperative pubic excess fatty tissue +	12 (5.78) [6.71]	9 (15.22) [2.55]	21
preoperative pubic excess fatty tissue -	10 (16.23) [2.39]	49 (42.78) [0.91]	59
Marginal Column Totals	22	58	80 (Grand Total)

*The chi-square statistic is 12.5495. The p-value is .000396. Significant at <.05.
*The chi-square statistic with Yates correction is 10.6145. The p-value is .001122. Significant at p<.05.

DISCUSSION

The rate of circumcision operation in the male population reached 80% and 56% of them was newborn age period in the USA (8). In circumcisions performed in the infant period, assistant devices such as gomco clamp, plastibell, and mogen clamp are used due to the preference of local anesthesia (3). In a study comparing plastibell, gomco clamp and TAG methods in the neonatal period, showed that the thermocautery method was superior in terms of hemostasis, operative time, and parent satisfaction, with less pain in the postoperative period (9). In Turkey, circumcisions performed with local anesthesia, TAG method, Ali'sclamp, dorsal slit is generally used (10). We prefered to use TAG method because of good hemostasis, easy to use, fast circumcision time and no need to use any dressing.

When the relationship between weight and complications was evaluated, the study by Storm et al., in which they examined the relationship between neonatal obesity and complications, also supports the data of our study. Storm et al. emphasized that the measurement of preoperative fat tissue as percentile or BMI is important in reducing possible complications (11). In our study, it was shown that the surgeon's determination of pubic fatty adipose tissue in the preoperative examination had a significant statistical result in the long-term complication relationship.

Surgical results and high complication rates are discussed, especially in groups that prefer infant circumcision. Considering the complication rates in circumcision, it has been shown that the average is 4 in 1000, this rate increases 10 to 20 times in infants (12). We know that the most common complication in infancy is minor bleeding and the most common late complication is penile adhesions/phimosis. However, excessive skin removal, penile injury or amputation, infections, and development of meatal stenosis are other complications that can be considered. Ponsky et al. reported the complication rate of penile adhesion and phimosis as 71% in their study with 61 patients under the age of 1(4). Akyüz et al., on the other hand, found the risk of penile adhesion and phimosis to be 1.6%, especially in babies under 6 months of age, in the study they published using the thermocautery assisted circumcision method (13).

In our study, we reported 2 groups as 0-6 to 6-12 month intervals, primarily because we were wondering if there was a difference in complication rates in early and late infants. When we look at the total complication rates, no significant difference was found in the 2 groups (35%, 32%). But it was observed that all of the minor bleedings were seen in infants 1 month and younger. Penile adhesions/phimosis

complication was observed with 27.4% rates in the total group. Excess penile tissue complication was 16%in group 1, 11,5% in group 2.

Among the reasons for the high complication rates in our study, it was thought that the use of clamps at a safe level was primarily due to the risk of glans amputation in the guillotine method. These cond reason was subcutaneous adipose tissue which is tends to increase rapidly in thickness during the babies first nine months following birth (14).This rise in fatty tissue in the infant period, increases the appearance of the buried penis. Therefore, the risk of penile adhesions/phimosis complications was increased in the infant group in our study compared to older ages. At the same time, we have also shown that the examination we performed in the preoperative period penil tissue has a statistically significant relationship with the probability of phimosis.

A limited number of studies on tissue damage of TAG circumcision support that nerve damage or tissue necrosis does not occur even when used at high temperatures (13).In addition, there are also studies suggesting thermocautery circumcision, especially in newborn circumcisions, due to the good control of minor bleeding(15). Based on this result, we do not think that the high rate of phimosis in our TAG circumcision series was due to thermocautery alone. We think that this result may have been due to the preoperative pubic fatty tissue and the long prepuce due to the safety of the guillotine method.

CONCLUSION

The fastest technique, the least complications and the best wound healing are the predicted targets in infant circumcision. Various techniques are studied in this age group. We think that this study is important in the search for the optimum technique and the risk of minor complications due to the increasing trend in infant circumcision. As a result, preoperative examination performed before circumcision in infant age is very important in the choice of circumcision technique.

Ethics Committee Approval: Ethics Committee Approval: Ethics approval for this study was obtained from the Diyarbakır Gazi Yaşargil Education and Research Hospital Clinical Research Ethics Committee (ethics committee date: 09/12/2022, ethics committee number:254).

Peer-review: Externally peer-reviewed

Author Contributions: Concept: FTÇ, Design: FTÇ, Data Collection and Processing: ZK, Analysis and Interpretation: ZK, Writing: FTÇ.

Conflict of Interest: The author declared no conflict of interest.

Financial Disclosure: The authors declared that this study has not received no financial support.

Acknowledgments: We would like to thank Zercan Kalı for his/her contribution to our study.

REFERENCES

1. World Health Organization; Joint United Nations Programme on HIV/AIDS. Neonatal and child male circumcision: a global review. 2010. Accessed January 22,2020.https://www.who.inti/hiv/pub/male circumcision/neonatal_child_MC_UNAIDS .pdf.
2. Hung YC, Chang DC, Westfal ML, Marks IH, Masiakos PT, Kelleher CM. A longitudinal population analysis of cumulative risks of circumcision. J.Surg Res. 2019;233:111-117.
3. Pieretti RV, Goldstein AM, Pieretti-Vanmarcke R. Late complications of newborn circumcision: a common and avoidable problem. Pediatr Surg Int. 2010 May;26(5):515-8. doi: 10.1007/s00383-010-2566-9. Epub 2010 Feb 14. PMID: 20155423.
4. Ponsky LE, Ross JH, Knipper N, Kay R. Penile adhesions after neonatal circumcision. J Urol. 2000 Aug;164(2):495-6. PMID: 10893633.
5. Karaman, M. I., Zulfikar, B., Caskurlu, T., & Ergenekon, E. (2004). Circumcision in hemophilia: A cost-effective method using a novel device. Journal of Pediatric Surgery, 39, 1562–1564. https://doi.org/10.1016/j.jpedsurg.2004.06.025
6. Lane JE, O'brien EM, Kent DE. Optimization of thermocautery in excisional dermatologic surgery. Dermatol Surg. 2006 May;32(5):669-75. doi: 10.1111/j.1524-4725.2006.32139.x. PMID: 16706762
7. Tuncer AA, Bozkurt MF, Bayraktaroğlu A, Koca HB, Doğan I, Çetinkursun S, Embleton DB. Examination of histopathological changes of scalpel, monopolar, bipolar, and thermocautery applications in rat experimental circumcision model. Am J Transl Res. 2017 May 15;9(5):2306-2313. PMID: 28559981; PMCID: PMC5446513.
8. Zambrano Navia M, Jacobson DL, Balmert LC, Rosoklija I, Holl JL, Davis MM, Johnson EK. State-Level Public Insurance Coverage and Neonatal Circumcision Rates. Pediatrics. 2020 Nov;146(5):e20201475. doi: 10.1542/peds.2020-1475. Epub 2020 Oct 14. PMID: 33055226.
9. El-Asmar KM, Abdel-Kader HM, El-Shafei EA, Ashraf I. Comparison between the bone cutter with thermal cautery, Gomco, and Plastibell for circumcision in neonates and infants: a prospective randomized trial. Egypt J Surg 2017;36:27e32.
10. Tuncer AA, Deger M. Incidence of Complications Following Thermocautery-assisted Circumcisions. Urol J. 2018 Nov 17;15(6):359-364. doi: 10.22037/uj.v0i0.4296. PMID: 29616499.

11. Storm DW, Baxter C, Koff SA, Alpert S. The relationship between obesity and complications after neonatal circumcision. J Urol. 2011 Oct;186(4 Suppl):1638-41. doi: 10.1016/j.juro.2011.04.016. PMID: 21862040
12. Omole F, Smith W, Carter-Wicker K. Newborn Circumcision Techniques. Am Fam Physician. 2020 Jun 1;101(11):680-685. PMID: 32463643.
13. Akyüz O, Tatar Z. Is it safe to use a thermocautery device for circumcision? Examination of the histopathological changes emerging after thermocautery-assisted circumcisions. Andrologia. 2021 Apr;53(3):e13968. doi: 10.1111/and.13968. Epub 2021 Jan 9. PMID: 33421180.
14. Schmelzle HR, Fusch C. Body fat in neonates and young infants: validation of skinfold thickness versus dual-energy X-ray absorptiometry. Am J Clin Nutr. 2002 Nov;76(5):1096-100. doi: 10.1093/ajcn/76.5.1096. PMID: 12399284.
15. Karaman MI, Zulfikar B, Caskurlu T, Ergenekon E. Circumcision in hemophilia: a cost-effective method using a novel device. J Pediatr Surg. 2004 Oct;39(10):1562-4. doi: 10.1016/j.jpedsurg.2004.06.025. PMID: 15486905.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci

October 2023; 9(4): 572-590

RESEARCH ARTICLE

DOI: 10.19127/mbsjohs.1276058

Assessments of Students' Numeracy Knowledge Levels in Health Literacy and Their Knowledge, Attitude, and Behavior Regarding Antibiotic Use

Asli Aykac[1](ID) Banu Tuncay[2](ID) Ahmet Özer Şehirli[3](ID)

[1]Near East University, Department of Biophysics, 99138 Nicosia, Cyprus.
[2]American University of Cyprus, Vocational School of Health Services, Department of Pharmacy Services, 99010 Nicosia, Cyprus.
[3]Near East University, Faculty of Dentistry, Department of Pharmacology, Nicosia, 99138, Cyprus

Received: 3 April 2023, Accepted: 16 July 2023, Published online: 29 October 2023

Abstract

Objectives: Rational antibiotic use (RAU), which is examined under the heading of rational drug use, draws an important road map in the prevention of antibiotic resistance development, which is a global problem that threatens future generations. It was aimed to evaluate the factors that determine the antibiotic use behaviors of students and the level of numeracy knowledge in health literacy, which is effective in reducing unnecessary or incorrect antibiotic use.

Methods: In the study, in which 212 students voluntarily participated, a questionnaire consisting of questions was used, in which socio-demographic characteristics, knowledge, attitudes, and behaviors related to antibiotic use were examined, as well as the level of numerical knowledge in health literacy.

Results: It was found that the average age of participants was 20.33±2.50, and 53.8% were females. It was determined that 77.4% of the participants preferred to go to the doctor when they had any health problems, and the most common reason for using antibiotics was fever (51.4%). The answer given for the "disease that requires antibiotic use" question was bacterial infections with 64.6%. Participants' numeracy level in health literacy was questioned with six different questions, and their average score was determined to 8.1±2.0. It was determined that the highest numeracy knowledge level score among the departments belonged to the students of the anesthesia and first and emergency departments. Moreover, it was found that the numeracy knowledge level score in health literacy for females was higher than that of males.

Conclusion: It has been determined that students studying in health sciences have sufficient knowledge about RAU and numeracy, but they do not have an excellent level of knowledge yet despite being health students. It is believed that the regulation of the " rational antibiotic use" course, which is included in the education curriculum, will be effective in solving this problem.

Keywords: Rational Antibiotic Use, University Student, Antibiotic Resistance, Numeracy in Health Literacy

Suggested Citation: Aykaç A, Tuncay B, Şehirli A.Ö. Assessments of Students' Numeracy Knowledge Levels in Health Literacy and Their Knowledge, Attitude, and Behavior Regarding Antibiotic Use. Mid Blac Sea Journal of Health Sci, 2023;9(4):572-590.

Address for correspondence/reprints:

Asli Aykac

Telephone number: +90 (533) 830 10 69

E-mail: aykacasli@yahoo.com

Note: The study was presented orally at "3rd International Hippocrates Congress on Medical and Health Sciences, March 6-7, 2020".

INTRODUCTION

Antibiotic resistance is an urgent global public health threat that killed at least 1.27 million people worldwide and was associated with nearly 5 million deaths in 2019, according to CDC reports. Globally, antibiotic and antifungal use is increasing, especially in low- and middle-income countries, as antibiotics become accessible and affordable. Given that global human consumption of antibiotics increased by 65% between 2000 and 2015, antibiotic consumption is projected to increase by 200% worldwide between 2015 and 2030 (1). In recent years, the global "One Health" movement has captured the attention of the entire world. In societies that are not aware of ‘’One Health’’, antibiotic resistance ratios are much higher (2). The irrational use of antibiotics due to the type of antibiotic supply, the reason for antibiotic use, and errors in the frequency of use lead to antibiotic resistance (3). It is reported that antibiotic resistance caused by inappropriate antibiotic consumption will threaten the lives of 10 million people worldwide by 2050 (4, 5). As microorganisms become resistant to anti-infective agents and drugs, available treatment options decrease in parallel with this situation. Infection is caused by resistant microorganisms that threaten human and animal health and cause prolonged disease processes, long-term hospitalization, and an increase in cost, morbidity, and mortality ratios (6, 7). Studies have reported that approximately 50% of all prescribed drugs are antibiotics (7, 8). The right attitude, adequate knowledge, and appropriate use of antibiotics are key components in the fight against antibiotic resistance. It is the responsibility of health authorities, the pharmaceutical industry, and all health professionals to find solutions to the antimicrobial resistance caused by the irrational use of antibiotics.

The frequency of antibiotic use is generally higher in outpatient treatment rather than in hospitalization. High ratios of resistance to antibiotics used in the treatment of common bacterial infections such as sexually transmitted infections, especially urinary tract infections, have been observed worldwide. For example, it has been reported that the rate of resistance to ciprofloxacin used in the treatment of urinary tract infections ranges from 8.4% to 92.9% for Escherichia coli and between 4.1% and 79.4% for Klebsiella pneumoniae (9). For this reason, the ratios of described resistant bacteria are reported to be higher than they should be (10,11). The idea that the use of antibiotics is a panacea despite little harm increases and even popularizes the inappropriate use of antibiotics by individuals, especially in developing countries. Although the biggest reason for the increase in antimicrobial resistance is the public's self-administration of antibiotics, the tendency of doctors to prescribe antibiotics for viral infections and/or the tendency of

pharmacists to sell antibiotics without a prescription also have a significant effect on the increase of antimicrobial resistance (12). Whereas, adherence to the drug regimen is essential to increase treatment efficacy and reduce the antimicrobial resistance ratio. The most common problem related to adherence to treatment is that individuals miscalculate the time to take the medications or do not take the medication on time. The compliance ratio of patients with the treatment regimens planned for them is reported to be 50%, including in developed countries (13, 14).

Ratios of self-medication are alarmingly high, especially in developing countries (15). Although there is no report describing the antimicrobial resistance ratio throughout the country in Turkish Republic of Northern Cyprus (TRNC), it was reported that the resistance ratio determined between 2010 and 2014 in a private hospital was lower than in other developing countries (16). Studies conducted in Middle Eastern countries report that irrational antibiotic use by students due to a lack of knowledge, attitude, and practice negatively affects the fight against antibiotic resistance (17-21). TRNC is a more developing country than the Middle East but does not have an administrative policy regarding antibiotic resistance. As emphasized in the results of the study evaluating the over-the-counter antibiotic sales of community pharmacists in TRNC, individuals can easily buy antibiotics without a prescription from any pharmacy (22).

Health literacy has a positive and significant effect on an individual's ability to cope with diseases and maintain their health status. There is a correlation between the increase in health literacy and less use of emergency care services, better general health, appropriate medication use, and better label reading of labels (23). In addition to reading and writing skills, individuals need basic math skills and an understanding of numbers needed to construct meaning in text, tables, or charts. In health literacy, one of the important parameters is numerical information about health. Basic computation and mathematics, namely numeracy, affect the individual's decision-making in health behaviors and accordingly the perception of the risks and benefits of the results (24). The use of antibiotics requires skills from problem-solving to decision-making, prospectus reading, and numeracy literacy. The inadequacy in knowledge of numeracy in the field of health affects the quality of communication with the physician negatively, as well as being an obstacle for the individual to manage himself (24, 25). Regarding infections, health literacy and the availability of numeracy tools are limited. Therefore, antimicrobial resistance ratios result from events that begin with self-treatment and eventually lead to antimicrobial resistance.

Raising the awareness of society, which is seen as a potential consumer, can only be achieved by increasing the knowledge of antimicrobial resistance with effective education and communication, and reducing the tendency of unnecessary antibiotic use. The current study, it was aimed to evaluate the factors that determine the antibiotic use behaviors of students and to evaluate the level of numeracy knowledge in health literacy, which is effective in reducing unnecessary or incorrect antibiotic use.

METHODS

Participants

At the beginning of the questionnaire form presented in our study, in which participation was based on volunteerism, the participants were informed about the purpose and content of the research. A total of 212 students voluntarily participated in our sample group, which consisted of 2nd-year students studying at a vocational school of health services at a private university. After obtaining the necessary permissions from the Near East University Scientific Research Ethics Committee (Appro. No. 74-935/2019), a questionnaire was conducted on the participants between December 1 and 30, 2019. After giving verbal information and signing the consent form by the participants, a questionnaire was applied to the students. The research was a questionnaire to evaluate the knowledge, attitudes, and behaviors of the 2nd-year vocational school of health services students in a private university regarding antibiotic use and their numerac skills related to health literacy.

Study Design

The questionnaire was adapted and developed through a literature review (26). Cronbach's coefficient for the current study result was 0.77. The questionnaire was composed of 5 sections: (a) socio-demographic characteristics; (b) ways of needing and obtaining antibiotics; (c) reasons for and frequency of antibiotic use; (d) antibiotic use information; and (e) knowledge levels of numeracy in health literacy. Knowledge levels of numeracy in health literacy of the participant was evaluated with a total of six questions using the parameters given in Table 1 (24). Scoring for each answer given to 6 questions in which the level of numeracy knowledge in health literacy of the student was questioned was as follows: the answers were "correct=2 points", "false, and left blank expression=0 points". The total score ranged from 0 (min) to 12 (max). A 9-12-point range represented an excellent level of numeracy knowledge in health literacy. The participants were asked whether they had received training on antibiotic use before and were asked to evaluate their level of knowledge on the subject according to their own statements. According to their own statements, their level of knowledge on antibiotic use was evaluated by using the Quintette Likert Scale from very poor (1) to excellent (5).

Table 1. The questions asked and the parameters evaluated in the calculation of the average level of general knowledge about numeracy knowledge in health literacy of the students participating in the research (n=212)

Evaluated parameters	Questions
risk percentage calculation	If 2 out of 10 people have a chance of getting a cold, what would be the risk of getting a cold?
duration of antibiotic treatment	Your doctor prescribed you an antibiotic for 7 days, you started taking the medication on the 1 October, when is your last day for taking the medication?
frequency of antibiotic use	Your doctor gives you an antibiotic and tells you to take it every 6 h. If you take your first tablet at 12 a.m., when do you take your next pill?
total daily dose calculation	If you take an antibiotic (625 mg) 2 times per day, how many total mg of antibiotics would you take in two days?
ratio conversion	If your antibiotic mixture contains 200 mg of medication per 2.5 ml. How many mg of medication is in a 50 ml bottle?
individual dose calculation	If your medicine bottle says the concentration is 10 mg/ml and your dose is 500 mg. How many ml should you take per dose?

Study Limitations

The research was limited to Vocational School of Health Services students aged 18 and over who resided in TRNC and agreed to participate in the research. The research was carried out in a certain time period.

Statistical Analysis

Descriptive and comparative statistical data were analyzed using the Statistical Package for the Social Sciences Program (SPSS; Ver. 24.0, free edition) (IBM Corp.; Armonk, NY, USA). Kolmogorov Smirnov and Shapiro Wilk tests were used to verify if the data conforms to a normal distribution. One-Way Anova and/or Kruskal-Wallis H tests were used to compare the relationship between the participants' socio-demographic characteristics and knowledge, attitude, behavior about antibiotic use, medical adherence and knowledge levels of numeracy in health literacy. The statistical significance value was taken as $p < 0.05$ in the analysis.

RESULTS

According to socio-demographic data, the average age of students was 20.33 ± 2.50. 53.8% (n = 114) of the participants were female, 97.6% were single (n = 207), and 41.5% (n = 88) lived in the dormitory. There were students in 23 different education programs at the vocational school of health services. It was determined that most of the questionnaire was taken from the department of first and emergency aid (42.9%; n = 91) (Table 2).

When the participants were asked whether they needed antibiotic use by themselves in the presence of any disease, 20.8% (n=44) stated that they needed "antibiotic use". When the participant students were asked what they do when they have health problems, 77.4% said they would "see a doctor". When asked how they provided the antibiotic when needed, 85.4% (n = 164) stated demanding antibiotics from a doctor (Table 3). Students stated that they used antibiotics most frequently in the presence of bacterial infections (63.2%) and fever as clinical findings (49.5%). The ratio of those who answered the question "How many times did you go to the doctor in the last year" as "once" was 34.4%, and the ratio of those who

have not been prescribed antibiotics after the doctor's examination was 47.2% (Table 3).

Table 2. Socio-demographic features of students participating in the research (n=212)

Characteristics		n	%
Age	18-20	138	65.1
	21-23	43	20.3
	24-26	27	12.7
	26^{+}	4	1.9
Gender	Female	114	53.8
	Male	98	46.2
Marital Status	Married	5	2.4
	Single	207	97.6
Place of residence	Dormitory	88	41.6
	House (Housemates)	66	31.1
	House (Family)	45	21.2
	House (Alone)	13	6.1
Nationality	Turkey	167	78.8
	TRNC	45	21.2
Healthcare personnel in family	Yes	57	26.9
	No	155	73.1
Departments	ODH, ORS, BDT, CDL, HDT, MWT, PST, ENT, WHS, LVH, AUT, OPT, OPO, PLT, PRF, RTT, MDS, MLR, ECT	77*	36.3
	Medical Imaging Technician	10	4.7
	Physiotherapy Technician	11	5.2
	First and Emergency Aid	91	42.9
	Anesthesia Technician	23	10.9

TRNC: Turkish Republic of Northern Cyprus *Departments with less than 10 participating students. ODH: Oral and Dental Health Support Personnel, ORS: Operating Room Services, BDT: Biomedical Device Technology, CDL: Child Development, and Learning HDT: Hemodialysis Technician, MWT: Midwifery, PST: Pharmacy Services, ENT: Electro-neurophysiology Technician, WHS: Worker Health and Safety, LVH: Laborant and Veterinary Health, AUT: Audiometry Technician, OPT: Optician, OPO: Orthopedic Prosthesis and Orthotics, PLT: Pathology Laboratory Technician, PRF: Perfusion Technician, RTP: Radiotherapy Technician, MDS: Medical Documentation and Secretarial, MLT: Medical Laboratory Technician, ECT: Elderly Care Technician

The knowledge, attitudes, and behaviors of the students regarding antibiotic use were questioned under the following headings: their reading habits of the prospectus, antibiotic intake method, duration of antibiotic use, and storage conditions. The percentage of students who read the instructions before using the antibiotic is 78.8%, and the ratio of participants who preferred to eat some food before taking the drug during antibiotic use was 84.9%. When the students were questioned about how long they used the prescribed antibiotic, 45.2% replied that they continued to use the drug until the symptoms of the disease disappeared. “Do you know enough about the storage conditions of antibiotics that do not require special storage conditions?” Although 81.6% of the students answered the question as sufficient, only 47.6% of the students stated that they store antibiotics at room temperature (Table 4).

Table 3. Behaviors related to antibiotic use, ways of providing antibiotics, Reasons and frequency of use of antibiotics of students participating in the study (n=212)

		Yes n (%)	No n (%)
Do you use antibiotics on your own when you have any health problems?		44 (20.8)	168 (79.2)
What do you do when you have any health problems?	See a doctor	164 (77.4)	48 (22.6)
	No specific treatment	39 (18.4)	173 (81.6)
	Self-medicated	9 (4.2)	203 (95.8)
How do you provide antibiotics?	left at home	12 (5.7)	200 (94.3)
	from friend	1 (0.5)	211 (99.5)
	from the pharmacy after being prescribed by a doctor	181 (85.4)	31 (14.6)
	pharmacy without prescription	2 (0.9)	210 (99.1)
Reason		**n**	**%**
Infections types	Viral	71	33.5
	Bacterial	134	63.2
	Parasitic	7	3.3
Symptoms	Pain	62	29.3
	Nausea/diarrhea	45	21.2
	Fever	105	49.5
Frequency		**n**	**%**
Seeing a doctor	Never	67	31.6
	1	73	34.4
	2	35	16.5
	> 2	37	17.5
Antibiotic prescription by a doctor	Never	100	47.2
	1	66	31.2
	2	23	10.8
	> 2	23	10.8

Table 4. Students' knowledge, attitudes, and behaviors about antibiotic use (n=212)

Antibiotics use	**n (%)**			
Reading prospectus	Yes 167 (78.8)	No 45 (21.2)		
Antibiotic intake method	before eating 22 (10.4)	while eating 4 (1.9)	after eating 180 (84.9)	doesn't matter 6 (2.8)
Duration of antibiotic use	until the box is finished 33 (15.6)	duration of prescribing 83 (39.2)	until the symptoms disappear 96 (45.2)	
Storage conditions	refrigerator 72 (34.0)	room temperature 101 (47.6)	dark place 39 (18.4)	

When the relationship between gender and independent variables was examined; it was determined that there was a significant difference between gender and self-use of antibiotics at home, obtaining antibiotics from the pharmacy after the doctor's prescription,

frequency of visiting a doctor in the previous year, prospectus reading habits, and eating before antibiotic intake (Table 5, $p<0.05$).

There was no significant difference between gender and duration of antibiotic use, storage conditions, and the reason for antibiotic use. When the relationship between the residence of the students and the frequency of the doctor's prescription of antibiotics was examined, a significant difference was found. According to this difference, the frequency of being prescribed antibiotics by doctors for the students living in the dormitory was significantly higher than the students living in other places ($p<0.05$). A significant difference was found between the place of residence of the students and the frequency of prescribing antibiotics by the doctor. It was determined that there was a significant difference between the "presence of health personnel in the family" data and the antibiotic intake duration of the participants. It has been determined that the ratio of use of the prescribed antibiotic during the prescribed duration among students who have health personnel in their families was significantly higher than that of those who do not have health personnel in their families ($p<0.05$).

Table 5. Dependent variables affected by gender, residence place, and having a health professional in the family.

Gender n (%)				**Female**	**Male**	**p**
Frequency of doctor visits	Never			26 (12.2)	43 (20.3)	**0.010***
	1			40 (18.9)	33 (15.5)	0.830
	2			18 (8.5)	15 (7.1)	0.916
	> 2			30 (14.2)	7 (3.3)	**0.000***
Prospectus reading	Yes			96 (45.3)	71 (33.5)	**0.037***
	No			18 (8.5)	27 (12.7)	**0.040***
antibiotic intake method	After eating			104 (48.8)	77 (36.3)	**0.017***
	Before eating			6 (3.0)	16 (7.6)	**0.020***
	While eating			2(1.0)	2 (0.9)	0.113
	Doesn't matter			2(1.0)	3 (1.4)	0.096
Place of residence n (%)		**Family**	**Dormitory**	**Housemates**	**Alone**	**p**
Frequency of doctor's prescription of antibiotic	Never	20 (9.4)	40 (18.9)	29 (13.7)	11 (5.2)	**0.045***
	1	14 (6.6)	28 (13.2)	22 (10.4)	2 (0.9)	0.071
	2	9 (4.3)	9 (4.2)	5 (2.3)	-	0.211
	> 2	2 (0.9)	11 (5.2)	10 (4.7)	-	0.062
Symptoms	Pain	8 (3.7)	29 (13.6)	23 (10.8)	2 (0.9)	0.053
	Diarrhea	10 (4.7)	19 (9.0)	15 (7.1)	1 (0.5)	0.074
	Fever	27 (12.7)	40 (18.9)	28 (13.2)	10 (4.7)	**0.044***
Healthcare personnel in the family n (%)				**Yes**	**No**	**p**
Antibiotic intake duration	until symptoms disappear			33 (15.6)	63 (29.7)	**0.009***
	until box is finished			9 (4.2)	24 (11.3)	0.183
	during the prescription			15 (7.1)	68 (32.1)	**0.012***

*, $p < 0.05$ and **, $p < 0.01$

Table 6. Comparison between the general knowledge level average score about numeracy knowledge in health literacy against socio-demographic data of the students participating in the study

Features	n	%	Av. Score ± SD	Min	Max	p
Gender						
Female	114	53.8	8.8 ± 2.0	4	14	0.021*
Male	98	46.2	7.5 ± 2.1	2	14	
Age						
18-20	138	65.1	7.2 ± 1.0	2	14	0.084
21-23	43	20.3	7.4 ± 2.1	4	14	
24-26	27	12.7	8.3 ± 1.1	4	14	
26+	4	1.9	8.1 ± 1.2	4	14	
Marital Status						
Married	5	2.4	7.5 ± 1.0	4	14	0.74
Single	207	97.6	7.4 ± 1.3	2	14	
Place of residence						
Dormitory	88	41.5	8.1 ± 1.0[a]	4	14	0.037*
House (Housemates)	66	31.1	7.1 ± 1.2 [a]	4	14	
House (Family)	45	21.2	7.8 ± 1.1 [a]	2	14	
House (Alone)	13	6.1	6.5 ± 1.4[b]	4	14	
Nationality						
Turkey	167	78.8	7.7 ± 2.3	4	14	0.81
TRNC	45	21.2	7.5 ± 2.1	2	14	
Healthcare personnel in family						
Yes	57	26.9	7.8 ± 1.4	4	14	0.78
No	155	73.1	7.7 ± 1.3	2	14	
Department						
ODH, ORS, BDT, CDL, HDT, MWT, PST, ENT, WHS, LVH, AUT, OPT, OPO, PLT, PRF, RTT, MDS, MLR, ECT	77*	36.3	6.9 ± 1.3 [a]	2	12	
Medical Imaging Technician	10	4.7	7.1 ± 1.2 [a]	4	14	
Physiotherapy Technician	11	5.2	7.3 ± 1.1 [a]	4	14	
First and Emergency Aid	91	42.9	8.7 ± 1.3 [b]	6	14	0.003**
Anesthesia Technician	23	10.9	9.2 ± 1.6 [b]	6	14	0.002**

*, $p < 0.05$ and **, $p < 0.01$

None of the students who self-evaluated their knowledge of antibiotic use rated their knowledge level as excellent. It was determined that the average score of knowledge level regarding antibiotic use, which was evaluated with a five-point Likert scale, was moderate for 70.7% of the students (Figure 1).

The mean scores of numeracy knowledge level in health literacy of the students were determined to be 8.1 ± 2.0. According to this score, it was determined that the numeracy in health literacy skills of the health services vocational school students was good. When the students' numeracy knowledge levels in health literacy were evaluated according to gender, it was determined that the mean score of female students was significantly higher than that of male students ($p < 0.05$; Table 6). When the

numeracy knowledge levels in health literacy of students were evaluated according to age groups, marital status, nationality, or the presence of healthcare personnel in their family, no statistically significant difference. When the numeracy knowledge levels in health literacy of students were evaluated according to their place of residence, a significant difference was found. It has been determined that the numeracy knowledge levels in health literacy of the students who live alone at home are lower than those who live in the dormitory, with a roommate, or with their family ($p < 0.05$). In our study, the relationship between the departments of the students in the vocational school of health services and their numeracy knowledge levels in health literacy was also evaluated. It was determined that the numeracy knowledge levels in health literacy of the students of the anesthesia technician and first and emergency aid departments were higher than the students of other departments participating in the research ($p < 0.01$).

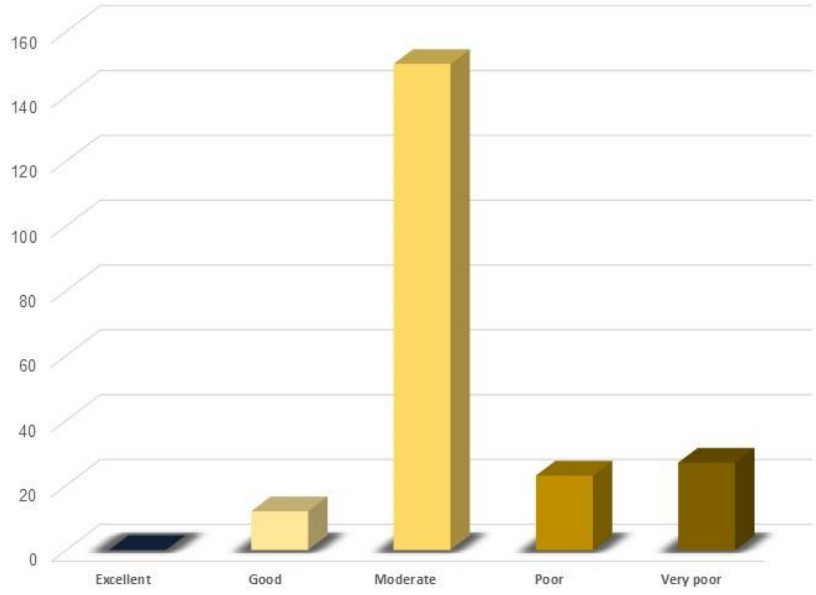

Figure 1. Students' self-assessed knowledge level of antibiotic use

DISCUSSION

In this study; the way of providing antibiotics, reason and frequency of use, and antibiotic use information (habit of reading the prospectus, taking an antibiotic when hungry or full, the duration to continue the antibiotic, and storage conditions) were investigated. The findings suggest gender, place of residence, and

having healthcare personnel in the family affected participants' knowledge, attributes, and behaviors about the usage of antibiotics. The most intensive participation in the study, based on volunteering, was provided by first and emergency aid (42.9%) and anesthesia technician department (10.8%) students. Moreover, it was determined that the highest knowledge score about numeracy in health literacy belonged to the students of these two departments. The reason why students studying in these departments both have higher participation and knowledge scores can be attributed to the fact that they received more training on drugs in accordance with the education curriculum in order to be authorized to use drugs, and thus their awareness increased.

In a study conducted among students studying in health sciences and non-health fields, it was determined that 36.1% of students studying in health sciences used self-medication in case of illness (27). According to the results we obtained, 77.4% of the students consult a doctor in the presence of a health problem, while 18.4% try to overcome their health problem without using medication. Our results, as found in the literature, determined that the ratio of self-medication was lower than expected and in line with the education received by our participant group. Our results, in a way, emphasize that the general health status of the individual is an important issue for the participants in the study.

The sources from which individuals obtain information about the antibiotics they use differ from country to country. One out of every three Europeans gets the information from their doctor, and 10% get it from their pharmacist. In Sweden, 98% of respondents to the questionnaire said that they took antibiotics with their doctor's prescription, while in Greece this rate was only 79% (28). Other studies emphasize that most people use drugs without consulting a doctor, and the most commonly used drugs are painkillers and antibiotics (29, 30). In our results, it was determined that the rate of using prescription antibiotics under the supervision of a doctor (85.4%) was higher than the rate of self-use of antibiotics. The fact that students participating in the study stated that they do not need antibiotics at a ratio of 79.2% when they encounter any health problem. The results can be considered evidence that the awareness of inappropriate antibiotic use has increased due to their education and that the expectation of the doctor to prescribe antibiotics has decreased. Below this positive result; public service announcements made by health authorities and restrictions on the over-the-counter sale of antibiotics (31).

A study reported that 35.6% of university students expected antibiotics to be prescribed for viral upper respiratory tract infections such as colds and flu. In the same study, they

emphasized that 77.8% of the students knew the role of antibiotics in the treatment of bacterial infections, but only 27.4% knew that antibiotics were not for viral infections (32). In our study, bacterial infections were determined as the type of disease requiring antibiotics at a ratio of 63.2%. In the definition of disease requiring antibiotic use, the ratio of students reporting viral infections was 33.5%. Considering the increase in the frequency of bacterial infections in parallel with the weakening of the immune system due to viral infections, our results were compatible with the literature. In our study, it was determined that the most common reason for antibiotic use was 'fever' with 49.5%. In the results of the research conducted with families, it was determined that the primary reason for starting antibiotics for the children of parents was fever (33). In similar studies, it has been found that the ratio of those who use antibiotics without the need for doctor control in viral infections such as the flu and cold was quite high (34).

The fact that the universe chosen for our research consisted of students and that 41.5% of the students stayed in dormitories can be explained as the reason for going to the doctor once last year. 47.2% of the students who went to the doctor in the previous year were not prescribed antibiotics, and 31.2% of the students have prescribed antibiotics once. In the study conducted in the TRNC, it was determined that pharmacists sell antibiotics without a prescription at a ratio of 41.5%.20 According to the data in our study, the low frequency of prescribing antibiotics confirms that antibiotics have ceased to be miracle drugs and that the attitudes and behaviors of all stakeholders on this subject have changed rationally.

Thanks to the developing technology, in our age where the speed of access to information is very high but information pollution on every subject is quite intense, patients can easily access information about the drugs they use. A study reported that as age increases, the frequency of obtaining information from physicians and pharmacists about drug use increases, but the frequency of reading/learning instructions for drug use decreases. As a result of the same research, it was determined that there was not a significant difference between the age groups of individuals and the status of regular drug prospectus reading depending on the presence of chronic disease (30). The fact that the rate of reading the prospectus of the students participating in the research is high (78.8%) suggests that this may be due to the fact that they are healthcare professionals despite their young average age. The information on whether to take antibiotics on an empty stomach or on a full stomach is not fully settled among the public. In this regard, the responsibility of all health professionals, especially physicians, and pharmacists, comes to the fore. It is of great importance to convey

the usage information or the points that need attention according to the drug properties to the patients, especially during the delivery of the drug to the patient. 84.9% of the students stated that they had a habit of eating before using antibiotics. With such a habit, the risk of drug-food interactions and/or delay in emptying stomach contents due to antibiotic use can be avoided.

The statement given by 45.3% of the participants regarding the duration of antibiotic use, which will contribute to the formation of antibiotic resistance, is that “they use the antibiotic given to them until the symptoms disappear”. Among the different answers, the ratio of participants stating that "it continues during the prescription", which is the ideal usage period, was 39.1%. Although these two ratios obtained from our results were close to each other, they were lower than the ratio (70%) of students who stated that they were "continuing during the prescription" as a result of the study conducted by Mete et al., (35). Kaya et al. found that 62.2% of the participants stopped using the drug when the symptoms of the disease disappeared, 25.7% changed the drug dose and 18.2% did not use the drug on time (36). While the results of the study conducted on the duration of antibiotic use emphasize the lack of general knowledge in this regard, the results of the current studies in the literature differ considerably from each other. When the responses given to the suggestions about the treatment were evaluated, it was determined that 10.4% of the patients used the antibiotic when they remembered, and 76.9% used it at the same time every day. RAU is an important point in the development of positive behaviors regarding antibiotic use. With the ratio of 76.9% obtained from our research, it is possible to say that the students received the necessary information from the doctor about the use of antibiotics after the examination and that they followed the antibiotic usage instructions given to them by the pharmacists while supplying their medicines.

Attention to the storage conditions of the drugs after opening the lid during use; in some cases, is important for drugs that lose their properties even in a short time such as the duration of treatment. Another responsibility of the health personnel is to warn the patients about the subject during drug supply and to provide the necessary information. In the study of Güngör et al., parents stated that they kept the antibiotics prescribed to their children in the refrigerator at a ratio of 59.5% (37). In our study results, it was stated that our students had stored antibiotics at room temperature with a ratio of 47.6%. In the study carried out by Sorensen et al., in Belgium, it was found that 1/3 of the participants hid the drugs under inappropriate conditions (38). It can be assumed that our students don't yet know enough about this topic because our findings don't entirely overlap with the literature.

In terms of antibiotic use of knowledge, attitudes, and behaviors of the participants; there was a statistically significant difference in the presence of gender, residence, and family health personnel. The effect of gender differences on the results is thought to be that the social responsibilities of females cause them to be more careful and detailed. The effect of students whose residence place is a dormitory on the results; in order to continue their education without interruption by taking their own responsibilities, they are more attentive to their general health status than other students. The fact that the presence of health personnel in the family has a meaningful effect on the results is thought to be an indication that the transfer of some known errors on the subject from parents to children is still continuing. Our results were consistent with the results of the study by Çelik et al. (39). It was determined that the level of knowledge of our students studying in the field of health, such as diseases that require antibiotic use, discrimination of symptoms, compliance with antibiotic treatment, and storage conditions, is not lower than the current literature data.

Studies on the level of numeracy knowledge in health literacy have generally been conducted on chronic diseases, and the number of studies evaluating the use of antibiotics and numeracy knowledge levels in health literacy in acute diseases is very limited. Our findings showed that the numeracy knowledge level of health services school students was good but not excellent. This negative result, which we encounter even in health students with middle and high education levels, can be considered a reflection of the fact that the situation can be worrying in individuals with standard education. As a result of a study, it was emphasized that the ratio of parents who believe that antibiotics will cure all kinds of viral, bacterial, and fungal infections is almost half of the individuals included in the study (40). Parents especially have problems giving the appropriate dose of liquid medicines to their children (41). Hasan et al. stated that there is a relationship between numeracy knowledge in health literacy and antibiotic resistance and side effects (24). It is also suggested that numeracy skills show parallelism with the patient's age, education level, and socioeconomic characteristics (42). Although the sample of our study consisted of second-year students studying in the field of health, no perfect positive relationship was found between education level and health literacy numerical knowledge level. However, 14.7% of the students scored above 9 points. This result highlights the fact that it is not easy to manipulate the numeracy level of health literacy knowledge of patients with adequate health literacy and education.

CONCLUSION

It is known that health literacy education for health professionals has the potential to

improve patient outcomes. Health literacy is an indicator of how individuals use their skills and even process health information according to demands. The main purpose is to improve communication between the patient and the healthcare professionals and to restore the health of the individual who requests healthcare services. Therefore, health literacy, which is the main guideline of the education programs of health professionals, should focus on reading, writing, and numeracy. It has been determined that students studying in the health sciences have sufficient knowledge about rational drug use and numeracy in health literacy, but they do not have an excellent level of knowledge yet despite being health students. It would be beneficial to organize the "rational antibiotic use" course in the education curriculum and to include courses that will improve students' numerical skills.

Ethics Committee Approval: Ethics committee approval was for this study from Near East University Scientific Research Ethics Committee (Appro. No. 74-935/2019)

Peer-review: Externally peer-reviewed.

Author Contributions: Concept-AA, BT, and AÖŞ, Design- AA, BT, AÖŞ, Data Collection and Processing – AA, BT, Analysis and Interpretation- AA, Writing-AA,

Acknowledgement: The study was presented orally at “3rd International Hippocrates Congress on Medical and Health Sciences, March 6-7, 2020”. The authors sincerely thank all Near East University, Vocational School of Health Services students who took the time to conduct this research.

Conflict of Interest: The author declared no conflict of interest.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. https://www.cdc.gov/drugresistance/about.html
2. Cantas L, Suer K. Review: the important bacterial zoonoses in "one health" concept. Front Public Health. 2014;14;2:144. doi: 10.3389/fpubh.2014.00144.
3. Llor C, Bjerrum L. Antimicrobial resistance: risk associated with antibiotic overuse and initiatives to reduce the problem. Ther Adv Drug Saf. 2014;5:229-241. doi: 10.1177/2042098614554919.
4. de Kraker ME, Stewardson AJ, Harbarth S. Will 10 Million People Die a Year due to Antimicrobial Resistance by 2050? PLoS Med. 2016;29:13:e1002184. doi: 10.1371/journal.pmed.1002184.
5. Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. Lancet. 2022;399:629-655. doi: 10.1016/S0140-6736(21)02724-0.
6. Aslam B, Wang W, Arshad MI, Khurshid M, Muzammil S, Rasool MH, et al. Antibiotic

resistance: a rundown of a global crisis. Infect Drug Resist. 2018;11:1645-1658. doi: 10.2147/IDR.S173867.

7. Reynolds D, Burnham JP, Vazquez GC, McCabe M, Yuenger V, Betthauser K, et al. The threat of multidrug-resistant/extensively drug-resistant Gram-negative respiratory infections: another pandemic. Eur Respir Rev. 2022;31:220068. doi: 10.1183/16000617.0068-2022
8. Torres NF, Chibi B, Kuupiel D, Solomon VP, Mashamba-Thompson TP, Middleton LE. The use of non-prescribed antibiotics; prevalence estimates in low-and-middle-income countries. A systematic review and meta-analysis. Arch Public Health. 2021;79:2. doi: 10.1186/s13690-020-00517-9.
9. https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance
10. Olesen SW, Barnett ML, MacFadden DR, Brownstein JS, Hernández-Díaz S, Lipsitch M, et al. The distribution of antibiotic use and its association with antibiotic resistance. Elife. 2018;7:e39435. doi: 10.7554/eLife.39435.
11. Cutler RL, Fernandez-Llimos F, Frommer M, Benrimoj C, Garcia-Cardenas V. Economic impact of medication non-adherence by disease groups: a systematic review. BMJ Open. 2018;8:e016982. http://doi.org/10.1136/bmjopen-2017-016982
12. Machowska A, Stålsby Lundborg C. Drivers of Irrational Use of Antibiotics in Europe. Int J Environ Res Public Health. 2018;16:27. doi: 10.3390/ijerph16010027
13. Jimmy B, Jose J. Patient medication adherence: measures in daily practice. Oman Med J. 2011;26:155-159. doi: 10.5001/omj.2011.38.
14. Bekker CL, Aslani P, Chen TF. The use of medication adherence guidelines in medication taking behaviour research. Res Social Adm Pharm. 2022;18:2325-2330. http://doi.org/10.1016/j.sapharm.2021.08.006.
15. Yin X, Mu K, Yang H, Wang J, Chen Z, Jiang N, et al. Prevalence of self-medication with antibiotics and its related factors among Chinese residents: a cross-sectional study. Antimicrob Resist Infect Control. 2021;10:89. doi: 10.1186/s13756-021-00954-3.
16. Ruh E, Gazi U, Güvenir M, Süer K, Çakır N. Antibiotic resistance rates of Pseudomonas aeruginosa, Acinetobacter baumannii and Klebsiella pneumoniae isolated from a university-affiliated hospital in North Cyprus. Turk Hij Den Biyol Derg. 2016;73:333-344.
17. Memon I, Alrashid AA, Alshammari HS, Rehman DE, Feroz Z, Nagro A, et al. Assessing the Effects of Basic Medical Science Courses on the Knowledge and Attitude towards Antibiotic Usage among

Pre-Professional Students in Saudi Arabia. Pharmacy (Basel). 2021;9:108. doi: 10.3390/pharmacy9020108.

18. Sawalha OF. A descriptive study of self-medication practices among Palestinian medical and nonmedical university students. Res Social Adm Pharm. 2008;4:164–172. http://doi.org/10.1016/j.sapharm.2007.04.004
19. Suaifan GA, Shehadeh M, Darwish DA. A cross-sectional study on Knowledge, attitude and behavior related to antibiotic use and resistance among medical and non-medical university students in Jordan. Afr J Pharm Pharmacol. 2012;6:763–770. http://doi.org/10.5897/AJPP12.080
20. Huang Y, Gu J, Zhang M. Knowledge, attitude and practice of antibiotics: A questionnaire study among 2500 Chinese students. BMC Med Educ. 2013;13:163. http://doi.org/10.1186/1472-6920-13-163
21. Ganesh M, Sridevi SA. Antibiotic use among medical and para medical students: knowledge, attitude and practice in a tertiary health care center in Chennai—A scientific insight. IJSR 2014;3:2277–8179. http://doi.org/10.36106/IJSR
22. Süer K, Çalı S, Aykaç A. Implementations Related to the Use of Antibiotics and Data Sources Used by Community Pharmacists in the Northern Cyprus. Cyprus J Med Sci. 2019;4:28-33. http://doi.org/10.5152/cjms.2019.697
23. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low health literacy and health outcomes: an updated systematic review. Ann Intern Med. 2011;155:97–107. http://doi.org/10.7326/0003-4819-155-2-201107190-00005
24. Hasan S, Gamal M, Samorinha C, Hassan NA. Antibiotic use numeracy: Developing the infectious numeracy test (INT). Res Social Adm Pharm. 2022;18:3580-3587. http://doi.org/10.1016/j.sapharm.2022.03.007.
25. Connell L, Finn Y, Dunne R, Sixsmith J. Health literacy education programmes developed for qualified health professionals: a scoping review protocol. HRB Open Res. 2022;4:97. doi: 10.12688/hrbopenres.13386.2.
26. Gupta MK, Vohra C, Raghav P. Assessment of knowledge, attitudes, and practices about antibiotic resistance among medical students in India. J Family Med Prim Care. 2019;8:2864-2869. doi: 10.4103/jfmpc.jfmpc_504_19
27. Büke Ç, Limoncu MH, Ermertcan Ş, Ciceklioglu M, Tuncel M, Köse Tet al. Irrational use of antibiotics among university students. J Infect. 2005;51:135-139, https://doi.org/10.1016/j.jinf.2004.12.001
28. European Commission. Special Eurobarometer 445: Antimicrobial Resistance; European Commission: Brussels, Belgium, 2016.

29. Karakurt P, Hacihasanoglu R, Yildirim A, Saglam R. Medication use among university Students. TAF Preventive Medicine Bulletin. 2010;9:505–512.
30. Yilmaz Kara D, Altun N, Kiliç M. Determination of Rational Drug Use Behaviors of Adult Individuals - A Cross-Sectional Study from Turkey. Curr Health Sci J. 2016;42:12-18. doi: 10.12865/CHSJ.42.01.02
31. Özcebe H, Üner S, Karadag O, Daryani A, Gershuni O, Czabanowska K, et al. Perspectives of physicians and pharmacists on rational use of antibiotics in Turkey and among Turkish migrants in Germany, Sweden and the Netherlands: a qualitative study. BMC Prim Care. 2022;23:29. https://doi.org/10.1186/s12875-022-01636-8
32. Tiong TW, Chua SS. Knowledge and Attitude of University Students on Antibiotics: A Cross-sectional Study in Malaysia. Drug Healthc Patient Saf. 2020;12:135-144. doi: 10.2147/DHPS.S253301
33. Güngör A, Çakır BÇ, Yalçın H, Çakır HT, Karauzun A. Evaluation of Parents' Attitudes and Behaviors Related to the Use of Antibiotics in Children. Turk J Pediatr. 2018;13:203-207. https://doi.org/10.12956/tjpd.2018.363
34. Zeru T, Berihu H, Buruh G, Gebrehiwot H, Zeru M. Parental knowledge and practice on antibiotic use for upper respiratory tract infections in children, in Aksum town health institutions, Northern Ethiopia: a cross-sectional study. Pan Afr Med J. 2020;35:142. https://doi.org/10.11604/pamj.2020.35.142.17848.
35. Mete S, Ünal Z. Kapadokya bölgesi il merkezlerinde yaşayanların ilaç kullanım alışkanlıklarının belirlenmesi. Nevşehir J Sci Technol. 2017;6:661-680. http://dx.doi.org/10.17100/nevbiltek.344344
36. Kaya H, Turan N, Keskin Ö, Tencere Z, Uzun E, Demir G, et al. Üniversite öğrencilerinin akılcı ilaç kullanma davranışları. J Anatolia Nurs Health Sci. 2015;18:35-42. https://doi.org/10.17049/ahsbd.67643
37. Güngör A, Çakır BÇ, Yalçın H, Çakır HT, Karauzun A. Evaluation of Parents' Attitudes and Behaviors Related to the Use of Antibiotics in Children. Turk J Pediatr. 2018;13:203-207. https://doi.org/10.12956/tjpd.2018.363
38. Sorensen L, Stokes JA, Purdie DM, Woodward M, Roberts MS. Medication management at home: Medication-related risk factors associated with poor health outcomes. Age Ageing. 2005;34:626-632. http://doi.org/10.1093/ageing/afi202
39. Çelik S, Alcadağ M, Erduran Y, Erduran F, Berberyakar N. The investigation of

antibiotic use situations health school student's. J Human Sci. 2010;7:1.

40. Alumran A, Hou XY, Hurst C. Assessing the overuse of antibiotics in children in Saudi Arabia: validation of the parental perception on antibiotics scale (PAPA scale). Health Qual Life Outcome. 2013;11:39. https://doi.org/10.1186/1477-7525-11-39
41. Yin HS, Mendelsohn AL, Wolf MS, Parker RM, Fierman A, van Schaick L, et al. Parents' medication administration errors: role of dosing instruments and health literacy. Arch Pediatr Adolesc Med. 2010;164:181–186. https://doi.org/10.1001/archpediatrics.2009.269
42. Ciampa PJ, Vaz LM, Blevins M, Sidat M, Rothman RL, Vermund SH, et al. The association among literacy, numeracy, HIV knowledge and health-seeking behavior: a population-based survey of women in rural Mozambique. PLoS One. 2012;7:e39391. https://doi.org/10.1371/journal.pone.0039391.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 591-605**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1277403

Is There A Relationship Between Chewing Side Preference and Brain Laterality in Bruxers and Non-Bruxers?

Özge Kartal[1(ID)], Defne Yalçın[1(ID)], İlknur Eninanç[1(ID)], Hasan Yeler[2(ID)], Esra Gültürk[3(ID)]

[1]Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Sivas Cumhuriyet University, Sivas, Turkey
[2] Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Sivas Cumhuriyet University, Sivas, Turkey
[3]Department of Basic Medical Sciences, Biostatistics, Faculty of Medicine, Sivas Cumhuriyet University, Sivas, Turkey

Received: 5 April 2023, Accepted: 5 October 2023, Published online: 29 October 2023

Abstract

Objective: There is no consensus on the etiology of unilateral mastication. While some studies argue that environmental factors such as missing teeth, teeth with restoration, pain, dental caries and temporomandibular disorder affect chewing side preference, others claim that brain laterality associated with hand, foot, ear and eye preferences also influences a chewing side preference. The aim of this study was to evaluate the relationship between the direction of unilateral chewing preference and brain laterality in fully dentate bruxers and non-bruxers (fully dentate or with missing and/or restored teeth).

Methods: Brain laterality of the subjects (n=132) was determined based on responses to questions about extremity and sensory preferences. The reliable visual analogue scale (VAS), Kazazoglu's method and the sunflower seed shell cracking test were used to determine chewing side preference (CSP).

Results: CSP as determined by VAS was not associated with brain laterality. While extremity and sensory preferences were predominantly right-sided (dominant left hemisphere) in all groups, the frequency of the left-side chewing was found to be high only among bruxers ($p>0.05$). No significant association was found between the results of VAS and other techniques ($p>0.05$).

Conclusion: The left-side CSP is observed more commonly in bruxers, suggesting that different central and peripheral mechanisms may be involved in bruxers.

Keywords: Chewing side preference; Laterality; Bruxism.

Suggested Citation: Kartal O, Yalcin D, Eninanc I, Yeler H, Gulturk E. Is There a Relationship Between Chewing Side Preference and Brain Laterality In Bruxers And Non-Bruxers Mid Blac Sea Journal of Health Sci, 2023;9(4):591-605.

Address for correspondence/reprints:

Defne Yalçın

Telephone number: +90 (346) 219 12 35

E-mail: dyeler@gmail.com

INTRODUCTION

Cerebral lateralization is described as the anatomical and functional differentiation between the left and right hemispheres of the brain (1). It also means that a hemisphere is predominantly responsible for control of a specific function (2). Functional cerebral lateralization refers to hand, foot, ear, and eye preferences (3).

Although chewing, the first step of digestion process (4), can occur bilaterally, it is considered that most people chew more on a particular side (right or left), that is, there is a chewing side preference (CSP) (5, 6).

There is no consensus on the etiology of unilateral mastication (7). While some studies argue that environmental factors such as missing teeth, teeth with restoration, pain, dental caries and temporomandibular disorder (TMD) affect chewing side preference (6-9), others claim that brain laterality associated with hand, foot, ear and eye preferences also influences CSP (3, 10, 11).

Clinically, lateralization is determined based on upper extremity tests (mostly hand) as well as information collected through eye (e.g., dominant eye test, eye deviation test), ear and lower extremity tests (foot) (12).

Bruxism is defined as parafunctional grinding and clenching of the teeth caused by nocturnal and/or diurnal activity of the masticatory muscles. Due to the controversial nature of this habit, most investigators state that the etiology of bruxism is multifactorial. Several methods and techniques are employed for the assessment of bruxism, including questionnaires, clinical examination, intraoral appliances, electromyography (EMG) and polysomnography (sleep laboratory) recordings. According to the clinical diagnosis, bruxism is graded as follows: possible, probable and definite bruxism. According to this system, “possible” bruxism is based on self-reporting through questionnaires and/or the anamnestic part of the clinical examination. The method involving self-report questionnaires in combination with clinical assessment of bruxism is commonly used in large-scale studies due to its convenience, and allows for making a diagnosis of “probable” bruxism (13, 14). “Definite” bruxism is diagnosed on the basis of self- reporting, a clinical examination, and polysomnographic or electromyographic recordings of the patients (13).

In a 2006 study, Fujita et al. (15) reported that bruxism is the most common behavior in patients with TMD and found a significant association between bruxism and unilateral

chewing. Similarly, Yeler et al. (16) also reported a significant relationship between bruxism and unilateral chewing. However, the relationship between the direction of unilateral chewing preference observed in bruxists and brain laterality has not been evaluated to date.

Although various methods are available to determine CSP (8, 17), there is still a lack of a widely accepted "gold standard" method for this purpose (17). Moreover, it has been noted that the nature of the test materials used in studies affects the assessment of the chewing side preference (18, 19). While Kazazoglu's method (20) uses a non-dissolving chewing gum with high cohesiveness and strong adhesiveness as test material, hard and solid foods such as almonds and roasted chickpeas are used in the VAS (visual analogue scale) method. In previous studies, VAS has been reported as the most reliable method to determine CSP (17).

Considering that a number of factors may negatively affect the test results, including the inability of the clinician to directly and simultaneously observe CSP, possible effects of the test environment on the patient and the period of thinking involved in the testing process, the authors of this study sought to determine whether "a simple gesture of cracking sunflower seed shells with the teeth can be used as a method to determine CSP".

The aims of this study were threefold: 1) to investigate the relationship between brain laterality and unilateral chewing preference as determined by VAS and Kazazoglu's method in fully dentate bruxers, fully dentate non-bruxers and non-bruxers with missing and/or restored teeth, 2) to evaluate the direction of unilateral chewing preference observed in all groups, and 3) to investigate whether cracking sunflower seed shells with the teeth can be reliably used to determine chewing side preference as an alternative to the established VAS method.

METHODS

Patient selection

The study protocol was approved by the Ethics Committee on Non-Interventional Clinical Trials of Sivas Cumhuriyet University on 14.04.2021 (No. 2021–04/06). The study was conducted in accordance with the principles laid out in the Declaration of Helsinki.

This study was conducted from April to December 2021 with 132 individuals (16 to 30 years of age) who presented to the Oral and Maxillofacial Radiology clinic of Sivas Cumhuriyet University Faculty of Dentistry for routine dental examination. Written informed consent was obtained from all individuals before initiation of the study.

G*Power version 3.1.9.4 was used for sample size calculation and power analysis, which showed that a total of 44 subjects (22 females, 22 males) would be needed for the study at $\alpha = 0.05$, $\beta = 0.20$, $1-\beta = 0.80$ and $d = 0.41$, with a test power of $p=0.806$. Individuals

who presented to the clinic and met the inclusion criteria defined for each group were randomly included in the study. Three groups were constructed for the study: fully dentate bruxers (Group I), fully dentate non-bruxers (Group II) and non-bruxers with missing or restored teeth (Group III). These groups were compared in terms chewing side preference and brain laterality.

The Karaduman Chewing Performance Scale (KCPS) was used to evaluate whether the groups have normal chewing function. KCPS classifies chewing function on a scale from 0 to 4. For normal chewing function, an individual must be able hold and bite on solid food, break down the food between the molars into small pieces and then swallow. Normal chewing function is assigned a score of 0 (21). In the current study, subjects with a score of 0 were included in each study group.

All study groups consisted of patients with normal chewing function and periodontal status, Angle Class I malocclusion, and no complaints of temporomandibular joint pain and/or orofacial pain. Dentate bruxers with no missing teeth other than third molars and self-reported teeth clenching/grinding for at least 6 months were included in Group I, and dentate non-bruxers with no missing teeth other than third molars without complaints of bruxism were assigned to Group II. Non-bruxers with missing and/or restored teeth were included in Group III, provided that the missing teeth or restorations were in the ipsilateral half jaws. Individuals with a bilateral chewing habit, a history of dental pain or masticatory muscle pain, ongoing orthodontic treatment and periodontal disease were excluded from the study.

In this study, the questionnaire proposed by Pintado et al. (22) and the clinical selection criteria described by Rompré et al. (23) were used for the diagnosis of probable bruxism. Responses to the questionnaire, clinical findings, and the diagnosis of bruxism were evaluated by a single dentomaxillofacial radiologist with 3 years of experience.

Using Pintado et al.'s criteria, bruxers were identified based on a positive answer to at least 2 of the following questions (22):

1. Has anyone ever told you that you grind your teeth at night?
2. Have you ever felt jaw fatigue on awakening in the morning?
3. Do you feel pain in your teeth and gums when you wake up in the morning?
4. Have you ever had headache on awakening in the morning?
5. Have you ever noticed that you grind your teeth during the day?
6. Have you ever noticed that you clench your teeth during the day?

Additionally, a diagnosis of bruxism was made when a subject met all of the clinical diagnostic criteria for bruxism proposed by Rompré et al. (23):

1. Self-reported teeth grinding at least 3 nights a week in the last 6 months,
2. The presence of clinical symptoms of tooth wear consistent with normal or eccentric jaw movements.
3. The presence of hypertrophy in the masseter muscle during voluntary contraction.
4. Self-reported fatigue, tenderness or stiffness in the chewing muscles after waking up in the morning.

Brain Laterality Test

Survey questions proposed by Nissan et al. (10) were used to determine brain laterality. For this test, all subjects responded to questions on 3 different tasks specific for handedness, footedness, eyedness and earedness, and individual preferences on a total of 12 tasks were noted.

Brain Laterality Test:

HAND:

-Hand used for throwing a ball

- Hand used for making a drawing

- Had used for erasing

FOOT:

-Foot used for kicking a ball

- Foot used to stomp on an object

- Foot used for standing on one leg

EAR:

-Ear used for listening through a hole

- Ear used for listening to a telephone

- Ear used for a single wired earpiece

EYE:

- Eye used for looking through a keyhole

- Eye used for looking through a dark hole

- Eye used for looking through a camera viewfinder

Based on patients' answers to the survey questions, the preferred side was recorded as right side, left side or both sides. Additionally, an I index was computed for each organ using the formula I = (R - L) / (R + L), where R is the number of tasks performed using the right side and L is the number of tasks performed using the left side,

The subject was considered right handed if I= +1 or left-side dominant if I= -1. A tendency for the right side was considered if I < 1. Left side dominance was considered if I > -1 or I= -1. If I = 0, the subject was considered as ambidextrous (10, 11).

Methods Used for Determining Preferred Chewing Side

Visual Analogue Scale (VAS)

The Visual Analogue Scale (VAS) is an easy and quick method that effectively assesses the degree of masticatory laterality. The scale is coded as (-1) for always using the left side, (+1) for always using the right side and (0) for using both sides equally. The subjects are asked to mark the preferred side for mastication on the scale after chewing hard foods such as almonds and roasted chickpeas (18).

Kazazoglu Method

The Kazazoglu method was used as an additional method to determine CSP of the groups. In this study, the data obtained using the

Kazazoglu method and VAS technique were compared.

This method was developed by Kazazoglu and consists of two parts, namely Observed Preferred Chewing Side and State Preferred Chewing Side. In the "Observed Preferred Chewing Side" part of the test, the chewing side is determined by visual inspection of the position of a chewing gum in the mouth after 1, 3, 5 and 7 consecutive chewing cycles. If three bites are observed on the same side of the chewing gum, then that side is considered as the chewing side. The "State Preferred Chewing Side" is determined based on the side where the chewing gum is located in the mouth after 2 minutes of chewing (18).

Sunflower Seed Shell Cracking (SSSC) Test

The Sunflower Seed Shell Cracking test was used in the current study based on the premise that it could be used to determine chewing side preference. For this test, the subject was asked to crack a shelled sunflower seed and the side that was first used for cracking was considered as the preferred chewing side. CSP was marked as right, left and the middle of the teeth and the agreement between the results of SCCC and VAS methods was investigated.

Statistical Analysis

The study data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM Corp., Armonk, NY). The study employed a single-blind method. Chi-square test and Fisher's exact test were used as appropriate for evaluating categorical variables and descriptive statistics. Categorical variables were reported as counts and percentages (%). Cohen's Kappa test was employed to investigate intra-observer reliability. The tests and methods used to determine chewing side preference were repeated at 1-week intervals by a single observer on 33 (25%) randomly selected patients to calculate intra-observer repeatability. Kappa (κ) coefficients were interpreted as follows: < 0.0, no agreement; 0.0 to 0.20, slight agreement; 0.21 to 0.40, fair agreement; 0.41 to 0.60, moderate agreement; 0.61 to 0.80, substantial agreement; 0.81 to 1.00, perfect agreement (24). P values less than 0.05 were considered statistically significant.

RESULTS

In this study, 196 individuals were evaluated, and 132 of them who met the study criteria

were included. The mean age of the study sample was 21.27 ± 2.97 years. The mean age was 21.65 ± 2.54 years in fully dentate bruxers, 21.15 ± 3.36 years in fully dentate non-bruxers and 21 ± 2.98 years in non-bruxers with missing and/or restored teeth. There was no significant age difference among the groups ($p>0.05$).

Regarding intra-observer agreement, while the VAS method showed substantial agreement (0.74) and the SSSC test exhibited perfect agreement (0.93), fair agreement (0.27) was

found for the observed preferred chewing side of Kazazoglu's test. The state preferred chewing side of Kazazoglu test was found to be non-reliable (0.5).

In the group of fully dentate bruxers, no significant association was found between CSP as determined by the VAS method and hand, foot, eye and ear preferences ($p>0.05$). In this group, extremity and sensory preferences were predominantly on the right side, whereas their chewing side preferences showed left side dominance (Table 1).

There was no significant association between VAS-assessed CSP and hand, foot, eye and ear preferences in fully dentate non-bruxers ($p>0.05$). In this group, CSPs were in the same direction and predominantly right-sided, which were at lower rates when compared with extremity and sensory preferences (Table 2).

No significant association was observed between VAS-assessed CSPs and hand, foot, eye and ear preferences among non-bruxers with missing and/or restored teeth ($p>0.05$). CSPs also showed right side dominance in this group, which was at a lower rate than extremity and sensory preferences (Table 3).

Table 1. Relationship between CSP and hand, foot, ear and eye preferences in fully dentate bruxers

		CSP as assessed by VAS			
		Right n (%)	**Left n (%)**	**Total n (%)**	**p**
HAND	**Right**	17 (44.7)	21 (55.3)	38 (86.4)	0.684
	Left	2 (33.3)	4 (66.7)	6 (13.6)	
FOOT	**Right**	17 (50)	17 (50)	34 (77.8)	0.148
	Left	2 (20)	8 (80)	10 (22.2)	
EAR	**Right**	15 (41.7)	21 (58.3)	36 (81.8)	0.710
	Left	4 (50)	4 (50)	8 (18.2)	
EYE	**Right**	17 (51.5)	16 (48.5)	33(75)	0.081
	Left	2 (18.2)	9 (81.8)	11 (25)	
CSP	**Total**	19 (43.2)	25 (56.8)	44 (100)	

CSP: Chewing Side Preference, VAS. Visual Analogue Scale

*Chi-square test (p denotes significance level, *p<0.05: statistically significant.)*

Table 2. Relationship between CSP and hand, foot, ear and eye preferences in fully dentate non- bruxers

		CSP as assessed by VAS			
		Right n (%)	**Left n (%)**	**Total n (%)**	**p**
HAND	**Right**	29 (67.4)	14 (32.6)	43 (93.3)	0.341
	Left	1 (100)	0 (0)	1 (6.7)	
FOOT	**Right**	14 (35.9)	25 (64.1)	39 (88.6)	0.647
	Left	4 (80)	1 (20)	5 (11.4)	
EAR	**Right**	24 (64.9)	13 (35.1)	37 (84.1)	1.000
	Left	5 (71.4)	2 (28.6)	7 (15.9)	
EYE	**Right**	24 (70.6)	10 (29.4)	34 (77.3)	0.271
	Left	5 (50)	5 (50%)	10 (22.7)	
CSP	**Total**	25 (65.9)	19 (34.1)	44 (100)	

CSP: Chewing Side Preference, VAS- Visual Analogue Scale

**p<0.05: statistically significant.*

Table 3. Relationship between CSP and hand, foot, ear and eye preferences in the non-bruxers with missing and/or restored teeth

	CSP as assessed by VAS				
		Right n (%)	**Left n (%)**	**Total n (%)**	**p**
HAND	**Right**	26 (63.4)	15 (36.6)	41 (93.2)	0.062
	Left	0 (0)	3 (100)	3 (6.8)	
FOOT	**Right**	24 (63.2)	14 (36.8)	38 (86.4)	0.208
	Left	2 (33.3)	4 (66.7)	6 (13.6)	
EAR	**Right**	21 (56.8)	16 (43.2)	37 (84.1)	0.682
	Left	5 (71.4)	2 (28.6)	7 (15.9)	
EYE	**Right**	23 (65.7)	12 (34.3)	35 (79.5)	0.128
	Left	3 (33.3)	6 (66.7)	9 (20.5)	
CSP	**Total**	26 (59.1)	18 (40.9)	44 (100)	

CSP: Chewing Side Preference, VAS: Visual Analogue Scale

**p<0.05: statistically significant.*

Table 4. Relationship between VAS and Kazazoglu method in the study groups

			Kazazoğlu (Observed)				
	Groups		**Right n (%)**	**Left n (%)**	**Both n (%)**	**Total n (%)**	**p**
VAS	**Fully dentate bruxers**	Right	11 (44)	5 (45.5)	3 (37.5)	19 (43.2)	0.935
		Left	14 (56)	6 (54.5)	5 (62.5)	25 (56.8)	
		Total	25 (56.8)	11 (25)	8 (18.2)	44 (100)	
	Fully dentate non-bruxers	Right	14 (63.6)	8 (80)	7 (58.3)	29 (65.9)	0.538
		Left	8 (36.4)	2 (20)	5 (41.7)	15 (34.1)	
		Total	22 (50)	10 (22.7)	12 (27.3)	44 (100)	
	Non-bruxers with missing and/or restored teeth	Right	18 (72)	6 (46.2)	2 (33.3)	26 (59.1)	0.118
		Left	7 (28)	7 (53. 8)	4 (66.7)	18 (40.9)	
		Total	25 (56.8)	13 (29.5)	6 (13.6)	44 (100)	

VAS: Visual Analogue Scale

*Chi-square test (p denotes significance level, *p<0.05: statistically significant.)*

In the current study, Kazazoglu's observed preferred chewing side method was used to determine CSP and compared with the VAS method, since the intra-observer agreement was lower for Kazazoglu's state preferred chewing side method. As a result, no significant association was found between the VAS method and Kazazoglu's observed preferred chewing side method among the groups (p>0.05) (Table 4).

On the sunflower seed shell cracking test, the subjects preferred the right side more frequently. In all three groups, there was no significant association between the VAS method and the SSSC test in terms of chewing side preference (p>0.05) (Table 5).

Table 5. Relationship between VAS and SSSC in the study groups

Groups		Sunflower Seed Shell Cracking Test				p
		Right n (%)	**Left** n (%)	**Middle of two teeth** n (%)	**Total** n (%)	
Fully dentate bruxers	Right	13 (68.4)	4 (21.1)	2 (10.5)	19 (43.2)	0.21
	Left	17 (68)	8 (32)	0 (0)	25 (56.8)	
	Total	30 (68.2)	12 (27.3)	2 (4.5)	44 (100)	
Fully dentate non-bruxers	Right	16 (55.2)	10 (34.5)	3 (13.3)	29 (59.1)	0.85
	Left	9 (60)	4 (26.7)	3 (13.3)	15 (34.1)	
	Total	25 (56.8)	14 (31.8)	2 (4.5)	44 (100)	
Non-bruxers with missing and/or restored teeth	Right	16 (61.5)	8 (30.8)	2 (7.7)	26 (59.1)	0.84
	Left	10 (55.6)	7 (38.9)	1 (5.6)	18 (40.9)	
	Total	26 (59.1)	15(34.1)	3 (6.8)	44 (100)	

VAS: Visual Analogue Scale
*Chi-square test (p denotes significance level, *p<0.05: statistically significant.)*

DISCUSSION

There is no universally accepted method for the diagnosis of bruxism, and each method has its own advantages and drawbacks (13). This study was conducted on individuals with "probable" bruxism due to the high cost and relatively difficult accessibility of polysomnographic and electromyographic recordings. The authors used the clinical evaluation criteria in addition to the questionnaire for this study and consider that a much more reliable study group has been established than would be obtained with the "possible" bruxism diagnostic criteria (13, 23).

In most of the physical activities, there is a preference to use one side of the body over the contralateral side with respect to hands, feet, ears and eyes (25, 26). Chewing is no exception and many studies have reported that there may be a preferred chewing side (7, 27).

There are several studies reporting that unilateral chewing is also affected by bruxism (17, 18). In a study, Fujita et al. (17) found a significant association between unilateral chewing and bruxism and stated that unilateral chewing and bruxism are the most common behaviors among parafunctional habits in patients with TMD ($p<0.05$). Consistently, Yeler et al. (18) found that 42% of individuals with TMD were bruxers and reported significant associations between TMD and bruxism and between bruxism and unilateral chewing ($p<0.05$). Ishibashi et al. (28) reported that bruxers with TMD tend to favor one side for chewing over the other compared to non-bruxers with TMD.

Former studies on the impact of environmental factors on chewing side preference (CSP) have yielded contradictory results. Various environmental factors have been examined in those studies, which included asymmetric tooth loss, partial denture, deciduous and mixed dentition, functional occlusal contact areas, head posture, presence

of caries, pain and food texture (3, 6, 7, 9, 11, 29, 30).

Haralur et al. (7), Omar et al. (31) and Rovira-Lastra et al. (5) have reported that the chewing side is affected by occlusal parameters, as assessed by the visual point method and masticatory efficiency test respectively. Contrastingly, Pond et al. (8) did not find an association between occlusion and chewing side preference using patient survey method. Oral pain and temporomandibular joint disorders have also been reported to affect CSP in aforementioned studies.

In a study involving 189 individuals from the Israeli population, Nissan et al. (10) investigated chewing side preference using patient questionnaire and the first cycle of gum chewing. The authors reported that local dental parameters such as missing teeth, teeth with implant-supported restoration and complete dentures had no effect on CSP. They also noted a significant association between CSP and hemispheric laterality ($p<0.05$). In another study by Nayak et al. (32) in 240 individuals from the Indian population, chewing side preference as determined by EMG or survey by age groups was not associated with caries in deciduous or permanent teeth.

In the current study, environmental factors such as pain, caries and premature occlusal contact other than missing or restored teeth were eliminated in all groups, which allowed for investigating specifically their effect on chewing side preference and its association with brain laterality. In contrast to Nissan et al.'s report (10), chewing side preference was not significantly associated with brain laterality in individuals with missing or restored teeth in the present study. This discrepancy may be explained by differences in populations studied and methodology. Moreover, since the primary aim of this study was not to investigate the impact of environmental factors on chewing side preference, the exclusion of the individuals who use both sides for chewing represents a limitation in the examination of any effect of environmental factors.

In studies reporting that chewing side preference is influenced by the central nervous system, CSP was found to be associated with hemispheric laterality including handedness, footedness, earedness and eyedness, and this relationship has been explored in diverse populations using different methods (3, 10, 11).

In a South Korean study by Seung-Min Lee et al. (3) in 54 fully dentate individuals without caries aged 25 to 35 years, chewing gum was used as the test food to determine CSP during 30 chewing strokes, and the side with more than 15 strokes was considered as the preferred chewing side. The authors reported that CSP was associated with eye and foot preferences ($p<0.05$) but not with hand and ear preferences ($p>0.05$).

In a study from Turkey by Serel Arslan et al. (11) involving 75 fully dentate individuals (21

to 45 years of age) with no caries, CSP was determined using VAS and found to be significantly correlated with hand, foot, ear and eye preferences ($p<0.05$). In that study, chewing side preference was reported to be centrally controlled.

On the other hand, there are studies reporting that there is no correlation between CSP and lateral dominance (27, 29, 33). Martinez-Gomis et al. (30) found no significant relationship between CSP and hand preference using Optosil silicone tablets as test material in 117 young adults 17 to 47 years of age with natural dentition ($p>0.05$). In a study by Gisel (33), preferences of placing food either on the left or right side of the mouth when starting to eat were examined in 98 children 5 to 8 years of age and then compared with hand preferences. As a result, they found no significant association between handedness and chewing side preference ($p>0.05$). Khamnei et al. (27) analyzed chewing side preference with handedness in 19 healthy young subjects using soft (cake) and hard (walnut) foods using surface EMG recordings from the jaw muscles and reported no significant correlation ($p>0.05$). However, they observed right side dominance for both preferences and suggested that chewing side preference possibly originates from the dominant brain hemisphere.

Previous studies have discussed involvement of many factors in the etiology of bruxism including the central nervous system (34, 35). Whether the unilateral chewing tendency reported among bruxers is also determined centrally was another topic that the current study was interested in examining. In line with aforementioned studies, CSPs were not significantly associated with hand, foot, ear and eye preferences or brain laterality in any of the groups including the bruxers in the present study. As there are no studies in the literature exploring the relationship between chewing side preference and brain laterality in bruxers, a direct comparison could not be made among bruxer populations across studies.

Furthermore, there were very few study subjects with left side dominance in extremity and sensory preferences, which limited the ability of the authors to draw firm conclusions on the correlation of chewing side preferences with brain laterality in left-handed subjects.

As reported by many studies, right-handedness and thus left brain dominance are more prevalent in the general population (5, 10, 36). Studies in different populations have demonstrated that chewing occurs predominantly on the right side (5, 36) and chewing side preference may be centrally regulated (5, 10, 11, 30).

Consistently, results of the current study showed a higher rate of right side preference in extremity use, indicating left brain dominance. However, although chewing side preferences were in the same direction as the extremity and sensory preferences among non-bruxer groups,

the lower rate of right side preference and the non-significant association with brain laterality suggest that environmental factors may be involved in these groups.

In the group of bruxers, right-sided extremity and sensory preferences along with a slight tendency to chew on the left side showed no relationship with the dominant brain lobe involved in extremity and sensory preferences ($p>0.05$). However, higher frequency of left side dominance among bruxers compared to the other groups in the current study led us to consider whether different central or environmental factors come into play in that case. The authors think that this differential finding observed in bruxers warrants further studies in larger populations with a balanced distribution of left-handed and right-handed individuals.

To the best of the authors' knowledge, Kazazoglu's method was tested in only one study in comparison to other methods. In a study, Varela et al. (36) compared kinesiography method with Kazazoglu's observed and state preferred chewing side tests for determining chewing side preference and found no significant agreement between the two methods. In the present study, Kazazoglu's method showed low intra-observer agreement and was not significantly associated with VAS ($p>0.05$). Based on these results, it was concluded that Kazazoglu's method is not a reliable method for determining chewing side preference.

In the current study, it was sought whether sunflower seed shell cracking (SSSC) test could serve as a better method to determine CSP than established methods. Although SSSC test was not significantly associated VAS, it showed perfect intra-observer agreement, which was the highest among the methods used. This may also explain the abrasions observed in the area used for cracking sunflower seed shells among individuals with a habit of eating sunflower seeds.

CONCLUSION

In conclusion, there was no relationship between chewing side preference and the dominant brain hemisphere indicated by the extremity and sensory preferences identified. Extremity and sensory preferences of the study sample were predominantly right-sided (dominant left hemisphere). However, right side preference for chewing was less common in the study groups, and even showed left side dominance among bruxer groups. Different central and peripheral mechanisms may be involved in CSP, and further studies are needed to corroborate the current findings. Kazazoglu's method was found to be a non-reliable method to determine CSP and although the sunflower seed shell cracking test was reliable, its validity could not be demonstrated.

Ethics Committee Approval: Approval of the study protocol was granted by the Ethics Committee on Non-Interventional Clinical Trials of Sivas Cumhuriyet University on 14.04.2021 (No. 2021–04/06).

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: ÖK, DY, İE, HY, EG; Design: ÖK, DY, İE, HY, EG; Data Collection and Processing: ÖK, DY, İE, HY, E G; Analysis and Interpretation: ÖK, DY, İE, HY, EG; Writing: ÖK, DY, İE

Conflict of Interest: The author declared no conflict of interest.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. Beaton AA, Hugdahl K, Ray P. Lateral asymmetries and interhemispheric transfer in aging: a review and some new data. Side bias: A neuropsychological perspective. 2000:101-52.
2. Teasell R, Hussein N. Clinical consequences of stroke. Evidence-based review of stroke rehabilitation, 2018. pp. 1–29.
3. Lee S-M, Oh S, Yu SJ, Lee K-M, Son S-A, Kwon YH, et al. Association between brain lateralization and mixing ability of chewing side. J Dent Sci. 2017;12(2):133-8.
4. Peyron MA, Woda A, Bourdiol P, Hennequin M. Age-related changes in mastication. J Oral Rehabil. 2017;44(4):299–312.
5. Rovira-Lastra B, Flores-Orozco EI, Ayuso-Montero R, Peraire M, Martinez-Gomis J. Peripheral, functional and postural asymmetries related to the preferred chewing side in adults with natural dentition. J Oral Rehabil. 2016;43(4):279-85.
6. Diernberger S, Bernhardt O, Schwahn C, Kordass B. Self-reported chewing side preference and its associations with occlusal, temporomandibular and prosthodontic factors: results from the population-based Study of Health in Pomerania (SHIP-0). J Oral Rehabil 2008; 35(8): 613-20.
7. Haralur SB, Majeed MI, Chaturvedi S, et al. Association between preferred chewing side and dynamic occlusal parameters. J Int Med Res 2019; 47(5): 1908-15.
8. Pond LH, Barghi N and Barnwell GM. Occlusion and chewing side preference. J Prosthet Dent 1986; 55(4): 498-500.
9. Santana-Mora U, López-Cedrún J, Mora MJ, Otero XL, Santana-Penín U. Temporomandibular disorders: the habitual chewing side syndrome. PloS one. 2013;8(4):e59980.
10. Nissan J, Gross MD, Shifman A, Tzadok L,Assif D. Chewing side preference as a type of hemispheric laterality. J Oral Rehabil 2004; 31(5): 412-6.
11. Serel Arslan S, İnal Ö, Demir N, Ölmez M, Karaduman A. Chewing side preference is

associated with hemispheric laterality in healthy adults. Somatosens Mot Res 2017; 34(2): 92-5.

12. Akinoğlu B, Düdükçü H, Mohammadi K, Yilmaz AE, Temur CS. Sağlıklı Gençlerde El, Göz ve Ayak Dominantlığı ile Motor Öğrenme Becerisi Arasındaki İlişkinin İncelenmesi. Uluslararası Egzersiz Psikolojisi Dergisi. 2022;4(2):47-56.
13. Eninanç İ, Yalçın Yeler D and Çınar Z. Investigation of mandibular fractal dimension on digital panoramic radiographs in bruxist individuals. Oral Surg Oral Med Oral Radiol 2021; 131(5): 600-9.
14. Lobbezoo F, Ahlberg J, Glaros AG, Kato T, Koyano K, Lavigne GJ et al. Bruxism defined and graded: an international consensus. J Oral Rehabil 2013; 40(1): 2-4.
15. Fujita Y, Motegi E, Nomura M, Kawamura S, Yamaguchi D, Yamaguchi H. Oral habits of temporomandibular disorder patients with malocclusion. Bull Tokyo Dent Coll 2003; 44(4): 201-7.
16. Yalçın Yeler D, Yılmaz N, Koraltan M, Aydın E. A survey on the potential relationships between TMD, possible sleep bruxism, unilateral chewing and occlusal factors in Turkish university students. Cranio 2017; 35(5): 308-14.
17. Flores-Orozco EI, Rovira-Lastra B, Peraire M, et al. Reliability of a visual analog scale for determining the preferred mastication side. J Prosthet Dent 2016; 115(2): 203-8.
18. Delport HP, De Laat A, Nijs J, et al. Preference pattern of mastication during the first chewing cycle. Electromyogr Clin Neurophysiol 1983; 23(6): 491-500.
19. Mizumori T, Tsubakimoto T, Iwasaki M, Nakamura T. Masticatory laterality–evaluation and influence of food texture. J Oral Rehabil 2003; 30(10): 995-9.
20. Kazazoglu E. Heath MR and Müller F. A simple test for determination of the preferred chewing side. J Oral Rehabil 1994; 21(6): 723-4.
21. Serel Arslan S, Demir N, Barak Dolgun A, Karaduman AA. Development of a new instrument for determining the level of chewing function in children. J Oral Rehabil 2016; 43(7): 488–95.
22. Pintado MR, Anderson GC, DeLong R, Douglas WH. Variation in tooth wear in young adults over a two-year period. J Prosthet Dent 1997; 77(3): 313-20.
23. Rompré PH, Daigle-Landry D, Guitard F, Montplaisir JY, Lavigne GJ. Identification of a sleep bruxism subgroup with a higher risk of pain. J Dent Res 2007; 86(9): 837-42.
24. Wan T, Jun H, Zhang H, Pan W, Hua H. Kappa coefficient: a popular measure of rater agreement. Shanghai Arch Psychiatry. 2015;27(1):62.
25. Serrien DJ, Sovijärvi-Spapé MM. Hemispheric asymmetries and the control of motor sequences. Behav Brain Res.2015;283:30-6.

26. Alqadah A, Hsieh YW, Morrissey ZD, Chuang CF. Asymmetric development of the nervous system. Dev Dyn.2018;247(1):124-37.
27. Khamnei S, Sadat-Ebrahimi S-R, Salarilak S, Oskoee SS, Houshyar Y, Shakouri SK, et al. Manifestation of hemispheric laterality in chewing side preference and handedness. BioImpacts: BI. 2019;9(3):189.
28. Ishibashi T and Funakubo F. Questionnaire evaluation of temporomandibular joint dysfunction factors in teen-age school children. Nippon Koku Kagaku Gakkai Zasshi 1988; 37: 980-7.
29. Martinez-Gomis J, Lujan-Climent M, Palau S, Bizar J, Salsench J,Peraire M. Relationship between chewing side preference and handedness and lateral asymmetry of peripheral factors. Arch Oral Biol 2009; 54(2): 101-7.
30. Barcellos DC, De Paiva Gonçalves SE, Da Silva MA, Borges AB, Pleffken PR, Pucci CR et al. Prevalence of chewing side preference in the deciduous, mixed and permanent dentitions. J Contemp Dent Pract 2011; 12(5): 339-42.
31. Omar SM, McEwen JD and Ogston SA. A test for occlusal function. Br J Orthod 1987; 14(2): 85-90.
32. Nayak UA, Sharma R, Kashyap N, Prajapati D, Kappadi D, Wadhwa S et al. Association between chewing side preference and dental caries among deciduous, mixed and permanent dentition. J Clin Diagnostic Res 2016; 10(9): ZC05-ZCO8.
33. Gisel EG. Development of oral side preference during chewing and its relation to hand preference in normal 2-to 8-year-old children. Am J Occup Ther 1988; 42(6): 378-83.
34. Castrillon EE, Ou K-L, Wang K, Zhang J, Zhou X, Svensson P. Sleep bruxism: an updated review of an old problem. Acta Odontol Scand. 2016;74(5):328-34.
35. Lobbezoo F, Van Der Zaag J, Van Selms MKA, Hamburger HL, Naeıje M. Principles for the management of bruxism. J Oral Rehabil 2008; 35(7): 509-23.
36. Varela JMF, Castro NB, Biedma BM, Da Silva Dominguez JL, Quintanilla JS, Bahillo JG et al. A comparison of the methods used to determine chewing preference. J Oral Rehabil 2003; 30(10): 990-4.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 606-621**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1278930

The Effect of Women's Family Planning Method Use on Worry Level

Kumru Aydın[1](ID) Ebru Şahin[2](ID)

[1]Department of Nursing, Instutition of Health Sciences, Ordu University, Ordu, Turkey
[2]Department of Gynecologic and Obstetrics Nursing, Faculty of Health Sciences, Ordu University, Ordu, Turkey

Received: 7 April 2023, Accepted: 5 October 2023, Published online: 29 October 2023

Abstract

Objectives: The research is aimed to determine the effect of women's family planning method use on worry level.

Methods: The sample of this descriptive study was composed of 339 women who applied to the outpatient clinics of a hospital in Trabzon between 15.05.2019-01.10.2019. Data from the study was collected via the personal data form and the Penn State Worry Questionnaire (PSWQ). Descriptive statistical methods, Cronbach Alpha reliability Test, t test in independent groups and ANOVA test were used to evaluate the research data. Before collecting data, permission to use the scale, research permission, ethics committee permission and written consent were obtained from the women participate in the research.

Results: The average age of the women involved in the study was 31.51±6.53. %51 of the women were high school graduates and %65.8 were housewives. %12.4 of women expressed concern about the family planning method they used. Women received an average score of 54.16±14.39 from PSWQ. The mean scores of women using oral contraceptives, condoms, intrauterine devices and withdrawal methods from PSWQ are respectively 52.19±9.17, 58.20±15.25, 46.84±14.97 and 59.38±13.82 found to be. The PSWQ mean scores of women 25-32 aged between, 6 Months-1 years married, living in a large family, has a pregnancy and a child, the family planning method he uses negatively affects his sexual life and his relationship with his wife, dissatisfied with the family planning method he and his wife use, not trusting the method, worried about the method, fear of pregnancy it was found to be higher than other women and the difference between groups was statistically significant ($p<0.05$).

Conclusion: Worry levels of women using withdrawal method were found to be higher than women using oral contraceptives and intrauterine devices, and worry levels of women were affected by different variables.

Keywords: Family planning, worry, woman, nursing.

Suggested Citation: Aydın K, Şahin E. The Effect of Women's Family Planning Method Use on Worry Level Mid Blac Sea Journal of Health Sci, 2023;9(4):606-621.

Address for correspondence/reprints:

Ebru Şahin

Telephone number: +90 (506) 256 97 64

E-mail: ebrugabalci_@hotmail.com

INTRODUCTION

Family planning (FP) is defined as couples' undertaking responsibilities in all respects in line with their decisions and having children whenever they want. FP helps couples to avoid undesired pregnancies, determine the duration between childbirths, decide when to have children by evaluating their age and economic conditions, and help infertile couples to have children. If FP, which has an important place in primary health care services, is not used sufficiently, many health and social problems arise (1). FP methods have two main goals. The first goal is to determine the durations between two pregnancies and the second is to control the delivery of more children. The three main elements that contribute to achieving these goals are knowledge, attitudes, and practices. Any of these factors affect the outcome of family planning (2).

Deciding on the FP method is one of the most sensitive and important issues for spouses. Many factors such as education, religious belief, and ethical and cultural values of the person may change this decision. The diversity of FP methods and applications increases personal freedom and determination (3). It is thought that this high diversity will also lead to indecision in spouses and increase anxiety levels.

Women stop using FP methods due to reasons such as not trusting the protectiveness of the methods, getting pregnant while using a method, pain, infections, difficulty in use, the spouse's unwillingness, dizziness, angriness, stomachache, nausea, weight gain, the thought that there may be a hormonal disorder, and wanting a child. Women who use intrauterine devices stop using them mostly due to bleeding (59.4%) and pain (33.3%); women using the withdrawal method stop using this method mostly since they do not trust the protectiveness of this method (57.4%); women using condoms stop using them mostly because their spouses do not want (46.1%); women using oral contraceptives OCS stop using this method mostly because they experience angriness, headache, and dizziness (54%) (4). These factors that lead women to stop using methods can affect women's psychology negatively.

In the study conducted by Çayan (4), it was determined that 35.6% of women conceived while using the method and that these women were using the withdrawal method (72.5%), condom (15.6%), OCS (3.9%), and intrauterine device (IUD) (%) 1.9) when they conceived. In the study of Helvacıoğlu et al. (5), it was determined that 27.8% of women had worries about the use of OCS and that they were most worried about weight gain (40.8%) and hair growth (25%). Women using the withdrawal method often have worries about conceiving (6,7). It was determined that couples using condoms were most worried about the tearing of the condom during sexual intercourse (8).

The problems women experience while using methods, their trust in the methods they use, the negative effects of the used method on sexual life, the lack of sufficient knowledge about the methods, the fear of conceiving while using the method, and the level of satisfaction with the methods lead to a risk of anxiety and reduced quality of life in women. There is a limited number of studies on FP methods and the worry phenomena in the literature. According to the Turkey Demographic and Health Survey (TDHS) reports, the most commonly used FP methods by women are withdrawal, condoms, intrauterine devices, and oral contraceptives (9,10). In this study, the most commonly used FP methods by women according to TDHS data were evaluated and the effect of these methods on the level of anxiety was examined. It is thought that the results will provide benefit the counseling services of nurses.

METHODS

Research Type, Population, and Sample

The descriptive study was conducted in a state hospital in Trabzon between 05/15/2019 and 10/01/2019. The sample size was calculated using the formula for known populations and 339 women were planned to be included in the study.

According to the calculated sample size, the aim was to reach an equal number of women using oral contraceptives (84 people), condoms (85 people), IUDs (85 people), and the withdrawal method (85 people).

Inclusion Criteria of Research

- Being married,
- Being at least a primary school graduate,
- Being aged between 18-49,
- Not being pregnant,
- Using one of the family planning methods (oral contraceptives, condoms, intrauterine devices, withdrawal) for at least 6 months,
- Not having a psychological problem,
- Not having a gynecological disease that prevents reproduction,
- Not having a sexually transmitted disease,
- Being able to communicate verbally,
- Voluntarily agreeing to participate in the research.

Exclusion Criteria of Research

- Having entered menopause naturally or with surgical methods,
- Using a method other than oral contraceptives, condoms, intrauterine devices, or the withdrawal method.
- Disagreeing to participate in the research.

A total of 339 married women who were at least primary school graduates, who were aged 18-49, who were not pregnant, who were using one of the FP methods (OCS, condom, IUD, withdrawal) for at least 6 months, and who did not have a psychological problem, gynecological disease or sexually transmitted disease were included in the study.

Women who had entered menopause naturally or with surgical methods and women who were using any method other than oral contraceptives, condoms, intrauterine devices, and the withdrawal method were not included in the study.

Data Collection

The research data were collected using a personal information form and the Penn State Worry Questionnaire (PSWQ) from the women who applied to the hospital's outpatient clinics, excluding the mental health and diseases outpatient clinics. The women were informed about the purpose and contributions of the research and the data collection tools were applied to the women who met the research criteria and volunteered to participate in face-to-face interviews. It took approximately 15-20 minutes to implement the data collection tools.

Data Collection Tools

Personal Information Form

The Personal Information Form was prepared by reviewing the literature and includes questions regarding the participants' socio-demographic characteristics (age, age of marriage, education and income level, employment status, family type, duration of marriage, and information about the spouse), obstetric characteristics (number of pregnancies and births, history of risky pregnancy, and loss of pregnancy), the FP method used, and sexual life characteristics (frequency of sexual intercourses, sexual self-evaluation, general communication with the spouse, FP method used for the last six months, duration of using the method, the effect of the FP method on sexual life and the relationship with the spouse, satisfaction of the woman with the FP method, satisfaction of the spouse with the FP method, trust in the FP method, worry about the FP method, and fear of pregnancy).

Penn State Worry Questionnaire (PSWQ)

PSWQ was developed by Meyer et al. in 1990. The Turkish reliability and validity of the questionnaire were established by Yılmaz et al. in 2008. The questionnaire evaluates the severity, prevalence, and controllability of general and persistent worry that is not specific to any subject. It is widely used in the evaluation of clinical practice and research on pathological worry. The questionnaire consists of 16 items. Participants evaluate the extent to which each item describes themselves on a 5-point Likert-type scale ranging from "1 = Does not describe me at all" to "5 = Describes me very well". The original PSWQ is in a single-factor structure. A single total score is obtained by summing the scores of all items. Of the 16 items of PSWQ, 11 are straight-scored and 5 (1, 3, 8, 10, and 11) are reverse-scored. The score obtainable from the questionnaire ranges from 16 to 80. An increase in the total score indicates an increase in the level of pathological worry. The psychometric analyses showed that the Turkish PSWQ has a single-factor structure as in the original version and that the evaluation should be made according to the total score (11,12).

The corrected item-total correlations of the questionnaire ranged from 0.32 to 0.75. The Cronbach alpha and split-half reliability coefficients of the questionnaire are 0.91 and the test-retest reliability coefficient is 0.88 (12).

Ethical consideration

Permission was taken from the author via e-mail to use the Penn State Worry Questionnaire in the study. To carry out the research, permission

(Annex-4) was taken from the Trabzon Provincial Directorate of Health, and institutional permission was taken from the hospital where the research was carried out. Ethics committee approval dated 04/04/2019 and numbered 2019/17 was received from the Clinical Research Ethics Committee of the University of Health Sciences, Kanuni Training and Research Hospital. Written informed consent was taken from the women who volunteered to participate in the study.

Statistical Analysis

The data were analyzed on the computer using the Statistical Package for Social Sciences (SPSS) for Windows 22 package program. Descriptive statistical methods including numbers, percentages, mean, standard deviation, minimum and maximum values for data analysis and Kurtosis and Skewness coefficients were used to check the normality distribution of the data. Independent samples t-test was used for the comparison of paired groups and One-Way Analysis of Variance (ANOVA) was used for the comparison of multiple groups. LSD and Dunnett-C tests were used for further analysis of the differences resulting from the Analysis of Variance. The internal validity of the questionnaire was evaluated using the Cronbach alpha coefficient. The data were tested and interpreted according to the significance level of 0.05.

RESULTS

The mean age of the women was 31.51±6.53 (20-49 years); the mean duration of marriage was 8.71±7.13 years (6 months-29 years); the mean age of marriage was 22.84±3.20 (15-39 years). Of the women, 52.2% were aged between 25-32; 51% were high school graduates; 65.8% were housewives; spouses of 53.4% were high school graduates; spouses of 49.9% were employees; 75.5% got married between the ages of 19-25; 43.7% were married for 1-5 years; 63.1% had a moderate income; 91.2% had a nuclear family; the place of longest residence of 56.3% was a town (Table 1).

The mean duration of the use of a method by women was 3.75±3.72 years. Of the women, 75.8% stated that they had been using the method for 1-5 years; 59% stated that the FP method they used did not affect their sexual life; 70.2% stated that the FP method they used did not affect their relationships with their spouses; 90% stated that they were satisfied with the FP method they used; 88.8% stated that their spouses were satisfied with the FP method they used; 86.7% stated that they trusted the FP method they used; 87.6% were not worried about the FP method they used; 63.4% were not afraid of conceiving (Table 2).

In our study, the mean score of the women on PSWQ was 54.16±14.39 and the Cronbach alpha value was 0.922 (Table 3).

The mean PSWQ score of the women using OCSs was 52.19±9.17; the mean PSWQ score of the women using condoms was 58.20±15.25; the mean PSWQ score of the women using IUDs was 46.84±14.97; and the mean PSWQ score of the women using the withdrawal method was 59.38±13.82. The mean PSWQ scores of the women were statistically different according to the FP method used ($p<0.05$). According to further analysis to determine the

Table 1. Distribution of Women According to Their Descriptive Characteristics (n=339)

Descriptive Characteristics	n	%
Age Group		
18-24 years	35	10.3
25-32 years	177	52.2
33-40 years	88	26.0
41 years and over	39	11.5
Education Level		
Primary school	26	7.7
Middle school	46	13.6
High school	173	51.0
Associate's degree	32	9.4
Bachelor's or higher degrees	62	18.3
Occupation		
Housewife	223	65.8
Government officer	41	12.1
Employee	51	15.0
Other	24	7.1
Education Level of the Spouse		
Primary school	10	2.9
Middle school	37	10.9
High school	181	53.4
Associate's degree	25	7.4
Bachelor's or higher degrees	86	25.4
Employment Status of the Spouse		
Unemployed	9	2.6
Government officer	89	26.3
Employee	169	49.9
Other	72	21.2
Duration of Marriage		
6 months-1 year	4	1.2
1-5 years	148	43.7
6-10 years	78	23.0
11-15 years	37	10.9
16 years and over	72	21.2
Age of Marriage		
18 years and below	28	8.3
19-25 years	256	75.5
26-30 years	50	14.7
31 years and over	5	1.5
Income Status		
Income < expenses	73	21.5
Income = expenses	214	63.1
Income > expenses	52	15.4
Family Type		
Nuclear family	309	91.2
Extended family	30	8.8
Place of Longest Residence		
Village	47	13.9
Town	191	56.3
City center	101	29.8

group from which the difference originated, the mean PSWQ score of the women using the withdrawal method was higher than the mean PSWQ score of the women using oral contraceptives and intrauterine devices (Table 4.)

Table 2. Distribution of Women's Characteristics Regarding the FP Method Used (n=339)

Characteristics	n	%
FP Method Used		
Oral contraceptives	84	24.7
Condom	85	25.1
Intrauterine device	85	25.1
Withdrawal	85	25.1
Duration of the Use of FP Method		
6 months-1 years	18	5.3
1-5 years	257	75.8
6-10 years	51	15.0
11-15 years	3	0.9
16 years and over	10	3.0
Effect of the FP Method on Sexual Life		
Positive	128	37.8
Negative	11	3.2
No effect	200	59.0
Effect of the FP Method on Relationship of Spouses		
Positive	97	28.6
Negative	4	1.2
No effect	238	70.2
Satisfaction of the Woman with FP Method		
Satisfied	305	90.0
Dissatisfied	34	10.0
Satisfaction of the Spouse with FP Method		
Satisfied	301	88.8
Dissatisfied	38	11.2
Trust in the FP Method		
Trustful	294	86.7
Untrustful	45	13.3
Worry about the FP Method		
Worried	42	12.4
Unworried	297	87.6
Fear of Conceiving		
Yes	124	36.6
No	215	63.4

In the comparison of women's mean PSWQ scores according to their descriptive characteristics, the differences found between the groups were statistically significant according to the age group (p=0.011), duration of marriage (p=0.09), and family type (p=0.018). In further analysis, the difference between the age group and the mean PSWQ

score originated from the mean scores of the women in the "25-32 age" group and the "33-40 age" group. The difference between the duration of marriage and the mean PSWQ score originated from the mean scores of the women who were married "1-5 years", "11-15 years", and "16 years and over" (Table 5).

In the comparison of women's mean PSWQ scores according to their obstetric characteristics, the differences found between the groups were statistically significant according to the number of pregnancies (p=0.000) and the number of living children (p=0.000). In further analysis, the difference found according to the number of pregnancies originated from the mean scores of the women who had "two pregnancies", "zero pregnancies", and "one pregnancy". The difference according to the number of living children originated from the mean scores of the women who had "two living children" and "one living child". The mean PSWQ scores were not statistically different according to the history of risky pregnancy and loss of pregnancy, (p>0.05) (Table 6).

Table 3. Descriptive Statistics and Reliability Coefficients of PSWQ

	n	Min.	Max.	Mean	SD.	Cronbach Alpha
Total	339	16.00	80.00	54.16	14.39	0.922

Table 4. Comparison of Women's PSWQ Scores According to the FP Method They Used (n=339)

Characteristics	n	Penn State Worry Questionnaire			
		Mean	SD.	Test Value	P
FP Method Used					
Oral contraceptives[a]	84	52.19	9.17	F=15.620	**0.000**
Condom[b]	85	58.20	15.25		
Intrauterine device[c]	85	46.84	14.97	Difference: a-d, c-d (Dunnett-C)	
Withdrawal [d]	85	59.38	13.82		

F:One-Way Analysis of Variance (ANOVA), Difference:LSD and Dunnett-C, SD:Standard Deviation

In the comparison of women's PSWQ scores according to the characteristics regarding the FP method used, the differences found between the groups were statistically significant according to the effect of the FP method on sexual life (p=0.006), the effect of the FP method on the relationship with the spouse (p=0.005), the satisfaction of the woman and the spouse with the FP method (p=0.000), the trust in the FP method (p=0.018), worry about the FP method (p=0.002), and the fear of conceiving (p=0.002). In further analysis, the difference between the effect of the FP method on sexual life and the mean PSWQ score originated from the mean scores of the women who stated that the FP method had a "negative effect" and the women who stated that the PF method had a "positive effect" and "no effect". The difference between the effect of the FP method on the relationship with the spouse and the mean PSWQ score originated from the women who stated a "positive effect" and the women who stated "no effect". The mean PSWQ scores of the women were not

statistically different according to the duration of the use of the FP method (p>0.05) (Table 7)

Table 5. Comparison of Women's PSWQ Scores According to Their Descriptive Characteristics (n=339)

Descriptive Characteristics	n	Penn State Worry Questionnaire			
		Mean	SD.	Test Value	P
Age Group					
18-24 years[a]	35	54.66	15.26	F=3.803	**0.011**
25-32 years[b]	177	56.42	13.00		
33-40 years[c]	88	50.74	15.16	Difference: b-c (Dunnett-C)	
41 years and over[d]	39	51.13	16.24		
Education Level					
Primary school	26	57.81	15.89	F=0.874	0.480
Middle school	46	52.41	11.20		
High school	173	54.79	15.01		
Associate's degree	32	53.22	14.43		
Bachelor's or higher degrees	62	52.65	14.06		
Occupation					
Housewife	223	54.10	14.84	F=0.346	0.792
Government officer	41	52.88	14.48		
Employee	51	55.78	13.86		
Other	24	53.42	11.12		
Education Level of the Spouse					
Primary school	10	58.70	10.23	F=0.968	0.425
Middle school	37	56.62	15.97		
High school	181	53.72	14.60		
Associate's degree	25	50.76	13.64		
Bachelor's or higher degrees	86	54.53	13.81		
Employment Status of the Spouse					
Unemployed	9	54.56	14.63	F=0.412	0.744
Government officer	89	53.48	14.52		
Employee	169	54.99	15.29		
Other	72	52.99	11.97		
Duration of Marriage					
6 month-1 year[a]	4	58.25	13.23	F=3.435	**0.009**
1-5 years[b]	148	56.74	13.59		
6-10 years[c]	78	54.44	12.26	Difference: b-d, b-e (LSD)	
11-15 years[d]	37	49.05	18.09		
16 years and over[e]	72	50.94	15.10		
Age of Marriage					
18 years and below	28	52.43	15.29	F=0.343	0.794
19-25 years	256	54.03	14.41		
26-30 years	50	55.74	13.88		
31 years and over	5	54.60	16.33		
Income Status					
Income < expenses	73	54.99	14.67	F=0.806	0.447
Income = expenses	214	54.43	14.24		
Income > expenses	52	51.88	14.67		
Family Type					
Nuclear family	309	53.58	14.42	t=2.373	**0.018**
Extended family	30	60.07	12.89		
Place of Longest Residence					
Village	47	57.66	13.35	F=1.626	0.198
Town	191	53.63	14.35		
City center	101	53.51	14.82		

F:One-Way Analysis of Variance (ANOVA), Difference:LSD and Dunnett C, t: Independent Samples t-Test

Table 6. Comparison of Women's PSWQ Scores According to Their Obstetric Characteristics

Obstetric Characteristics	n	Penn State Worry Questionnaire			
		Mean	SD	Test Value	P
Number of Pregnancies (n=339)					
None[a]	50	56.26	15.09	F=6.129	**0.000**
1[b]	114	57.59	12.39		
2[c]	93	49.48	14.89	Difference: a-c, b-c (LSD)	
3 pregnancies and over[d]	82	53.40	14.67		
Number of Living Children (n=289)					
None[a]	15	52.80	14.61	F=6.229	**0.000**
1[b]	106	58.10	12.09		
2[c]	101	49.82	15.13	Difference: b-c (Dunnett-C)	
3 children and over[d]	67	53.18	14.42		
History of Risky Pregnancy (n=289)					
Yes	50	57.12	13.63	t=1.818	0.070
No	239	53.10	14.32		
Loss of Pregnancy (n=289)					
Yes	44	55.98	14.46	t=1.101	0.272
No	245	53.41	14.22		

F:One-Way Analysis of Variance (ANOVA), Difference: LSD and Dunnett C, t: Independent Samples t-Test

DISCUSSION

Worry is considered a cognitive component of anxiety, the reaction that prepares the person for future risks. In two different studies conducted by Castillo et al. (13), the mean PSWQ scores of female participants were found to be 48.86±10.14 and 48.45±10.22. In the study conducted by Rodríguez-Biglieri and Vetere (14), it was found that female participants' mean score on PSWQ was 44.92±10.51. In the study of Bottesi et al. (15), women's mean score on PSWQ was 46.77±12.65. In the thesis study of İnegöl (16), the mean PSWQ score of female participants was reported as 48.47±9.30. In the present study, the mean score of women on PSWQ was found as 54.16±14.39. When the studies carried out with different samples were examined, it was thought that the difference in the mean PSWQ scores was due to the fact that the studies were conducted in societies with different value judgments and cultural characteristics and included different age groups.

Table 7. Comparison of Women's PSWQ Scores According to Their Characteristics regarding the FP Method They Used (n=339)

Characteristics	n	Penn State Worry Questionnaire			
		Mean	SD.	Test Value	P
Duration of the Use of FP Method					
6 months-1 year	18	54.89	14.04		
1-5 years	257	54.45	13.86		
6-10 years	51	51.98	16.36	F=1.296	0.271
11-15 years	3	42.00	28.58		
16 years and over	10	60.10	12.35		
Effect of the FP Method on Sexual Life					
Positive[a]	128	53.38	13.44	F=5.196	**0.006**
Negative[b]	11	67.64	8.12	Difference: a-b, b-c	
No effect[c]	200	53.92	14.92	(LSD)	
Effect of the FP Method on Relationship of Spouses					
Positive[a]	97	50.43	13.49	F=5.370	**0.005**
Negative[b]	4	64.00	25.46	Difference: a-c	
No effect[c]	238	55.51	14.29	(LSD)	
Satisfaction of the Woman with FP Method					
Satisfied	305	53.05	14.28	t=-5.240	**0.000**
Dissatisfied	34	64.12	11.36		
Satisfaction of the Spouse with FP Method					
Satisfied	301	52.92	14.25	t=-5.372	**0.000**
Dissatisfied	38	63.95	11.60		
Trust in the FP Method					
Trustful	294	53.44	14.42	t=-2.374	**0.018**
Untrustful	45	58.87	13.40		
Worry about the FP Method					
Worried	42	60.71	13.33	t=3.199	**0.002**
Unworried	297	53.23	14.31		
Fear of Conceiving					
Yes	124	57.29	13.74	t=3.084	**0.002**
No	215	52.35	14.47		

F:One-Way Analysis of Variance (ANOVA) Difference:LSD and Dunnett-C t: Independent Samples t-Test

The withdrawal method is still one of the most commonly used FP methods in our country since it is cost-free and accessible at any time. Although it is the most widely used FP method, the rate of dissatisfaction with the method is high. In the study conducted by Ateşer et al. (17), it was concluded that 51.6% of women using the withdrawal method were not satisfied with the method. Women who use the withdrawal method often do not enjoy their sexual life as they are worried about conceiving. It was found that 67.3% of women using the withdrawal method in the study of Çiftçioğlu and Erci (7) and 65.2% of women using the withdrawal method in the study of Yanıkkerem et al. (6) had worries about

conceiving. In the study conducted by Budak et al. (18), the rate of women who conceived while using the withdrawal method was found to be 31%. The withdrawal method interrupts sexual intercourse, negatively affects couples' sexual satisfaction and marital adjustment, and reduces sexual desire (19,20,21,22). In the study of Ercan (23), it was stated that the high rate of the use of the withdrawal method negatively affected women's health by causing an increase in undesired pregnancies, frequent births, miscarriages, and maternal and infant deaths. In our study, it was determined that the mean PSWQ score of women using the withdrawal method (59.38±13.82) was higher than the mean scores of those using oral contraceptives (52.19±9.17) and IUDs (46.84±14.97). It is thought that the higher worry level of women using the withdrawal method may be due to factors such as the use of the method by men and lack of control of women, the fear of conceiving, and the negative effects on sexual intercourse and marital adjustment.

It was determined that the mean PSWQ score of the women in the 25-32 age group (56.42±13.00) was higher than the mean PSWQ score of the women in the 33-40 age group (50.74±15.16). It is thought that the higher mean score of women in the 25-32 age group may be due to the fact that they newly started to use the FP method, women had a higher level of fear of conceiving in the early period, and they had uncertain conditions about the future.

In the study, it was determined that the mean score of the women who had been married for 1-5 years (56.74±13.59) was higher than the mean PSWQ scores of the women who had been married for 11-15 years (49.05±18.09) and 16 years or over (50.94±15.10). It can be suggested that the high PSWQ score of women who had been married for 1-5 years might have originated from their worries due to trying to get to know their spouses during this period, assuming new responsibilities along with marriage, and efforts to adapt to married life.

In our study, the mean PSWQ score of the women who had an extended family (60.07±12.89) was found to be higher than the mean PSWQ score of the women who had a nuclear family (53.58±14.42). It is thought that women living in extended families may be more worried due to difficulties in making their own decisions, not being able to maintain their sexual life freely, having more responsibilities compared to individuals in a nuclear family structure, limited social space, and not feeling economically sufficient.

In the 2018 TDHS report, it was reported that the mean ideal number of children for married women aged between 15-49 is 3.0 and the ideal mean number of living children is 2.3 (10). In the study of Yücel et al. (24), it was reported that the ideal number of children for women was 2.0±0.9 on average. In our study, it

was determined that 51.7% of the women had two or more pregnancies and that 58.1% had two or more children. When the relationship between the number of pregnancies and children and the worry levels of women was examined, it was found that the mean PSWQ score of the women who had two pregnancies was lower compared to the women who had one pregnancy and no pregnancy at all and that the mean PSWQ score of the women with two living children was lower than the mean PSWQ score of the women with one child. It is thought that having children at a planned number is effective in changing the level of worry of women according to the number of pregnancies and children. It can be suggested that having children as planned can reduce their worries about the future.

The level of sexual satisfaction affects the relationship of the spouses, the quality of this relationship, and marital satisfaction (25). Some women do not use any FP method since their sexual life is affected negatively and they are dissatisfied (26). It was determined that women who stated that the FP method they used negatively affected their sexual life had a higher mean PSWQ score than the women who stated that it had a positive effect or no effect at all and that the mean PSWQ score of the women who stated that the FP method they used had a positive effect on their relationships with their spouses was lower than the mean score of the women who stated that it had no effect at all. It can be said that women whose sexual life is negatively affected due to the method they use have reduced sexual satisfaction, thus their relationships with their spouses and marital satisfaction are impacted and women may worry about these issues.

It was determined that the mean PSWQ scores of the women who stated that they and their spouses were dissatisfied with the method they used, who were worried about the method they used, who did not trust the method, and who had fear of conceiving while using the method were higher than the mean PSWQ scores of the women who were satisfied with the method used, who were not worried about the method, who trusted the method, and who did not have fear of conceiving. It can be suggested that experiencing side effects and some problems related to the methods used may increase women's fear of conceiving and, accordingly, their worry levels. Furthermore, women who are dissatisfied with the method they use will not feel safe and will exhibit a concerned attitude due to the problems they experience.

CONCLUSION

In our study, it was determined that the worry levels of women who used the withdrawal method were higher than those who used oral contraceptives and intrauterine devices and that the worry levels of women varied according to age, duration of marriage, family type, number of pregnancies and

children, the effect of the FP method on sexual life and the relationship with the spouse, satisfaction of women and their spouses with the method used, trust in the method used, and the fear of conceiving.

According to the results of our research, it is recommended to develop scales that will evaluate women's worries about FP and measure their worry levels, carry out in-depth studies to determine the reasons for women's worries about FP, and examine the relationship between women's worries and FP.

Ethics Committee Approval: Ethics committee approval dated 04/04/2019 and numbered 2019/17 was received from the Clinical Research Ethics Committee of the University of Health Sciences, Kanuni Training and Research Hospital.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: ES, Design: ES, KA, Data Collection and Processing: KA, Analysis and Interpretation: ES, KA, Writing: KA

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has not received no financial support.

Acknowledgements: The authors would like to thank all participants for participating in the study.

REFERENCES

1. Calikoglu EO, Bedir B, Yilmaz S, Aydin A. [Health knowledge of medical students about family planning and sexually transmitted diseases] Fam Pract Palliat Care. 2017;2(2):12-17
2. Sultan S, Ali MM, Bardai SS, Kanpurwala MA, Punjwani FS. Knowledge, attitude, and practice of family planning methods among marrierd men and women. Journal Womens Health. 2018;7(3). doi: 10.4172 / 2325-9795.1000311
3. Çalışkan BG, Doğan B, Olçum GG. The effect of age and educational status on the family planning method choice of women living in a rural area. Turkish Journal of Family Medicine. 2014;18(4):189-194.
4. Çayan A. The relationship between the attitudes of married women aged 15–49 towards family planning methods and the contraceptive methods they use (Specialization Thesis). Aydin: Adnan Menderes University. 2009.
5. Helvacioglu C, Daddeviren H, Kanawati A, Cengiz H, Ekin M. Public awareness level about the oral contraceptives. Bakırköy Tıp Dergisi 2018;14:53-6. https://doi.org/10.5350/BTDMJB.20170401101511
6. Yanıkkerem E, Acar H, Elem E. Withdrawal users' perceptions of and experience with contraceptive methods in Manisa, Turkey. Midwifery. 2006;22(3):274-284.

7. Çiftçioğlu S, Erci B. Coitus interruptus as a contraceptive method: Turkish women's perceptions and experiences. Journal of Advanced Nursing. 2009;65(8):1686-1694.
8. Mumcu N. Examining the effect of traditional practices and beliefs on the use of family planning methods (Master's Thesis). Afyon: Afyon Kocatepe University. 2004.
9. Türkiye Demographic and Health Survey (TDHS). (2013). Accessed: December 11, 2017, http://www.hips.hacettepe.edu.tr/tnsa2013/rapor/TNSA_2013_ana_rapor.pdf
10. Türkiye Demographic and Health Survey (TDHS). (2018). Accessed: March 12, 2020, http://www.hips.hacettepe.edu.tr/tnsa2018/rapor/TNSA2018_ana_Rapor.pdf
11. Meyer TJ, Miller ML, Metzger RL, Borkovec TD. (1990). Development and validation of the Penn State Worry Questionnaire. Behaviour Research and Therapy. 1990;28:487-495.
12. Yılmaz AE, Gençöz T, Wells A. Psychometric characteristics of the Penn State Worry Questionnaire and Meta-Cognitions Questionnaire-30 and metacognitive predictors of worry and obsessive-compulsive symptoms in Turkish Sample. Clinical Psychology and Psychotherapy. 2008;15:424-439.
13. Castillo C, Macrini L, Cheniaux E, Landeira-Fernandez J. Psychometric properties and latent structure of the Portuguese version of the Penn State Worry Questionnaire. The Spanish Journal of Psychology. 2010;13(1):431-443.
14. Rodríguez-Biglieri R, Vetere GL. Psychometric characteristics of the penn state worry questionnaire in an argentinean sample: A cross-cultural contribution. The Spanish Journal of Psychology. 2011;14(01):452–463.
15. Bottesi G, Martignon A, Cerea S, Ghisi M. Worry and associated cognitive features in Italian university students: Does gender make a difference? Personality and Individual Differences. 2018;126:38-43.
16. İnegöl MA. Examining the role of anxiety sensitivity and intolerance of uncertainty as mediating variables in the relationship between attachment anxiety and pathological anxiety (Master's Thesis). Istanbul: Maltepe University. 2016.
17. Ateşer GB, Güzel E, Kaya S, Aydın DS, Şahbaz N, Durmuş MK. Pregnancy protection method preferences of Turkish women. Okmeydani Medical Journal. 2017;33(4):241-246.
18. Budak MŞ, Toğrul C, Balsak D, Sakar MN, Tahaoğlu AE, Akgöl S ve ark. The Evaluation Of Failed Contraception Methods And Causes In Elective Pregnancy Termination. The Journal of Gynecology - Obstetrics and Neonatology. 2015;12(3):106-109.

19. Woods JL, Hensel JD, Fortenberry JD. Contraceptive withdrawal in adolescents: a complex picture of usage. Journal Pediatr Adolesc Gynecol. 2009;4:233–237.
20. Özdemir H. The effect of family planning methods used by men on women's sexual life (Master's Thesis). Aydin: Adnan Menderes University. 2014.
21. Jones RK, Lindberg LD, Higgins JA. Pull and pray or extra protection? contraceptive strategies involving withdrawal among us adult women. Elsevier Contraseption. 2014;90:416-421.
22. Kaplan E, Zeyneloğlu S. The effects of women's sexual satısfictıon on theır marıtal accordance, whose spouses ımplementıng "coıtus ınterruptus" as the famıly plannıng method. Necmettin Erbakan University Faculty of Health Sciences Journal. 2018;1(1):10-17.
23. Ercan EP. Satisfaction of adult women of reproductive age with the family planning methods they use and evaluation of the affecting factors (Medical Specialization Thesis). Istanbul.: Republic of Turkey Health Sciences University Haseki Health Application and Research Center. 2019.
24. Yücel U, Güner S, Şen F. Evaluation of family planning service use in women aged 15-49 with children under two years old. medical sciences 2018;13(4):120-128.
25. Gülsün M, Ak M, Bozkurt A. Marriage and Sexuality. Current Approaches In Psychıatry. 2009;1(1):68-79.
26. Casey PM, MacLaughlin KL, Faubion SS. Impact of contraception on female sexual function. Journal of Women's Health. 2017;26(3):207-213.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci

October 2023; 9(4): 622-637

RESEARCH ARTICLE

DOI: 10.19127/mbsjohs.1289201

Characteristics of Patients with Asthma Attack Followed in the Intensive Care Unit

Selen Karaoğlanoğlu[1] Ozge Can Bostan[2] Serpil Öcal[3] Ebru Ortaç Ersoy[3] Ahmet Uğur Demir[4] Ali Fuat Kalyoncu[2] Gül Karakaya[2]

[1]Ordu University, Faculty of Medicine, Department of Pulmonology, Ordu, Turkey
[2]Hacettepe University, Faculty of Medicine, Department of Pulmonology, Division of Allergy and Immunology, Ankara, Turkey
[3]Hacettepe University, Faculty of Medicine, Department of Pulmonology, Ankara, Turkey
[4]Hacettepe University, Faculty of Medicine, Department of Internal Medicine, Division of Intensive Care Medicine, Ankara, Turkey

Received: 5 May 2023, Accepted: 16 July 2023, Published online: 29 October 2023

Abstract

Objective: Asthma attack is a critical reason for morbidity and mortality if not treated effectively at the right time. Data about the efficiency of noninvasive and invasive mechanical ventilation (NIV, IMV) in respiratory failure due to asthma attacks are scant. The aim of this study was to investigate the relationship between asthma-related factors, medical and NIV/IMV treatments received in the Intensive Care Unit (ICU), and the mortality rates and length of hospital stay, in asthma attacks.

Methods: The characteristics of patients with severe asthma treated in Hacettepe University Medical ICU for a ten-year period were analyzed from patient records retrospectively. The association between age, sex, comorbidities, asthma duration, treatment, adherence to the treatment, the effectiveness of NIV/IMV treatment if performed, and asthma attack severity, length of hospital stay, and mortality were investigated.

Results: A total of 22 patients were included in this study. In addition to medical treatment, eight (36.6%) patients received NIV, five (22.7%) received invasive mechanical ventilation (IMV), and five (22.7%) patients had both. Four (18.1%) patients died in the ICU. There was no significant relationship between these parameters and length of hospital stay and mortality. The relationship between baseline PaCO2, pH, and HCO3 and the difference of PaCO2, pH, and $HCO3^{-}$ changes were significant, indicating the correct and effective use of NIV/IMV.

Conclusion: NIV applications, which have been proven to be effective in hypercapnic respiratory failure, were also found to be effective in hypoxemic respiratory failure due to asthma attacks. The absence of a relationship between the investigated parameters and mortality revealed that the reasons for the mortality might be infections or comorbidities, not the respiratory tract.

Keywords: Asthma, severe asthma, asthma attack, intensive care unit

Suggested Citation: Karaoğlanoğlu S, Can Bostan Ö, Öcal S, Ortaç Ersoy E, Demir A.U, Kalyoncu A.F, Karakaya G. Characteristics of Patients with Asthma Attack Followed in the Intensive Care Unit. Mid Blac Sea Journal of Health Sci, 2023;9(4):622-637

Address for correspondence/reprints: Selen Karaoğlanoğlu

Telephone number: +90 (533) 051 12 61

E-mail: drselenu@gmail.com

INTRODUCTION

Asthma is a chronic inflammatory disease associated with airway inflammation and bronchial hyperreactivity, characterized by occasional dyspnea, cough, and wheezing, mostly increasing after exposure to triggers such as allergens, exercise, or viral infections (1). Asthma affects 1-20% of the population in different countries and an estimated 300 million people worldwide. Also asthma cause 455.000 deaths, with a prevalence ranging between 2-12 % in adults (2). The prevalence of asthma in adults in Turkey was reported to be 1.2-9.4%, while the prevalence of asthma-like symptoms was reported 9.8-27.3% (3). The emergence or increase of symptoms such as cough, dyspnea, chest tightness, and wheezing and the deterioration of respiratory functions in parallel with the symptoms in an asthmatic patient are defined as "asthma attacks". The severity of an asthma attack may vary from mild increases in symptoms to respiratory failure resulting in death (4).

The most important point in the treatment of an attack is the early recognition of the onset of the attack by the patient and immediate start to the appropriate treatment at home, or in hospital if necessary. Severe attacks in which emergency treatments fail should be followed up in intensive care units (ICU) and evaluated in the need for non-invasive ventilation (NIV) and/or invasive mechanic ventilation (IMV) (5). The severity of the attacks and the treatment responses of patients may be different. Therefore, it is essential to investigate which patients respond better to particular treatments.

The efficacy of non-invasive ventilation (NIV) has been proven especially in diseases such as chronic obstructive pulmonary disease (COPD) with hypercapnic respiratory failure, but its use in hypoxemic respiratory failure and asthma attacks is still controversial (6-8). However, recent studies have shown that NIV applications in hypoxemic respiratory failure reduce intubation and mortality rates, and also the time of hospitalization (7, 9-11).

The aim of this study is to investigate patients followed up in a tertiary ICU due to asthma attacks by means of the relationship between age, gender, comorbidities, asthma duration, and medications, causes of attacks, medical and NIV/IMV treatments, if any, received in ICU, and their mortality rates and length of hospital stay.

METHODS

The present retrospective study included adult patients with asthma attacks admitted to Hacettepe University Hospital, Internal Medicine ICU for a ten-year period. Due to the retrospective design of the study, the characteristics of patients admitted to the intensive care unit with asthma attack were searched from their files and hospital data system. All patients who met the inclusion criteria within the specified date range without

randomization were enrolled. Masking method was not used and the files of all patients diagnosed with asthma attack in the last ten years were meticulously examined. Patients with physician-diagnosed asthma who had symptoms such as progressive dyspnea, cough, wheezing, and chest tightness at admission and determined with an ICD-10 code for asthma were included in the study. Since this study is retrospective, every patient who met the inclusion criteria was included in the study without going through sample size. Despite an asthma diagnosis code, patients whose clinical symptoms were not compatible with an asthma attack as mentioned above were not included in the study. Patients' age, gender, age at the onset of asthma, time until the first hospitalization in the ICU, medications used at admission with asthma attack, conditions that may cause an asthma attack, accompanying comorbidities, APACHE II scores, length of stay in ICU, treatments received in the ICU, discharge status, chest X-ray and/or thoracic computed tomography (CT) findings, echocardiography, Brain-Natriuretic Peptide (BNP), D-dimer values if performed, were collected.

The definition of an asthma exacerbations (asthma attack or acute asthma) was based on the presence of episodes accompanied by the coexistence of one or more of the complaints including progressive dyspnea, cough, wheezing, and chest tightness according to Global Initiative for Asthma (GINA) and Asthma Diagnosis and Treatment Guide, Chronic Asthma Treatment, Step Treatment 2022 Update Guideline (3, 12). Body temperature values ≥38.3 ˚C at least twice were defined as fever and leucocytosis was defined as >10000 μ/L for white blood cell (WBC) count. The diagnosis of pneumonia was made with the presence of fever or leukocytosis in addition to infiltration on chest X-ray or findings compatible with an infection on thoracic CT, if available. For BNP, values above 100 pg/ml were considered significant in terms of chronic heart failure. Chest radiographs were evaluated by intensive care physicians and thorax CT was reported by the radiology department. Echocardiography evaluations were performed and reported by experienced cardiology physicians.

Chest X-rays were performed on all patients to investigate the cause of the aggravation of the attacks, and thoracic CT was performed when there are abnormalities on chest X-rays. Patients with a history of cardiac disease or suspected cardiac morbidity during follow-up were also evaluated by echocardiography. For the medical treatments in the ICU, salbutamol, and ipratropium were administered by inhalation every four hours, and continuous oxygen therapy was given to keep oxygen saturation at 90% and above. NIV was applied when the desired oxygen saturation targets could not be achieved with a nasal or face mask or when the patient had tachypnea and use of

accessory respiratory muscles. And intubation was performed by physicians within appropriate indications.

The ethical approval of the Hacettepe University Scientific Research Evaluation Commission has been obtained (Approval date and number: 10.04.2013; GO 13/207-10).

Statistical Analysis

SPSS 18.0 was used for statistical analysis (IBM, Armonk, NY, USA). Descriptive statistics were reported as numbers and percentages (%) for categorical variables and mean ± standard deviation, and median and interquartile ranges for continuous variables. In comparisons for mortality and treatment groups, Chi-square test was used for categorical variables, and Mann-Whitney U test was used for continuous variables. Fisher's exact test was used for comparisons of categorical variables when the expected number was below 5 in 25% of the cells. The relationship between blood gas changes and initial measurements was evaluated by a non-parametric (Spearman) correlation coefficient and correlation graphs were determined. In all comparisons, $p<0.05$ was accepted for statistical significance in bilateral tests.

RESULTS

Twenty-two patients hospitalized in Hacettepe University Internal Medicine Intensive Care Unit due to an asthma attack were included in the current retrospective study. Eighteen (81.8%) of the patients were female and the mean age of the study group was 71±14 years. The most common symptom of admission to the emergency department was dyspnea, which was observed in all patients, and hypertension (11 (50%)) was the most common accompanying chronic disease. Rhinitis, which may frequently accompany asthma, was present in only two (9.1%) patients (Table 1). The median time from the diagnosis to ICU admission with an asthma attack was 17 ± 18.8 years. Considering the season of hospitalization in the ICU, 6 (27.2%) patients were hospitalized in winter, 6 (27.2%) in autumn, 5 (22.7%) in summer, and 5 (22.7%) in spring. Except for two patients, all other patients (20 (90.9%)) were on asthma medications at the time of admission. The medications used by the patients were summarised in Table 1. Pneumonia (20 (90.9%)) was the most common cause of the attacks while pulmonary thromboembolism and acetylsalicylic acid intake were observed in only one (4.5%) patient each (Table 1).

The most common causes of admission to the emergency department were dyspnea and sleep disturbance due to dyspnea. The most common clinical finding in all patients at the time of initial examination was rhonchi. APACHE II scores calculated at ICU admission were available in 20 patients and the median score was found 13.6 (IQR: 8-34).

Chest X-rays were performed on 20 (90.9%) patients and 10 (50%) were evaluated

normal. Thoracic CT was performed on 11 (50%) patients. The findings included embolism, bronchiectasis, right heart dilatation, atelectasis, pleural effusion, and findings consistent with pneumonia. BNP levels were measured in eight (36.3%) patients and four (50%) were above the reference value. Fourteen (63.6%) patients were evaluated by echocardiography and five (35.7%) had heart failure when four (28.5%) had pulmonary hypertension (PHT).

Table 1. Patient characteristics of the study population

Variables	**n (%)**
Age, mean±SD, years	71±14
Female	18 (81.8%)
Asthma treatment before ICU admission	
No medication	2 (9)
SABA as-needed	1 (4,5)
ICS alone	4 (18,1)
ICS +LABA	8 (36,3)
Tiotropium alone	0 (0)
ICS +LABA+Tiotropium	6 (27,2)
ICS with nebuliser	1 (4,5)
Comorbidities	
Hypertension	11 (50)
Diabetes Mellitus	6 (27,2)
CAD	4 (18,1)
CHF	4 (18,1)
Rhinitis	2 (9)
Other*	12 (54)
Reasons for ICU admission	
Pneumonia	20 (90,9)
Pulmonary thromboembolism	1 (4,5)
NSAID-execerbated bronchospasm	1 (4,54)

CAD: Coronary artery disease, CHF: Congestive heart failure, AAA: Abdominal aortic aneurysm, AF: atrial fibrillation, BPH: Benign prostate hypertrophy, CKD: Chronic kidney disease, SABA: Short-acting β-agonist, ICS: Inhaled corticosteroid, LABA: Long-Acting β-Agonists, NSAID: Nonsteroidal anti-inflammatory drug. *Other comorbidities: AAA, bronchiectasis, hypothyroidism, AF, BPH, endometrium cancer, CKD

In the evaluation of the characteristics of the four female patients who died in the ICU, it was observed that the median age was 80 years and the reason for hospitalization was pneumonia in all four. In the follow-up, all had fever, and the respiratory examinations revealed rhonchi. Two (50%) had leucocytosis and the other two had normal white blood cell counts. In the arterial blood gas (ABG) at admission, one (25%) of them had combined metabolic

acidosis and respiratory acidosis, and the others had compensated respiratory acidosis. One was not receiving treatment for asthma at the time of the attack, while the others were receiving inhaled corticosteroid and long-acting beta2 agonist (ICS+LABA) combination treatment. When the accompanying pulmonary diseases that may aggravate the asthma attack were analyzed, it was observed that one had cystic bronchiectasis and the others did not have any other underlying lung disease. Echocardiography was performed in two of them, one had an ejection fraction (EF) of 39%, 3rd-degree tricuspid regurgitation, and the other had an EF of 55%. Two patients had newly diagnosed asthma, while the other two patients had asthma duration of 10 and 30 years. One of the patients with newly diagnosed asthma did not respond to NIV treatment in the ICU, was intubated and remained intubated for 28 days, and died. The other patients were treated with NIV for a median of seven days and then intubated. The median length of ICU stay of these four patients was 16 days. All four patients were non-smokers, one had no comorbidities, and the others had one or more comorbidities.

In addition to medical treatment, eight (36.3%) patients received only NIV, five (22.7%) patients received IMV, five (22.7%) patients received NIV and then IMV support, and four (18.1%) patients received no mechanical ventilation support. All NIVs were performed with a mouth-nose mask and no other complications such as barotrauma were observed except for mild facial injuries due to local compression.

NIV was administered to a total of 13 (59.1/%) patients who could not achieve the desired oxygen saturation targets with a nasal or face mask or who had tachypnea and the use of auxiliary respiratory muscles. Since 5 (38.4%) of these patients did not respond to NIV, they were intubated and switched to IMV. Five (22.7%) patients were immediately intubated due to severe asthma attacks that did not respond to medical treatment. NIV/IMV was not applied in four (18.1%) patients.

ABG results were available in 20 (90.9%) patients. The mean PaO2 was 71.9 ± 28.2 mmHg and PaCO2 was 55.6 ± 21.5 mmHg at the time of admission. Table 2 shows the comparison of the difference between admission and final ABG values of the patients. When the ABG results at ICU admission and the changes between the admission and final values were analyzed, no significant difference was observed in terms of PaO2, but a significant relationship was found between the baseline values of pH, PaCO2, and $HCO3^{-}$ and their changes (Table 3).

The relationship between patients' admission $HCO3^{-}$ and $HCO3^{-}$ changes was

presented in Figure 2. It was observed that there was a similar relationship between the change in $HCO3^{-}$ and PaCO2 in alive patients. Hospitalization $HCO3^{-}$ values were decreased with the treatment in the alive group but there was no similar relation in the patients who died. In the analysis of the pH values of the patients at the time of admission and pH changes, an inverse trend was observed.

Table 2. Evaluation of ABG values at ICU admission and discharge

	Alive (n=15)		**Dead (n=4)**		
	Median	IQR (25%, 75%)	Median	IQR (25%, 75%)	p-value
Admission Values					
pH	7.37	(7.27, 7.4)	7.37	(7.29, 7.39)	0,74
PaO2 (mmHg)	60	(54, 85)	62.5	(55.25, 102)	0,89
PaCO2 (mmHg)	49	(36, 73)	60.5	(32.25, 82.75)	0,74
SaO2 (%)	92	(82, 96)	94	(91.25, 96.75)	0,47
$HCO3^{-}$ (mmol/L)	25	(21.7, 31)	29	(14.5, 33)	0,96
Final Values					
pH	7.40	(7.37, 7.45)	7.43	(7.02, 7.48)	0,81
PaO2 (mmHg)	72	(56, 80)	140	(54.25, 156.75)	0,15
PaCO2 (mmHg)	41	(35,47)	37.5	(30, 62.25)	0,74
SaO2 (%)	95	(91, 96)	98	(67.75, 99)	0,15
$HCO3^{-}$ (mmol/L)	26	(23, 29)	28	(12, 33.5)	0, 67
Differences					
pH	0.04	(0.00, 0.10)	0.06	(-0.27, 0.10)	0,74
PaCO2 (mmHg)	-10	(-21, 0)	-13	(-43, 10.25)	0,96
$HCO3^{-}$ (mmol/L)	-1	(-6, 3)	-2	(-6, 5)	0,96

Table 3. The relationship between variations of PaCO2, $HCO3^{-}$, pH values, and values at admission

Parameter	**All patients Correlation coefficient (p value)**	**Dead patients Correlation coefficient (p value)**	**Alive patients Correlation coefficient (p value)**
PaCO2*	-0,76 (<0,001)	-0,80 (0,2)	-0,80 (<0,001)
$HCO3^{-}$**	-0,61 (0,005)	-0,4 (0,6)	-0,70 (0,003)
pH	0,58 (0,009)	0,94 (0,051)	-0,84 (<0,001)

*PaCo2: Partial arterial carbondioxide pressure, **$HCO3^{-}$: Plasma bicarbonate level

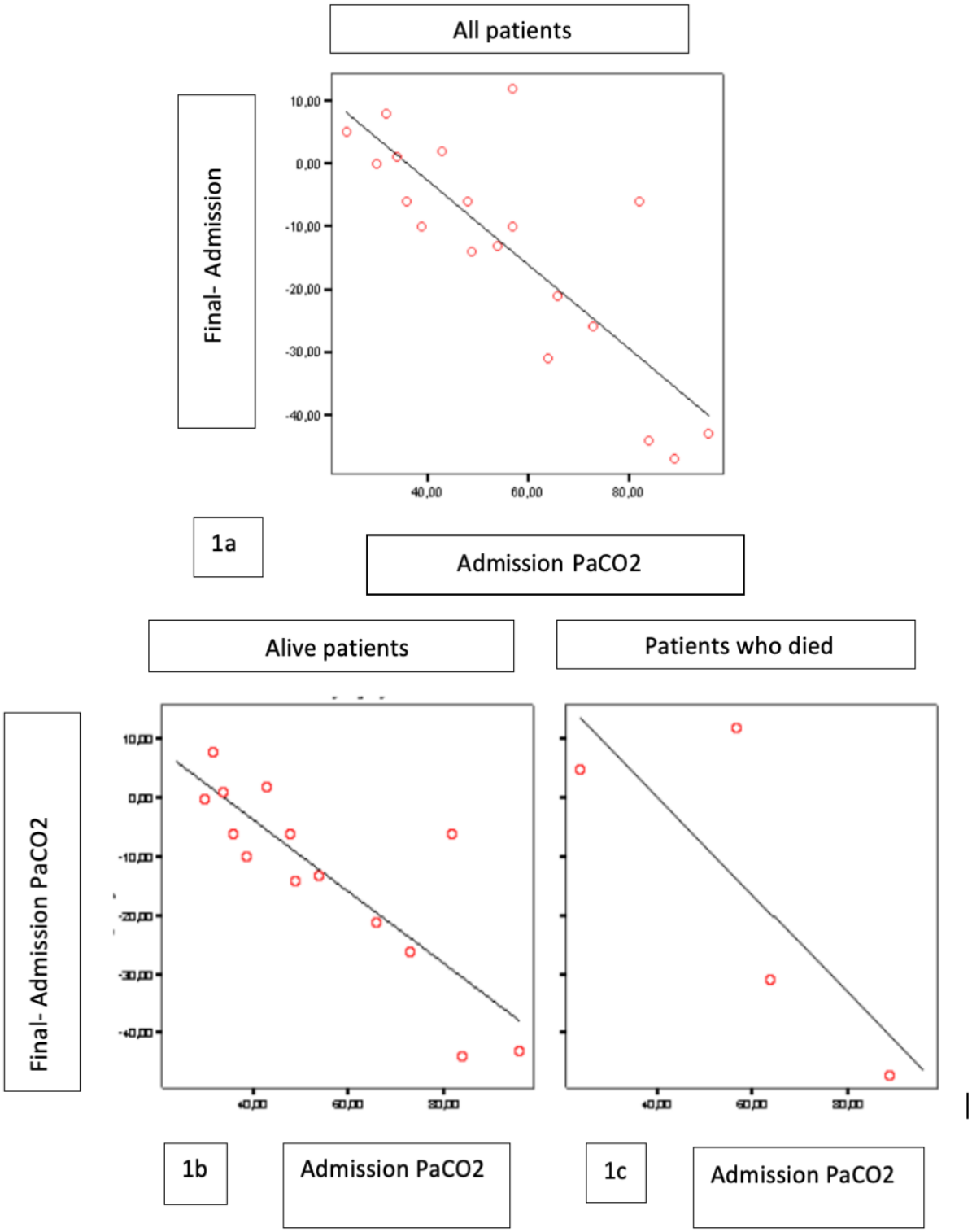

Figure 1. Graph of the relationship between admission PaCO2 and PaCO2 change
a: In all patients; b: In alive patients; c: In dead patients

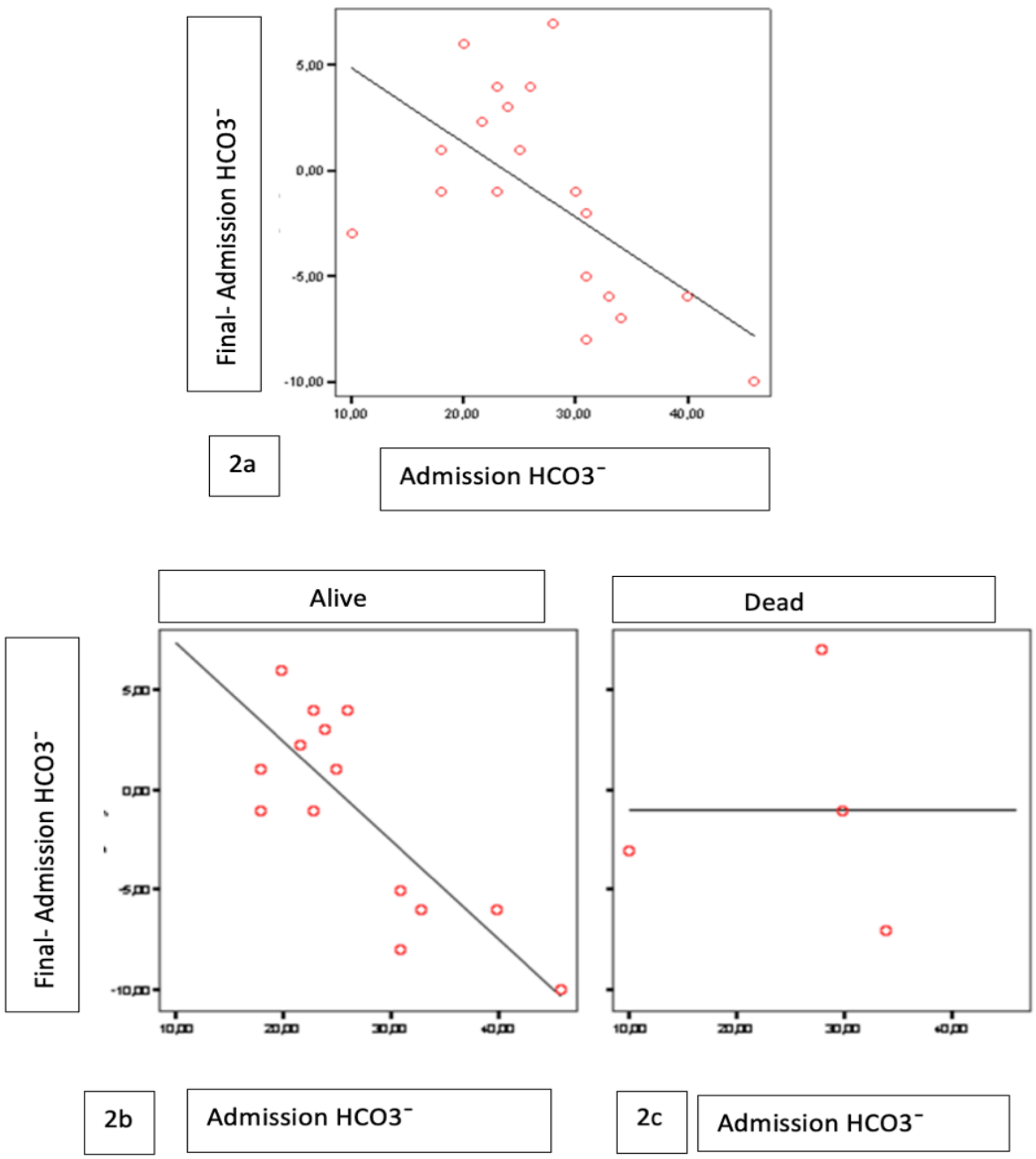

Figure 2. Graph of the relationship between admission HCO3 and HCO3 change a: In all patients; b: In alive patients; c: In dead patients

The higher the PaCO2 value at hospitalization time, the greater the decrease in PaCO2 with treatment was observed; however, this improvement was not associated with mortality (Figure 1).

The initial pH values of alive patients were higher and these values tended to normalize with treatment. The pH values of dead patients increased during hospitalization compared to the admission values (Figure 3).

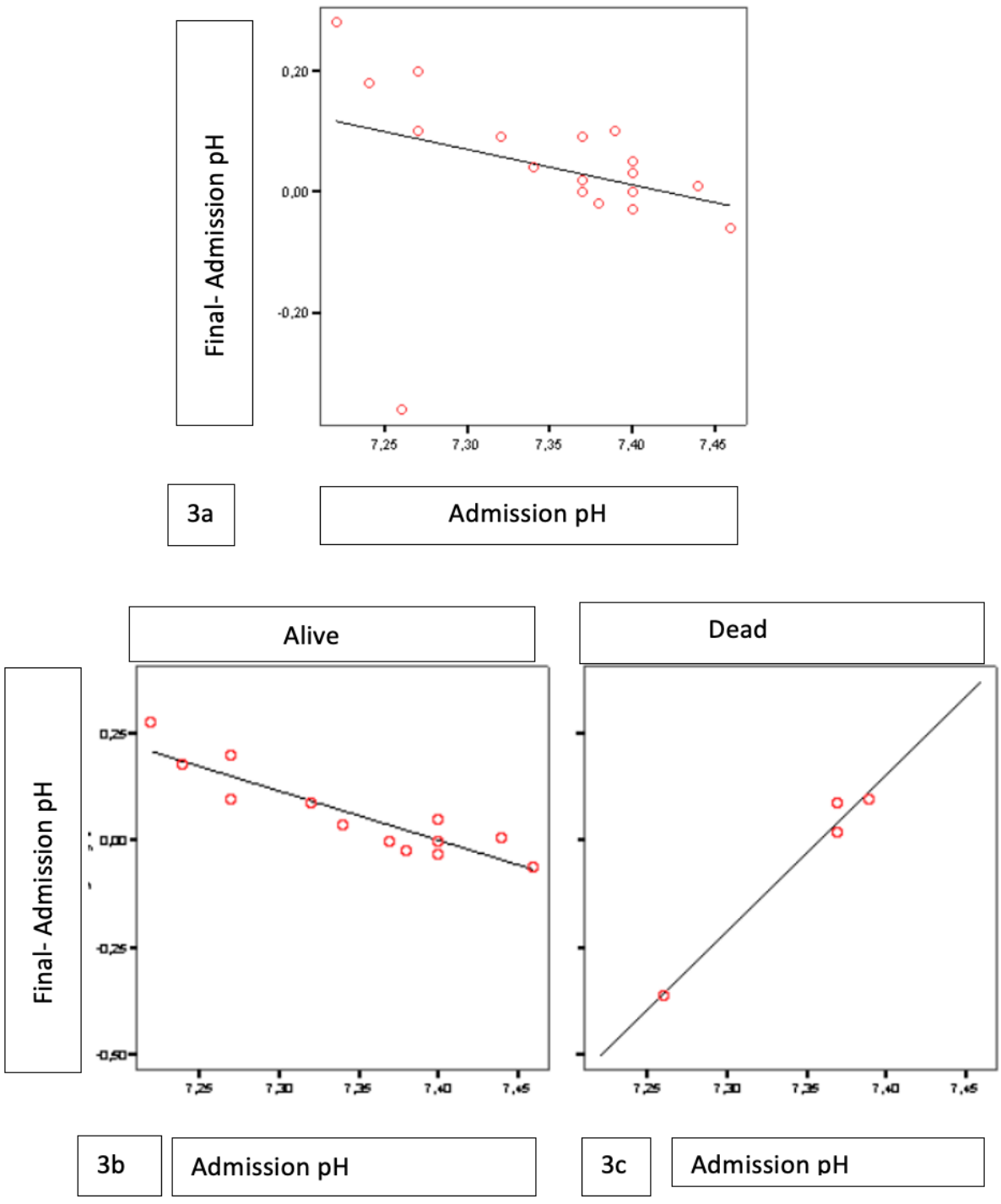

Figure 3. Graph of the relationship between hospitalization pH and pH change a: In all patients; b: In alive patients; c: In dead patients

DISCUSSION

In this study; the way of providing antibiotics, reason and frequency of use, and antibiotic use information (habit of reading the prospectus, taking an antibiotic when hungry or full, the duration to continue the antibiotic, and storage conditions) were investigated. The findings suggest gender, place of residence, and having healthcare personnel in the family

affected participants' knowledge, attributes, and behaviors about the usage of antibiotics. The most intensive participation in the study, based on volunteering, was provided by first and emergency aid (42.9%) and anesthesia technician department (10.8%) students. Moreover, it was determined that the highest knowledge score about numeracy in health literacy belonged to the students of these two departments. The reason why students studying in these departments both have higher participation and knowledge scores can be attributed to the fact that they received more training on drugs in accordance with the education curriculum in order to be authorized to use drugs, and thus their awareness increased.

In a study conducted among students studying in health sciences and non-health fields, it was determined that 36.1% of students studying in health sciences used self-medication in case of illness (27). According to the results we obtained, 77.4% of the students consult a doctor in the presence of a health problem, while 18.4% try to overcome their health problem without using medication. Our results, as found in the literature, determined that the ratio of self-medication was lower than expected and in line with the education received by our participant group. Our results, in a way, emphasize that the general health status of the individual is an important issue for the participants in the study.

The sources from which individuals obtain information about the antibiotics they use differ from country to country. One out of every three Europeans gets the information from their doctor, and 10% get it from their pharmacist. In Sweden, 98% of respondents to the questionnaire said that they took antibiotics with their doctor's prescription, while in Greece this rate was only 79% (28). Other studies emphasize that most people use drugs without consulting a doctor, and the most commonly used drugs are painkillers and antibiotics (29, 30). In our results, it was determined that the rate of using prescription antibiotics under the supervision of a doctor (85.4%) was higher than the rate of self-use of antibiotics. The fact that students participating in the study stated that they do not need antibiotics at a ratio of 79.2% when they encounter any health problem. The results can be considered evidence that the awareness of inappropriate antibiotic use has increased due to their education and that the expectation of the doctor to prescribe antibiotics has decreased. Below this positive result; public service announcements made by health authorities and restrictions on the over-the-counter sale of antibiotics (31).

A study reported that 35.6% of university students expected antibiotics to be prescribed for viral upper respiratory tract infections such as colds and flu. In the same study, they emphasized that 77.8% of the students knew the role of antibiotics in the treatment of bacterial

infections, but only 27.4% knew that antibiotics were not for viral infections (32). In our study, bacterial infections were determined as the type of disease requiring antibiotics at a ratio of 63.2%. In the definition of disease requiring antibiotic use, the ratio of students reporting viral infections was 33.5%. Considering the increase in the frequency of bacterial infections in parallel with the weakening of the immune system due to viral infections, our results were compatible with the literature. In our study, it was determined that the most common reason for antibiotic use was 'fever' with 49.5%. In the results of the research conducted with families, it was determined that the primary reason for starting antibiotics for the children of parents was fever (33). In similar studies, it has been found that the ratio of those who use antibiotics without the need for doctor control in viral infections such as the flu and cold was quite high (34).

The fact that the universe chosen for our research consisted of students and that 41.5% of the students stayed in dormitories can be explained as the reason for going to the doctor once last year. 47.2% of the students who went to the doctor in the previous year were not prescribed antibiotics, and 31.2% of the students have prescribed antibiotics once. In the study conducted in the TRNC, it was determined that pharmacists sell antibiotics without a prescription at a ratio of 41.5%.20 According to the data in our study, the low frequency of prescribing antibiotics confirms that antibiotics have ceased to be miracle drugs and that the attitudes and behaviors of all stakeholders on this subject have changed rationally.

Thanks to the developing technology, in our age where the speed of access to information is very high but information pollution on every subject is quite intense, patients can easily access information about the drugs they use. A study reported that as age increases, the frequency of obtaining information from physicians and pharmacists about drug use increases, but the frequency of reading/learning instructions for drug use decreases. As a result of the same research, it was determined that there was not a significant difference between the age groups of individuals and the status of regular drug prospectus reading depending on the presence of chronic disease (30). The fact that the rate of reading the prospectus of the students participating in the research is high (78.8%) suggests that this may be due to the fact that they are healthcare professionals despite their young average age. The information on whether to take antibiotics on an empty stomach or on a full stomach is not fully settled among the public. In this regard, the responsibility of all health professionals, especially physicians, and pharmacists, comes to the fore. It is of great importance to convey the usage information or the points that need attention according to the drug properties to the

patients, especially during the delivery of the drug to the patient. 84.9% of the students stated that they had a habit of eating before using antibiotics. With such a habit, the risk of drug-food interactions and/or delay in emptying stomach contents due to antibiotic use can be avoided.

The statement given by 45.3% of the participants regarding the duration of antibiotic use, which will contribute to the formation of antibiotic resistance, is that “they use the antibiotic given to them until the symptoms disappear”. Among the different answers, the ratio of participants stating that "it continues during the prescription", which is the ideal usage period, was 39.1%. Although these two ratios obtained from our results were close to each other, they were lower than the ratio (70%) of students who stated that they were "continuing during the prescription" as a result of the study conducted by Mete et al., (35). Kaya et al. found that 62.2% of the participants stopped using the drug when the symptoms of the disease disappeared, 25.7% changed the drug dose and 18.2% did not use the drug on time (36). While the results of the study conducted on the duration of antibiotic use emphasize the lack of general knowledge in this regard, the results of the current studies in the literature differ considerably from each other. When the responses given to the suggestions about the treatment were evaluated, it was determined that 10.4% of the patients used the antibiotic when they remembered, and 76.9% used it at the same time every day. RAU is an important point in the development of positive behaviors regarding antibiotic use. With the ratio of 76.9% obtained from our research, it is possible to say that the students received the necessary information from the doctor about the use of antibiotics after the examination and that they followed the antibiotic usage instructions given to them by the pharmacists while supplying their medicines.

Attention to the storage conditions of the drugs after opening the lid during use; in some cases, is important for drugs that lose their properties even in a short time such as the duration of treatment. Another responsibility of the health personnel is to warn the patients about the subject during drug supply and to provide the necessary information. In the study of Güngör et al., parents stated that they kept the antibiotics prescribed to their children in the refrigerator at a ratio of 59.5% (37). In our study results, it was stated that our students had stored antibiotics at room temperature with a ratio of 47.6%. In the study carried out by Sorensen et al., in Belgium, it was found that 1/3 of the participants hid the drugs under inappropriate conditions (38). It can be assumed that our students don't yet know enough about this topic because our findings don't entirely overlap with the literature.

In terms of antibiotic use of knowledge, attitudes, and behaviors of the participants;

there was a statistically significant difference in the presence of gender, residence, and family health personnel. The effect of gender differences on the results is thought to be that the social responsibilities of females cause them to be more careful and detailed. The effect of students whose residence place is a dormitory on the results; in order to continue their education without interruption by taking their own responsibilities, they are more attentive to their general health status than other students. The fact that the presence of health personnel in the family has a meaningful effect on the results is thought to be an indication that the transfer of some known errors on the subject from parents to children is still continuing. Our results were consistent with the results of the study by Çelik et al. (39). It was determined that the level of knowledge of our students studying in the field of health, such as diseases that require antibiotic use, discrimination of symptoms, compliance with antibiotic treatment, and storage conditions, is not lower than the current literature data.

Studies on the level of numeracy knowledge in health literacy have generally been conducted on chronic diseases, and the number of studies evaluating the use of antibiotics and numeracy knowledge levels in health literacy in acute diseases is very limited. Our findings showed that the numeracy knowledge level of health services school students was good but not excellent. This negative result, which we encounter even in health students with middle and high education levels, can be considered a reflection of the fact that the situation can be worrying in individuals with standard education. As a result of a study, it was emphasized that the ratio of parents who believe that antibiotics will cure all kinds of viral, bacterial, and fungal infections is almost half of the individuals included in the study (40). Parents especially have problems giving the appropriate dose of liquid medicines to their children (41). Hasan et al. stated that there is a relationship between numeracy knowledge in health literacy and antibiotic resistance and side effects (24). It is also suggested that numeracy skills show parallelism with the patient's age, education level, and socioeconomic characteristics (42). Although the sample of our study consisted of second-year students studying in the field of health, no perfect positive relationship was found between education level and health literacy numerical knowledge level. However, 14.7% of the students scored above 9 points. This result highlights the fact that it is not easy to manipulate the numeracy level of health literacy knowledge of patients with adequate health literacy and education.

CONCLUSION

In conclusion, the present study revealed that severe respiratory symptoms improved when respiratory support with NIV/IMV was given

without delay, within the correct indications, to patients who were admitted to the ICU due to severe asthma attacks and did not respond to medical treatment.

Ethics Committee Approval: Ethics committee approval was received for this study from the Clinical Research Ethics Committee of Hacettepe University (Approval date and number: 10.04.2013; GO 13/207-10).

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: SK, GK; Design: SK, GK, Data Collection and Processing: SK, SÖ, EOE; Analysis and Interpretation: AUD, SK; Writing: SK, OCB

Conflict of Interest: The author declared no conflict of interest.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. Cevhertas L, Ogulur I, Maurer DJ, Burla D, Ding M, Jansen K, et al. Advances and recent developments in asthma in 2020. Allergy 2020;75(12):3124-3146.
2. Busse WW, Fang J, Marvel J, Tian H, Altman P, Cao H. Uncontrolled asthma across GINA treatment steps 2 - 5 in a large US patient cohort. J Asthma 2022;59(5):1051-1062.
3. Çelik G, Aydın Ö, Türk Toraks Derneği Astım ve Alerji Çalışma Grubu. Astım Tanı ve Tedavi Rehberi, Astımın Kronik Tedavisi Basamak Tedavisi 2022 Güncellemesi
4. Kostakou E, Kaniaris E, Filiou E, Vasileiadis I, Katsaounou P, Tzortzaki E, et al. Acute Severe Asthma in Adolescent and Adult Patients: Current Perspectives on Assessment and Management. J Clin Med 2019;8(9):1283.
5. Agnihotri NT, Saltoun C. Acute severe asthma (status asthmaticus). Allergy Asthma Proc 2019;40(6):406-409.
6. Pallin M, Hew M, Naughton MT. Is non-invasive ventilation safe in acute severe asthma? Respirology 2015;20(2):251-7.
7. Pallin M, Naughton MT. Noninvasive ventilation in acute asthma. J Crit Care 2014;29(4):586-93.
8. Davidson AC, Banham S, Elliott M, Kennedy D, Gelder C, Glossop A, et al. BTS/ICS guideline for the ventilatory management of acute hypercapnic respiratory failure in adults. Thorax 2016;71 Suppl 2:ii1-35.
9. Sheikh M, Tiruvoipati R, Hurley JC. Non-invasive ventilation of patients with acute asthma. Intern Med J 2019;49(2):262-264.
10. Binachon A, Grateau A, Allou N, Ferdynus C, Allyn J, Dangers L, et al. Acute severe asthma requiring invasive mechanical ventilation in the era of modern resuscitation techniques: A 10-year bicentric retrospective study. PLoS One 2020;15(10):e0240063.

11. Althoff MD, Holguin F, Yang F, Grunwald GK, Moss M, Vandivier RW, et al. Noninvasive Ventilation Use in Critically Ill Patients with Acute Asthma Exacerbations. Am J Respir Crit Care Med 2020;202(11):1520-1530.
12. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention, 2022 (GINA, 2022).
13. El Shinnawy OM, Metwally M, Abdel Aleem NA, Eid WM. Assessment of noninvasive ventilation in patients with acute severe asthma. Egypt J Chest Dis Tuberc 2022;71:67-73.
14. Shigemura M, Homma T, Sznajder JI. Hypercapnia: An Aggravating Factor in Asthma. J Clin Med 2020;9(10):3207.
15. Vasileiadis I, Alevrakis E, Ampelioti S, Vagionas D, Rovina N, Koutsoukou A. Acid-Base Disturbances in Patients with Asthma: A Literature Review and Comments on Their Pathophysiology. J Clin Med 2019;8(4):563.
16. Senna G, Latorre M, Bugiani M, Caminati M, Heffler E, Morrone D, et al. Sex Differences in Severe Asthma: Results From Severe Asthma Network in Italy-SANI. Allergy Asthma Immunol Res 2021;13(2):219-228.
17. Chowdhury NU, Guntur VP, Newcomb DC, Wechsler ME. Sex and gender in asthma. Eur Respir Rev 2021;30(162):210067.
18. Mikhail I, Grayson MH. Asthma and viral infections: An intricate relationship. Ann Allergy Asthma Immunol 2019;123(4):352-358.
19. Martin MJ, Beasley R, Harrison TW. Towards a personalised treatment approach for asthma attacks. Thorax 2020;75(12):1119-1129.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 638-651**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1297235

Comparison of Bilateral Ultrasound-Guided Erector Spinae Plane Block and Thoracic Epidural Analgesia in Open Heart Surgery

Ebru Çanakcı[1(ID)] NilayTas[1(ID)] Aysenur Kırdemir[1(ID)] Ismail Elmali[1(ID)] Melih Ürkmez[2(ID)]

[1]Ordu University Faculty of Medicine, Department of Anesthesiology and Reanimation, Ordu, Turkey
[2]Ordu University Faculty of Medicine, Department of Cardiovascular Surgery, Ordu, Turkey

Received: 15 May 2023, Accepted: 26 July 2023, Published online: 29 October 2023

Abstract

Objective: In our study, it was aimed to compare the postoperative analgesic efficacy of bilateral USG-guided erector spinae plane block (ESP) block and thoracic epidural analgesia (TEA) in patients who underwent open heart surgery.

Methods: No interventional multimodal analgesia technique was applied to the patients in the control group, only iv patient-controlled analgesia (iv PCA) device was inserted at the end of the operation. The duration of postoperative mechanical ventilation (MV), the amount of opioid consumed in the first 24 hours, and the visual analog scale (VAS) scores during postoperative 1st, 2nd, 4th, 6th, 12th, 24th hours while resting/coughing were recorded.

Results: There was a notable difference there among the groups in terms of the amount of postoperative opioid consumption (p=0.001). There was a notable difference there among the groups in the resting VAS scores at the postoperative 1st, 2nd, 4th, 12th, and 24th hours (p<0.001, p=0.002, p=0.002, p=0.051, p=0.001, p=0.021 respectively). There was a notable difference there among the groups in the VAS scores while coughing at the postoperative 1st, 2nd, 4th, 6th, and 24th hours (p<0.001, p<0.001, p<0.001 p=0.008, p=0.051, p=0.006 respectively).

Conclusion: We think that ESP block is a good alternative to TEA, which is shown as the gold standard in pain control after open heart surgery

Keywords: Erector spinae plane block, thoracic epidural analgesia, postoperative analgesia management

Suggested Citation: Canakci E, TasN,Kirdemir A , Elmali I, Urkmez M. Comparison of Bilateral Ultrasound-Guided Erector Spinae Plane Block and Thoracic Epidural Analgesia in Open Heart Surgery Mid Blac Sea Journal of Health Sci, 2023;9(4):638-651.

Address for correspondence/reprints:

Ebru Canakci

Telephone number: +90 (532) 265 16 87

E-mail: canakciebru@gmail.com

INTRODUCTION

More than 800.000 open heart surgeries are performed worldwide each year (1). Coronary artery bypass grafting surgery and valve surgery are traditionally performed through median sternotomy, with severe damage to soft tissues and bone tissue during the dissection stage. Moderate to severe pain occurs in 30-75% of patients after cardiac surgery. In 4-10% of patients, chronic pain syndrome may develop postoperatively (2,3).Hemodynamic stability, improvement of myocardial oxygenation, immune modulation and bleeding control can be achieved with adequate pain treatment. This may reduce the duration of mechanical ventilation, cardiac ischemic events and arrhythmias in the postoperative period. Improved pain control has a notable impact on hospital stay and patient satisfaction, as well as reducing surgery-related complications. Therefore, providing adequate intraoperative and postoperative analgesia should be a primary priority for the anesthesiologist (3).

Ultrasound (USG) guided erector spinae plane (ESP) block is applied by injecting a solution containing local anesthetic into the fascia under the erector spinae muscle (4-6). Because of the application site of the ESP block is far from the pleura and neuraxial tissues, it reduces the risk of complications owing to injury to these structures. The sonoanatomy is easy to view, and the get around of the local anesthetic is clearly visible (7-9). Cadaver studies have indicated that the injection get rounds to the ventral and dorsal roots of the spinal nerves and formed sensory blockade in both the anterolateral thorax and the posterior hemithorax (4). In the literature, it was stated that efficient analgesia was derived in randomized controlled studies looking into the effectiveness of ESP block for postoperative analgesia management after open heart surgery, breast surgery and ventral hernia repair (7-9).

Thoracic epidural analgesia (TEA) is the perfect option in thoracotomy surgeries, but it has important undesirable side effects for instance hypotension, dural puncture and contralateral block (10). Epidural analgesia has been using in cardiac surgery for many years. However, the use of TEA is limited for fear of increased risk of epidural hematoma due to preoperative and intraoperative anticoagulation therapy. Since epidural catheterization is a controversial technique, it is very important to update the risk-benefit ratio of epidural catheterization in cardiac surgery (11,12). A recent review described the benefits and risks associated with thoracic epidural analgesia and concluded that “the put upon of epidurals in cardiac surgery is no more dangerous than non-cardiac surgery” (13).

In this study, it is aimed to compare the postoperative analgesic efficacy of USG-guided bilateral ESP block and TEA in patients conducting open heart surgery.

METHODS

The study started after getting approval from Ordu University Clinical Research Ethics Committee (the ethics committee decision dated 06.05.2022 and with registration number 2022/191).

Following the ethics committee approval, patients there among the ages of 18-80, with ASA (American Society of Anesthesiologist) score III-IV and pain assessment cooperation who underwent elective open heart surgery in the cardiovascular surgery operating room of Ministry of Health, Ordu University Training and Research Hospital were included in the study .Our study was carried out between 1 June 2022 and 01 February 2023. The patients who wanted to quit the study voluntarily, had local anesthetic allergy, substance abuse, chronic pain syndrome, cooperation disorder, pregnant or breast feeding, peripheral nerve disease and emergency open heart surgery were not included in this study. Written and verbal informed consent was obtained from all patients participating in the study by giving detailed information about the procedure before the operation. Group selection was performed based on the patient's preference. The groups were randomized as follows: When the patient was taken to the operating table, She/he was asked to choose one of the 3 sealed envelopes. The analgesia method written in the envelope was applied to the patient. According to the type of postoperative analgesia, 3 groups were formed as the control group (Group Control), Group ESP and Group TEA. Postoperative results such as VAS scores and the amount of opioid consumed were performed by a different anesthetist who did not know the patient groups. The study was performed as a single-blind, randomized controlled and prospective study.

Power analysis was performed for our study. Considering the postoperative 1st hour VAS values, it was concluded that a total of 48 cases, 16 in each group, should be included in the study with 95% confidence (1-α), 95% test power (1-β), f=0.597 effect size (14). 68 cases, including 22 control group, 23 TEA, 23 ESP block group, were included in our study.

After electrocardiography (ECG), noninvasive blood pressure measurement, blood oxygen saturation (SpO2) and temperature monitoring, the patients were intubated after anesthesia induction with 2-3 mg/kg iv propofol, 1.5 mcg/kg fentanyl and 0.6 mg/kg rocuronium bromide. Anesthesia was maintained with 2% sevoflurane, 40% O2-air mixture and 0.05 mcg/kg/min fentanyl infusion. The fresh gas flow of the anesthesia device was set to 4 lt/min. Intraoperative invasive blood pressure monitoring was performed by radial artery cannulation. At the end of the operation, an i.v patient-controlled analgesia device (i.v PCA) was connected to all patients without basal infusion by pressing the button when they felt pain. The patient-controlled analgesia device was set with no basal infusion, with a 10-

minute lock-in time to give a bolus dose of 20 mg Tramadol (Ramadex 100 mg/2 ml, Haver İlaç, Istanbul, Turkey) when the patient pressed the button.

No interventional multimodal analgesia technique was applied to the patients in the control group, only iv PCA device was used at the end of the operation.

In the ESP block group, the patient was seated on the operating room table after monitoring. USG-guided bilateral ESP block was performed in the sitting position. After asepsis-antisepsis was achieved, the high-frequency linear USG probe was placed rough 2-3 cm lateral to the T5 vertebra in the transverse plane, and the T5 transverse process was visualized on USG. By advancing the block needle parallel to the probe in the cranio-caudal direction with an in-plane technique, it was felt to touch the transverse process at approximately 4 cm, passing first the trapezius, then the rhomboid major and erector spinae muscle. Confirmation was performed by observing the opening of the muscle fascia with 5 ml of saline. Afterwards, 0.5% bupivacaine 10 cc and 0.9% saline 10 cc were mixed and a total of 20 ml of solution was given in this plane. The same process was repeated for the other side. A total of 40 ml of 0.25% bupivacaine, 20 ml right and 20 ml left, was given for analgesia. The USG device we use is Clarius L7 HD3 Linear Ultrasound scanner (Clarius, AG Healthcare, Istanbul, Turkey), and for ESP block, sonovisible 80 mm BBraun (BBraun, Stimuplex, Melsungen, Germany) branded block needle was used. At the end of the operation, an i.v PCA device was used.

In the TEA group, the patient was seated on the operating room table after monitoring. A thoracic epidural catheter was inserted in the sitting position. After asepsis-antisepsis was achieved, median intervention was made through the T6-7 intervertebral space, and the epidural space was reached with the hanging drop technique. The catheter (Perifix, 18 G Tuohy needle, BBraun, Melsungen, Germany) was placed in the epidural space approximately 4-5 cm. A test dose was administered with 3 ml of 2% lidocaine containing 5 μg/ml adrenaline (1:200.000). Invasive blood pressure and heart rate response were monitored. After the location of the epidural catheter was confirmed, 20 ml of local anesthetic solution prepared with 0.25% bupivacaine was administered through the catheter. Likewise, 20 ml of bupivacaine, prepared at a concentration of 0.25%, was administered during sternal closure. A total of 40 ml of diluted local anesthetic was administered to the patient. When the surgery is over, the epidural catheter was removed and an i.v PCA device was inserted. Demographic characteristics of the cases, Euroscore scores, ASA scores, mean arterial pressures (MAP) after intubation, before and after perfusion and pulse values were recorded. Similarly, postoperative mechanical ventilation (MV)

duration, visual analogue scores (VAS) while resting and coughing after extubation at 1st, 2nd, 4th, 6th, 12th, and 24th hours, postoperative opioid (tramadol) amount consumed were recorded.

Statistical analysis:

Data were analyzed with IBM SPSS v23. Conformity to the normal distribution was evaluated using the Shapiro-Wilk test. Chi-square test was used to compare categorical variables according to groups. One-way analysis of variance was used to compare the normally distributed data according to the groups. The Kruskal Wallis test was used to compare the data that were not normally distributed according to the groups, and multiple comparisons were examined with the Dunn test. The Friedman test was used to compare data that were not normally distributed over time within the group. Analysis results were presented as mean ± standard deviation and median (minimum – maximum) for quantitative data, and frequency (percent) for categorical variables. Significance level was taken as $p<0.05$.

RESULTS

There was no statistical difference there among the groups in terms of gender, ASA risk class, type of surgery and smoking. The results are shown in Table 1.

The analysis results of the groups regarding age, weight, height, EF (Ejection Fraction), operation time, postoperative MV duration and postoperative opiod consumption are shown in Table 2.

Table 1. Comparison of gender, ASA, type of surgery, smoking variables according to groups

	Control	TEA	ESPB	Total	Test stat.	p
Gender						
Female	11 (50)	10 (43.5)	7 (30.4)	28 (41.2)	1.853	0.396
Male	11 (50)	13 (56.5)	16 (69.6)	40 (58.8)		
ASA						
3	15 (68.2)	13 (56.5)	15 (65.2)	43 (63.2)	0.716	0.699
4	7 (31.8)	10 (43.5)	8 (34.8)	25 (36.8)		
Surgery Type						
Valve surgery	5 (22.7)	2 (8.7)	5 (21.7)	12 (17.6)	4.905	0.297
Coronary	11 (50)	17 (73.9)	16 (69.6)	44 (64.7)		
Valve and coronary	6 (27.3)	4 (17.4)	2 (8.7)	12 (17.6)		
Smoking						
None	14 (63.6)	10 (43.5)	9 (39.1)	33 (48.5)	3.058	0.217
Yes	8 (36.4)	13 (56.5)	14 (60.9)	35 (51.5)		

*Chi-square test, frequency (percent)

There was a notable difference there among the groups in terms of postoperative opioid consumption (p=0.001). There was no difference there among the groups in terms of postoperative MV duration.

Comparisons made in terms of mean arterial pressure (MAP) and pulse, which are intraoperative vital signs, are shown in Table 3.

Table 2. Comparison of age, height, weight, Ejection Fraction (EF), Euroscore, operation time, postoperative mechanical ventilation (MV) time, postoperative opioid amount by groups

	Control	TEA	ESPB	Total	Test stat.	p
Age	61.86±8.50	65.22±10.00	62.13±10.38	63.09±9.66	0.845	0.434*
	61.50 (47.00 - 77.00)	64.00 (47.00 - 84.00)	62.00 (42.00 - 86.00)	62.00 (42.00 - 86.00)		
Weight	77.55±11.38	78.91±11.39	79.74±11.88	78.75±11.42	0.206	0.814*
	76.50 (60.00 - 105.00)	78.00 (59.00 - 100.00)	82.00 (55.00 - 105.00)	79.00 (55.00 - 105.00)		
Height	165.45±9.35	164.83±8.66	168.48±8.35	166.26±8.81	1.131	0.329*
	165.00 (150.00 - 185.00)	165.00 (150.00 - 180.00)	169.00 (152.00 - 183.00)	166.00 (150.00 - 185.00)		
EF	0.52±0.08	0.51±0.07	0.55±0.06	0.53±0.07	5.287	0.071**
	0.55 (0.25 - 0.60)	0.55 (0.35 - 0.60)	0.55 (0.45 - 0.65)	0.55 (0.25 - 0.65)		
Euroscore	2.55±2.46	2.04±2.14	2.13±1.74	2.24±2.11	0.468	0.791**
	2.00 (0.00 - 9.00)	2.00 (0.00 - 7.00)	2.00 (0.00 - 5.00)	2.00 (0.00 - 9.00)		
Operation Duration	3.62±0.98	3.28±0.82	3.13±0.53	3.34±0.81	4.928	0.085**
	3.50 (2.00 - 6.00)	3.00 (2.00 - 5.50)	3.00 (2.45 - 4.00)	3.00 (2.00 - 6.00)		
Postoperative MV duration	11.48±11.35	10.91±5.05	7.70±1.42	10.01±7.23	4.786	0.091**
	8.00 (4.00 - 55.00)	10.00 (5.50 - 28.00)	8.00 (4.50 - 11.00)	8.00 (4.00 - 55.00)		
Postoperative opioid amount (mg)	118.18±113.96	21.78±42.15	30.57±87.52	55.94±95.20	13.912	**0.001****
	100.00 (0.00 - 400.00)a	0.00 (0.00 - 100.00)b	0.00 (0.00 - 400.00)b	0.00 (0.00 - 400.00)		

*One-way analysis of variance, **Kruskal Wallis test, a-b: No difference between groups with the same letter, mean ± standard deviation, median (minimum – maximum)

In terms of intraoperative vital signs, no notable difference was found in all measured time periods.

The comparison of the VAS score resting values according to the groups is presented in Table 4.

Except for the postoperative 6th hour, a notable difference was found thereamong the groups in the other time periods (postoperative 1st, 2nd, 4th, 12th, 24th hours). Obtained p values were determined as p<0.001, p=0.002, p=0.002, p=0.051, p=0.001, p=0.021 in the time frame, respectively. The p value obtained at the sixth hour all groups was 0.051, which is very close to the level of significance.

The line graph of the resting VAS values is presented in Figure 1.

The line graph of the coughing VAS values is presented in Figure 2.

Table 3. Comparison of MAP and pulse values by groups

	Control	TEA	ESPB	Total	Test stat.	p
Preoperative MAP	117.95±18.25	108.78±17.95	110.43±20.11	112.31±18.95	3.821	0.148**
	121.00 (83.00 - 155.00)	108.00 (80.00 - 145.00)	111.00 (81.00 - 176.00)	112.50 (80.00 - 176.00)		
MAP after intubation	80.27±18.75	83.87±25.48	78.00±20.06	80.72±21.48	0.429	0.653*
	77.50 (51.00 - 115.00)	81.00 (38.00 - 137.00)	70.00 (45.00 - 124.00)	78.50 (38.00 - 137.00)		
MAPjust before the perfusion	67.91±14.06	59.39±12.32	65.96±10.09	64.37±12.60	5.059	0.080**
	64.50 (51.00 - 111.00)	58.00 (40.00 - 83.00)	63.00 (51.00 - 84.00)	63.00 (40.00 - 111.00)		
MAP just after the perfusion	72.68±12.11	70.04±13.06	66.26±14.79	69.62±13.45	1.312	0.276*
	71.00 (55.00 - 108.00)	69.00 (50.00 - 100.00)	68.00 (40.00 - 100.00)	69.50 (40.00 - 108.00)		
Preoperative pulse	85.59±18.13	86.13±22.17	84.09±16.49	85.26±18.83	0.071	0.932*
	83.00 (54.00 - 112.00)	81.00 (55.00 - 144.00)	83.00 (60.00 - 122.00)	82.50 (54.00 - 144.00)		
Pulse after intubation	76.09±11.08	82.13±20.98	75.09±15.49	77.79±16.48	1.065	0.587**
	74.00 (55.00 - 102.00)	78.00 (62.00 - 144.00)	73.00 (53.00 - 114.00)	75.00 (53.00 - 144.00)		
Pulse just before the perfusion	78.05±12.67	79.35±23.17	78.61±13.21	78.68±16.86	0.134	0.935**
	78.00 (54.00 - 101.00)	77.00 (48.00 - 144.00)	76.00 (55.00 - 109.00)	77.50 (48.00 - 144.00)		
Pulse just after the perfusion	79.95±12.42	77.78±18.91	73.52±11.07	77.04±14.60	3.267	0.195**
	78.00 (61.00 - 101.00)	70.00 (57.00 - 134.00)	71.00 (55.00 - 101.00)	71.50 (55.00 - 134.00)		

The comparison of the VAS score values when coughing according to the groups is presented in Table 5. Except for the postoperative 12th hour, there was a notable difference between the groups in all other time periods (1st, 2nd, 4th, 6th, 24th hours) evaluated. The p values obtained were determined as $p<0.001$, $p<0.001$, $p<0.001$ $p=0.008$, $p=0.051$, $p=0.006$ in the time frame, respectively. The p value obtained in 12th hour all groups was 0.051, which is very close to the level of significance.

Table 4. Comparison of VAS score ***resting*** values according to groups

	Control	TEA	ESPB	Total	Test stat.	p*
VAS score 1st hour of rest	4.32±1.84 4.00 (1.00 - 9.00)a	2.17±1.47 2.00 (0.00 - 4.00)b	2.52±1.93 2.00 (0.00 - 9.00)b	2.99±1.97 3.00 (0.00 - 9.00)	16.780	**<0.001**
VAS score 2nd hour of rest	4.14±2.03 4.00 (1.00 - 9.00)a	2.26±1.66 2.00 (0.00 - 5.00)b	2.22±1.28 2.00 (0.00 - 4.00)b	2.85±1.88 3.00 (0.00 - 9.00)	12.717	**0.002**
VAS score 4th hour of rest	3.95±2.03 3.50 (1.00 - 9.00)a	2.04±1.46 2.00 (0.00 - 4.00)b	2.17±1.37 2.00 (0.00 - 4.00)b	2.71±1.84 3.00 (0.00 - 9.00)	12.785	**0.002**
VAS score 6th hour of rest	3.55±1.82 3.50 (0.00 - 7.00)	2.96±4.43 2.00 (0.00 - 22.00)	2.65±2.25 3.00 (0.00 - 11.00)	3.04±3.04 3.00 (0.00 - 22.00)	6.333	0.051
VAS score 12th hour of rest	3.59±1.62 3.00 (1.00 - 8.00)a	1.83±1.44 2.00 (0.00 - 5.00)b	2.39±1.34 2.00 (0.00 - 4.00)ab	2.59±1.62 2.50 (0.00 - 8.00)	13.151	**0.001**
VAS score 24th hour of rest	3.36±1.68 3.00 (1.00 - 8.00)a	2.00±1.38 2.00 (0.00 - 5.00)b	2.26±1.57 2.00 (0.00 - 6.00)ab	2.54±1.64 2.00 (0.00 - 8.00)	7.760	**0.021**
Test stat.	20.685	4.312	2.678			
p**	0.051	0.505	0.750			

*Kruskal Wallis test, **Friedman test, a-b: No difference between groups with the same letter, mean ± standart deviation, median (minimum – maximum)

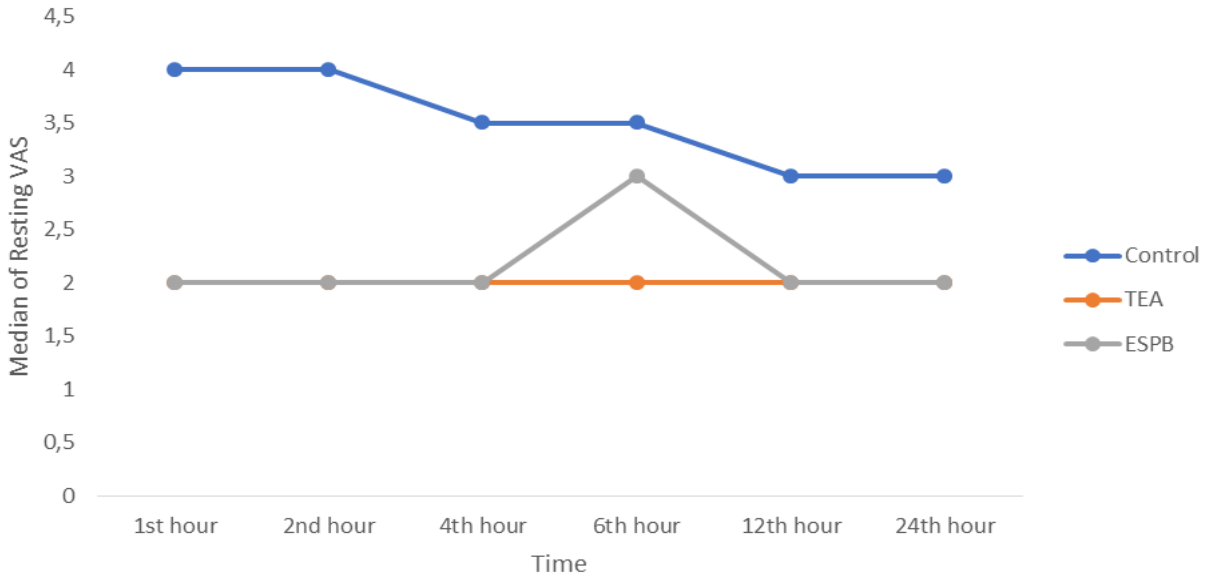

Figure 1. Line graph of resting VAS values

Table 5. Comparison of VAS score values when ***coughing*** according to groups

	Control	TEA	ESPB	Total	Test stat.	p*
VAS score 1st hour when coughing	5.18±1.71 5.00 (2.00 - 8.00)a	3.00±1.68 3.00 (0.00 - 6.00)b	2.87±1.32 3.00 (0.00 - 5.00)b	3.66±1.88 3.00 (0.00 - 8.00)	19.929	**<0.001**
VAS score 2nd hour when coughing	4.82±1.82 5.00 (2.00 - 8.00)a	2.91±1.56 3.00 (0.00 - 6.00)b	2.78±1.09 3.00 (0.00 - 5.00)b	3.49±1.76 3.00 (0.00 - 8.00)	17.029	**<0.001**
VAS score 4th hour when coughing	4.68±1.94 4.00 (2.00 - 9.00)a	2.91±1.41 3.00 (0.00 - 6.00)b	2.70±1.22 3.00 (0.00 - 5.00)b	3.41±1.76 3.00 (0.00 - 9.00)	15.742	**<0.001**
VAS score 6th hour when coughing	4.45±1.90 4.00 (2.00 - 9.00)a	3.00±1.68 3.00 (0.00 - 7.00)b	2.87±1.32 3.00 (1.00 - 5.00)b	3.43±1.77 3.00 (0.00 - 9.00)	9.671	**0.008**
VAS score 12th hour when coughing	4.23±1.93 4.00 (2.00 - 9.00)	2.91±1.59 3.00 (0.00 - 6.00)	2.91±1.56 3.00 (0.00 - 6.00)	3.34±1.78 3.00 (0.00 - 9.00)	7.098	0.051
VAS score 24th hour when coughing	4.41±1.87 4.00 (2.00 - 9.00)a	2.77±1.60 3.00 (0.00 - 6.00)b	2.87±1.66 2.00 (0.00 - 6.00)b	3.34±1.85 3.00 (0.00 - 9.00)	10.094	**0.006**
Test stat.	12.338	0.462	2.677			
p**						

*Kruskal Wallis test, **Friedman test, a-b: No difference between groups with the same letter, mean ± standart deviation, median (minimum – maximum)

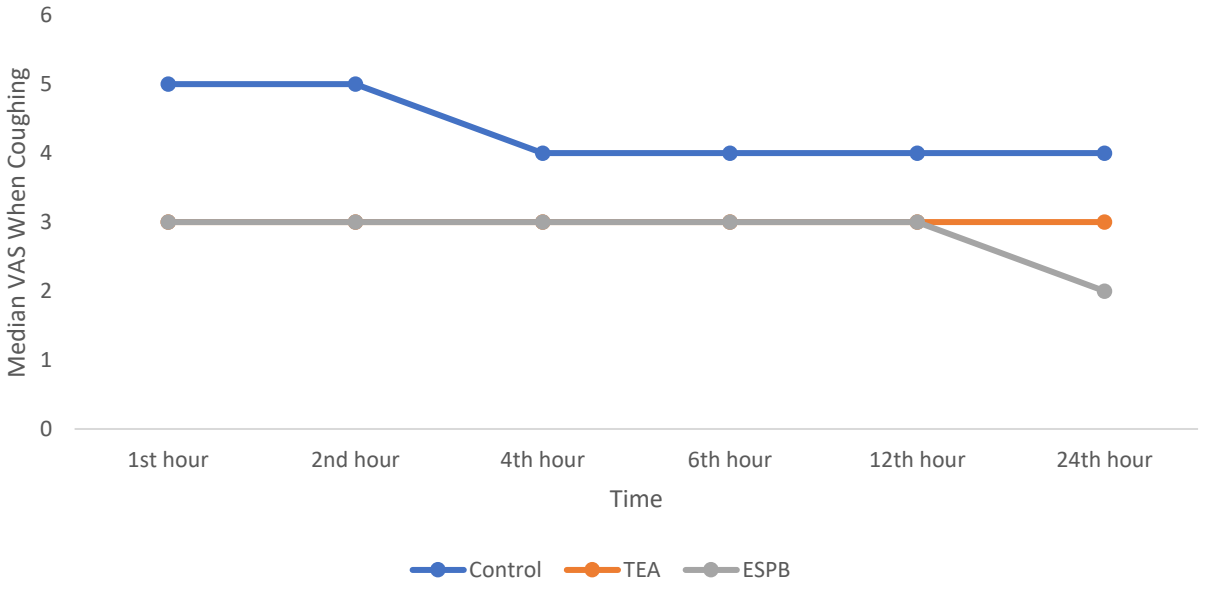

Figure 2. The line graph of the coughingVAS values is presented in Figure 2.

DISCUSSION:

As a result of our study, a notable difference was found between the TEA group, ESP group and control group in terms of postoperative opioid consumption. It was determined that less opioids were consumed in the postoperative period in the TEA group and ESP block group. However, when the TEA and ESP block groups

were compared in terms of opioid consumption, no notable difference was found. Similarly, between resting and coughing VAS scores, much lower VAS scores were obtained in the TEA and ESP block group compared to the control group. According to our results, USG-guided ESP block may be an alternative analgesic method to TEA in the analgesia of open heart surgery.

In a randomized controlled study conducted by Nagajara et al. in 2018, the analgesic efficacy of TEA and bilateral continuous ESP block were compared in 50 patients who had undergone cardiac surgery with median sternotomy. Postoperative pain assessment using VAS at rest and during coughing was performed at 0th, 3rd, 6th, 12th, 24th, 36th and 48th hours, and if VAS at rest >4, rescue analgesia was administered with iv fentanyl 1 mcg/kg. It was observed that both groups had similar VAS scores at 0th, 3rd, 6th and 12th hours both at rest and during coughing. However, it was determined that the ESP group had lower VAS scores at 24th, 36th and 48th hours. There was no notable difference there among the groups in terms of intraoperative fentanyl consumption, the need for rescue analgesics in the first postoperative hour and during the 48-hour follow-up of the patients. The authors found no difference there among the groups in terms of the duration of postoperative mechanical ventilation (7). In our study, a notable difference was found between resting and coughing VAS scores. In addition, in our study, a difference was found there among the groups in terms of the amount of tramadol consumed postoperatively. The amount of tramadol consumed postoperatively was low in the TEA and ESP block groups. Similarly, we did not detect any difference in terms of postoperative mechanical ventilation time.

In a prospective, randomized, controlled study performed by Piskin et al. (15) in 2021, the analgesic effect of USG-guided continuous ESP block after VATS (Video Associated Trans Thoracic Surgery) surgery was researched. Eighty patients between the ages of 18-75, ASA score I-III, who would undergo VATS surgery were included in the study, and the patients were divided into 2 groups as continuous ESP block and control group. Patients in both groups were given tramadol via an i.v PCA device. Tramadol and pethidine consumption there among the groups, VAS values at postoperative 0th, 1st, 4th, 8th, 12th, 24th, 36th and 48th hours, and opioid-related side effects were recorded, and the 0th hour VAS score was statistically lower in the continuous ESP block group. It was determined that the use of continuous ESP block in VATS significantly reduced the amount of tramadol used in the first 48 hours postoperatively, and the amount of pethidine rescue analgesia used in the continuous ESP block group was found to be statistically significantly lower (15). Our

results are significantly similar to the results of the study of Piskin et al. (15). A continuous ESP block catheter was not used in our study. The catheter inserted for TEA was also removed at the end of the operation to ensure homogenization of the groups. In our study, the amount of postoperative tramadol was found to be low in the TEA and ESP block groups. Our VAS scores were found to be low in the block groups in almost all the time periods measured.

In a retrospective study performed by Kukreja P. et al. in 2021, the analgesic efficacy of TEA, continuous ESP block, and continuous paravertebral block applied for analgesia after thoracic surgery in various procedures were compared. Patients who had undergone thoracotomy, VATS, oesophagectomy or pectus repair surgery and who had TEA (n=50), continuous ESP block (n=20) and continuous paravertebral block (n=34) preoperatively were included in the study. The groups were compared in terms of VAS values there among 0th-6th hours, 6th-12th hours, 12th-24th hours, postoperative morphine requirement, postoperative nausea, vomiting and hospital stay in the postoperative intensive care unit. There was no notable difference in terms of 0th-6th hour, 6th-12th hour and 12th-24th hour VAS values. When the amount of morphine used there among 0-6 hours, 6th-12th hours and 12th-24th hours postoperatively was compared, a difference was found there among the 3 groups in each time period. While the need for morphine was the lowest in the TEA group in each period, it was found to be the highest in the continuous paravertebral block group. When the TEA group and the continuous ESP block group were compared independently of the continuous paravertebral group, no difference was found there among the two groups in terms of morphine use there among 6th-12th hours postoperatively. The amount of morphine used there among 0th-6th hours and 12th-24th hours postoperatively was found to be higher in the continuous ESP block group than in the TEA group, and this difference was statistically significant (16). In our study, no difference was found thereamong the two groups in the pairwise comparison of TEA and ESP block postoperative opioid consumption. There was no difference there among TEA and ESP block groups there among our VAS scores at rest and coughing. A notable difference was found when triple comparison was made for both parameters. Our results are partially in agreement with the results of Kukreja P et al.

In a study conducted by Erturk et al., the postoperative analgesic efficacy of TEA in open heart surgery was investigated. IV PCA device was inserted in the control group, epidural PCA device was inserted in the TEA group. Tramadol amount consumed in the first 24 hours and rest and pain scores were evaluated. The amount of tramadol consumed for the first 24 hours was found to be lower in the TEA group compared to the control group

(14). Similarly, VAS scores at rest/coughing were lower than the control group. Our results are in perfect agreement with the results of the study of Erturk et al. (14). Our tramadol amounts consumed in the first 24 hours and our VAS scores were found to be lower in the TEA group compared to the control group.

Our study has some limitations. Although PCA continued for an average of 48 hours in patients, pain scores were followed in the first 24 hours postoperatively. Therefore, the long-term effects of the methods used on pain scores and complications could not be evaluated. A homogenization could not be established there among the groups because the socioeconomic and educational levels and ages of the patients were different, and pain is a subjective concept.

CONCLUSION

Consequently, we think that ESP block is a good alternative to TEA, which is shown as the gold standard in pain control after open heart surgery. We think that randomized controlled studies with larger populations are needed to support the findings of our study and to evaluate the postoperative analgesia and long-term effects of TEA and ESP block. .

Ethics committee approval: Ethics committee approval was received for this study from Ordu Clinical Research Ethics Committee of Ordu University with file number 2022/191.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: EC, Design: EC, NT, IE, MU Data Collection and Processing: EC, NT, AK, IE, MU Analysis and Interpretation, EC, NT, AK, IE, MU Writing: EC, AK, IE, MU

Conflict of Interest: The author declared no conflict of interest.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. Nalysnyk L, Fahrbach K, Reynolds MW, Zhao SZ, Ross S. Adverseevents in coronaryartery bypass graft (CABG) trials: a systematic review and analysis. Heart(British Cardiac Society). 2003:1;89(7):767–72.
2. Bigeleisen PE, Goehner N. Novel approaches in pain management in cardiacsurgery. CurrentOpinion in Anaesthesiology. 2015;28(1):89–94.
3. Kehlet H, Jensen TS, Woolf CJ. Persistent post surgical pain: risk factors and prevention. The Lancet. 2006:1;367(9522):1618–25.
4. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ. The erector spinae plane block: a novel analgesic technique in thoracic neuropathic pain. Reg Anesth Pain Med. 2016;41(5):621–7,
5. Forero M, Rajarathinam M, Adhikary S, Chin KJ. Continuous erector spinae plane

block for rescue analgesia in thoracotomy after epidural failure: A Case Rep. A&A Practise 2017;8(10):254–56.

6. Chin KJ, Malhas L, Perlas A. The erector spinae plane block provides visceral abdominal analgesia in bariatric surgery: A report of 3 cases. Reg Anesth Pain Med 2017; 42(3):372–76.
7. Nagaraja PS, Ragavendran S, Singh NG, Asai O, Bhavya G, Manjunath N et al. Comparison ofcontinuous thoracic epidural analgesia with bilateral erector spinae plane block for perioperative pain management in cardiac surgery. Ann Card Anaesth. 2018;21(3):323-27. doi: 10.4103/aca.ACA_16_18. PMID: 30052229; PMCID: PMC6078032.
8. Gürkan Y, Aksu C, Kuş A, Yörükoğlu UH, Kılıç CT. Ultrasound guided erector spinae plane block reduces postoperative opioid consumption following breast surgery: A randomized controlled study. Journal of Clinical Anesthesia. 2018;50(1):65- 68.
9. Chin KJ, Adhikary S, Sarwani N, Forero M. Theanalgesicefficacy of pre-operativebilateralerectorspinaeplane (ESP) blocks in patients having ventral hernia repair. Anaesthesia. 72(4);452-460, 2017.
10. Marshall K, McLaughlin K. Pain Management in Thoracic Surgery. Thorac Surg Clin. 2020;30(3):339-346. doi: 10.1016/j.thorsurg.2020.03.001.
11. Kirnö K, Friberg P, Grzegorczyk A,Milocco I,Ricksten SE,Lundin S. Thoracic epidural anesthesia during coronary artery bypass surgery: Effects on cardiac sympathetic activity, myocardial blood flow and metabolism, and central hemodynamics. Anesth Analg. 1994; 79(6):1075-81.
12. Davies RG, Myles PS, Graham JM. A comparison of the analgesic efficacy and side effects of paravertebral vs epidural blockade for thoracotomy-a systematic review and metaanalysis of randomized trials. Br J Anaesth 2006;96(4):418–26.
13. Royse C, Royse A, Soeding P. Prospective randomized trial of high thoracic epidural analgesia for coronary artery bypass surgery. Ann Thorac Surg 2003; 75(1):93-100
14. Erturk, E, Aydogdu Kaya F, Kutanis D, Besir A, Akdogan A, Geze S et al. The effectiveness of preemptive thoracic epidural analgesia in thoracic surgery. Bio Med Research International 2014; Article ID:673682 pp:1-6
15. Piskin O, Gokce M, Altınsoy B, Baytar C, Aydın BG, Okyay RD et al. Effects of continuous erector spinae plane block on postoperative pain in video-assisted thoracoscopic surgery: a randomized controlled study. Gen Thorac Cardiovasc Surg. 2022;70(1):64- 71. doi: 10.1007/s11748-021-01687-1.
16. Kukreja P, Herberg TJ, Johnson BM, Kofskey AM, Short RT, MacBeth L et al.

Retrospective Case Series Comparing the Efficacy of Thoracic Epidural with Continuous Paravertebral and Erector Spinae Plane Blocks for Postoperative Analgesia After Thoracic Surgery. Cureus. 2021;13(10):e18533. doi: 10.7759/cureus.18533.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 652-661**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1298898

The Impact of The COVID-19 Pandemic on Smoking Cessation

Emine Serap Yılmaz[1(ID)] Selen Karaoğlanoğlu[1(ID)] Nurhan Köksal[2(ID)]

[1]Department of Pulmonology, Ordu University School of Medicine, Ordu, Turkey
[2]Department of Pulmonology, Ondokuzmayis University School of Medicine, Samsun, Turkey

Received: 18 April May, Accepted: 5 October 2023, Published online: 29 October 2023

Abstract

Objective: In our study, we aimed to reveal the number of applications made to the smoking cessation clinic in our hospital, smoking cessation behavior, and the relationship between this situation and the status of being diagnosed with COVID-19 in the nine months before and after March 11, 2020, when the first case with a diagnosis of COVID-19 was detected in our country.

Methods: Individuals over 18 who applied to the Ministry of Health's Ordu University Training and Research Hospital smoking cessation outpatient clinic within nine months before (Group A) and after the COVID-19 pandemic (Group B) were included in our study. Age, gender, chronic diseases, Fagerström addiction scores, and treatment they received for smoking cessation were noted through the tobacco addiction treatment monitoring system (TÜBATİS), and their smoking status was questioned by reaching them three months after their application to us. In the first year of the pandemic, the patients in Group A were reached again and questioned about whether they had been diagnosed with COVID-19 (PCR positivity).

Results: It was determined that there were 320 patients in Group A and 60 patients in Group B, and there was a statistically significant difference in age and smoking cessation behavior between the two groups ($p < 0.05$). While 20.6% of Group A was 55 years old and over and 8.1% was under 25 years old, these rates were 13.3% and 21.7% in Group B, respectively ($p = 0.041$). The percentage of those who quit smoking was 48.9% in Group A and 30.9% in Group B ($p = 0.029$). When the patients in Group A were re-evaluated in the first year of the pandemic, the rate of having COVID-19 was 6.6% in those who quit smoking, 6.3% in those who did not quit, and 31.2% in those who quit and started again ($p = 0.001$).

Conclusion: Health services have had to give up their workforce to fight the epidemic during the pandemic process, and therefore, there has been a decrease in patient admissions in smoking cessation polyclinics. During the restriction periods, there was an increase in the tendency to smoke due to reasons such as social isolation, increased mental and physical slowdown, psychological effects, and economic concerns, and a decrease in the application to health centers due to the risk of transmission, especially in elderly patients with chronic diseases. We think the decrease in our smoking cessation rates and especially in the applications of patients over 55 years old compared to the pre-pandemic period may be due to this reason. Smoking cessation studies should be carried out more decisively, and information should be provided about the combined risks associated with smoking, even in regular outpatient clinic meetings.

Keywords: COVID-19 infection, smoking addiction, smoking cessation clinic

Suggested Citation: Yılmaz E. S, Karaoğlanoğlu S, Köksal N.The impact of the COVID-19 pandemic on smoking cessation. Mid Blac Sea Journal of Health Sci, 2023;9(4):652-661

Address for correspondence/reprints:
Emine Serap Yilmaz

Telephone number: +90 (507) 173 55 63
E-mail: drserapyilmaz55@gmail.com

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a disease that mainly affects the respiratory system and can progress to acute respiratory failure. The disease picture occurs when the causative Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) rarely enters the body from the upper respiratory tract, rarely from the conjunctival mucosa, and mainly from the nose and mouth.

There are transmembrane spike (S) glycoproteins on the cell surface of coronaviruses. This glycosylated cell surface protein contains two distinct functional domains (S1 and S2) that are thought to mediate virus entry into the host cell. The S1 domain contains the angiotensin-converting enzyme-2 (ACE2) receptor binding domain and is responsible for host cell entry (1) .

The increase in the expression of this gene, which is responsible for cell entry, increases the affinity and allows the virus to spread more easily from person to person. Studies have shown that ACE2 expression increases in those who consume cigarettes and tobacco products (2, 3).

In addition to increased ACE2 gene expression in smokers, COVID-19 infection and complications arising from accompanying comorbidities play an active role in the severe course of the infection. Comorbidities, especially cardiovascular and chronic respiratory diseases, can cause COVID-19 to progress into a severe clinical picture and result in mortality (4).

Smoking or passive exposure to tobacco products, especially cigarettes, deteriorates mucociliary activity in the respiratory tract, increases permeability in the epithelium, and causes an inflammatory response (5). COVID-19 causes unexplained and abnormal blood clotting by predisposing to thrombosis, and smoking addiction increases this complication (6).

Identifying and preventing potential host risk factors reduces virus transmission and the severity of COVID-19 infection. In our study, we aimed to reveal the number of applications made to our hospital's smoking cessation outpatient clinic during the nine months before and after the pandemic, smoking cessation behavior, and the relationship between this situation and the status of being diagnosed with COVID-19.

METHODS

Permission for our study was received from the Ordu University Ethics Committee with KAEK application number 58 and decision number 51. Individuals over 18 who applied to the Ministry of Health’s Ordu University Training and Research Hospital smoking cessation outpatient clinic within nine months before (Group A) and after the COVID-19 pandemic (Group B) were included in our study. Age, gender, chronic disease, Fagerström addiction score, and treatment they

received for smoking cessation were noted through the tobacco addiction treatment monitoring system (TÜBATİS). The patients were contacted three months after their application to us, and their smoking status was questioned. In the first year of the pandemic, the patients in Group A were reached again and questioned about whether they had been diagnosed with COVID-19 (PCR positivity).

Statistical Analysis

Analyses were performed with IBM SPSS Package Program version 22.0 (IBM Corporation, Armonk, NY, USA). Discrete and categorical data were expressed as numbers and percentages. The chi-squared test was used to compare these data. $P < 0.05$ was considered the statistical significance level.

RESULTS

While the number of patients who applied to the smoking cessation outpatient clinic in the nine months before the pandemic (Group A) was 320, this number was only 60 in the nine months after the pandemic (Group B). It was determined that there was a statistically significant difference between the age of the patients and their success in smoking cessation treatment before and after the pandemic ($p < 0.05$). While 20.6% of the patients who applied to the outpatient clinic before the pandemic were aged 55 and over, 8.1% were under 25; these rates were 13.3% and 21.7%, respectively, in the post-pandemic period ($p = 0.041$). There was no significant difference between the genders in the smoking cessation outpatient clinic admission. The patients were given nicotine replacement therapy, varenicline, varenicline+nicotine replacement therapy, bupropion+nicotine replacement therapy, or psychosocial support therapy, and there was no significant difference between the two groups in terms of the treatments given (Table 1).

A statistically significant result was obtained when the success of the given treatment was questioned. While the percentage of those who applied to the outpatient clinic and quit smoking was 48.9% before the pandemic, this rate was only 30.9% in the post-pandemic period ($p = 0.029$) (Table 2).

The smoking status of addicts according to the Fagerström addiction score in the pre-pandemic and post-pandemic periods is presented in Table 3. There were no statistically significant differences in smoking cessation status according to addiction level both before and after the pandemic ($p = 0.990$ and $p = 0.794$, respectively) (Table 3).

Among the patients in Group A who were reached in the first year of the pandemic, the status of being diagnosed with COVID-19 (PCR positivity) was 6.6% for those who quit smoking, while this rate was 6.3% for those who did not quit smoking and 31.2% for those who quit and started again ($p = 0.001$) (Table 4).

Table 1. Application to the smoking cessation outpatient clinic in the nine months before and after the pandemic

	Group A		Group B		Total		
	N	%	N	%	N	%	p-value
Age							
18-25	26	8.1	13	21.7	39	10.5	0.041
26-35	77	24.1	11	18.3	88	23.1	
36-45	87	27.2	16	26.7	103	27.0	
46-55	64	20.0	12	20.0	76	19.9	
56-65	50	15.6	5	8.3	55	14.4	
Over 65	16	5.0	3	5.0	19	5.0	
Total	320	100.0	60	100.0	380	100.0	
Gender							
Female	119	37.2	18	30	137	36.1	0.287
Male	201	62.8	42	70	243	63.9	
Total	320	100.0	60	100.0	380	100.0	
Treatment Received							
Nicotine replacement	25	7.8	3	5	28	7.3	0.768
Varenicline (Champix)	268	83.8	51	85	319	83.7	
Varenicline (Champix)+ nicotine replacement	1	0.3	-	-	1	0.3	
Bupropion+nicotine replacement	3	0.9	-	-	3	0.8	
Psychosocial support	23	7.2	6	10	30	7.9	
Total	320	100.0	60	100.0	380	100.0	
Chronic Disease Status							
None	217	67.8	40	66.7	258	67.7	0.693*
Hypertension	29	9.1	5	8.3	34	8.9	
Diabetes mellitus	10	3.1	3	5	13	3.4	
COPD	7	2.2	2	3.3	9	2.4	
Asthma	7	2.2	-	-	7	1.8	
Heart failure/atherosclerotic heart disease	1	0.3	-	-	1	0.3	
Depression	8	2.5	2	3.3	10	2.6	
Liver failure	1	0.3	-	-	1	0.3	
Multiple systemic diseases	40	12.5	8	13.4	48	12.6	
Total	320	100.0	60	100.0	380	100.0	
* Chi-square test							

Table 2. Smoking cessation status with the given treatment

	Group A		Group B		Total		
	N	%	N	%	N	%	p-value
Smoking status							
Quit	152	48.9	17	30.9	169	46	0.029*
Quit and start again	16	5.1	2	3.6	18	4.9	
Did not quit	143	46.0	36	65.5	179	49	
Total	311	100.0	55	100.0	366	100.0	
* Chi-square test							

Table 3. Comparison of smoking cessation status according to addiction level

	Smoking status (Pre-pandemic)			Total	p-value
Fagerström addiction score	Quit	Quit and start again	Did not quit		
Very low dependence	2 (1.3)	0 (0.0)	3 (2.1)	5 (1.6)	0.990*
Low dependence	7 (4.6)	1 (6.3)	5 (3.5)	13 (4.2)	
Moderate dependence	17 (11.2)	2 (12.5)	19 (13.3)	38 (12.2)	
High dependence	47 (30.9)	5 (31.5)	39 (27.3)	91 (29.3)	
Very high dependence	79 (52.0)	8 (50.0)	77 (53.8)	164 (52.7)	
Total	152 (100.0)	16 (100.0)	143 (100.0)	311 (100.0)	
	Smoking status (Post-pandemic)				
Fagerström addiction score	Quit	Quit and start again	Did not quit		
Moderate dependence	1 (5.9)	0 (0.0)	5 (13.9)	6 (10.9)	0.794*
High dependence	6 (35.3)	1 (50.0)	9 (25.0)	16 (29.1)	
Very high dependence	10 (58.8)	1 (50.0)	22 (61.1)	33 (60.0)	
Total	17 (100.0)	2 (100.0)	36 (100.0)	55 (100.0)	
* Chi-square test					

Table 4. Group A smoking status and COVID-19 PCR positivity

	COVID-19		Total	p-value
Smoking status (Group A)	With PCR positivity	Without PCR positivity		
Quit	10 (6.6)	142 (93.4)	152 (100.0)	0.001
Quit and start again	5 (31.2)	11 (68.8)	16 (100.0)	
Did not quit	9 (6.3)	134 (93.7)	143 (100.0)	
Total	24 (7.7)	287 (92.3)	311 (100.0)	

DISCUSSION

Active or passive exposure to tobacco products increases the risk of respiratory tract infections. It is known that all tobacco products, especially cigarettes, cause lung damage through the activation of inflammatory cytokines, programmed cell death in the pulmonary tissue, and circulating immune cells such as T cells (7).

In addition to this immunological mechanism, which causes susceptibility to infection in smokers, structural damage is also observed. These structural changes are the main ones that include inflammation and fibrosis around the bronchi and alveoli, increased permeability of the respiratory tract mucosa, and inadequate mucociliary clearance (8).

It has been found that the angiotensin-converting enzyme-2 (ACE2) gene, which is thought to mediate the entry of the coronavirus into the host cell, is more expressed in respiratory tract samples of smokers (2, 3). One study found that ACE2 gene expression did not differ significantly between genders and age

groups, but it was higher in male smokers than in non-smokers. For this reason, it has been stated that the higher number of cases in men and the more severe clinical course in China may be related to the fact that men smoke more (3, 9).

In a study by Zhang et al., in which 140 patients were included and 58 patients with severe clinical conditions were examined, it was found that 3.4% were still smoking and 6.9% had smoked in the past (10). Guan et al. included 1099 patients with COVID-19, 173 of whom were severe and 926 of whom were in a mild clinic; 16.9% of the severe ones were smokers, 5.2% of them were past smokers, and 11.8% of the mild ones were smokers, and 1.3% of them had smoked in the past and quit. In the patients included in the study, clinical worsening developed that required follow-up in the intensive care unit in 25.5% of smokers and 7.6% of former smokers (11).

In a meta-analysis evaluating the relationship between smoking and COVID-19, when the test positivity and hospitalization rates of smokers, quitters, and never-smokers were evaluated, it was found that smokers had lower test positivity than never-smokers. However, hospitalization rates were higher in smokers than in non-smokers (12).

In another study evaluating those who have never smoked, those who smoke, and those who are still smokers in patients infected with COVID-19, values close to those of who have never smoked were found in those who quit (13).

In a study investigating the relationship between clinical worsening and smoking, 78 patients had 27.3% cigarette smoking in the severe clinical group and 3.0% in the mild clinical group (14).

In a study examining the risk factors of cases diagnosed with COVID-19 who developed fibrotic lung disease during follow-up, it was found that the severity of the disease, length of stay in the intensive care unit and mechanical ventilator, advanced age, smoking, and alcohol use facilitate the progression to fibrosis (15).

When comorbidities and smoking status were examined, the presence of comorbid diseases was higher in smokers among 1590 patients diagnosed with COVID-19. One comorbid disease (1.79 times), and two or more comorbid diseases (2.59 times) cause a more severe course in the COVID-19 clinic (16).

Considering that there may also be asymptomatic cases infected with SARS-CoV-2, it is not clear whether smoking is associated with SARS-CoV-2 infection or with this infection becoming symptomatic.

Some studies also state that smoking is not associated with severe COVID-19 infection. In a meta-analysis study, it was stated that COVID-19 does not cause a severe clinical picture in patients who are smokers and that smoking cannot be shown as a cause of exacerbation of the disease (17).

It has also been hypothesized that nicotinic acetylcholine receptors (nAChR) play a critical role in the pathophysiology of SARS-CoV-2 infection, and as a result, nicotine and nicotinic orthosteric and/or allosteric agents can be recommended as a possible treatment for SARS (18).

Ivermectin, which has been shown to inhibit the replication of SARS-CoV-2 in in vitro cells, is a positive allosteric modulator of α7 nAChR (19, 20). The nicotinic hypothesis should be further explored with experimental observations, electrophysiological testing, and animal experiments determining whether SARS-CoV-2 physically interacts with nAChR in vitro. These opposing viewpoint studies are hypothetical.

There has been an increase in the effort to quit smoking due to fear and anxiety in societies during the pandemic period. In a study conducted in our country, it was stated that while the success rate of smoking cessation was 23.7% in the pre-pandemic period in patients who applied to the smoking cessation outpatient clinic, this rate increased to 31.1% with the pandemic period (21).

A meta-analysis observed that COVID-19 infection causes a 30-50% more severe clinical picture in current and former smokers than in never-smokers (22). Although current studies are insufficient to draw firm conclusions about the relationship between the risk of contracting COVID-19 infection and the severity of infection and smoking status, preventing serious consequences of COVID-19 infection, including death, is the most convincing reason against smoking.

The limitations of our study include some important restrictions on smoking cessation clinic services due to the effects of the COVID-19 pandemic on healthcare services. These restrictions have manpower limitations, patient reductions, and psychological effects. During the pandemic period, manpower in health services was used intensively, especially to combat the pandemic. Therefore, there were not enough personnel in smoking cessation clinics to provide further services to patients. Older individuals with chronic diseases have reduced their visits to health centers in order to avoid COVID-19 infection. This situation has also led to a decrease in applications to smoking cessation clinics. The pandemic has come with factors such as social isolation, mental and physical slowdown, and economic concerns. These factors have negatively affected the psychological health of individuals participating in smoking cessation treatment. Therefore, it may have reduced the success of smoking cessation treatment.

These limitations may affect the effectiveness of smoking cessation clinics during the pandemic period. Future studies may focus on overcoming these challenges and investigating how we can make smoking

cessation treatment more effective under pandemic conditions.

CONCLUSION

Health services had to use their workforce to fight the epidemic during the pandemic process. As in our center, there has been a decrease in patient acceptance in smoking cessation outpatient clinics. The number of patients aged 55 and older who applied to our smoking cessation outpatient clinic decreased after the pandemic, while the number of patients aged 25 and under increased. We think this may have been caused by elderly people with chronic diseases avoiding applying to the health institution due to the fear of being severely affected by the epidemic.

Social isolation, mental and physical slowdown, psychological effects, and economic reasons lead to increased cigarette smoking during restriction periods. We think the decrease in our smoking cessation rates compared to the pre-pandemic period may be due to this.

Considering that smokers may be more affected by COVID-19 infection during this period and the clinical course may be worse, smoking cessation studies should be carried out more decisively, and information should be provided about the combined risks of smoking even in regular outpatient clinic meetings.

Ethics Committee Approval: Approval for the study was obtained from the Ministry of Health (https://bilimselarastirma.saglik.gov.tr/) and Ordu University Clinical Research Ethics Committee with the decision number KAEK 58 2021/51.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: ESY, SK, Design: ESY, SK Data Collection and Processing: ESY, SK, Analysis or Interpretation: ESY, SK, NK, Writing: ESY, SK, NK

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. Li F, Li W, Farzan M, Harrison SC. Structure of SARS coronavirus spike receptor-binding domain complexed with receptor. Science. 16 Eylül 2005;309(5742):1864-8.
2. Brake SJ, Barnsley K, Lu W, McAlinden KD, Eapen MS, Sohal SS. Smoking Upregulates Angiotensin-Converting Enzyme-2 Receptor: A Potential Adhesion Site for Novel Coronavirus SARS-CoV-2 (Covid-19). J Clin Med. 20 Mart 2020;9(3):841.

3. Cai G, Bossé Y, Xiao F, Kheradmand F, Amos CI. Tobacco Smoking Increases the Lung Gene Expression of ACE2, the Receptor of SARS-CoV-2. Am J Respir Crit Care Med. 15 Haziran 2020;201(12):1557-9.
4. Zheng YY, Ma YT, Zhang JY, Xie X. COVID-19 and the cardiovascular system. Nat Rev Cardiol. Mayıs 2020;17(5):259-60.
5. Samet JM. Tobacco Products and the Risks of SARS-CoV-2 Infection and COVID-19. Nicotine Tob Res. 01 Aralık 2020;22(Supplement_1):S93-5.
6. Sifat AE, Nozohouri S, Villalba H, Vaidya B, Abbruscato TJ. The Role of Smoking and Nicotine in the Transmission and Pathogenesis of COVID-19. J Pharmacol Exp Ther. 01 Aralık 2020;375(3):498-509.
7. Nordman JC, Muldoon P, Clark S, Damaj MI, Kabbani N. The α4 nicotinic receptor promotes CD4+ T-cell proliferation and a helper T-cell immune response. Mol Pharmacol. Ocak 2014;85(1):50-61.
8. Dye JA, Adler KB. Effects of cigarette smoke on epithelial cells of the respiratory tract. Thorax. Ağustos 1994;49(8):825-34.
9. Cai H. Sex difference and smoking predisposition in patients with COVID-19. Lancet Respir Med. Nisan 2020;8(4):e20.
10. Zhang JJ, Dong X, Cao YY, Yuan YD, Yang YB, Yan YQ, vd. Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. Allergy. Temmuz 2020;75(7):1730-41.
11. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, vd. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 30 Nisan 2020;382(18):1708-20.
12. Simons D, Shahab L, Brown J, Perski O. The association of smoking status with SARS-CoV-2 infection, hospitalization and mortality from COVID-19: a living rapid evidence review with Bayesian meta-analyses (version 7). Addiction. 2021;116(6):1319-68.
13. Leung JM, Yang CX, Tam A, Shaipanich T, Hackett TL, Singhera GK, vd. ACE-2 expression in the small airway epithelia of smokers and COPD patients: implications for COVID-19. Eur Respir J. Mayıs 2020;55(5):2000688.
14. Liu W, Tao ZW, Wang L, Yuan ML, Liu K, Zhou L, vd. Analysis of factors associated with disease outcomes in hospitalized patients with 2019 novel coronavirus disease. Chin Med J (Engl). 05 Mayıs 2020;133(9):1032-8.
15. Ojo AS, Balogun SA, Williams OT, Ojo OS. Pulmonary Fibrosis in COVID-19 Survivors: Predictive Factors and Risk Reduction Strategies. Pulm Med. 2020;2020:6175964.
16. Guan WJ, Liang WH, Zhao Y, Liang HR, Chen ZS, Li YM, vd. Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. Eur Respir J. Mayıs 2020;55(5):2000547.

17. Lippi G, Henry BM. Active smoking is not associated with severity of coronavirus disease 2019 (COVID-19). Eur J Intern Med. Mayıs 2020;75:107-8.
18. Changeux JP, Amoura Z, Rey FA, Miyara M. A nicotinic hypothesis for Covid-19 with preventive and therapeutic implications. C R Biol. 05 Haziran 2020;343(1):33-9.
19. Caly L, Druce JD, Catton MG, Jans DA, Wagstaff KM. The FDA-approved drug ivermectin inhibits the replication of SARS-CoV-2 in vitro. Antiviral Res. Haziran 2020;178:104787.
20. Krause RM, Buisson B, Bertrand S, Corringer PJ, Galzi JL, Changeux JP, vd. Ivermectin: a positive allosteric effector of the alpha7 neuronal nicotinic acetylcholine receptor. Mol Pharmacol. Şubat 1998;53(2):283-94.
21. Kayhan Tetik B, Gedik Tekinemre I, Taş S. The Effect of the COVID-19 Pandemic on Smoking Cessation Success. J Community Health. Haziran 2021;46(3):471-5.
22. Gallus S, Scala M, Possenti I, Jarach CM, Clancy L, Fernandez E, vd. The role of smoking in COVID-19 progression: a comprehensive meta-analysis. Eur Respir Rev Off J Eur Respir Soc. 31 Mart 2023;32(167):220191.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 662-668**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1302337

Surveillance of Infection Control in Dental Settings During Covid-19 Pandemic

Mehmed Taha Alpaydin[1](ID), Damla Torul[2](ID), Mehmet Melih Omezli[2](ID)

[1]Department of Orthodontics, Faculty of Dentistry, Ordu University, Ordu, Turkey
[2]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Ordu University, Ordu, Turkey

Received: 25 May 2023, Accepted: 19 August 2023, Published online: 29 October 2023

Abstract

Objective: Fluorescence marking is a cost-effective method to evaluate the completeness of cleaning in clinical surfaces. The aim of this study is to evaluate the potential sources of infection by surveillance of frequently contacted surfaces in the clinic and patient waiting areas in dental practice by fluorescent marker.

Materials and methods: The surfaces that are frequently contacted by patients, clinicians, and the staff in the clinic, local intervention room, and patient waiting room were determined. Fluorescent marker dye was applied onto frequently contacted surfaces. Following cleaning after the patient's discharge, the dye-applied surfaces were examined with a fluorescent lamp.

Results: The surfaces in the patient waiting area were observed to have the highest scores in terms of the frequency of the touches. According to the fluorescent marker method, 50 % of the frequently contacted surfaces were scored as totally clean, 17 % were partially clean, and 33 % were not clean.

Conclusion: This study suggests that the fluorescent marker method is an easy and practical method that can be used for the surveillance of surface cleaning in dental settings. More careful and strict hygiene regimens are required not to overlook any potential source of infection, such as the patient waiting area, and eliminate the potential routes of the spread of infection.

Keywords: Decontamination, Cross-Infection, Equipment Contamination

Suggested Citation: Alpaydin M.T, Torul D, Omezli M.M. Surveillance of Infection Control in Dental Settings During Covid-19 Pandemic. Mid Blac Sea Journal of Health Sci, 2023;9(4):662-668.

Address for correspondence/reprints:

Mehmed Taha Alpaydın

Telephone number: +90 (452) 212 12 86

E-mail: alpaydintaha@gmail.com

INTRODUCTION

An outbreak of an unknown origin emerged in late December 2019 in China and spread rapidly all over the world. The pathogen responsible for this epidemic, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a new type of coronavirus virus that infects mammals and humans (1-3). SARS-CoV-2 is reported to be transmitted via inhalation of the pathogenic virus that can hang in the air, direct contact with patient materials like blood or saliva, and also indirect contact with contaminated tools and/or environmental surfaces in dentistry (4). During dental procedures, droplets and aerosol particles can hang in the air for long periods and then settle on peripheral surfaces. Live viruses are reported to be present in the saliva of infected individuals; thus, all horizontal surfaces can serve as a secondary source for transmission of SARS-CoV-2. Additionally, the fact that patients can spread the virus increases the risk in dental practice dramatically (4-6).

It has been reported that SARS-CoV-2 can survive up to 72 hours to 7 days on various surfaces (4, 7). Considering the persistence of coronavirus on inanimate surfaces is important in terms of preventing the spread of the virus in this way (8, 9). Regardless of the route of transmission, the minimal viral load of SARS-CoV-2 that will cause the disease has not yet been determined. Thus, all aerosol-contaminated surfaces that have been contacted by physicians or patients should be considered potentially contaminated (10).

Direct or indirect contact with bodily fluids and infected dental tools creates a potential path for the spread of the microorganisms. Also, contaminated surfaces in dental settings can potentially contribute to cross transmission of these pathogens (4,11). Thus, the dental clinician, staff and patient may be at risk of cross-infection in the dental environment (10).

To evaluate the completeness of cleaning in clinical surfaces, a number of techniques have been proposed, including bioluminescence, microbiological count, and fluorescent markers (11,12). The fluorescent marker technique demonstrates the physical removal of an applied substance by making the remaining substance visible after washing with UV light and has been used in numerous hospital wards (11).

The aim of this study is to determine the underestimated potential sources of infection by surveillance of frequently contacted surfaces in the clinic and patient waiting areas in dental practice.

METHODS

This pilot study was approved by the Ethics Committee of Ordu University (No:2020/144) and constituted of two parts. In the first stage, to determine the surfaces that are frequently contacted by patients, physicians, and the staff in the clinic, local intervention room, and patient waiting room, two researchers

performed observation independently during the peak hours of the clinic (10-12 am, 2-4 pm) for a week. 4 randomly selected dental units from the clinic and local intervention room, and the patient waiting area were observed. The 10 most frequently contacted surfaces were determined. In the second stage, fluorescent marker dye (Sanitest, Sanidez Tic. Ltd., Istanbul, Turkey) was applied onto frequently contacted surfaces, previously determined by researchers (M.T.A., D.T.), of a dental unit in the clinic and local intervention room and surfaces in the patient waiting room following the terminal cleaning at the end of the day. The dye was applied with a reference created from acetate paper by researchers (M.T.A., D.T.) to ensure standardization (Figure 1). Because the marker dye is transparent, it is not visible in normal light but shows a fluorescent view under UV light. The fast-drying dye consists of a material that is completely obtained from natural products and has no toxic effect. Also, the marker dye is resistant to abrasion but can easily be removed when wiped with a damp cloth. After the discharge of the patient dental unit was cleaned by the staff blinded to the study. Subsequently, the dye applied surfaces were examined with a fluorescent lamp. The surfaces from which the paint has been completely removed will be scored as completely clean, partially clean if some of it has been removed, and dirty if there is no change in the dye.

Figure 1. Reference used for the application of the fluorescent dye

IBM SPSS Statistics for Windows software (version 23.0, IBM Corp, Chicago, USA) was used. Categorical variables are presented as n (%). The frequency of the touches among the surfaces was compared with the Kruskal-Wallis test. The significance level was accepted as 0.05.

RESULTS

The surfaces in the patient waiting were area observed to have the highest scores in terms of the frequency of the touches. However, no significant difference was observed among the 10 surfaces in terms of the frequency of contacts (p=0.437). According to the fluorescent marker method, of the 18 high-touch surfaces to which the dye was applied, 9 surfaces (50 %) were totally clean, 3 surfaces (17 %) were partially clean, and 6 surfaces (33 %) were not clean (Figure 2).

Table 1. Scoring of the surfaces after fluorescent marking

		CL			LIR			PWA		
		NC	C	PC	NC	C	PC	NC	C	PC
1	Bracket Table		x			x				
2	Dental Chair Backrest		x				x			
3	Dental Chair Headrest		x			x				
4	Door Password Panel		x			x				
5	Mobile Cabinetry		x			x				
6	PC Monitor	x			x					
7	Reflector			x	x					
8	Dental Chair Armrest		x		x					
9	Sitting Area							x		
10	Patient Admission Desk							x		

CL: Clinic, **LIR**: Local intervention room, **PWA:** Patient waiting area, **C:** Clean, **NC:** Not clean, **PC:** Partially clean

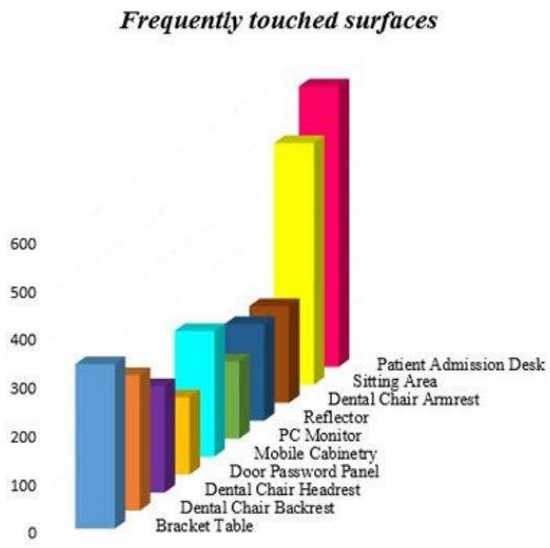

Figure 2. Graph showing the top 10 most touched surfaces.

DISCUSSION

Because of the spilt water and aerosols, the highest amount of contamination has been reported to occur around the oral cavity. After the treatment was completed, the aerosols are hanging in the air in the clinic. It is claimed that <5 μm aerosols can be entrained into the air and transported over distances up to 1 m (10). In fact, the inactivation time of the SARS-CoV-2 on surfaces is still not clear. Kampf et al.(8) found that at room temperature, human coronaviruses can remain infectious on surfaces for up to 9 days. According to Van Doremalen et al.(7), transmission of SARS-CoV-2 to the surfaces may occur since the virus can remain alive and infectious for hours or days. Ye et al.(13) have recently reported surfaces contaminated with SARS-CoV-2 in patient care areas in the hospital environment. Thus, transmission via contaminated intimate surfaces is a crucial factor in terms of coronaviruses' super spread.

If the virus transfers to hands or equipment, it will lead to infection through contact with the mucous membranes by indirect contact if the concentration is above the infectious dose. Furthermore, the time spent in the dental clinic could lead patients to be infected. Thus, an effective hygiene protocol is vital for healthcare settings like dental practice (14, 15). To determine sites that could benefit from targeted cleaning attention several methods have been used previously (16). Fluorescence marking is reported as an inexpensive method that requires minimal equipment and improves practice (17). The Centers for Disease Control and Prevention suggested using fluorescent markers as a tool to evaluate surface cleaning (18). Therefore, we tested the surfaces using fluorescent dye. This method has been frequently used in hospital

settings however, to the best of our knowledge the present study is the first study used this method in dentistry.

In the present study, most of the surfaces were scored as clean in the clinic and local intervention room, however, the more frequently touched surfaces, when compared to the other eight surfaces in the patient waiting room, were scored as not clean. We think that this may be originated from the lack of appreciation or attention by staff for the potential role of these surfaces when compared to the surfaces in clinical areas in the transmission of SARS-CoV-2 rather than ineffective terminal disinfection cleaning in general. It may also be caused by overload or confusion regarding task sharing among staff.

CONCLUSION

More careful and strict hygiene regimens are required not to overlook any potential source of infection, such as the patient waiting area, and eliminate the potential routes of the spread of infection.

Ethics Committee Approval: Approval for the study was obtained from the Ministry of Health (https://bilimselarastirma.saglik.gov.tr/) and Ordu University Clinical Research Ethics Committee with the decision number 2020/144.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: MTA, DT, MMO, Design: MTA, DT, MMO, Data Collection and Processing: MTA, DT, MMO, Analysis and Interpretation: MTA, DT, MMO, Writing: MTA, DT, MMO

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. Chen Y, Guo Y, Pan Y, Zhao ZJ. Structure analysis of the receptor binding of 2019-nCoV. Biochem Biophys Res Commun 2020;17;525(1):135-40.
2. Ceron JJ, Lamy E, Martinez-Subiela S, Lopez-Jornet P, Capela e Silva F, Eckersall PD, et al. Use of Saliva for Diagnosis and Monitoring the SARS-CoV-2: A General Perspective. Journal of Clinical Medicine 2020;9(5):1491.
3. Lin B, Mei Z, Hongbin G, Xinhong W, Kaibin W, Mingxiao L, et al. Significant expression of FURIN and ACE2 on oral epithelial cells may facilitate the efficiency of 2019-nCov entry. BioRxiv. 2020.
4. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci 2020;12(1):9.
5. Ge ZY, Yang LM, Xia JJ, Fu XH, Zhang YZ. Possible aerosol transmission of COVID-19 and special precautions in

dentistry. J Zhejiang Univ Sci B 2020;21(5):361-8.

6. To KK, Tsang OT, Yip CC, Chan KH, Wu TC, Chan JM, et al. Consistent Detection of 2019 Novel Coronavirus in Saliva. Clin Infect Dis 2020;71(15):841-3.
7. van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, et al. Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. N Engl J Med 2020;382(16):1564-7.
8. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. J Hosp Infect 2020;104(3):246-51.
9. Otter JA, Yezli S, Salkeld JA, French GL. Evidence that contaminated surfaces contribute to the transmission of hospital pathogens and an overview of strategies to address contaminated surfaces in hospital settings. Am J Infect Control 2013;41(5):6-11.
10. Volgenant CMC, Persoon IF, de Ruijter RAG, de Soet JJH. Infection control in dental health care during and after the SARS-CoV-2 outbreak. Oral Dis 2021; 27(3): 674–83
11. Hung IC, Chang HY, Cheng A, Chen AC, Ting L, Chen MW, et al. Application of a fluorescent marker with quantitative bioburden methods to assess cleanliness. Infection Control & Hospital Epidemiology 2018;39(11):1296-300.
12. Fattorini M, Ceriale E, Nante N, Lenzi D, Manzi P, Basagni C, et al. Use of a fluorescent marker for assessing hospital bathroom cleanliness. American Journal of Infection Control 2016;44(9):1066-8.
13. Ye G, Lin H, Chen S, Wang S, Zeng Z, Wang W, et al. Environmental contamination of SARS-CoV-2 in healthcare premises. J Infect 2020;81(2):1-5.
14. Wang J, Feng H, Zhang S, Ni Z, Ni L, Chen Y, et al. SARS-CoV-2 RNA detection of hospital isolation wards hygiene monitoring during the Coronavirus Disease 2019 outbreak in a Chinese hospital. Int J Infect Dis 2020;94:103-6.
15. Fiorillo L, Cervino G, Matarese M, D'Amico C, Surace G, Paduano V, et al. COVID-19 Surface Persistence: A Recent Data Summary and Its Importance for Medical and Dental Settings. Int J Environ Res Public Health 2020;17(9):3132.
16. Carling P. Methods for assessing the adequacy of practice and improving room disinfection. Am J Infect Control 2013;41(5):20-5.
17. Havill NL. Best practices in disinfection of noncritical surfaces in the health care setting: creating a bundle for success. Am J Infect Control 2013;41(5):26-30.

18. Rock C, Xie A, Andonian J, Hsu YJ, Osei P, Keller SC, et al. Evaluation of environmental cleaning of patient rooms: Impact of different fluorescent gel markers. Infect Control Hosp Epidemiol 2019;40(1):100-2.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 669-678**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1346240

Evaluatıon of the Fagerström Nicotine Dependence Test and the Situation of Smoking Patients Wishing to Stop Smoking in the Family Medicine Polyclinic

Bestegül Çoruh Akyol[1] Mervegül Kaya[2] Muhammet Özdemir[1] Ömer Ufkun Yıldırım[1] Cihan Özdemir[1] Özgür Enginyurt[1] Soner Çankaya[3]

[1]Ordu University Medicine Faculty, Family Medicine Department
[2]Altınordu District Health Directorate
[3]19 Mayıs Üniversity, Yaşar Doğu Sports Science Faculty, Sports Management Department

Received: 19 August 2023, Accepted: 8 October 2023, Published online: 29 October 2023

Abstract

Objective: According to the results of the Türkiye Health Survey; While the rate of individuals aged 15 and over who use tobacco products every day was 28.0% in 2019, it increased to 28.3% in 2022. According to the World Health Organization (WHO), smoking is the cause of death for more than 8 million people each year. The use of tobacco and tobacco products is an important health problem that harms individuals and societies, has attracted attention all over the world in recent years, and needs to be treated. In our study, it was aimed to evaluate the addiction status of individuals applying to our outpatient clinics, to determine what measures should be taken for the treatment of smoking and to determine if there is a regional awareness in the addiction score.

Methods: Our study, which was planned as a cross-sectional, descriptive and prospective study, included 184 people over the age of 18, who were active smoking and who accepted to participate in the study, who applied to Ordu University Medical Faculty Family Medicine Polyclinic between 12.10.2021 and 15.01.2022 for any reason. The Fagerström Nicotine Dependence Test was used in the analysis of the addiction score. In the study, chi-square analysis was used to determine whether the Fagerström Nicotine Addiction Test Questions of Smoker Patients in the Family Medicine Outpatient Clinic changed according to the gender and age of the patients. The SPSS 21.0 V. statistical package program was used for all statistical calculations. It was considered that the research findings were significant at the P<0.05 level by expressing as n, percentage.

Results: 74.5% (n=137) were male, 25.5% (n=47) were female. 51.6% (n=95) were single, 46.7% (n=86) were university graduates. 21.7% (n=40) were not working, 49.5% (n=91) had income more than their expenses. 89.1% (n=164) did not have any disease, 25.0% (n=46) used alcohol. 40.8% (n=75) lived in metropolitan cities. 48.4% were smoking 1-9 pack/year, 54.9% had not tried to quit smoking53.3% of them started smoking in the friend environment, 32.1% of them started to smoke because of stress and 14.6% of them were curious and pretentious. The mean test score of FNBT was 6.30±2.77. There were 38 (20.6%) people with high addiction scores, 48 (26.1%) people with moderate and 98 (53.3%) people with low addiction scores. There was no statistically significant difference in terms of gender, marital status, employment and education status according to the level of addiction. Moderate-high level of dependence was significantly higher in alcohol users (p<0.001).

Conclusion: Individuals who want to quit smoking should be evaluated within the framework of a biopsychosocial approach and this demand should be supported by medical treatment if necessary. For this reason, it is important to support the units that provide smoking cessation outpatient clinics, especially in primary care.

Keywords: Rational Antibiotic Use, University Student, Antibiotic Resistance, Numeracy in Health Literacy

Suggested Citation: Çoruh Akyol B, Kaya M, Özdemir M, Yıldırım Ö.U, Özdemir C, Enginyurt Ö, Çankaya S. Evaluatıon of The Fagerström Nicotine Dependence Test and the Situation of Smoking Patients Wishing to Stop Smoking in the Family Medicine Polyclinic Mid Blac Sea Journal of Health Sci, 2023;9(4):669-678.

Address for correspondence/reprints:

Bestegül Çoruh Akyol

Telephone number: +90 (532) 584 99 38

E-mail: bestegulcoruh@yahoo.com

Note: This study was presented as an oral presentation at the 7. International Health Science and Family Medicine Congress held in İzmir - Turkiye on 10-12 February 2022

INTRODUCTION

Considered among the etiological factors of many death-related diseases, cigarettes are one of the products that health professionals struggle with the most, since they are used legally in our country. Different tobacco products, especially cigarettes, are used in tobacco products. These include hookah tobacco, cigars, heated tobacco, pipe tobacco. According to the results of the Türkiye Health Survey carried out in 2022; While the rate of individuals aged 15 and over who use tobacco products every day was 28.0% in 2019, it increased to 28.3% in 2022. It has been determined that this rate is 41.3% for men and 15.5% for women in 2022. The rate of individuals who do not use tobacco products (quit and never use) decreased from 68.7% in 2019 to 68.0% in 2022 (1). According to the World Health Organization (WHO), smoking is the cause of death for more than 8 million people each year. While more than 7 million of these deaths were observed in direct smokers, 1.3 million were observed in passive smokers. The Framework Convention on Tobacco Control, adopted by WHO member states in 2003, was adopted to address the smoking epidemic. A total of 182 countries, including our country, are parties to this agreement (2). While there is no gender difference in smokers in developing countries where access to information and professional support options in case of need are increasing, this behavior is more common in men in developing countries where smoking rates continue to increase (3). Noncommunicable diseases (NCDs) kill more than 40 million people each year. It is possible to define these diseases, which correspond to approximately 75% of the deaths on earth, as “chronic diseases”. Subgroups of this title include cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. Although it is generally associated with advanced age, smoking is the main age-independent risk factor among NCDs (4). The definition of WHO on this subject is “There is a way of transmission in all epidemics and there

is a means of spreading disease and death. In the case of the tobacco epidemic, this tool is not a virus, bacteria or other microorganism – it is an industry and a working strategy." is in the form (5).

The substance that causes addiction in tobacco is nicotine in its composition, and nicotine addiction is often blamed for unsuccessful quit attempts and continued use of tobacco (6). Smoking creates a sense of pleasure and smokers want to smoke again and again because they seek this sense of pleasure.

Smoking is a safety hazard. Opposing smoking in the workplace should be considered a scientific necessity and a duty, not a luxury (7). Tobacco habit is defined by the American Psychiatric Association as a psychiatric disorder that includes cognitive, behavioral and physiological symptoms (8). In the case of addiction, people continue to use the substance in question despite experiencing health or non-health problems resulting from the subject. Addiction is a health problem that needs to be treated. Treatment is difficult but not impossible (9).

The use of tobacco and tobacco products is an important health problem that harms individuals and societies, has attracted attention all over the world in recent years, and needs to be treated. A number of methods such as Fagerstrom Nicotine Dependence Test (FTND), carbon monoxide in respiratory air, determining the number of cigarettes smoked in 24 hours are used to help guide the treatment process by determining the addiction level of individuals. These methods include some scales in which the daily cigarette consumption of the person is questioned or the person evaluates his own addiction. The most widely used of these scales is the Fagerstorm Nicotine Dependence test (10). For this reason, a questionnaire study was preferred in order to evaluate the FTND score results and willingness to quit smoking in our patients over the age of 18 who applied to our outpatient clinic. "Assessment of tobacco product use and exposure status" is specified as recommendation level A in the United States (USA) Preventive Services Working Group (USPSTF) recommendation rating table (11). As a requirement of preventive medicine, the smoking status of individuals who apply to family medicine polyclinics is questioned in many of them. For all these reasons, in order to contribute to the goal of a smoke-free society, which is one of the requirements of a healthy society, this study aimed to contribute to the requirements for a healthy society both regionally and universally with the results obtained by evaluating the Fagerström nicotine dependence test and the desire to quit smoking in patients applying to family medicine.

METHODS

Our study, which was planned as a cross-sectional, descriptive and prospective study, included 184 people over the age of 18, who were active smoking and who accepted to

participate in the study, who applied to Ordu University Medical Faculty Family Medicine Polyclinic between 12.10.2021 and 15.01.2022 for any reason. A questionnaire form, in which the sociodemographic characteristics of the participants and their knowledge of cigarette consumption were analyzed by the researcher, and FNBT were applied to the participants by face-to-face survey method. The sample calculation was made with the Gpower program. When the power was 95%, d=0.5, α=0.05, the minimum sample size was found to be 100.

Developed in 1991, FNBT consists of 6 questions and the answers are scored (12). FNBT results were graded in 3 groups as nicotine addiction low (0-3 points), moderate (4-6 points), and high (≥7 points) (13). The Turkish validity and reliability study of the test was conducted by Uysal et al. It was found to be moderately reliable and it was concluded that it can be used as a measurement method in the evaluation of nicotine addiction in smoking cessation outpatient clinics (14).

Statistical Analysis

In the study, chi-square analysis was used to determine whether the Fagerström Nicotine Addiction Test Questions of Smoker Patients in the Family Medicine Outpatient Clinic changed according to the gender and age of the patients. The SPSS 21.0 V. statistical package program was used for all statistical calculations. It was considered that the research findings were significant at the P<0.05 level by expressing as n, percentage. Ethics committee approval for this study Ordu University Received from the Clinical Research Ethics Committee of the University Clinical Research Ethics Committee (Ethics committee date and no: 31.12.2021 , 281)

RESULTS

In our study, which included 184 people, 74.5% (n=137) male and 25.5% (n=47) female, the mean age of the participants was 33.8±12.06 (min:18-max:71) detected. 95 people were single (51.6%) and 89 people (48.4%) were married. 32.6% (n=60) were high school graduates and 46.7% (n=86) were university graduates. 21.7% (n=40) were not working, nearly half (49.5%, n=91) of the participants had more income than their expenses. 89.1% (n=164) did not have any disease. 46 people (25.0%) were using alcohol. While 75 people (40.8%) lived in the metropolitan center, 71 people (38.6%) lived in the district. When the smoking status was calculated as (packs/year), grouping was done in 10-year periods and according to this, 89 people smoked 1-9 pack/year at the most with 48.4%, followed by 20.4% (n=43) with 10-year periods. It was tracking 19 packs/year usage. 54.9% (n=101) had not tried to quit smoking98 people (53.3%) started smoking in the friend environment, 59 people (32.1%) started smoking due to stress, 27 people (14.7%) started smoking because of curiosity and

wantonness. The mean test score of FNBT was 6.30±2.77. There were 38 (20.6%) people with high addiction scores, 48 (26.1%) people with moderate and 98 (53.3%) people with low addiction scores. There was no statistically significant difference in terms of age, gender, marital status, employment and education status according to addiction level (p>0.05). The distribution of the participants' FNBT questions according to the age variable is given in Table 1. Moderate-high level of dependence was significantly higher in alcohol users (p<0.001). Statistical significance was determined in the distribution of answers in the addiction test score, as well as in the amount of cigarettes consumed daily in the sub-assessments of the questions and in the questions of smoking more cigarettes in the morning. (p=0.016, p=0.022) The variation of the test score by gender is shown in Table 2.

Table 1. Distribution of Fagerström Nicotine Addiction Test Questions of Smoking Patients in the Family Medicine Polyclinic by Age Variable

	Under 20 [n(%)]	21-30 [n(%)]	31-40 [n(%)]	Over 40 ve [n(%)]	χ^2-value	*P-value*
How soon after waking up do you smoke your first cigarette of the day?						
after 1 hour	12(40)	16(29,6)	17(34,7)	17(33,3)	6,837	0,654
within 31-60 minutes	4(13,3)	12(22,2)	8(16,3)	12(23,5)		
within 6-30 minutes	6(20,0)	17(31,5)	9(18,4)	10(19,7)		
within the first 5 minutes	8(26,7)	9(16,7)	15(30,6)	12(23,5)		
Do you find it difficult not to smoke in places where smoking is prohibited?						
Yes	6(20)	17(31,5)	17(34,7)	15(29,4)	2,011	0,570
No	24(80)	37(68,5)	32(65,3)	36(70,6)		
Which cigarette of the day is more difficult for you to give up?						
First cigarette in the morning	10(33,3)	18(33,3)	23(46,9)	24(47,1)	3,531	0,317
Cigarettes smoked at other times	20(66,7)	36(66,7)	26(53,1)	27(52,9)		
How many cigarettes do you smoke per day?						
10 and less	11(36,7)	18(33,3)	10(20,4)	11(21,6)	15,220	0,077
11-20 unıts	17(56,7)	23(42,6)	18(36,7)	25(49,0)		
21-30 unıts	1(3,3)	10(18,5)	13(26,5)	10(19,6)		
31 and more	1(3,3)	3(5,6)	8(16,4)	5(9,8)		
Do you smoke more in the morning than at any other time of the day?						
Yes	7(23,3)	8(14,8)	10(20,4)	12(23,5)	1,510	0,680
No	23(76,7)	46(85,2)	39(79,6)	39(76,5)		
Do you also smoke when you are sick enough to require bedtime?						
Yes	9(30)	14(25,9)	20(40,8)	15(29,4)	2,882	0,410
No	21(70)	40(74,1)	29(59,2)	36(70,6)		
After this evaluation, would you consider getting professional support for smoking cessation (Smoking cessation polyclinics)						
Yes	22(73,3)	38(70,4)	27(55,1)	31(60,8)	4,003	0,261
No	8(26,7)	16(29,6)	22(44,9)	20(39,2)		

Table 2. Distribution of Fagerström Nicotine Addiction Test Questions of Smokers in the Family Medicine Outpatient Clinic by Gender

	Male[n(%)]	Female[n(%)]	χ^2-value	*P-value*
How soon after waking up do you smoke your first cigarette of the day?				
after 1 hour	43(31,4)	19(40,4)	5,359	0,147
within 31-60 minutes	31(22,6)	5(10,7)		
within 6-30 minutes	28(20,5)	14(29,8)		
within the first 5 minutes	35(25,5)	9(19,1)		
Do you find it difficult not to smoke in places where smoking is prohibited?				
Yes	41(29,9)	14(29,8)	0,001	0,986
No	96(70,1)	33(70,2)		
Which cigarette of the day is more difficult for you to give up?				
First cigarette in the morning	58(42,3)	17(36,2)	0,551	0,458
Cigarettes smoked at other times	79(57,7)	30(63,8)		
How many cigarettes do you smoke per day?				
10 and less	31(23)	18(38)	10,323	**0,016**
11-20 unıts	61(45)	23(49)		
21-30 unıts	28(20)	6(13)		
31 and more	17(12)	0(0)		
Do you smoke more in the morning than at any other time of the day?				
Yes	33(24,1)	4(8,5)	5,285	**0,022**
No	104(75,9)	43(91,5)		
Do you also smoke when you are sick enough to require bedtime?				
Yes	45(32,8)	13(27,7)	0,436	0,509
No	92(67,2)	34(72,3)		
After this evaluation, would you consider getting professional support for smoking cessation (Smoking cessation polyclinics)				
Yes	86(62,8)	32(68,1)	0,429	0,512
No	51(37,2)	15(31,9)		

DISCUSSION

Smoking, which has been identified as a modifiable risk factor in the etiology of many fatal diseases, is a costly and global public health problem. Early recognition and initiation of treatment of smoking addiction plays a key role in the prevention of many chronic diseases and is considered one of the most cost-effective prevention methods.

In the study of Örsel et al., groups with very low, low, moderate, high and severe levels of nicotine dependence were determined according to the score obtained from the nicotine addiction test, and they were grouped into three groups in order to perform statistical

analysis (15). While a significant difference was found between the three groups in terms of gender ratios; No difference was found in terms of variables such as education, age, marital status, employment, age of starting smoking. It is stated that men show more severe levels of nicotine dependence (16). Esen and Arıca determined the addiction status of men as 60.40% and for women as 54.70% in their study with 415 people (10). Although the majority of our participants were male, no significant difference could be found between gender in our study according to the scores obtained from the addiction test. However, in the sub-score evaluations of the test, "How many cigarettes do you smoke per day?" and “Do you smoke more in the morning than at any other time of the day?” There was statistical significance in the answers given to the questions. This may be due to the addiction score results of our study.

In a study conducted among pulmonologists, the rate of non-use was 74% for women and 60% for men, (p=0.001) (17). In a study conducted by Tezcan et al. on Hacettepe University Faculty of Medicine academicians, 38.0% of physician academic staff had never smoked. 15.8% have drank before and quit. It was determined that 37.2% of the three hundred and seventy-one physician academic staff smoked during the study (37.9% for men, 36.3% for women). Smoking is statistically significantly higher in males (Chi-square= 9.96, p= 0.007) (18). In the study conducted by Sezer et al., which included all physicians and dentists working in Elazığ, when physicians and dentists were evaluated together, the smoking size of males was %. It was determined that the smoking dimension of women was 54.9 and 39.5% (SD= 1.75, p> 0.05) (19). Gorin and Heck, who made a meta-analysis of 37 studies on smoking cessation counseling, reported that the greatest effect in smoking cessation counseling was provided by nurses after doctors (20). Tobacco use of health workers; it primarily threatens their own health, but also causes a serious contrast in the fight against tobacco addiction. The validity of the suggestions of a health professional who is known to smoke about his patient not smoking is unknown. However, the fact that smoking cannot be prevented even by a physician has been proven once again with these rates.

Studies conducted among workers working in various sectors in our country have shown that the rates of nicotine addiction are high (21, 22). In a community-based study investigating socioeconomic variables in nicotine addiction in rural southwestern China, more nicotine addiction was observed in males and the highest addiction rate was reported in the 35-44 age group (23). In the studies of Esen and Arıca, no difference was found between working and not working status (10). In our study, there was no difference between the addiction score and whether the individuals had an active working life or not. The difference between the studies

may be due to the differences in the regions where the studies were conducted.

In our study, it was determined that the most common reasons for students to start smoking were "environment-friend environment" (47.0%). In a similar study conducted at Yeditepe University, the most common reasons for starting smoking were "affected by friends" (32.1%) and "stress" (24.6%); Düzce University Faculty of Medicine students answered as "environment and friend environment" (43.5%) and "stress" (17.4% (23,24,25). In our study, friend environment and stress were found to be the causes of smoking, respectively, in line with the literature. According to this, it can be said that cigarettes are used as a tool for socialization.

Individuals can benefit from the smoking cessation program effectively only if the person feels willing, determined and ready. Studies have shown that smoking cessation levels are unfortunately not at the desired rates and one of the important reasons for this situation is that individuals are not ready to quit smoking (26).

In the study of Benegal et al., nicotine addiction was found to be high in those with medium and low education levels (27), while no difference was found in the study of Esen and Arıca (10). In our study, there was no difference between education status and addiction score, and the difference and similarity between the studies may be due to the different or similar grouping according to education level during the analyses.

CONCLUSION

As the design of our study was conducted in an outpatient clinic where undifferentiated patients applied, it may have resulted in different results from the sources available in the literature with the social data. After filling out the questionnaire, the majority of the participants wanted to get information about smoking cessation methods from us. Just as it is impossible to leave a substance with a potential for addiction alone, this also applies to unilateral medical support. Individuals who want to quit smoking should be evaluated within the framework of a biopsychosocial approach and this demand should be supported by medical treatment if necessary. For this reason, it is important to support the units that provide smoking cessation outpatient clinics, especially in primary care..

Ethics Committee: Ethics committee approval for this study Ordu University Received from the Clinical Research Ethics Committee of the University Clinical Research Ethics Committee (Ethics committee date and no: 31.12.2021 ,281)

Author Contributions: Concept: BÇA, ÖE, SC, Design: BÇA, ÖE, MK, MÖ, CÖ Data Collection and Processing: MÖ, ÖUY, CÖ, MK; Analysis and Interpretation: SC, BÇA, MK; Writing: BÇA, ÖE, MÖ, SC, CÖ, ÖUY,

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. https://data.tuik.gov.tr/Bulten/Index?p=Turkiye-Saglik-Arastirmasi-2022-49747 Accessed date: 01.08.2023
2. https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IX-4&chapter=9&clang=_en Accessed date: 05.08.2023
3. Oğuz, Sıdıka; Çamcı, Gülşah; Kazan, Mahsum. Üniversite öğrencilerinin sigara kullanım sıklığı ve sigaranın neden olduğu hastalıkları bilme durumu. Van Tıp Derg 2018, 25.3: 332-337.
4. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases Accessed date: 12.08.2023
5. WHO Report on the Global Tobacco Epidemic, 2008: The MPOWER Package. Geneva, World Health Organization, 2008.
6. Bahelah R, DiFranza J R., Fouad F M, Ward K D, Eissenberg T, Maziak W. Early symptoms of nicotine dependence among adolescent waterpipe smokers. Tobacco Control. 2016; 25(e2): e127-e134.
7. Karlıkaya C. Smoking and profession Solunum. 2004; 6(6): 262-275.
8. Argüder E Karalezli A, Hezer H, Kılıç H, Er M, Hasanoğlu H C, Demir P. Factors Affecting the Success of Smoking Cessation Turk Toraks Derg. 2013; 14: 81-7.
9. Sağlam l. Clinical Evaluation of Nicotine Dependence. Current Chest Diseases Series. 2017; 4 (1): 78-89.
10. Esen A D, Arıca S. The Evaluation of Nicotine Dependence Levels and Sociodemographic Characteristics Among Applicants Admitted for Smoking Cessation. Ankara Med J 2018;(3):328-36.
11. Tanrıöver Ö. Mental Health and Substance Abuse Usage Screening and Consulting. Klinik Tıp Aile Hekimliği Derg 2017; 9(2): Sayfa 51-54
12. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström Test for Nicotine Dependence: a revision of the Fagerström Tolerance Questionnaire. Br J Addict. 1991; 86:1119-27.
13. Bozkurt N, Bozkurt Aİ, Evaluation of the Fagerström Test for Nicotine Dependence (FBNT) in determining nicotine addiction and Creation of a new test for nicotine addiction. Pamukkale Medical Journal. 2016;9(1):45-51
14. Uysal MA, Kadakal F, Karşidağ C, Bayram NG, Uysal O, Yilmaz V. Fagerström test for nicotine dependence: reliability in a Turkish sample and factor analysis. Tuberk Toraks 2004; 52:115-21.

15. Örsel O, Örsel S, Alpar S, Uçar N, Fırat Güven S, Şipit T, Kurt B . The Effect of Nicotine Dependence Levels on Treatment Outcomes in Smoking Cessation. Respiratory Diseases 2005; 16: 112-118
16. Fagerstrom KO, Kunze M, Schoberberger R, et al. Nicotine dependence versus smoking prevalence: Comparisons among countries and categories of smokers 1996; 5:1-3.
17. Bostan Pazarlı P, Elbek O, Kılınç O, Akçay Ş, Kıran S. Attitudes and Behaviors of Chest Disease Physicians, Members of Turkish Thoracic Society, in the Field of Tobacco Control. Smoking and Health National Committee 5th Annual Congress, 8-11 May 2011 Kocaeli.
18. Tezcan S, Yardım N. In Various Health Institutions in TurkeyDoctor, Nurse and Faculty of Medicine Students' Smoking Dimension. Tüberküloz ve Toraks Derg 2003; 51(4): 390-397.
19. Sezer RE, Öztürk ŞZ, Bilgin N, Açık Y. Behaviors and Attitudes of Physicians and Dentists Working in Elazig about Smoking. Doğa- Tr. J. Of Medical Sciences 1990; 14: 381-90.
20. Gorın, Sherri Sheinfeld; Heck, Julia E. Meta-analysis of the efficacy of tobacco counseling by health care providers. Cancer Epidemiology Biomarkers & Prevention 2004, 13.12: 2012-2022.
21. Ünalacak M, Altın R, Kart L, et al. Smoking prevalence, behaviour and nicotine addiction among coal workers in Zonguldak. Turkey. J Occup Health 2004; 46:289-295.
22. Aksakal A, Khorshid L. Investigation of smoking and nicotine addictions of individuals working in Adana TEKEL factory. Bağımlılık Derg 2006; 7:57-64.
23. Terzi, Ö., Kumcağız, H., Terzi, M., & Dündar, C. Cigarette Smoking and Determination of Nicotine Dependence Levels in University Students. Addicta: The Turkish Journal on Addictions 2019;6.4: 168-181.
24. Akan, H., Hayran, O., Özcan, M., & Acar, U. Smoking prevalence among university students: a cross-sectional study. Turkish Journal of Family Practice 2010, 14.2: 71-76.
25. Oğuz S, Çamcı G, Kazan M. Üniversite öğrencilerinin sigara kullanım sıklığı ve sigaranın neden olduğu hastalıkları bilme durumu. Van Tıp Derg 2018, 25.3: 332-337.
26. Erol S, Erdoğan S. Application of a stage based motivational interviewing approach to adolescent smoking cessation: The Transtheoretical Model-based study. Patient education and counseling 2008, 72.1: 42-48.
27. Benegal V, Sugunan AP, Jeemon P, et al. Tobacco use and nicotine dependency in a cross- sectional representative sample of 18,018 individuals in Andaman and Nicobar Islands, India. BMC Public Health. 2012; 12:515.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci
October 2023; 9(4): 679-695

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1350411

A New Method of Detecting Submerged Implants: An Animal Experiment

Eren Yılmaz[1](ID) Emel Bulut[2](ID) Nilüfer Kuruca[3](ID) Tolga Güvenç[3](ID)

[1]Department of Oral and Maxillofacial Surgery, Karabük University Faculty of Dentistry
[2]Department of Oral and Maxillofacial Surgery, Ondokuz Mayıs University Faculty of Dentistry
[3]Department of Veterinary Pathology, Ondokuz Mayıs University Faculty of Veterinary Medicine

Received: 26 August 2023, Accepted: 13 October 2023, Published online: 29 October 2023

Abstract

Objective: There are difficulties in determining the location of submerged implants when cover screws and healing screws are to be replaced. Because of this, a new implant cover screw has been designed. The purpose of this study was to investigate the properties of a novel implant cover screws in rabbits.

Methods: 10 New Zealand White rabbits were randomly divided into two groups. Diastema regions behind the incisor teeth were used for the placement of cover screws. In the control group, the screws (n=20) that received no processing were placed whereas, in the experimental group, the screws (n=20) that top surfaces were coated with europium and dysprosium doped strontium aluminate were placed to the diastema regions. Animals were sacrificed after 6 weeks. Dental LED curing light was applied to the oral mucosa regions in which screws were placed in the experimental group just after sacrification and the visibility of the screws was evaluated. To determine the biocompatibility of the coated screws, oral mucosas which contacted with the screws, livers and kidneys were removed and examined histopathologically.

Results: After light application, only the screws in the upper jaws of the experimental group became visible (n=10). Histopathological examinations performed on the kidneys, livers and oral mucosa tissues which contacted with the screws. There were no significant differences between the experimental and control groups regarding these tissues.

Conclusion: According to the results of this study, it can be concluded that the titanium implant cover screws coated with europium and dysprosium doped strontium aluminate were biocompatible for rabbits.

Keywords: Biocompatibility; Cover screw; Dental implant; Rabbit; Strontium aluminate

Suggested Citation: Yılmaz E, Bulut E, Kuruca N, Güvenç T. A New Method of Detecting Submerged Implants: An Animal ExperimentMid Blac Sea Journal of Health Sci, 2023;9(4):679-695.

Address for correspondence/reprints:

Eren Yılmaz

Telephone number: +90 (549) 743 14 53

E-mail: erenyilmaz@karabuk.edu.tr

INTRODUCTION

Nowadays, the best material for the treatment of edentulousness is titanium dental implants. These are surgically implanted in jaws, and then dental prostheses are prepared and placed on them.

Dental implant surgery is performed in two ways, either one- or two-stage surgery. In one-stage dental implant surgery, the body of the implant is placed in the jawbone. A healing screw is screwed into the implant body for healing soft tissue around the implant in the same session. The surgical site is sutured, and the healing screw remains open to the mouth. Therefore, they are called “non-submerged” or “transmucosal” implants. Immediately or after osseointegration, prosthetic stages can take place.

In two-stage dental implant surgery, the body of the implant is closed with a cover screw made of titanium to protect the internal structure of the implant from blood, saliva, and soft and hard tissues until the prosthetic stages after implantation. The surgical site is sutured, and the implant remains completely under the oral mucosa. Therefore, they are called “submerged” implants. After osseointegration, the oral mucosa on the implant is incised or excised during a second surgery. The cover screw is removed and replaced with the healing screw. Then, in the same way as in one-stage surgery, prosthetic stages are started.

Many problems can be encountered when replacing the cover screw with the healing screw. Failure to detect the exact location of the implant may result in more incisions than are necessary. To remove a cover screw of about 3mm in diameter, a region of the required size for implant surgery can be incised, but this situation has led to many complications.

Phosphorescence is a phenomenon whereby a material receives energy from ultraviolet, visible or infrared rays and gives this energy off in its environment for a certain period of time, even after the excitation irradiation ends. Europium and dysprosium doped strontium aluminate ($SrAl_2O_4$: Eu^{+2}, Dy^{+3}) is a pigment that has this characteristic (1). Previous studies have shown that it is biocompatible (2,3) and produces very strong visible light (4).

Coating titanium cover screws with this biocompatible pigment can help the surgeon easily locate implant sites in the mouth. For this purpose, dental LED curing lights which are very powerful light sources and used in nearly all dental clinics can be used. After these light sources are applied in the mouth, the cover screws may become visible under the oral mucosa due to their phosphorescent properties, and the exact location of the implant can be found. In this way, unnecessary incisions can be avoided, and complications can be reduced.

Material that is being considered for use in human bodies is usually tried in animals first. This is also the case for implants. The first

implant studies were performed on experimental animals (5). Therefore, it was decided to use the rabbits for our study. Dental implants were not used. However, screws made from titanium, such as dental implant material, can be considered miniature implants. In addition, the visibility of the screws must be evaluated in live tissues to which blood flow continues. To determine the visibility and biocompatibility of the screws in the oral tissues, it was planned that the screws are placed in jawbones.

The aim of this study is to investigate whether europium and dysprosium doped strontium aluminate coated titanium screws will become visible under the rabbit's oral mucosa after light application and whether they are biocompatible for rabbits.

METHODS

The study was performed at the Ondokuz Mayıs University Faculty of Dentistry in Samsun, Türkiye.

Animals

10 healthy male New Zealand White rabbits were used with a minimum age of 6 weeks and a weight of at least 2kg. Experimental animals were procured from Ondokuz Mayıs University Medico-Surgical Research Laboratory. The number of rabbits was determined by reference to the different implant studies (6,7). Animals were randomly chosen from the supplier and randomly divided into two groups as experimental (n=5) and control (n=5).

In the experimental group, two of the animals died, one on the first day due to nutritional deficiency and the second on the seventh day due to oral infection after the surgery. This situation was diagnosed by the responsible veterinarian in the Ondokuz Mayıs University Medico-Surgical Research Laboratory and reported to the Ondokuz Mayıs University Animal Care and Ethics Committee. After that, permission was given again, and 2 rabbits were treated with the same procedure. As a result, a total of 12 animals was used in the study.

Screws and Their Features

Titanium dental implant cover screws were chosen for the study. The length of the screws was measured as 6mm. The largest diameter at the top surface was 3mm and the smallest diameter at the bottom was 1mm. These screws were used directly in the control group (Figure 1a). On the other hand, screws were used in the experimental group that the top surface of the screw was coated with a long persistent phosphorescent pigment, europium and dysprosium doped strontium aluminate (Figure 1b). All screws were sterilized in a dental autoclave before surgery (Nüve NC 23B, Nüve Laboratory and Sterilization Tech., Türkiye).

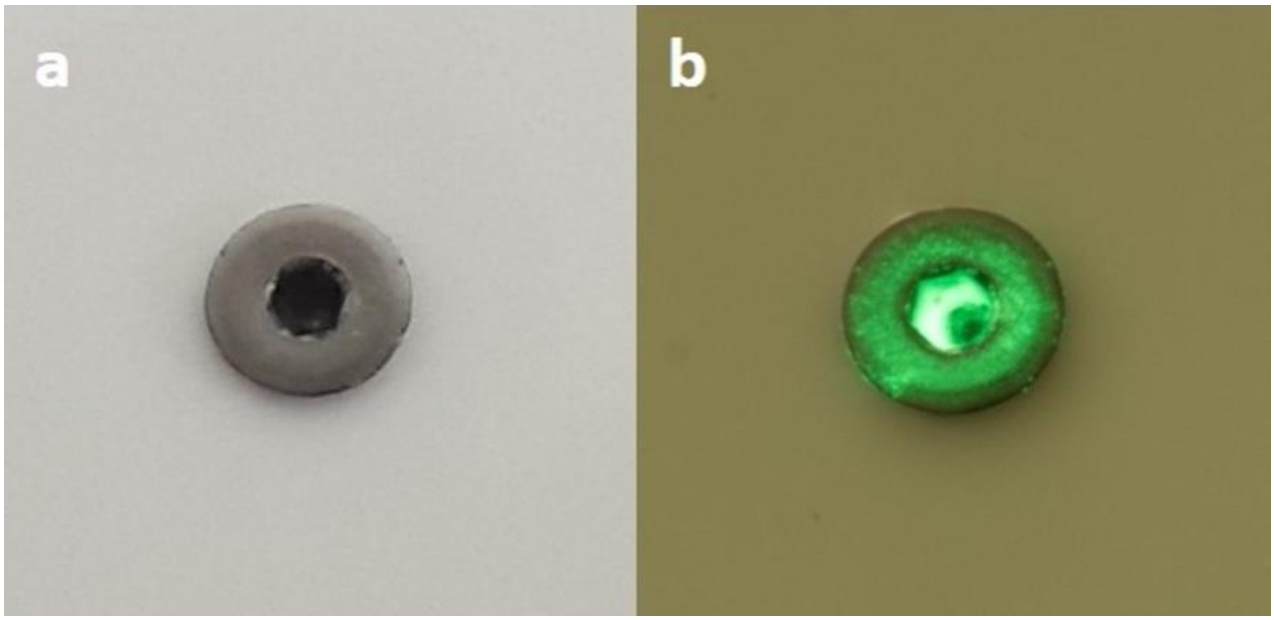

Figure 1. a: The screws that used in the control group without strontium aluminate, **b:** The strontium aluminate coated screws that used in the experimental group.

Presurgical Cadaveric Examination

The screws were planned to be placed on jawbones to examine the effects on oral tissues. For a clear understanding of the anatomy of rabbits' jaws, a mature male rabbit cadaver was examined before surgical implantation of the screws.

Firstly, it was determined that the screws could be placed in the large diastema region between the incisor and cheek teeth. The diastema regions were examined with elevating flap from the upper and lower jaws. The mental foramen was close to the cheek teeth. After that, the upper and lower jaws were cut out coronally, including the cheek teeth.

The jaws were separated from the midline. Radiographs were taken from the right sides. The radiographs showed that the incisor teeth would be damaged if the screws were placed vertically. Therefore, it was decided to place the screws buccolingually.

On the left side of the jaws 1cm behind the incisor teeth, the bones were drilled using a surgical fissure bur with a diameter of 1mm, the same as the screws' groove diameter. Then, radiographs were taken, and no damage was detected on the incisor teeth.

The buccolingual thicknesses of the drilled region in the lower and upper jaws were measured with calipers, yielding 8.2mm for the upper jaw and 4.1mm for the lower jaw. Screws used in the upper jaws were shortened by about 3mm because it was noticed that the 6mm length screws would enter the nasal cavity in the upper jaws.

Surgical Procedure

The rabbits were anaesthetized with 8mg/kg intramuscular xylazine (Xylazin Bio® 2%,

Bioveta, Czechia) and 50mg/kg ketamine (Ketasol® 10%, Richter Pharma Ag, Austria). The perioral regions were shaved. Preoperative weights were determined with precision scales. The oral cavity and perioral region were disinfected with polyvinylpyrrolidone-iodine (Batticon® 10%, Adeka, Türkiye). For local anesthesia of each half of the jaws, 0.5ml articaine containing 1:200000 epinephrine (Ultracain® DS, Sanofi-Aventis, Türkiye) was administered.

The upper jaw was incised vertically in the distal part of the incisor tooth and horizontally along the line following ruga palatina. The flap was elevated. The bone was drilled 1cm away from the incisor tooth with a 1mm diameter surgical bur marked at 3mm. The screw was placed, and the flap was sutured with three resorbable sutures (Pegelak® 3.0, Doğsan, Türkiye) (Figure 2a-2d).

Similarly, the lower jaw was incised vertically in the distal part of the incisor tooth and horizontally along the line following the lip fold. The flap was elevated, and the bone was drilled 1cm away from the incisor tooth with a 1mm diameter surgical bur marked at 6mm. The screw was placed, and the flap was sutured with three resorbable sutures (Pegelak® 3.0, Doğsan, Türkiye) (Figure 2e-2h).

In all, 40 dental implant cover screws were placed in 10 animals, one screw per each half of the jaws. On the lower jaws, 6mm screws were placed. All screws applied to the upper jaws were shortened to 3mm before the surgery. Untreated screws were placed in the control group, and coated screws were placed in the experimental group. Animals in the same group were operated in random order, and all surgical procedures were performed by the same surgeon.

Post-Operative Care

All animals were placed in separate metal cages after the surgical procedure under standard conditions (temperature 22±2°C; humidity 55±5%; light/dark cycle 12/12h) with water and food ad libitum. They were fed with a soft diet for three weeks because the surgical region was the mouth. Rabbits were observed frequently to monitor food intake and activity. They were given analgesics (0.3mg/kg Meloxicam, Maxicam®, Sanovel, Türkiye) and antibiotics (50mg/kg cefazolin sodium, Cezol® 1gr I.M./I.V., Deva, Türkiye) intramuscularly twice a day for four days after the surgery.

Sacrification and Other Applications

To determine the most important result of the experiment, dental LED curing light (Woodpacker® LED.B, Guilin Woodpacker Medical Instrument Co. Ltd., China) was applied to all regions where the screws were placed just after the sacrification. The light was put in contact with the oral mucosas, and the light intensity was adjusted to the maximum and held for 20 seconds per region. The appearance of the screws under the mucosas was evaluated by two independent observers in

the operating room when the animals were alive. The observers stayed 30cm away from the lighted region, and the room was illuminated with daylight.

All animals' last weights were evaluated with precision scales. The oral mucosa that was in contact with the screws was excised approximately 2x1cm in each half of the jaws. Abdomens were opened to remove livers and kidneys. Each kidney was divided into two. Livers were cut into samples with 1cm between them. Samples were taken by the same pathologist and placed in 10% buffered formaldehyde.

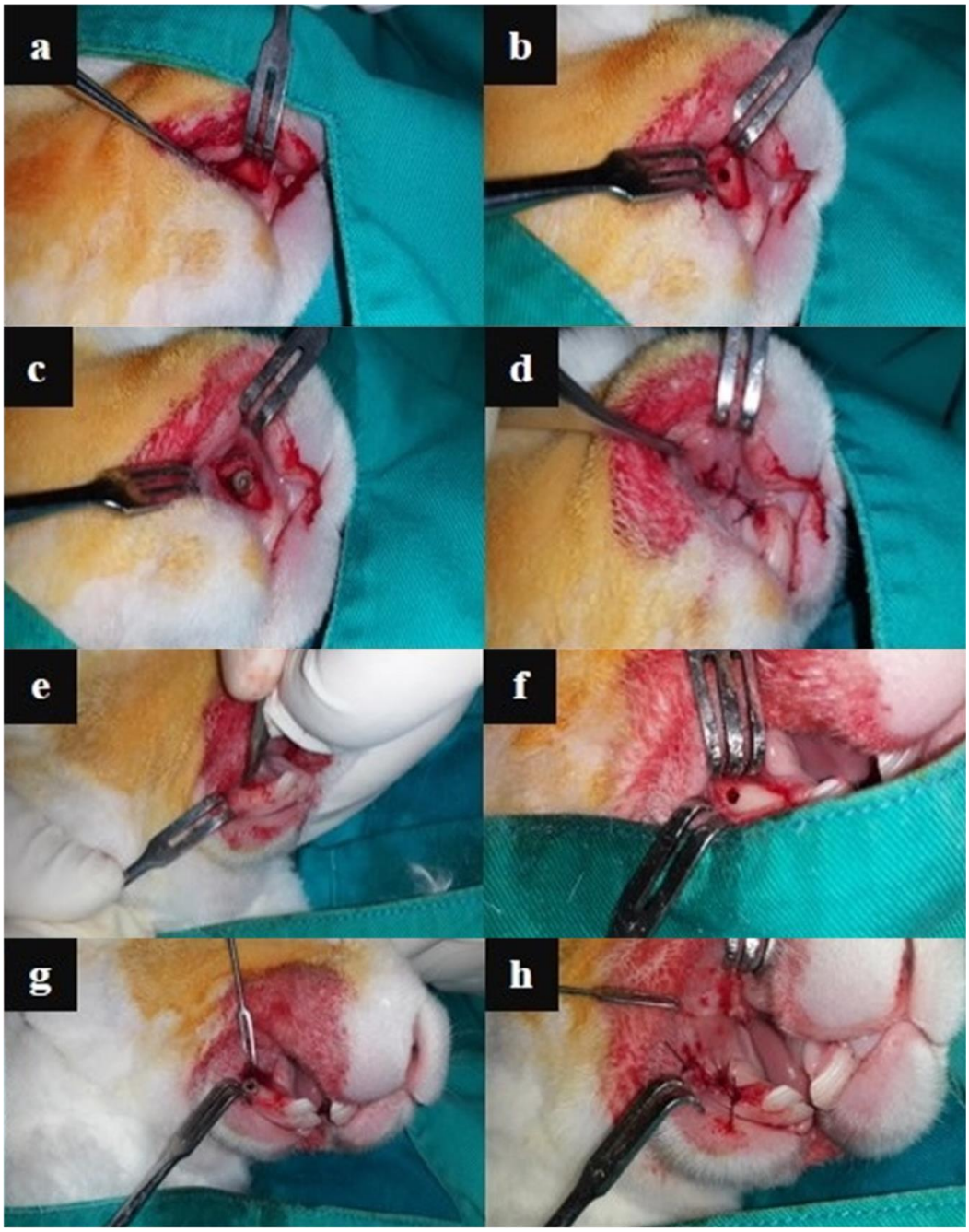

Figure 2. Intraoperative view after elevating of the flap, drilling of the bone, implanting of the screw and suturing of the surgery region. **a,b,c,d:** The upper jaw, **e,f,g,h:** The lower jaw.

Histopathological Preparations and Analysis

All tissues were fixed with 10% buffered formaldehyde for 48 hours. They were divided into small pieces for examination. Each piece was placed in a cassette and washed for 4 to 6 hours in running water to remove the formaldehyde completely. After that, they were placed in an automatic tissue processing device. Tissues were embedded in paraffin blocks. Paraffin blocks were cut at a 5-6µm thickness with microtome. Then all paraffin was removed in an oven. Tissues were stained with hematoxylin-eosin. Preparation of tissue samples was completed to examine them with a light microscope.

All prepared tissues were examined with a light microscope (Eclipse® E600, Nikon, Japan). The presence of an inflammatory reaction and the status of epithelialization were examined. The thickness of the oral mucosa epithelium was also measured using computer images obtained from the microscope. Differences between experimental and control groups were statistically evaluated.

Statistical Analysis

Preoperative and sacrification weights of all animals and epithelial thicknesses in each half of the jaws were compared statistically with a computer program (IBM SPSS Statistics® 20, Chicago, IL, USA). The normal distribution of all data was confirmed with the Shapiro-Wilk test. Independent samples were compared with independent samples T-test. The means of the preoperative and sacrification weights of the experimental and control groups were compared with paired samples T-test. Epithelial thicknesses were compared with paired samples T-test within the same group, and the intergroup epithelial thicknesses were compared with independent samples T-test. The significance level was chosen as 0.05 in all analyses.

RESULTS

Weights Comparison

To evaluate the homogeneity of the groups, preoperative weight values of the control and experimental groups were compared with the independent samples T-test (P=0.36). The distribution of the preoperative weights of groups was homogeneous (Table 1).

During the experiment, to see differences between the groups in terms of weights of the animals, the sacrification weights of the control group and of the experimental group were compared with the independent samples T-test (P=0.50). There was no statistical difference between them and both groups were affected by the process in the same way (Table 1).,

Table 1. Comparison of preoperative and sacrification weights (kg) between groups

		Minimum	Maximum	Mean	Median	Standard Deviation	p
Preoperative Weight	**Control (n=5)**	3.36	4.25	3.74	3.57	0.43	0.362
	Experimental (n=5)	2.25	4.22	3.30	3.74	0.90	
Sacrification Weight	**Control (n=5)**	2.10	4.03	3.22	3.10	0.75	0.501
	Experimental (n=5)	2.27	3.56	2.93	3.06	0.48	

To see the effect of the experiment on each animal, the differences between the preoperative and sacrification weights of all animals in the control and experimental groups were compared with the paired-samples T-test (P=0.30 for the control group; P=0.16 for the experimental group). It was concluded that the weights of the animals were not affected in either group by the experiment (Table 2). Europium and dysprosium doped strontium aluminate coating has no effect on weight loss or gains in rabbits.

Visibility of Screws Under Oral Mucosa Before and After the Light Application

Before the application of dental LED curing light to the oral mucosa where the screws were implanted, no findings were observed by the independent observers about the screws in both groups. After that, dental LED curing light was applied and the visibility of the screws under the oral mucosas was evaluated in both groups. It was determined that all screws implanted in the upper jaws became visible in the experimental group and they could be located under the mucosas by independent observers (Figure 3a). There was a green light in these regions that can be seen clearly in the room which was illuminated by daylight. However, all the screws implanted in the control group and on the lower jaws in the experimental group were not visible (Figure 3b). No findings regarding screws were found by both independent observers.

Histopathological Examination Finding

In the study, epithelization was normal and there was no inflammatory reaction in all oral mucosa regions in the experimental (Figure 4a-4e) and control (Figure 4f-4j) groups. In addition, the histological appearances of the livers and kidneys were normal, and no pathology was observed. A granulomatous infection was detected only in one oral mucosa region in the experimental group, which developed far from the contact region of the screw (the left lower jaw of the fifth rabbit in the experimental group). The reason was identified as food trauma and normal oral flora.

Table 2. Comparison of preoperative and sacrification weights (kg) in each groups

		Minimum	Maximum	Mean	Median	Standard Deviation	p
Control (n=5)	**Preoperative Weight**	3.36	4.25	3.74	3.57	0.43	0.296
	Sacrification Weight	2.10	4.03	3.22	3.10	0.75	
Experimental (n=5)	**Preoperative Weight**	2.25	4.22	3.30	3.74	0.90	0.156
	Sacrification Weight	2.27	3.56	2.93	3.06	0.48	

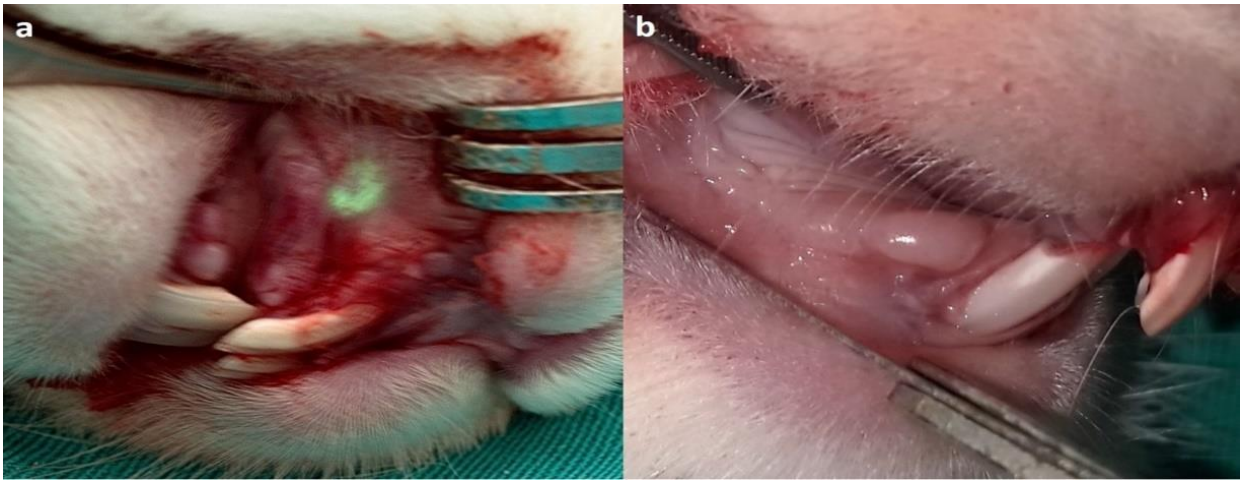

Figure 3. a: The screw's appearance after the light application in the upper jaw, **b:** The appearance in the lower jaw after the light application.

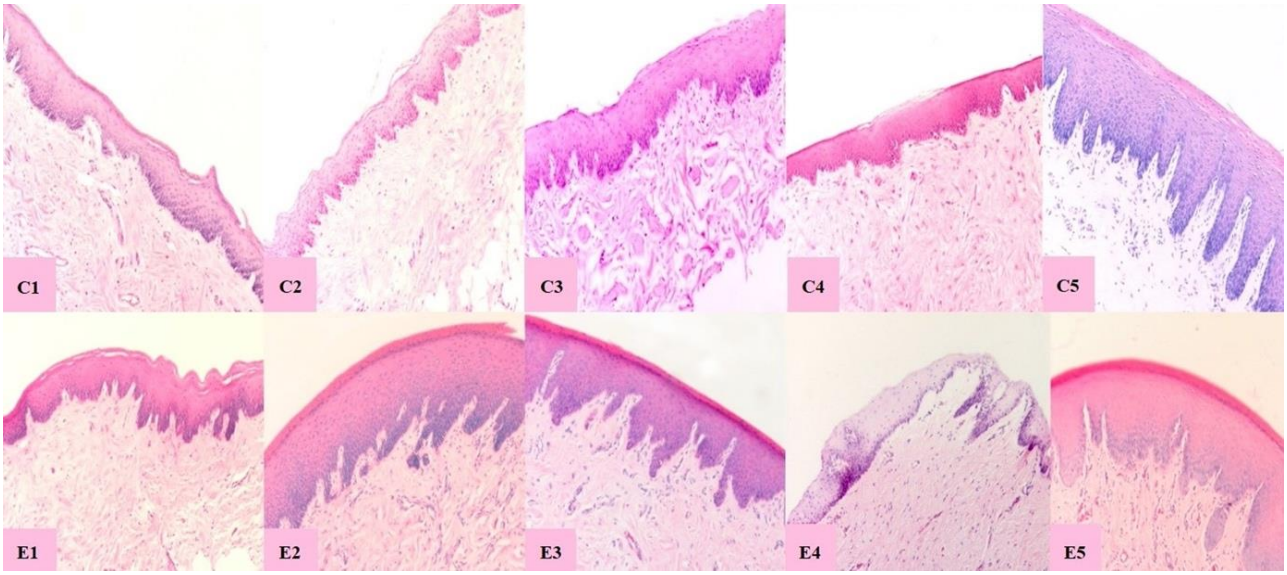

Figure 4. Histology of all animals' oral mucosa epithelium after hematoxylin-eosin staining (Magnification x10) (C= Control group, E= Experimental group).

Comparison of Epithelial Thickness

Epithelial thickness was measured at three different sites on each oral mucosa using computer images obtained from the microscope. The mean of these three measurements was determined and recorded as the epithelial thickness of these tissues.

Oral mucosa epithelial thicknesses in each half of the jaws between the control and experimental groups were compared with independent samples T-test (P=0.08 for right upper jaw; P=0.42 for left upper jaw; P=0.86 for left lower jaw; P=0.08 for right lower jaw) (Table 3). There was no significant difference between the oral mucosa epithelium thicknesses of each half of the jaws in the control and experimental groups. As a result, it was found that europium and dysprosium doped strontium aluminate coating did not affect epithelial thickness.

Table 3. Comparison of oral mucosal epithelial thickness (µm) of the control and experimental groups in each half of the jaws

		Minimum	Maximum	Mean	Median	Standard Deviation	p
Right Upper Jaws	**Control (n=5)**	132.630	224.560	173.236	173.120	38.250	0.081
	Experimental (n=5)	173.330	242.990	216.224	230.640	29.241	
Left Upper Jaws	**Control (n=5)**	114.430	398.840	273.508	304.390	110.256	0.417
	Experimental (n=5)	103.550	426.730	209.110	165.230	127.038	
Left Lower Jaws	**Control (n=5)**	182.270	463.190	346.312	354.640	102.866	0.856
	Experimental (n=5)	185.080	487.760	359.176	354.770	113.256	
Right Lower Jaws	**Control (n=5)**	259.890	426.410	322.390	323.140	65.967	0.078
	Experimental (n=5)	363.840	447.630	390.110	373.330	35.688	

DISCUSSION

The importance of dental implant surgery has been increasing with the developments of novel implant designs, surface properties and surgical techniques that offer many options for surgeons. The techniques are very important in oral implantology, as they are in all surgical sciences. In oral implantology, there are two techniques for implant placement, one- or two-stage surgery (8). Many studies have compared the two techniques. Both have advantages and disadvantages, but no consensus has been reached about which one is better (8-27).

Two-stage surgery is preferred more by practitioners. Dental radiograph is the most used method to determine the location of an implant under the oral mucosa after osseointegration. Scalpels are chosen mostly to use in the second surgery. Sometimes, dentists detect implant sites incorrectly. The incision is expanded to find the implant after such a failure, and over-incised regions are sutured. No infection usually develops, and antibiotics are not prescribed after this procedure. However, if an infection develops, dentists prescribe antibiotics. Incorrect or over-

incisions delay patients' prosthetic treatment stages (28).

Two-stage surgery has the disadvantage of requiring a second surgery, which takes more time and increases scar formation and treatment costs. Thick oral mucosa, dentists' lack of experience and multiple implant applications in edentulous cases make second surgery difficult. In some cases, the procedure can be performed with the elevating flap from a large region, as in the first stage (29). However, one of the important subjects in all surgical sciences is the minimal incision that provides optimum access to the surgical site. Over-incisions increase the risk of complications after surgery (30).

Flapless and conventional implant surgeries were compared, and less resorption in the neck region of the implant body with flapless surgery was reported (31). In some studies, flap elevation was found to induce bone resorption (32,33). These studies prove that excessive or wrong incisions and elevating the flap have negative consequences when replacing the cover screws in the second stage of the two-stage surgery.

All this information made it necessary to develop a new, minimally invasive method in two-stage implant surgery that can determine the exact location of the implant under the oral mucosa. For this purpose, a study using phosphorescent pigment coated implant cover screws and dental LED curing light has been designed.

In this study, rabbits were preferred because of the jaw structures suitable for screw placement. It was planned to place screws in each half of the jaws to obtain maximum data from a minimum number of animals. Europium and dysprosium doped strontium aluminate coated implant cover screws were surgically implanted in the experimental group, while untreated implant cover screws were used in the control group. At the end of six weeks that is necessary for implant osseointegration in rabbits (34), the visibility and biocompatibility of the screws under the oral mucosa were investigated.

Before the light application, there was no sign about screws in all rabbits. After that, the light was applied to both groups to determine whether the screws under the mucosa are visible. All screws were clearly observed in the upper jaws in the experimental group. However, all the other screws were not seen. This is the most important result of the study.

Oral mucosa regions in contact with the screws were excised to investigate the local biocompatibility of the europium and dysprosium doped strontium aluminate coating. To evaluate general biocompatibility, livers and kidneys were removed based on other toxicity and biocompatibility studies in the literature (35-38). All tissues were stained with hematoxylin-eosin and examined with a light microscope. Histopathologically, no inflammatory reaction was observed in any

tissues. Epithelialization of the oral mucosas, epithelial cells, and underlying connective tissues were normal. Livers and kidneys were healthy. Thus, it was determined that europium and dysprosium doped strontium aluminate is biocompatible for these tissues.

Increasing epithelial thickness is one of the most important findings in oral malignity (39). Therefore, the epithelial thickness of each oral mucosa was measured. The epithelial thicknesses of the control and experimental groups on each half of the jaws were compared. At the end of the comparison, there was no statistically significant difference between the epithelial thicknesses of the groups. Thus, it was proved that europium and dysprosium doped strontium aluminate has no effect on epithelial thickness.

The preoperative and sacrification weights of each animal were measured with a precision scale. There was no statistically significant difference between the two groups in terms of preoperative weight. This shows that two randomly separated groups were homogeneously distributed in terms of their weights. Similarly, there was no statistically significant difference between the two groups in terms of sacrification weight. This indicates that animals were equally affected by the process. Finally, preoperative and sacrification weights of each animal were compared, and no statistically significant difference was found. Thus, it was proved that normal screws and europium and dysprosium doped strontium aluminate coated screws have no weight effects on animals.

Europium and dysprosium doped strontium aluminate is the easiest to acquire, most used and researched, long-term and powerful light-emitting phosphorescent pigment. The strongest light is produced by europium and dysprosium doped strontium aluminate among all long persistent phosphorescent pigments (4). HeLa cell cultures were treated with europium and dysprosium doped strontium aluminate at four different concentrations (0.001, 0.01, 0.1, 1µg/µL), and the study showed that europium and dysprosium doped strontium aluminate is not cytotoxic at any of these concentrations (2). In safety data sheets published by manufacturers, oral and dermal acute toxicity LD50 doses for rats are reported to be >2000mg/kg and the chromosomal aberration test about reproductivity is evaluated to be negative (3). For these reasons, europium and dysprosium doped strontium aluminate was used in this study.

Different methods have been found in the literature to determine the exact location of implants. An ultrasonic device was developed to locate submerged implants (40). It can detect implants that are under the oral mucosa that is up to 5mm thick in pigs. But the system is not reliable in implants with more than 5mm of mucosal thickness. Additionally, the need for a special device for detecting is disadvantageous.

In a previous study, paint was injected into the oral mucosa at the end of the first stage to detect the exact location of the implant (29). In 87.5% of the cases, implants were clearly found in the second stage of the surgery. The biopsies showed that the paint is biocompatible for the tissues and no foreign body reaction developed. This is a very useful and economical method. However, the excessive injection can be done by mistake in aesthetic regions. In addition, even though the paint is biocompatible for the body, a foreign material will remain permanently.

Another method for locating implants under the oral mucosa is the use of electronic devices (29). A sensor is moved inside the mouth, and it gives an audible, light warning when it detects an implant. Then the site is marked, and the mucosa on the implant is excised or incised. There are some disadvantages such as the expensive cost of the device or the incorrect results that may be gained due to the low battery or deformation of the sensor.

Our study is considered an alternative method that uses dental LED curing light and coated cover screws with phosphorescent pigment. This technique does not add an additional process to the conventional two-stage surgery. There is no need for a new device, and the production cost of the screws is very low. Also, the location of the screws can be found exactly, quickly and without radiographs.

Mainly, the visibility of phosphorescent coated screws under live tissues after a light application was evaluated in this study. In addition, their biocompatibility was investigated. For these reasons, some other analyzes have been limited. The most important limitation of this study is that it is not possible to determine what the maximum thickness of the tissue should be to see the coated screws. They could be measured with a periodontal probe or a needle after implantation or before sacrification. But due to the risk of tissue injury during the measurement, it was not performed in both times. Nevertheless, it was seen that all soft tissues on the lower jaws are thicker than on upper jaws. Very thick folds on the lower jaws were observed just above all screws. This could be why the screws could not be detected in the lower jaws in the experimental group.

The other limitation is exactly unknown general biocompatibility. Liver and kidney examinations and previous studies give an idea, but this is not precise. Further studies are needed to reveal these situations.

CONCLUSION

In this study which examined the effects of europium and dysprosium doped strontium aluminate coated titanium materials on rabbits, a different method was developed for the second stage of two-stage dental implant surgery even though there are some limitations. The coated screws were detected under the oral mucosa. In addition, this material was found to

be biocompatible for examined tissues. In the future, maybe this method can also be applied in humans after necessary steps are fulfilled, and a minimally invasive procedure will arise that is different from the conventional methods in the two-stage implant surgery.

Ethics Committee Approval: The study protocol was approved by the Ondokuz Mayıs University Animal Care and Ethics Committee with project number 2017/07.

Author Contributions; Concept: EY, EB, NK, TG, Design: EY, Data Collection and Processing: EY, Analysis and Interpretation: EY, EB, Writing: EY, EB,

Conflict of Interest: The authors have declared that no conflicts of interest exist.

Financial Disclosure: This study was supported by Ondokuz Mayıs University with project number PYO.DİS.1904.17.015.

REFERENCES

1. Li Y, Gecevicius M, Qiu J. Long persistent phosphors--from fundamentals to applications. Chem Soc Rev 2016;45:2090-136.
2. Montes-Frausto JB, Juarez-Moreno K, Can-Uc B, Hirata-Flores GA. Synthesis and cytotoxic effects of SrAl2O4 persistent luminescence nanoparticles co-doped with Eu2+/Dy3+ ions. Optical Materials Express 2016;6:1488-99.
3. Alumilite Corporation. 2015. Strontium-Dysprosium-Europium-Aluminate safety data sheet https://www.alumilite.com/PDFs/SDS/powders/Phosphorescent-Powder.pdf.
4. Yen WM, Shionoya S, Yamamoto H. Phosphor Handbook 2nd ed. Boca Raton: CRC Press; 2007.
5. Branemark PI. Osseointegration and its experimental background. J Prosthet Dent 1983;50:399-410.
6. Duyck J, Ronold HJ, Van Oosterwyck H, Naert I, Vander Sloten J, Ellingsen JE. The influence of static and dynamic loading on marginal bone reactions around osseointegrated implants: an animal experimental study. Clin Oral Implants Res 2001;12:207-18.
7. Klokkevold PR, Nishimura RD, Adachi M, Caputo A. Osseointegration enhanced by chemical etching of the titanium surface. A torque removal study in the rabbit. Clin Oral Implants Res 1997;8:442-7.
8. Sanchez-Siles M, Munoz-Camara D, Salazar-Sanchez N, Camacho-Alonso F, Calvo-Guirado JL. Crestal bone loss around submerged and non-submerged implants during the osseointegration phase with different healing abutment designs: a randomized prospective clinical study. Clin Oral Implants Res 2018;29:808-12.
9. Barber HD, Seckinger RJ, Silverstein K, Abughazaleh K. Comparison of soft tissue

healing and osseointegration of IMZ implants placed in one-stage and two-stage techniques: a pilot study. Implant Dent 1996;5:11-4.

10. Ericsson I, Randow K, Nilner K, Petersson A. Some clinical and radiographical features of submerged and non-submerged titanium implants. A 5-year follow-up study. Clin Oral Implants Res 1997;8:422-6.
11. Abrahamsson I, Berglundh T, Moon IS, Lindhe J. Peri-implant tissues at submerged and non-submerged titanium implants. J Clin Periodontol 1999;26:600-7.
12. Buser D, Mericske-Stern R, Dula K, Lang NP. Clinical experience with one-stage, non-submerged dental implants. Adv Dent Res 1999;13:153-61.
13. Becker W, Becker BE, Ricci A, Bahat O, Rosenberg E, Rose LF, et al. A prospective multicenter clinical trial comparing one- and two-stage titanium screw-shaped fixtures with one-stage plasma-sprayed solid-screw fixtures. Clin Implant Dent Relat Res 2000;2:159-65.
14. Cecchinato D, Olsson C, Lindhe J. Submerged or non-submerged healing of endosseous implants to be used in the rehabilitation of partially dentate patients. J Clin Periodontol 2004;31:299-308.
15. Engquist B, Astrand P, Anzen B, Dahlgren S, Engquist E, Feldmann H, et al. Simplified methods of implant treatment in the edentulous lower jaw: a 3-year follow-up report of a controlled prospective study of one-stage versus two-stage surgery and early loading. Clin Implant Dent Relat Res 2005;7:95-104.
16. Cordaro L, Torsello F, Roccuzzo M. Clinical outcome of submerged vs. non-submerged implants placed in fresh extraction sockets. Clin Oral Implants Res 2009;20:1307-13.
17. Esposito M, Grusovin MG, Chew YS, Coulthard P, Worthington HV. Interventions for replacing missing teeth: 1- versus 2-stage implant placement. Cochrane Database Syst Rev 2009:CD006698.
18. Tallarico M, Vaccarella A, Marzi GC. Clinical and radiological outcomes of 1- versus 2-stage implant placement: 1-year results of a randomised clinical trial. Eur J Oral Implantol 2011;4:13-20.
19. Torkzaban P, Arabi SR, Roshanaei G, Rostami M, Soheilifar S. A Comparative Study of Clinical Parameters in Submerged and Non submerged Implants. J Clin Diagn Res 2015;9:ZC26-9.
20. Gheisari R, Eatemadi H, Alavian A. Comparison of the Marginal Bone Loss in One-stage versus Two-stage Implant Surgery. J Dent (Shiraz) 2017;18:272-6.
21. Paul S, Petsch M, Held U. Modeling of Crestal Bone After Submerged vs Transmucosal Implant Placement: A Systematic Review with Meta-Analysis. Int J Oral Maxillofac Implants 2017;32:1039-50.

22. Flores-Guillen J, Alvarez-Novoa C, Barbieri G, Martin C, Sanz M. Five-year outcomes of a randomized clinical trial comparing bone-level implants with either submerged or transmucosal healing. J Clin Periodontol 2018;45:125-35.
23. Gehrke SA, Braganca LK, Velasco-Ortega E, Calvo-Guirado JL. Evaluation of dimensional behavior of peri-implant tissues in implants immediately exposed or submerged in fresh extraction and healed sites: a histological study in dogs. Int J Implant Dent 2018;4:5.
24. Martinez-Gonzalez JM, Martin-Ares M, Martinez-Rodriguez N, Barona-Dorado C, Sanz-Alonso J, Cortes-Breton-Brinkmann J, et al. Comparison of peri-implant soft tissues in submerged versus transmucosal healing: A split mouth prospective immunohistochemical study. Arch Oral Biol 2018;90:61-6.
25. Moustafa Ali RM, Alqutaibi AY, El-Din Gomaa AS, Abdallah MF. Effect of Submerged vs Nonsubmerged Implant Placement Protocols on Implant Failure and Marginal Bone Loss: A Systematic Review and Meta-Analysis. Int J Prosthodont 2018;31:15-22.
26. Troiano G, Lo Russo L, Canullo L, Ciavarella D, Lo Muzio L, Laino L. Early and late implant failure of submerged versus non-submerged implant healing: A systematic review, meta-analysis and trial sequential analysis. J Clin Periodontol 2018;45:613-23.
27. Wu S, Wu X, Shrestha R, Lin J, Feng Z, Liu Y, et al. Clinical and Radiologic Outcomes of Submerged and Nonsubmerged Bone-Level Implants with Internal Hexagonal Connections in Immediate Implantation: A 5-Year Retrospective Study. J Prosthodont 2018;27:101-7.
28. Yılmaz E, Bulut E. 2018. One- or two-stage implant surgery preferences of dentists. https://forms.gle/XGVv6n1jgbtPQZdo7.
29. Soylu E, Gonen ZB, Alkan A. A New Detection Method for Submerged Implants: Oral Tattoo. J Prosthodont 2018;27:361-3.
30. Andersson L, Kahnberg KE, Pogrel MA. Oral and Maxillofacial Surgery 1st ed. Chichester: Wiler Blackwell; 2010.
31. Perez-Albacete Martinez C, Vlahovic Z, Scepanovic M, Videnovic G, Barone A, Calvo-Guirado JL. Submerged flapless technique vs. conventional flap approach for implant placement: experimental domestic pig study with 12-month follow-up. Clin Oral Implants Res 2016;27:964-8.
32. Vlahovic Z, Mihailovic B, Lazic Z, Golubovic M. Comparative radiographic and resonance frequency analyses of the peri-implant tissue after dental implants placement using flap and flapless techniques: an experimental study on domestic pigs. Vojnosanit Pregl 2013;70:586-94.

33. Vohra F, Al-Kheraif AA, Almas K, Javed F. Comparison of crestal bone loss around dental implants placed in healed sites using flapped and flapless techniques: a systematic review. J Periodontol 2015;86:185-91.
34. Gehrke SA, Perez-Albacete Martinez C, Piattelli A, Shibli JA, Markovic A, Calvo Guirado JL. The influence of three different apical implant designs at stability and osseointegration process: experimental study in rabbits. Clin Oral Implants Res 2017;28:355-61.
35. McDannold N, Fossheim SL, Rasmussen H, Martin H, Vykhodtseva N, Hynynen K. Heat-activated liposomal MR contrast agent: initial in vivo results in rabbit liver and kidney. Radiology 2004;230:743-52.
36. Okolie NP, Osagie AU. Liver and kidney lesions and associated enzyme changes induced in rabbits by chronic cyanide exposure. Food Chem Toxicol 1999;37:745-50.
37. Voss KA, Riley RT, Norred WP, Bacon CW, Meredith FI, Howard PC, et al. An overview of rodent toxicities: liver and kidney effects of fumonisins and Fusarium moniliforme. Environ Health Perspect 2001;109 Suppl 2:259-66.
38. Al-Hashem F. Camel's milk protects against aluminum chloride-induced toxicity in the liver and kidney of white albino rats. Am. J. Biochem. & Biotech. 2009;5(3):98-108.
39. Thomson P. Oral Precancer 1st ed. Chichester: Wiler Blackwell; 2012.
40. Culjat MO, Choi M, Singh RS, Grundfest WS, Brown ER, White SN. Ultrasound detection of submerged dental implants through soft tissue in a porcine model. J Prosthet Dent 2008;99:218-24..

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 696-710**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1352841

Evaluation of Department Preferences of Faculty of Medicine Assistants: The Case of Ordu

Bestegül Çoruh Akyol[1](ID) Yeliz Kaşko Arıcı[2](ID)

[1]Ordu University, Faculty of Medicine, Family Medicine Department, Ordu, Turkey
[2]Ordu University, Faculty of Medicine, Biostatistics and Medical Informatics Department, Ordu, Turkey

Received: 30 August 2023, Accepted: 8 October 2023, Published online: 29 October 2023

Abstract

Objective: Professions are tools for individuals to realize their expectations and wishes about life according to their own dynamics, and medicine differs from other professions in that it essentially includes human life. This study aimed to examine the department preferences of Medical Faculty Assistants and to determine the factors affecting these preferences.

Methods: The sample for the study was made up of 105 assistants who agreed to participate voluntarily. The study utilized a survey as a data collection tool that contains the demographic variables and the "Physicians' Preference Tendencies of Specialty Branch Scale".

Results: Although gender, marital status and the time spent in the profession changed the answers given to the survey questions, it was determined that the general practitioners were not effective factors in the choice of specialty branch, and the significant change occurred depending on the age factor. The preference of branch due to the importance given to status showed a significant change in those aged 30 and over.

Conclusion: Those who are older make their choices by considering the position and prestige of the physician both in the working environment and in society. The age of a general practitioner has been determined as the most effective factor when choosing a specialty department due to the concerns that can be gathered under the title of status.

Keywords: Specialization in medicine, career choice, branch preference

Suggested Citation: Çoruh Akyol B, Kaşko Arıcı Y. Evaluation of Department Preferences of Faculty of Medicine Assistants: The Case of Ordu. Mid Blac Sea Journal of Health Sci, 2023;9(4):696-710

Address for correspondence/reprints: **E-mail:** bestegulcoruh@yahoo.com

Bestegül Çoruh Akyol

Telephone number: +90 (532) 584 99 38

INTRODUCTION

The preferences for specialty education both affect and are affected by the educational and living conditions of asistant physicians. Physicians who graduate with the title of "medical doctor" after 12 semesters of medical education in our country have the right to choose according to the score they get in the Medical Specialization Exam – Tıpta Uzmanlık Sınavı (TUS), which is held twice a year, if they aim to specialize in any field under the conditions of our country. According to the results of this exam, the "Assistant Physician" who completes the minimum assistantship training period of the relevant department in the branches in which (s) he is placed is entitled to use the title of "Specialist Doctor" after the Specialist Thesis (s) he will defend and the Specialist Exam (s)he will take. In our country, there are not only these two titles after graduation, but also the title of "Minor Specialist" in many branches, and within this title, the specialist physician is subjected to examination before and after. While the total number of physicians working in hospitals affiliated to the Ministry of Health, university hospitals and private hospitals was 171,259 in 2020, it increased by 7.2% to 183,569 in 2021. About 37,017 physicians within the scope of this issue work as "Assistant Physician" (1).

Within the framework of the Health Transformation Project, which was put into practice in Türkiye in 2003, the preferences of physicians began to vary due to factors such as the full-time law numbered 5947 and the increase in malpractice lawsuits and penalties (2). In a study conducted among medical faculty assistants, 85.4% (n=1381) thought that the health policies implemented in Türkiye were effective in choosing a specialty career, while 14.6% (n=236) thought that they were not effective; It was found that 72.4% (n=1170) think that violence in health is effective in choosing a specialty career, and 27.6% (n=447) think that it is not effective (3). In addition to the individuality of living conditions, the workload intensity and the variability of the dynamic processes within the branches themselves can cause significant anxiety in physicians. It is seen that this state of anxiety also affects the preferences according to the available resources. There are many studies showing that women in many countries prefer female obstetricians (4,5,6).

As in the whole world, the effect of developing technology and changing cultural structures is experienced in our country. When we look at the health sector in particular, the fact that the changing expectations of service delivery today have serious differences between the parties is added to the part of the reasons that the physician should think about the field to be chosen during the decision to be made by the physician. Job satisfaction levels among employees are becoming more and more

important (7). In cases where this level is below what it should be, the quality of the service provided may also decrease (8). The opposite of this proposal is also possible (9). Job satisfaction is affected by multifactorial reasons. According to the "Job Characteristics Theory" defined by Hackman and Oldham; Job satisfaction can be mentioned with the combination of skill variety, task integrity, task importance, autonomy and feedback scales (10).

In many studies, it is thought that asking medical school assistants' opinions about medical education, evaluating their satisfaction, and conducting surveys in this area to freely express their thoughts about specialty education will increase the quality of medical education and professional satisfaction, and the results obtained in this respect are also shared (11, 12). In the study of Yıldırım and Marakoğlu, 62.6% (n = 114) of the participants chose internal sciences, 34.1% (n = 62) surgical sciences, and 3.3% (n = 6) basic sciences as their field of specialization in medicine. When the departments desired by the participants as a result of TUS were compared according to their gender, it was determined that girls wanted internal sciences more than boys, and boys wanted surgical sciences and basic sciences more than girls, statistically significantly (p=0.001) (11).

Recently, the "feminization of medicine" has attracted attention in many regions. Especially in departments such as pediatrics, obstetrics and gynecology, dermatology, psychiatry (13).

There are studies in the literature examining the factors affecting the choice of specialty in medicine after graduation (14,15,16,17). In a study, the motivations that affect assistants to choose to be experts in the field they think about after graduation are respectively; interest, love and thinking that it is appropriate (45.2%; n=81), being a comfortable department (20.1%; n=36), professional satisfaction (14.0%; n=25), academic career thinking (11.7%; n=21) and financial gain (2.2%; n=4). It is known that the TUS scores of such departments have decreased significantly over the years due to the fact that departments with more difficult working conditions such as malpractice anxiety and frequent seizures, especially surgical sciences, are less preferred (18).

In the study conducted on senior assistants of Akdeniz University Faculty of Medicine, the first among the factors affecting the choice of specialization was their own interests (80.3%), while TUS scores (72.1%) were found to be the second most common reason (19). Professions are a tool for individuals to realize their expectations and wishes for life according to their own dynamics. The profession of medicine differs from other professions in that it contains human life in its essence. The dynamics experienced in the field of health in our country in recent years are more than ever. It is seen that preferences have changed in many

areas, especially in parallel with the changing world order and education system with the pandemic. Some statistics also point to radical changes in branch choices. For this reason, in our study, we aimed to reveal the department preferences of the specialty assistants of our province Training and Research Hospital and the factors that may be effective in these preferences.

METHODS

Population and Sampling

The study was approved by Ordu University Clinical Research Ethics Committee (Approval no.: 2023/213). The population of this study consisted of medical doctors working as a specialty in medicine assistants at the Ordu University Training and Research Hospital. No sampling method was used in the study because of aimed to reach the entire population. 105 assistants who volunteered to participate in the study constituted the sample of the study.

Study Design and Data Collection Tools

An online cross-sectional survey was conducted in August 2023 by filling out the online questionnaire prepared via Google Forms. The study utilized a survey as a data collection tool that contains the demographic variables and the "Physicians' Preference Tendencies of Specialty Branch Scale". Demographic data such as age, gender, marital status, and time spent in residency training were recorded. The "Physicians' Preference Tendencies of Specialty Branch Scale" was developed by Nazife Öztürk and consists of 42 items and 7 dimensions (Table 3) (20). Responses to the statements in the scale were structured as a 7-point Likert type, and they were listed as 1: Strongly disagree, 2: Disagree, 3: Somewhat disagree, 4: Neither agree nor disagree, 5: Agree a little, 6: Agree, 7: Strongly agree.

Statistical Analysis

Descriptive statistics were calculated as mean, standard deviation and mean rank values for continuous data, and frequency (n) and percentage (%) for categorical variables. The Mann-Whitney U test was used to compare subscale scores in groups of independent variables. For statistical significance, p-values ≤ 0.050 at the 95% Confidence interval were considered significant. IBM SPSS v28 (Chicago, IL, USA) was used for data analysis.

RESULTS

A total of 105 specialty in medicine assistants, 57.1% male and 42.9% female, participated in the study. 1.9% of the assistants were continuing their specialization education in the Department of Basic Medical Sciences, 82.9% in the Department of Internal Medicine Sciences, and 15.2% in the Department of Surgical Medical Sciences. While 51.4% of the assistants were in the 24-29 age range, 48.6% of them were 30 years or older, and the mean age was 30.57±4.57(24-44) years (Table 1).

Table 2 shows the responses of the assistants to the "What are the first 3 branches you want

to choose as a result of medical specialty exam question. When the answers were examined, it was seen that the most preferred departments in the first preferences of the assistants were Family Medicine (25.7%), Dermatology (9.5%), and Emergency Medicine (8.6%), respectively. Family Medicine was the most preferred department in the 2nd and 3rd preferences (7.6% and 9.6%).

Table 3 shows the frequency distribution of the answers to "Physicians' Preference Tendencies of Specialty Branch Scale". It is noteworthy that in most of the scale items, the participants tended towards positive statements such as "Agree a little", "Agree" and "Strongly agree". This is particularly evident in the "risk" subscale.

The subscale scores of the Physicians' Preference Tendencies of Specialty Branch Scale were compared according to the demographic characteristics (Table 4-7).

It was tested whether the subscales of the scale changed according to gender (Table 4). The subscales scores did not differ statistically significantly between men and women ($p>0.05$).

Table 1. Basic characteristics of the participants

		n	%
Gender	Male	60	57.1
	Female	45	42.9
Married Status	Single	43	41.0
	Married	62	59.0
Time spent in residency training (year)	≤1	39	37.1
	>1	66	62.9
Age group	24-29	54	51.4
	≥30	51	48.6
Department	Basic Medical Sciences	2	1.9
	Internal Medicine Sciences	87	82.9
	Surgical Medical Sciences	16	15.2

It was tested whether the subscales of the scale changed according to age groups (Table 5). The "Status subscale" scores did differ statistically significantly by age groups ($p=0.027$). Assistants aged ≥30 years gave more positive answers to questions in this subscale ("*Since I think that specialist physicians look at general practitioners negatively, I will choose a branch*", "*I will choose a branch because I think being a specialist is prestigious.*", "*I prefer a branch to go to the compulsory service later.*", "*I will choose a branch because of the social pressure on physicians.*" And "*I will choose a branch because I do not want to stay as a general practitioner.*") than those aged 24-29 years.

Table 2. Responses of the participants to the "What are the first 3 branches you want to choose as a result of medical specialty exam question

Department	1. Preference		2. Preference		3. Preference	
	n	%	n	%	n	%
Unanswered	1	1.0	22	21.0	34	32.4
Emergency Medicine	9	8.6	6	5.7	3	2.9
Forensic Medicine	2	1.9	2	1.9	0	0.0
Family Medicine	27	25.7	8	7.6	10	9.6
Anesthesia	6	5.7	5	4.8	2	1.9
Brain Nerve Surgery	1	1.0	1	1.0	2	1.9
Biochemistry	7	6.7	2	1.9	1	1.0
Child Psychiatry	2	1.9	3	2.9	1	1.0
Internal medicine	1	1.0	4	3.8	3	2.9
Dermatology	10	9.5	5	4.8	6	5.7
Infectious Diseases	4	3.8	4	3.8	3	2.9
Physiology	0	0.0	0	0.0	2	1.9
Physical Therapy Rehabilitation	3	2.9	7	6.7	4	3.8
Interventional radiology	1	1.0	0	0.0	0	0.0
General Surgery	0	0.0	1	1.0	0	0.0
Genetic	0	0.0	1	1.0	1	1.0
Eye diseases	2	1.9	4	3.8	2	1.9
Chest Diseases	0	0.0	2	1.9	4	3.8
Public Health	0	0.0	3	2.9	2	1.9
Histology	0	0.0	0	0.0	1	1.0
Obstetrics	0	0.0	3	2.9	2	2.0
Cardiology	2	1.9	2	1.9	1	1.0
ENT*	1	1.0	1	1.0	5	4.8
Cardio Vascular Surgery	1	1.0	0	0.0	0	0.0
Microbiology	1	1.0	4	3.8	1	1.0
Neurology	1	1.0	0	0.0	1	1.0
Orthopedics	4	3.8	1	1.0	1	1.0
Pathology	2	1.9	0	0.0	1	1.0
Pediatrics	1	1.0	1	1.0	3	2.9
Plastic surgery	2	1.9	4	3.8	0	0.0
Psychiatry	7	6.7	3	2.9	4	3.8
Radiation oncology	0	0.0	0	0.0	1	1.0
Radiology	4	3.8	4	3.8	2	1.9
Sports Medicine	1	1.0	0	0.0	0	0.0
Urology	2	1.9	2	1.9	2	1.9

*ENT: Ear Nose Throat

Table 3. Frequency distribution of "Physicians' Preference Tendencies of Specialty Branch Scale"

Subscale	Items	1		2		3		4		5		6		7	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Risk	I prefer branches with fewer seizures.	9	8.6	6	5.7	5	4.8	11	10.5	15	14.3	22	21.0	37	35.2
	I prefer branches with a low probability of encountering difficult patients.	12	11.4	15	14.3	6	5.7	13	12.4	11	10.5	19	18.1	29	27.6
	I prefer branches where the probability of encountering an administrative investigation due to the treatment or procedure applied to the patient is low.	4	3.8	7	6.7	7	6.7	13	12.4	20	19.0	19	18.1	35	33.3
	I prefer branches with low risk of malpractice in patients.	3	2.9	4	3.8	6	5.7	17	16.2	14	13.3	19	18.1	42	40.0
	I prefer branches where I will not be exposed to hostile attitudes from patients.	8	7.6	2	1.9	2	1.9	7	6.7	6	5.7	17	16.2	63	60.0

	I prefer branches where the possibility of paying compensation for the treatment or procedure applied to the patient is low.	4	3.8	7	6.7	9	8.6	7	6.7	13	12.4	24	22.9	41	39.0
	I prefer branches where the probability of being judged due to the treatment or procedure applied to the patient is low.	4	3.8	7	6.7	6	5.7	7	6.7	15	14.3	26	24.8	40	38.1
	I prefer branches that do not have emergency services.	13	12.4	7	6.7	9	8.6	6	5.7	11	10.5	22	21.0	37	35.2
	I prefer branches with low risk of complications in patients.	7	6.7	1	1.0	10	9.5	15	14.3	9	8.6	19	18.1	44	41.9
	I prefer branches with a low mortality rate in their patients.	10	9.5	10	9.5	8	7.6	12	11.4	11	10.5	22	21.0	32	30.5
	I prefer branches where I am less likely to be verbally insulted.	10	9.5	1	1.0	6	5.7	10	9.5	6	5.7	18	17.1	54	51.4
	I prefer branches where I am less likely to make mistakes.	2	1.9	6	5.7	7	6.7	18	17.1	8	7.6	26	24.8	38	36.2
Comfort	If I get a high score in the TUS exam, I prefer comfortable branches.	8	7.6	6	5.7	2	1.9	10	9.5	12	11.4	15	14.3	52	49.5
	In order to increase the performance score, I prefer branches in which I will not exert much effort.	11	10.5	6	5.7	8	7.6	21	20.0	20	19.0	17	16.2	22	21.0
	Today, as a result of the TUS exam, I choose the branches most preferred by the physicians.	19	18.1	9	8.6	7	6.7	21	20.0	19	18.1	12	11.4	18	17.1
	I prefer branches with a light workload.	8	7.6	11	10.5	7	6.7	10	9.5	15	14.3	22	21.0	32	30.5
	I prefer branches with comfortable assistantship training.	5	4.8	11	10.5	6	5.7	12	11.4	10	9.5	17	16.2	44	41.9
	I prefer branches where I do not need to develop a dialogue with the patient.	15	14.3	9	8.6	17	16.2	15	14.3	17	16.2	15	14.3	17	16.2
	I prefer branches where the performance score is fixed every month.	15	14.3	18	17.1	9	8.6	33	31.4	15	14.3	10	9.5	5	4.8
Health problems	I prefer branches that do not require much physical strength.	4	3.8	13	12.4	7	6.7	11	10.5	15	14.3	28	26.7	27	25.7
	I prefer branches that do not require me to run all the time.	10	9.5	12	11.4	11	10.5	15	14.3	18	17.1	18	17.1	21	20.0
	I prefer branches that do not require me to stand for a long time.	6	5.7	11	10.5	5	4.8	13	12.4	17	16.2	22	21.0	31	29.5
	I prefer branches where I will be less physically tired.	4	3.8	6	5.7	7	6.7	10	9.5	23	21.9	25	23.8	30	28.6
Status	Since I think that specialist physicians look at general practitioners negatively, I will choose a branch.	21	20.0	16	15.2	9	8.6	17	16.2	16	15.2	13	12.4	13	12.4
	I will choose a branch because I think being a specialist is prestigious.	10	9.5	8	7.6	11	10.5	20	19.0	17	16.2	23	21.9	16	15.2
	I prefer a branch to go to the compulsory service later.	38	36.2	20	19.0	10	9.5	22	21.0	6	5.7	2	1.9	7	6.7
	I will choose a branch because of the social pressure on physicians.	21	20.0	10	9.5	13	12.4	15	14.3	18	17.1	17	16.2	11	10.5
	I will choose a branch because I do not want to stay as a general practitioner	15	14.3	10	9.5	6	5.7	18	17.1	18	17.1	14	13.3	24	22.9
Emotional Involvement	I prefer branches that have the opportunity to do research.	12	11.4	4	3.8	8	7.6	25	23.8	22	21.0	17	16.2	17	16.2
	I prefer branches that require my lifelong reading and research.	15	14.3	12	11.4	12	11.4	28	26.7	22	21.0	7	6.7	9	8.6
	I prefer branches that suit my personal abilities.	0	0.0	0	0.0	1	1.0	10	9.5	23	21.9	30	28.6	41	39.0
	I always prefer branches that are in my ideal.	10	9.5	6	5.7	8	7.6	25	23.8	16	15.2	11	10.5	29	27.6

	I prefer branches that I think will work with high-level technology in the future.	15	14.3	9	8.6	7	6.7	36	34.3	19	18.1	9	8.6	10	9.5
	I prefer the branches of my professors that I was influenced by during my medical education.	18	17.1	13	12.4	11	10.5	18	17.1	19	18.1	17	16.2	9	8.6
	I prefer branches that suit my personality.	2	1.9	0	0.0	1	1.0	7	6.7	14	13.3	22	21.0	59	56.2
Earning	I prefer branches with high performance gain.	11	10.5	11	10.5	10	9.5	22	21.0	24	22.9	12	11.4	15	14.3
	I prefer branches with high performance scores.	12	11.4	10	9.5	13	12.4	21	20.0	22	21.0	12	11.4	15	14.3
	I prefer branches where I will earn more.	7	6.7	6	5.7	5	4.8	19	18.1	29	27.6	21	20.0	18	17.1
Gender and Marital Status	Gender is effective in choosing the branch of physicians.	9	8.6	4	3.8	5	4.8	9	8.6	40	38.1	26	24.8	12	11.4
	Male physicians tend to choose surgical branches.	9	8.6	7	6.7	6	5.7	16	15.2	39	37.1	20	19.0	8	7.6
	The number of shifts is important in the branch preference of female physicians.	7	6.7	6	5.7	6	5.7	10	9.5	23	21.9	31	29.5	22	21.0
	It is important that spouses are guided by the choice of branch of married physicians.	7	6.7	5	4.8	4	3.8	19	18.1	31	29.5	27	25.7	12	11.4

1: Strongly disagree, 2: Disagree, 3: somewhat disagree, 4: Neither agree nor disagree, 5: Agree a little, 6: Agree, 7: Strongly agree

Table 4. Comparison of subscales of "Physicians' Preference Tendencies of Specialty Branch Scale" by gender

Subscale	Female				Male				p[a]
	n	Mean	SD	Mean Rank	n	Mean	SD	Mean Rank	
Risk	45	5.36	1.46	54.38	60	5.25	1.47	51.97	0.687
Comfort	45	4.62	1.38	52.27	60	4.62	1.37	53.55	0.831
Health problems	45	5.14	1.59	57.01	60	4.81	1.57	49.99	0.241
Status	45	3.72	1.50	48.98	60	3.99	1.40	56.02	0.241
Emotional Involvement	45	4.68	1.05	51.18	60	4.75	0.96	54.37	0.595
Earning	45	4.53	1.43	54.76	60	4.36	1.77	51.68	0.607
Gender and Marital Status	45	4.61	1.49	50.62	60	4.97	1.03	54.78	0.486

[a]: Mann-Whitney U test

Table 5. Comparison of subscales of "Physicians' Preference Tendencies of Specialty Branch Scale" by age groups

Subscale	24-29year				≥30year				p[a]
	n	Mean	SD	Mean Rank	n	Mean	SD	Mean Rank	
Risk	54	5.26	1.43	51.85	51	5.34	1.50	54.22	0.690
Comfort	54	4.62	1.27	51.91	51	4.62	1.47	54.16	0.705
Health problems	54	4.92	1.62	52.43	51	4.99	1.55	53.61	0.842
Status	54	3.63	1.42	46.60	51	4.14	1.44	59.77	**0.027**
Emotional Involvement	54	4.75	1.07	54.09	51	4.69	.92	51.84	0.705
Earning	54	4.52	1.49	54.11	51	4.34	1.78	51.82	0.699
Gender and Marital Status	54	4.74	1.30	50.74	51	4.89	1.21	55.39	0.432

[a]: Mann-Whitney U test

It was tested whether the subscales of the scale changed according to married status

(Table 6). The subscales scores did not differ statistically significantly between single and married (p>0.05).

It was tested whether the subscales of the scale changed according to time spent in residency training (Table 7). The subscales scores did not differ statistically significantly ≤1year and >1year (p>0.05).

Table 6. Comparison of subscales of "Physicians' Preference Tendencies of Specialty Branch Scale" by married status

Subscale	Single				Married				p[a]
	n	Mean	SD	Mean Rank	n	Mean	SD	Mean Rank	
Risk	43	5.24	1.34	50.57	62	5.34	1.54	54.69	0.495
Comfort	43	4.71	1.09	52.93	62	4.56	1.53	53.05	0.984
Health problems	43	4.74	1.60	48.71	62	5.10	1.56	55.98	0.228
Status	43	3.89	1.32	52.49	62	3.86	1.54	53.35	0.886
Emotional Involvement	43	4.69	1.05	51.24	62	4.74	0.96	54.22	0.622
Earning	43	4.72	1.40	57.58	62	4.24	1.76	49.82	0.197
Gender and Marital Status	43	4.87	1.11	53.48	62	4.77	1.35	52.67	0.893

[a]: Mann-Whitney U test

Table 7. Comparison of subscales of "Physicians' Preference Tendencies of Specialty Branch Scale" by time spent in residency training (year)

Subscale	≤1year				>1year				p[a]
	n	Mean	SD	Mean Rank	n	Mean	SD	Mean Rank	
Risk	39	5.40	1.26	54.15	66	5.24	1.57	52.32	0.765
Comfort	39	4.89	1.17	58.47	66	4.46	1.45	49.77	0.156
Health problems	39	5.17	1.46	56.42	66	4.82	1.64	50.98	0.374
Status	39	4.09	1.36	57.15	66	3.75	1.49	50.55	0.282
Emotional Involvement	39	4.64	1.12	50.87	66	4.77	.92	54.26	0.582
Earning	39	4.41	1.57	53.12	66	4.45	1.68	52.93	0.976
Gender and Marital Status	39	4.92	1.16	55.69	66	4.75	1.31	51.41	0.484

[a]: Mann-Whitney U test

DISCUSSION

It has been determined that there are not enough Family Medicine Specialists in the Family Medicine Practice process, which started with the pilot application in 2010 in our country. As a result, the increase in both family medicine clinics and "Assistant Physician" quotas has become inevitable (2,21,22). As we stated in Table 2, Family Medicine was the department that took the most place among those who answered the questions of the first 3 branches that they wanted to choose among the participants in our study. This was followed by Dermatology and Psychiatry in the 1st

preferences, Physical Therapy and Rehabilitation and Emergency Medicine in the 2nd preferences, and Dermatology and Ear, Nose, Throat (ENT) departments in the 3rd preferences. Although the number of positions opened in any of the available resources is not included in the reasons for choosing the department, the factors affecting the choice of specialization in the study of Göktaş Dörtyol et al., is stated as the intensity of working hours (57.9%), financial return (51.9%) and malpractice risk (42.6%) (19).

In Hungary, the most important factor in the professional career has been identified as high income (23). It has been observed that general practice in England has a positive effect on medical graduates due to working conditions and hours (24).

Bowman and Halasy's research among medical school assistants resulted in Family Medicine, Emergency Medicine and Anesthesia (25). In another study in which 137 medical faculty assistants participated, ENT (27.7%), Ophthalmology (23.3%), Internal Medicine (20.5%) and Cardiology (20.4%) were the four most ideal branches. The least preferable department. General Surgery (43.0%). This was followed by Physical Therapy and Rehabilitation (26.3%) and Internal Medicine departments (24.9%) (26). Özveren listed the branches preferred by medical residents as 68% cardiology, 37.9% plastic, reconstructive and aesthetic surgery and 24.6% ophthalmology. The undesirable branches in the medical specialty exam are general surgery with 62.3%, neurosurgery with 25.3% and gynecology and obstetrics with 23.7% (27). There are similarities and differences between the results of our study and the literature. In both cases, it may be due to differences in the number of participants and varying working conditions according to the regions and regions where the studies were designed.

According to the Branch Preference Tendency Scale of the physicians we used in our study, there are subscales of the risk status attributed to the individual, the comfort of the branch in question, the health problems that may be encountered, the status differences that may be experienced due to the branch, the relationship of the branch with the personal mood, financial gain, gender and marital status. 57.1% male and 42.9% female, participated in the study. And a very high rate of training was received in internal branches (82.9%) As stated in Table 4, the subscale scores of the physicians did not differ according to gender (19). In a study evaluating the lecturers working in the Department of Obstetrics and Gynecology in our country, 42.62% of all employees were found to be women. Accordingly, it has been determined that the gender of the head of the department is female, which significantly increases the female dominance in the cadres (28). In the study in question, this difference

may have been detected in the relevant branch compared to other branches due to sociocultural reasons. In the study of Yılmaz et al., 49.2% female and 50.8% male assistant physicians were identified. More than half of them (54.5%) were working in internal medicine (29). In another study, it was concluded that male physicians preferred to specialize in surgery and female physicians preferred to specialize in internal medicine and basic medical sciences (30). In a study involving 368 people in Japan and examining gender differences in specialty preference, 227 of the participants were male. In the same study, women preferred internal medicine more than men, except for obstetrics and gynecology (31). In the study conducted in Saudi Arabia, it was determined that not only the decisions of individuals but also their social environment are effective in making branch selections according to gender (32). There are similarities between studies at the national level and differences at the international level. This may be due to the differences in sociocultural structures.

Medical assistants ' preferences have evolved over time with quality of life or technological advances (33). The first two factors affecting the choice of specialization in Budapest are; while it is material gain and social status (34); Göktaş Dörtyol et al., concluded that specialization should be done for the reasons of professional satisfaction, career opportunity, economic comfort and status, similar to the reasons for preferring the medical faculty (19). In the study conducted in Denizli, "professional satisfaction" with 71.5% among the reasons for the desire to become a specialist physician resulted in "better materiality" with 52.2% (35). Açıkgöz and colleagues declared the reasons for assistants ' specialization goals as professional satisfaction, status opportunity and economic reasons (36). Takeda et al also reported that the choice of specialty will be affected by factors such as the characteristics and feasibility of the healthcare system or the reimbursement policies of the authorities (37). In the meta-analysis of Querdio et al., they divided the factors affecting the choice of specialty into 5 groups. Decisions made according to this classification are based on the education received at the faculty (e.g. curriculum structure), the characteristics of the assistants, the assistants ' values (personal preferences), the characteristics they need to be satisfied (e.g. income, status, work life balance), the perception of their areas of specialization (e.g. extracurricular or internal experiences) are affected (38). In our study, there was a significant relationship only between the specialization status and age according to the subscales of the scale we used, but no significant correlation was found between the variables categorized with the other subgroups. In another study, it has been determined that the most common factors affecting the reasons for choosing the Histology

and Embryology branch of the physicians participating are those such as ‘setting aside time for oneself’, ‘number/ intensity of shifts’, ‘patient intensity’, ‘number of standby duty’ and ‘probability of exposure to violence’ (39). These differences between studies may be due to differences in study populations and designs.

Study Limitations

The study limitations include the use of a specific group in the community and a moderate sample size.

CONCLUSION

Due to multi-factorial changes, preferences for specialization areas change in processes that can be considered dynamic all over the world. Accessible national data is not yet fully sufficient, and there is a need for studies that are inclusive of the whole country and all areas of expertise. On a biopsychosocial basis, it is clear that everyone's dynamic is to work comfortably and harmoniously with teammates, without forcing the person. Based on the knowledge that preferences changed even faster after the pandemic that affected the whole world, we examined the specialty assistants in Ordu in our study. Gender, marital status, age and time spent in residency slightly changed the answers given to the survey questions, but a significant change occurred depending on the age factor. Those who are older make their choices by considering the position and prestige of the physician both in the working environment and in the society. As a result, the age of a general practitioner appears to be an effective factor when choosing a specialty branch due to the concerns that can be gathered under the title of status.

Ethics Committee: Ethics committee approval for this study Ordu University Received from the Clinical Research Ethics Committee of the University Clinical Research Ethics Committee (Ethics committee date and no: 18.08.2023, 213)

Author Contributions: Concept: BÇA, YKA, Design: BÇA, YKA, Data Collection and Processing: BÇA, YKA, Analysis and Interpretation: BÇA, YKA, Writing: BÇA, YKA,

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. Health Statistics Yearbook 2021 Newsletter, T.R. Ministry of Health General Directorate of Health Information Systems: 2022. s.7-8.
2. Kaya A, Aktürk Z, Çayır Y, Taştan K. Medical Specialization Exams Between 2007 and 2013: A Trend Analysis. Ankara Med J. 2014; 14(2): 53-58
3. İbze S. Factors Affecting the Determination of Emergency Medicine Specialization as a Career Choice by Akdeniz University

Faculty of Medicine Students. Antalya: Akdeniz University Faculty of Medicine, Department of Emergency Medicine.2019.

4. Rızk D E E, El-Zubeir M A, Al-Dhaheri A M, Al-Mansouri F R, Al-Jenaibi H S Determinants of women's choice of their obstetrician and gynecologist provider in the UAE Acta Obstet Gynecol Scand 2005; 84: 48-53.
5. Howell E A, Gardiner B, Concato J. Do women prefer female obstetricians? Obstet Gynecol 2002; 99: 1031– 1035.
6. Chandler PJ, Chandler C, Dabbs ML. Provider gender preference in obstetrics and gynecology: a military population. Mil Med 2000; 165: 938–940.
7. Demiral Y, Akvardar Y, Ergör A. The effect of job satisfaction on anxiety and depression levels in physicians working in a university hospital. Journal of DEU Faculty of Medicine 2006; 20:157-64.Freeborn D K. Satisfaction, commitment and physiological well-being among HMO physicians. West J Med 2001; 174:13-18.
8. Freeborn D K. Satisfaction, commitment and physiological well-being among HMO physicians. West J Med 2001; 174:13-18.
9. Cedfeldt A S, Bower E A, English C, Grady-Weliky T A, Girard D E, Choi D. Personal time off and residents' career satisfaction, attitudes and emotions. Med Educ 2010; 44:977–84.
10. Grant A M, Shin J. Work motivation: Directing, energizing, and maintaining effort (and research). In: Ryan MN, editor. Oxford Handbook of Motivation. Oxford: Oxford University Press,2011:13.Availableat: http://www.management.wharton.upenn.edu/grant/GrantShinMotivationHandbook2011.pdf. Accessed August 12,2023.)
11. Yıldırım D İ, Marakoğlu K. Determination of medical school interns' thoughts about medical education and medical specialty exam and their branch preferences. Genel Tıp Derg 2019; 29(4):183-189.
12. Karaoğlu L, Karaoğlu L, Şahin T, Eğri M, Pehlivan E, Genç F, Güneş G. Occupational satisfaction level of physicians working as research assistants at İnönü University Turgut Özal Medical Center. Bulletin of Community Medicine 2006; 25:7-14.
13. Bedoya-Vaca R, Derose K P, Romero-Sandoval N. Gender and physician specialization and practice settings in Ecuador: a qualitative study. BMC health services research. 2016; 16: 1-12.
14. Tengiz F İ, Babaoğlu A B. Career preferences of senior medical students and factors affecting these preferences. SDU Medical Faculty Journal 2020:27(1):67-78.
15. Hamid S, Inam SHA, Jamil H, Zeb R. Speciality preference with respect to gender among medical students of Pakistan. J Pak Med Assoc Journal 2019:8:1190-1193.

16. Querido S, Broek S, Rond M, Wigersma L, Cate O. Factors affecting senior medical students‟ career choice. Int J Med Educ 2018; 9: 332-339.
17. Cansever IH, Metin A, Kişi M. Systematic review on the factors affecting medical students' medical specialty preferences. Opus International Journal of Community Research 2020;13(7):792-812.
18. Çıtıl R, Keten M. Specializıation Preferences and Professional Anxiety Levels of Medical Faculty Students Gaziosmanpaşa Üniversitesi Tıp Fakültesi Dergisi 2021;13(3): 171-192.
19. Göktaş Dörtyol B. Future thoughts and career choices of last year of medical faculty students and affecting factors. Tip Egitimi Dunyasi, 2017, 16: 12-21.
20. Öztürk N, A Research on the Factors Affecting the Preference of Medical Specialization Branches. Isparta: T.C. Süleyman Demirel University Institute of Social Sciences Department of Health Management. 2019.
21. Tekin O, Üstü Y, Uğurlu M: Field Training in Family Medicine Specialization Education. Ankara Medical Journal 2012;12(1):16-21.
22. Set T, Aktürk Z: Family Medicine Specialty Training Positions in Turkey between 2001-2010: Relative Increase but Far from Adequate. Journal of Health Pulse 2010;26:42-45.
23. Girasek E, Molnár R, Eke E, Szócska M. The medical career choice motivations—Results from a Hungarian study. Open Medicine, 2011; 6(4), 502-509.
24. Goldacre, M J, Laxton L, Harrison E M, Richards J M, Lambert T W, Parks R W. Early career choices and successful career progression in surgery in the UK: prospective cohort studies. BMC surgery. 2010; 10:1-11.
25. Bowman R, Halasy M. Preventing rural workforce by design. Rural & Remote Health 2014;14.
26. Emül M, Dalkıran M, Uzunoğlu S, Tosun M, Duran A, Yavuz R, et al. Attitudes of students preparing for the medical specialty exam about psychiatry residency. Thinking Man Journal of Psychiatry and Neurological Sciences 2010;23:223- 9.
27. Özveren C P. The opinions of senior students and newly graduated physicians preparing for the medical specialty exam about the specialty of emergency medicine and the factors affecting their preferences. 2015.
28. Davas Aksan HA, Ergin I, Çiçekoğlu M, Samandağ B. Gender Inequalities at Obstetrics and Gynecology Departments of Turkish Medical Schools Tıp Eğitimi Dünyası Dergisi 2011(32):1-7.
29. Yılmaz N, Alkan A, Ertümer AG, Kuh Z. Evaluation of medical specialties in terms of

gender. Cukurova Medical Journal. 2021;46:1257-66

30. Kalaycıoğlu B D. Changes in physicians' specialty preference from 1987 to 2017. Medical Education World 2020;19:158-71
31. Kawamoto R, Ninomiya D, Kasai Y, Kusunoki T, Ohtsuka N, Kumagi T, Abe M. Gender difference in preference of specialty as a career choice among Japanese medical students. BMC medical education. 2016 Dec 1;16(1):288.
32. Alwazzan L, Rees CE. Women in Medical Education: Views and Experiences From The Kingdom of Saudiarabia. 2016 John Wiley & Sons Ltd and The Association for the Study of Medical Education; Medıcal Education 2016;50:852–865
33. Levaillant M, Levaillant L, Lerolle N, Vallet B, Hamel-Broza J F. Factors influencing medical students' choice of specialization: A gender based systematic review. EClinicalMedicine. 2020; 28.
34. Girasek E. Resident Doctors' Motivation For Sprecialisation Choice And Working İn Rural Areas. PhD Thesis. Budapest, 2012.
35. Ergin A, Dikbaş E, Bozkurt AI, Atçeken G, Gürbüz H, Yılmaz C, et al. Postgraduation Career Choice of Medical Faculty Students and Affecting Factors. World of Medical Education. 2011;32:8-17.
36. Açıkgöz B, Ekemen A, Zorlu I, Yüksel NA, Ayoğlu FN. Specialization tendency in medical students, specialization field selection and affecting factors. Mersin University Journal of Health Sciences. 2019;12:113-25.
37. Takeda, Y., Morio, K., Snell, L. et al. Characteristic profiles among students and junior doctors with specific career preferences. BMC Med Educ. 2013; 125.
38. Querdio S J, Vergouw D, Wigersma L, Batenburg RS, De Rond MEJ, Ten Cate OTJ. Dynamics of Career Choice Among Students in Undergraduate Medical Courses. A BEME Systematic Review: BEME Guide No.33. Medical Teacher:2016,38 (1),18-29.
39. Çetinavcı D, Koçak E N, Yüce S, Elbe H. Evaluation of the Factors Affecting the Selection of Histology and Embryology in the Medical Specialization Examination. Namık Kemal Tip Dergisi, 2022; 10 (4).

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 711-720**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1360495

Analysis of YouTube Videos on Initiating Postpartum Sexual Life

Reyhan Erkaya[1(ID)], Yeliz Kaşko Arıcı[2(ID)]

[1]Karadeniz Technical University, Faculty of Health Sciences, Department of Nursing, Trabzon, Turkey.
[2]Ordu University, Faculty of Medicine, Department of Bioistatistics and Medical Informatics Unit, Ordu-Turkey

Received: 3 April 2023, Accepted: 16 July 2023, Published online: 29 October 2023

Abstract

Objectives: The study aims to provide an evaluation of videos on YouTube regarding the "timing of initiating postpartum sexual intercourse" in terms of their view counts, like ratios, and presenters.

Methods: This is a descriptive research study. The study population consisted of 68 Turkish videos published on YouTube between August 21, 2023, and August 26, 2023, by searching the YouTube page with the keywords "timing of initiating postpartum sexual life." Of these videos, 9 were related to sexual desire/sexual dysfunction, 8 focused on vaginismus/painful sexual intercourse, 4 covered sexual intercourse during pregnancy, 6 discussed sexual intercourse after vaginoplasty, 6 addressed sexual intercourse after hysterectomy/menopause/kidney transplantation, 3 provided methods for revitalizing postpartum sexual life, and 4 contanined advertisements, all of which were excluded from the sample. Finhally, the sample of the study was determined as 28. Frequency and percentage distribution were used in the analysis of the data.

Results: This is a descriptive research study. The study population consisted of 68 Turkish videos published on YouTube between August 21, 2023, and August 26, 2023, by searching the YouTube page with the keywords "timing of initiating postpartum sexual life." Of these videos, 9 were related to sexual desire/sexual dysfunction, 8 focused on vaginismus/painful sexual intercourse, 4 covered sexual intercourse during pregnancy, 6 discussed sexual intercourse after vaginoplasty, 6 addressed sexual intercourse after hysterectomy/menopause/kidney transplantation, 3 provided methods for revitalizing postpartum sexual life, and 4 contanined advertisements, all off which were excluded from the sample. Finhally, the sample of the study was determined as 28. Frequency and percentage distribution were used in the analysis of the data.

Conclusion: Despite the relatively low number of YouTube videos on the subject of the study, the majority of them were presented by healthcare professionals, offering concise, well-received, and relevant content. It can be suggested that there is a need to increase online resources for sexual health education during the postpartum period.

Keywords: Postpartum period, resumption of sexual ıntercourse, online ınformation, YouTube

Suggested Citation: Erkaya R, Kaşko Arıcı Y. Analysis of YouTube Videos on Initiating Postpartum Sexual Life. Mid Blac Sea Journal of Health Sci, 2023;9(4):710-719

Address for correspondence/reprints:

Reyhan Erkaya

Telephone number: +90 (462) 230 04 76 – 8864

E-mail: reyhanerkaya@ktu.edu.tr

INTRODUCTION

Sexuality is a concept that encompasses all aspects of an individual's gender and is influenced by biological, psychological, socio-economic, cultural, ethical, and religious factors (1). Therefore, sexuality can vary at different stages of life, and the postpartum period is one of these stages (2-3). The timing of postpartum sexual intercourse and sexual relations can vary from society to society. The initiation of sexual intercourse during this period is associated with the psychological readiness of the partners and the physical recovery of the woman (1, 5, 6).

According to the 2018 Turkey Demographic and Health Survey (TDHS) data, in Turkey, it is traditionally recommended to abstain from sexual intercourse for 40 days after childbirth, and 77% of women adhere to this rule within the first two months after childbirth. This sexual abstinence period typically lasts for 2.3 months (7). Usually, signs such as the completion of uterine involution, healing of the episiotomy, cessation of lochia (postpartum bleeding), and the woman's return to her previous physiology can indicate the start of sexual intercourse (8). Supporting this, in another study conducted in Turkey, the traditional postpartum sexual abstinence period was observed to be six weeks, or 40 days, after childbirth (9). Other research studies in the literature have shown variations in the time when women return to sexual life during the postpartum period. Studies have indicated that the majority of women return to postpartum sexual life within 6 to 9 weeks (1, 8, 10, 11).

However, sexuality remains a topic that is not easily discussed and is considered taboo in some societies. This situation is influenced by societal, cultural, social factors, and religious beliefs (12).

The postpartum period, in particular, is a time when women experience significant changes in their sexuality, and during these processes, there can be a lack of information. However, women often avoid sharing their sexual problems with healthcare professionals. On the other hand, healthcare professionals may neglect this issue during postpartum check-ups (13). Therefore, women who have given birth and parents turn to various alternative platforms to address their lack of knowledge.

The increasing prominence of digital media platforms indicates that they are an important source of health information, especially for new-generation parents and are frequently used by pregnant women and new parents (14,15).

The Global Digital Report for 2019 reveals that 57% of the world's population, which totals 7.5 billion people, actively uses the internet, and 45% actively use social media platforms (such as Facebook, Instagram, Twitter, Pinterest, YouTube, Tumblr, Snapchat, Linkedin). According to the same report, in a country with a population exceeding 80 million, such as Turkey, 72% of the population uses the internet, and 63% of the population, or 52 million people, actively use social media. According to social media usage statistics in Turkey, YouTube is the most widely used social media platform with a 92% share. Instagram ranks second with 84%, while Facebook follows YouTube with an 83% share (16). Current data shows that 95% of internet users worldwide watch YouTube, and as of 2021, there were 2,240.03 million YouTube users (17).

Among the topics parents most commonly seek information on in digital media are areas that focus on developmental changes, such as postpartum sexual life, newborn care and feeding, postpartum complications, postpartum depression, stress management, personal care and hygiene, nutrition, and pregnancy prevention methods. These areas are among the topics that parents show the most interest on digital platforms and seek to fill their knowledge gaps (18).

This study provides an analysis of Turkish-language videos on YouTube regarding "the timing of postpartum sexual intercourse." It includes the number of views, like rates, video content, and presenters on this widely used social platform.

METHODS

Research Type

The research is a descriptive study aiming to explore YouTube videos on the topic of "the timing of postpartum sexual intercourse."

Location and Time of the Research

Research data was collected by searching the YouTube page with the keywords 'Doğum sonu cinsel yaşama başlama zamanı' (the timing of postpartum sexual intercourse) between August 21, 2023, and August 26, 2023.

Population and Sample of the Research

The population of the research consisted of 68 Turkish videos published on the topic between 2014-2023, as identified by searching the YouTube page with the specified keywords between August 21, 2023, and August 26, 2023. However, videos that did not address postpartum sexual problems, including 9 videos on sexual desire/loss of sexual desire, 8 videos on vaginismus/painful sexual intercourse, 4 videos on sexual intercourse during pregnancy, 6 videos on sexual intercourse after vaginoplasty, 6 videos on sexual intercourse after hysterectomy/menopause/kidney transplant, 3 videos on ways to revive postpartum sexual life, and 4 videos containing advertisements were excluded from the sample. As a result, the sample of the research was determined as 28.

Data Collection Tools

Research data was collected by the researcher and included information such as publication date, video duration, number of views, number of likes, number of comments, video content, presenter, and teaching method. The research involved a detailed analysis of videos in terms of content and format using the document review method, which is one of the qualitative research methods. The data collection process was carried out using a data collection tool designed by the researcher. This tool (publication date, video duration, number of views, number of likes, number of comments, video content, presenter, and teaching method) was used to capture various characteristics of the videos (19, 20).

Statistical analysis

The videos included in the research were individually watched by the researcher, and data were assessed in line with the data collection tool (publication date, video duration, number of views, number of likes, number of comments, video content, presenter, and teaching method) and transferred to the data collection form. The transferred information was evaluated as frequencies and percentages using the Statistical Package for the Social Sciences (SPSS) program version 29.0, where the statistical analysis of the research was performed.

Ethics of the Study

Since the YouTube videos used in the study are publicly accessible on an open platform, access rights are open to everyone, and therefore, ethical committee approval was not required. Furthermore, as the names of the videos and information about the educators were not provided in the research, there were no privacy and ethical issues (21).

Limitations of the Research

This research is limited to the keywords "Doğum sonu cinsel yaşama başlama zamanı" (the timing of postpartum sexual intercourse) and thus has limitations.

RESULTS

YouTube, as one of the largest video sharing platforms on the internet, holds significant importance in today's world. Users can easily access to all kinds of video content on YouTube, regardless of time and place, making it an unlimited platform for health, education, information sharing, and commerce. Taking this into consideration, between August 21, 2023, and August 26, 2023, Turkish videos on the topic of "the timing of postpartum sexual intercourse" were examined for their view counts, likes, video content, and presenters, and the results are presented in Table 1.

In the research, it was found that 57.1% of the videos were published between August 20, 2020 and August 20, 2023. When the duration of the videos related to "postpartum sexual initiation" was examined, it was observed that 60.7% of them were between 1-10 minutes. In

addition, the highest view count of the videos was 67.9% in the range of 1-10,000, while 21.4% had >50,000 views, 7.1% had 10,001-30,000 views, and 3.6% had 30,001-50,000 views. Regarding likes, 39.3% of the videos received the highest number of likes in the range of 1-10, while 32.1% received >100 likes, 10.8% received 51-100 likes, and 7.1% received 11-50 likes. On the other hand, 10.8% of the videos were viewed but received no likes. Concerning comments, 60.7% of the videos related to "postpartum sexual initiation" received no comments, while 32.1% received comments ranging from 1 to 25. It was observed that 92.9% of the instructors providing education in the videos were doctors, while only 7.1% were Family Planning Consultants. Regarding the methods used in the provided education, it was found that 46.4% included Oral + Subtitle Presentation, 39.3% were solely Oral Presentation, and 14.3% were Oral + Subtitle + Visual Presentation (Table 1).

DISCUSSION

YouTube, with its visual content, is one of the most widely used social platforms in daily life, having millions of members. Since everyone can upload videos without going through a detailed review, despite concerns about the reliability of content, patients, healthcare professionals, and ordinary people benefit from these videos (22). Especially in cultures where sexuality is considered taboo and cannot be openly discussed, the lack of information and the need for it lead individuals to alternative searches (13). The increasing accessibility, prevalence, personalization, and independence from time, space, and individuals offered by the internet provide a solution to this quest (23-25).

The postpartum period is a sensitive time period when life is reshaped for both parents and women in every respect, requiring special adaptations and seeking answers to questions (6,26,27). In our study, it was seen that especially in the last 3 years, with the increase in accessibility to social media platforms like YouTube, as much as % 57.1% of videos were uploaded on topics related to "postpartum sexual initiation." This indicates uncertainty about postpartum counseling education in the healthcare system, the presence of question marks in people's minds, and insufficient information. It is thought that this number will increase over time.

When the durations of the videos included in the study were examined, it was observed that 60.7% of them had a duration of 1-10 minutes. Looking at the data for Turkey, where the duration of internet use is 7 hours and 9 minutes, 2 hours and 48 minutes of which is spent on social media, it can be concluded that the durations of the videos in the study were reasonable and watchable (28). In a video-supported study conducted by Demir and Taşpınar (2022), it was observed that postpartum education provided through videos increased women's self-efficacy in sexuality,

breastfeeding, and adaptation to the postpartum period, created behavior change, and had a positive effect (29). Similarly, in different studies, it has been seen that the use of social media has a positive contribution to managing the process for women during the postpartum period (30,31).

Table 1. The General Characteristics of Videos and the Teaching Methods Used by Instructors in the Videos

Variables	n	%
Publication date		
20.08.2014 -20.08.2017	2	7.2
20.08.2017 -20.08.2020	10	35.7
20.08.2020 -20.08.2023	16	**57.1**
Video duration		
<1 dk	6	21.4
1-10 dk	17	**60.7**
11-20 dk	3	10.8
>20 dk	2	7.1
Number of views		
1-10,000	19	**67.9**
10,001-30,000	2	7.1
30,001-50,000	1	3.6
>50,000	6	21.4
Number of likes		
0	3	10.7
1-10	11	**39.3**
11-50	2	7.1
51-100	3	10.8
>100	9	32.1
Number of comments		
0	17	**60.7**
1-25	9	32.1
26-50	1	3.6
51-100	0	0.0
>100	1	3.6
Title of the instructor		
Doctor	26	**92.9**
Midwife/Family Planning Consultant	2	7.1
Educational tools		
Verbal speech	11	39.3
Verbal speech and Subtitle	13	**46.4**
Verbal speech, Subtitle and Image	4	14.3

Furthermore, in addition to the duration, it was observed that the videos received a high level of views (67.9%), likes (39.3%), and comments (32.1%). Users, while passively watching these videos, tend to establish communication by commenting on the shared videos and interacting with the users who posted them (32). However, due to the limited research on video-based education on postpartum sexual life in the literature, more research in this field is needed.

In our study, it was found that the instructors providing education in the videos were healthcare professionals, with 92.9% being doctors and only 7.1% being Family Planning Consultants. This is of great importance in terms of societal dynamics. Mahmud et al. (2017) emphasize that education provided by healthcare professionals is a critical factor supporting high-quality access to health and is also essential for the reliability of information (33). Another study found that receiving personalized developmental care and informative social support from healthcare professionals was effective in increasing self-efficacy, creating positive parenting experiences, and reducing stress levels in families (34).

When the methods used in the provided education were examined in our study, it was observed that 46.4% included both oral presentation and subtitles. 39.3% of the education was solely delivered through oral presentation, and 14.3% included a combination of oral presentation, subtitles, and visual materials. Using educational tools that target multiple sensory organs is an effective way to encourage learners and enhance the understanding of the provided information.

For example, while people can remember only 20% of what they hear, they can recall 50% of information presented both visually and aurally (29). Another study showed that the level of impact on learning was increased when information reached both the eye and the ear instantly through a multimedia application consisting of video, animation, and sound (35). These findings support our research results.

CONCLUSION

In a medium like YouTube, where unlimited information rapidly flows, Turkish data regarding the 'postpartum sexual initiation time' question is quite limited. YouTube can be a significant source of information on women's health and sexual health. However, unfortunately, women's health and sexuality are still considered taboo in many societies, facing issues such as censorship or content restrictions on these topics. Therefore, platforms like YouTube should encourage videos containing informative, supportive, and educational content on sexual health and sexuality, helping to break down these taboos.

Ethical Approval: Since the YouTube videos used in the study are publicly accessible on an open platform, access rights are open to everyone, and therefore, ethical committee approval was not required.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: RE, Design: RE, Data Collection and Processing: RE, Analysis and/or Interpretation: RE, YKA, Writing: RE

Conflict of Interest: The authors declare that they have no conflict of interest.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. Selimoğlu EŞ, Beydağ KD. Quality of Sexual Life for Breastfeeding Women in the Postpartum Period. Acıbadem University Journal of Health Sciences. 2020; 11(1): 174-180.
2. Tuğrul B, Artan İ. Examining Mothers' Views on Children's Sexual Education. Hacettepe University Faculty of Education Journal. 2001; 20: 141-149.
3. Olsson A, Lundqvist M, Faxelid E, Nissen E. Women's Perceptions of Sexual Life After Childbirth: Focus Group Discussions with Postpartum Women. Scandinavian Journal of Caring Sciences. 2005; 19(4): 381-387.
4. Özmen D, Çetinkaya A, Kuş K, Yılmaz M, Hügül Y. Attitudes of Teachers Working in Primary Schools in Manisa Towards Sexual Education. Health and Society. 2006; 2: 81-89.
5. Drozdowskyj ES, Castro EG, López ET, Taland IB, Actis CC. Factors Influencing Couples' Sexual Life During the Postpartum Period: A Systematic Review. Sexual Medicine Reviews. 2020; 8(1): 38-47.
6. Güler E, Erbil N. Factors Affecting Sexuality in the Postpartum Period and the Responsibilities of Healthcare Professionals. Andrology Bulletin. 2022; 24(2): 147-154.
7. Hacettepe University Institute of Population Studies (2019). 2018 Turkey Demographic and Health Survey (TDHS). Hacettepe University Institute of Population Studies, Presidency of Strategy and Budget of the Republic of Turkey, and TÜBİTAK, Ankara, Turkey.
8. Türk R, Erkaya R. An Evaluation of Postpartum Sexual Lives of Primiparous Women. International Refereed Journal of Nursing Research. 2019; 15: 144-168.
9. Gölbaşı Z, Eğri G. Traditional Practices Related to Maternal Care in the Postpartum Period. Cumhuriyet Medical Journal. 2010; 32: 276-282.
10. İliyasu Z, Galadancı HS, Danlami KM, Salihu HM, Aliyu MH. Correlates of Postpartum Sexual Activity and Contraceptive Use in Kano, Northern Nigeria. African Journal of Reproductive Health. 2018; 22(1): 103-112.
11. Quoc Huy NV, Phuc An LS, Phuong LS, Tam LM. Pelvic Floor and Sexual Dysfunction After Vaginal Birth with Episiotomy in Vietnamese Women. Journal of Sexual Medicine. 2019; 7(4): 514-521.
12. Üstgörül S. Evaluation of YouTube Videos on the Fear of First Sexual Intercourse and Virginity Using the DISCERN Tool. Journal of Social Work. 2022; 6(1): 73-81.
13. Avcı SÇ, Daşıkan Z. Sexual Health and Counseling in the Postpartum Period: The

Use of the BETTER Model. Andrology Bulletin. 2021; 23(3): 196-206.

14. Jaks R, Baumann I, Juvalta S, Dratva J. Parental Digital Health Information-Seeking Behavior in Switzerland: A Cross-Sectional Study. BMC Public Health. 2019; 19(1): 1-11.
15. Kocademir L, Gerçek E. Use of Digital Media in Prenatal and Postnatal Periods. Journal of Women's Health Nursing. 2020; 6(1): 29-43.
16. Digital Reports Turkey. Digital 2019 Turkey (January 2019) v01. Retrieved on August 21, 2023, from https://www.slideshare.net/DataReportal/digital-2019-turkey-january-2019-v01.
17. Üstgörül S. Evaluation of YouTube Videos on the Fear of First Sexual Intercourse and Virginity Using the DISCERN Tool. Journal of Social Work. 2022; 6(1): 73-81.
18. Tomfohrde OJ, Reinke JS. Technology Use by Breastfeeding Mothers. Computers in Human Behavior. 2016; 64: 556-561.
19. Turan S. Qualitative Research: A Guide for Design and Implementation. Ankara: Nobel Publishing. 2013.
20. Aydın R, Vildan Ü. Analysis of YouTube Videos on Breastfeeding Education. Samsun Journal of Health Sciences. 2020; 5(2): 166-172.
21. Annak İM, Atay Doyğacı AG, Karadağ M. Analysis of YouTube Videos Published to Prevent Lymphedema After Mastectomy. Journal of Traditional Medical and Complementary Therapies. 2019; 2(2): 64–70.
22. Ataç Ö, Özalp Y, Kurnaz R, Güler OM, İnamlık M, Hayran O. YouTube as an Information Source During the Coronavirus Disease (COVID-19) Pandemic: Evaluation of Turkish and English Content. Cureus. 2020; 12(10): 2-8. doi:10.7759/cureus.10795.
23. Kahveci H. Examination of Social Media Contents in the Context of Moral Values: The Case of YouTube. Anadolu Journal of Educational Sciences International. 2021; 11(1): 204-225. DOI: 10.18039/ajesi.786295.
24. Aranda-Jan CB, Mohutsiwa-Dibe N, Loukanova S. Systematic Review on the Effectiveness of Implementation of Mobile Health (mHealth) Projects in Africa: What Works, What Does Not Work, and Why. BMC Public Health. 2014; 14(1): 1-15.
25. Jacobs RJ, Lou JQ, Ownby RL, Caballero J. A Systematic Review of eHealth Interventions to Improve Health Literacy. Health Informatics Journal. 2014; 22(2): 81-98.
26. Koç E, Oskay Ü. Sexuality and Counseling in the Postpartum Period. Journal of Women's Health Nursing. 2015; 2: 15-26.
27. İnci FH, Serçekuş P. Evaluation of Web-Based Training Materials on Breast Milk

and Breastfeeding. Pamukkale Medical Journal. 2015; 8(1): 45-50.

28. Kemp S. Digital 2020 Global Overview Report. Retrieved on August 28, 2023, from https://wearesocial.com/blog/2020/01/digital-2020-3-8-billion-people-use-social-media.
29. Demir R, Taşpınar A. The Impact of Different Discharge Education Methods on Preparedness for Discharge, Postpartum Adjustment, and Breastfeeding Self-Efficacy. Adnan Menderes University Faculty of Health Sciences Journal. 2022; 6(1): 97-115. DOI: 10.46237/amusbfd.997250.
30. Demir Yıldırım A, Yılmaz Esencan T, Güder A, Daştan K. Mobile Health Applications Used in the Field of Midwifery. Karya Journal of Health Science. 2023; 4(2): 174-178.
31. Ngoma C, Chawani MS, Herstad J. Adaptation of a Mobile Application to Improve the Flow of Birth Information from the Community to the District Level. Lecture Notes in Computer Science and Telecommunications Engineering. 2011; 64: 79-92.
32. Altun Ş. Social Media and Celebrity Culture: The Case of YouTube (Master's thesis, Istanbul Gelisim University Institute of Social Sciences). 2019.
33. Mahmud N, Rodriguez J, Nesbit J. A Text Message-Based Intervention to Bridge the Healthcare Communication Gap in the Rural Developing World. Technology and Health. 2012; 18(2): 137-144. doi:10.3233/THC-2010-0576.
34. Butler SC, Huyler K, Kaza A, Rachwal C. Filling a Significant Gap in the Cardiac Intensive Care Unit: Implementation of Individualized Developmental Care. Cardiology in the Young. 2017; 27(9): 1797-1806. doi:10.1017/S1047951117001469.
35. Murray S, Noland B. Video Modeling for Young Children with Autism Spectrum Disorders: A Practical Guide for Parents and Professionals. United Kingdom: Jessica Kingsley. 2012.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **October 2023; 9(4): 721-727**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1360495

Evaluation of Homocysteine, Trace Element, and Vitamin Levels in Male Individuals with Hemorrhoidal Disease

Gürkan Çıkım[1(ID)], Solmaz Susam[1(ID)], Mustafa Göksu[2(ID)], Fatih Üçkardes[3(ID)], Muhittin Önderci[1(ID)]

[1]Department of Biochemistry, Faculty of Medicine, Adiyaman University, Adiyaman, Turkey
[2]Department of Surgical Medical Sciences, Faculty of Medicine, Adiyaman University, Adiyaman, Turkey
[3]Department of Biostatistics and Medical Informatics, Faculty of Medicine, Adiyaman University, Adiyaman, Turkey

Received: 29 August 2023, Accepted: 24 October 2023, Published online: 29 October 2023

Abstract

Objectives: Hemorrhoidal disease is a common and uncomfortable condition affecting people worldwide, primarily in the lower rectal region. This study explores the relationship between hemorrhoidal disease and the levels of homocysteine, folic acid, vitamin B12, zinc, and copper in men.

Methods: A prospective study included 38 male patients with internal hemorrhoids (Group I) and 38 healthy male individuals (Group II). Venous blood samples were collected after a 12-hour fast and analyzed for homocysteine, folic acid, vitamin B12, zinc, and copper levels. Statistical analyses, including the Kolmogorov-Smirnov test, Mann-Whitney U or Two-Sample t-test, Receiver Operating Characteristic (ROC) analysis, and Multivariate Binary Logistic regression, were performed.

Results: Group I and Group II had similar age and body mass index (BMI). Homocysteine and copper levels were significantly higher in Group I, while folic acid and vitamin B12 levels were significantly lower. High homocysteine levels (≥11.2 µmol/L) had a sensitivity of 92.11%, while low vitamin B12 (<114) and high copper (≥1004) levels exhibited high specificity (97.37% and 86.8%, respectively). An increase of one unit in vitamin B12 was associated with a 1.04% decrease in hemorrhoid occurrence.

Conclusion: This study suggests that evaluating homocysteine, copper, folate, and vitamin B12 levels may be valuable in patients with or at risk of hemorrhoidal disease. Future research should include larger, more diverse samples to enhance the generalizability of these findings.

Keywords: Hemorrhoidal disease, trace elements, folate, vitamin B12, homocysteine

Suggested Citation: Cikim G, Susam S, Goksu M, Uckardes F, Onderci M. Evaluation of Homocysteine, Trace Element, and Vitamin Levels in Male Individuals with Hemorrhoidal Disease. Mid Blac Sea Journal of Health Sci, 2023;9(4):720-726.

Address for correspondence/reprints: **Telephone number:** +90 (416) 216 1015

Gürkan Çıkım **E-mail:** drgurkanc@hotmail.com

INTRODUCTION

Hemorrhoidal disease is a benign anorectal disease with a prevalence ranging from 4% to 17%, which is seen with different frequencies in different populations (1). It shows symptoms such as pain, bleeding, sagging, and itching in the anus region and affects the quality of life by causing important social problems (2). Zinc is an element that plays a role in various metabolic pathways, possessing antioxidant and anti-inflammatory properties. Its deficiency has been linked to increased chronic oxidative stress and inflammation (3). Copper is one of the elements involved in metabolic processes such as the development of connective and bone nerve tissues, electron transport chain, cell proliferation, and vessel formation (4). Since copper deficiency (Menkes disease) and excess (Wilson's disease) cause various diseases and cause changes in antioxidant-oxidant effects, the body copper balance is very important (5).

Homocysteine is a toxic amino acid formed during the conversion of methionine to cysteine (6). It has been shown that the increase in homocysteine in the body causes oxidative stress, DNA damage, neurovascular such as epilepsy dementia, cardiovascular, nephrogenic and vascular diseases such as atheromatous plaque formation, as well as events such as increased inflammatory cytokines (7, 8).

Vitamin B12 (cobalamin) is a water-soluble vitamin that plays a crucial role in neurological development, erythropoiesis, and DNA synthesis. Its deficiency can lead to conditions such as hyperhomocysteinemia, megaloblastic anemia, and neurological diseases (9). Folate, a vitamin primarily responsible for single-carbon transfer, plays a pivotal role in various biochemical processes, including nucleic acid synthesis, neurotransmitter production, phospholipid formation, protein synthesis, and the conversion of homocysteine to methionine (10). Deficiency in folate can result in hyperhomocysteinemia, neural tube defects in pregnant women, megaloblastic anemia, and cardiovascular diseases (11).

This study aims to investigate the alterations in homocysteine, folic acid, vitamin B12, zinc, and copper levels in men with hemorrhoidal disease and assess their potential role in the disease's progression and etiology.

METHODS

This prospective study included 38 male patients (Group I) who presented with complaints of bleeding, pain, itching, or swelling in the anal region and were diagnosed with internal hemorrhoidal disease at the General Surgery outpatient clinic of Adiyaman University Medical Faculty Hospital. These patients met the selection criteria, which required them to be aged 30-40 years, have no prior treatment, be non-smokers, have no chronic illnesses, and possess a comparable body mass index.

The control group (Group II) comprised 38 healthy male individuals with similar demographic characteristics and no underlying diseases. Ethical approval for this study was granted by the Adiyaman University Ethics Committee (Decision number: 2022/2-17, Decision date: 16/02/2023).

Obtaining Serum Samples

Venous blood was drawn from both groups after 12 hours of fasting. Afterwards, blood samples were centrifuged at 4000 rpm for 10 minutes and their serums were separated. Samples were stored at -80 0C degrees until analysis.

Analysis of folic acid, vitamin B12 and homocysteine levels

Electrochemiluminescence immunoassay method and Beckman Coulter autoanalyzer (Beckman Coulter DxI 800, Kraemer Blvd. Brea, CA 92821 USA) were used for vitamin B12 and folate levels.

For homocysteine levels; electrochemiluminescence immunoassay based Siemens Immulite autoanalyzer (Diagnostic Products Corporation, Los Angeles, CA, USA) was used.

Analysis of selected trace element levels

In the analysis of serum zinc and copper levels microwave digestion was performed in Berghof brand MSW-4 model device and then reading was performed in Perkin Elmer brand NexION 350X model ICP-MS device. The working principle of this device was the same as our previous study (12).

Statistical Analysis

The SPSS version 25.0 (IBM Statistics for Windows version 25, IBM Corp., Armonk, NY, USA) and Medcalc software, version 20.006. programme was used to analyze the study data. The Kolmogorov Smirnov test was used to determine the normal distribution of the data, and then the Mann-Whitney U or Two Samples t-test was used for intergroup comparisons. The Receiver Operating Characteristic (ROC) analysis test was used for the diagnostic features of the parameters used in the disease, and the Multivariate Binary Logistic regression analysis test was used to determine the disease risk. $p<0.05$ was considered statistically significant for all the analyses.

RESULTS

The study was conducted in Group I, comprising male patients with internal hemorrhoids, and Group II, consisting of healthy male individuals. The average age for patients was 36.0 ± 3.99, while the control group had an average age of 35.87 ± 3.91. Body mass indexes were 24.79 ± 2.97 for patients and 23.64 ± 2.12 for the control group. There was no statistically significant difference in terms of age and BMI between both groups. In the study, copper, zinc, vitamin B12, folate and homocysteine levels were examined in both groups. Copper and homocysteine levels were statistically significantly higher in group I, and

folic acid and vitamin B12 levels were significantly lower. There was no significant difference between the two groups in terms of zinc. Table 1 summarizes the results for the parameters.

The results of the Diagnostic criteria of biochemical parameters measured in hemorrhoid patients are given in Table 2. Especially when the cut of sensitivity value for Homocysteine was determined as 11.2, sensitivity of 92.11% (95% CI = 78.6-98.3%) was found at a high rate. On the other hand, the specificity of 97.37% (95% CI = 86.2-99.9%) and 86.8% (95% CI = 71.9-95.6%) was found to be high when vitamin B12 and copper and parameters were considered as 114 and below, 1004 and above, respectively (Table 2).

Taking into account the analysis, an increment of one unit in vitamin B12 was associated with a decrease in the occurrence of hemorrhoids by 1.04% (Table 2).

Table 1. Comparisons of the serum levels of laboratory parameters

Parameters	**Group I: Hemorrhoids N=38**	**Group II: Control N=38**	**P value**
Age[1] (year)	36.0± 3.99	35.87±3.91	0.885
BMI (kg/m²)	24,79 ± 2,97	23,64 ± 2,12	0,902
Homocysteine[1] (µmol/L)	17.87±7.53	14.06±5.14	0.012
Folat[2] (pg/mL)	6.53 (3.14-14.57)	7.15 (4.04-15.72)	0.012
B12[2] (pg/mL)	131 (56-312)	222 (102-662)	<0.001
Zinc[1] (ppb)	607±188.33	582.85±112.98	0.498
Copper[1] (ppb)	972.39±218.14	833.72±130.85	<0.001

[1]: Independent two sample t test was used. Mean±SD.
[2]: Mann Whitney U test was used. Median (min-max).

Table 2. Cut of values for certain parameters.

Variables	**AUC ROC [95 % CI]**	**P value**	**Cut off [95 % CI]**	**Sensitivity [95 % CI]**	**Specificity [95 % CI]**	**+LR [95 % CI]**	**-LR [95 % CI]**
Homocysteine	0.651 [0.533 to 0.757]	0.017	>11.2 [>8.9 to >17]	92.11 [78.6 - 98.3]	39.47 [24.0 - 56.6]	0.52 [1.2 - 2.0]	0.20 [0.06 - 0.60]
Folat	0.667 [0.549 to 0.771]	0.008	≤6.7 ≤4.7 to ≤11.22	60.53 [43.4 - 76.0]	71.05 [54.1 - 84.6]	2.09 [1.2 - 3.7]	0.56 [0.4 - 0.9]
B12	0.765 [0.654 to 0.855]	<0.001	≤114 [≤96 to ≤207]	44.74 [28.6 - 61.7]	97.37 [86.2 - 99.9]	17.00 [2.4-121.4]	0.57 [0.4 - 0.8]
Copper	0.688 [0.571 to 0.789]	0.002	>1004.97 [>770.2 - >1100.75]	47.37 [31.0-62.0]	86.8 [71.9 - 95.6]	3.60 [1.5 - 8.7]	3.60 [1.5 - 8.7]

+LR: Positive likelihood ratio, -LR: Negative likelihood ratio

DISCUSSION

It is known that hyperhomocysteinemia causes adverse effects in many systems such as oxidative stress and free radical increase, suppression of antioxidant system, disruption of endothelial integrity, especially cardiogenic, nephrogenic and neurogenic tissues (13). Plasma homocysteine levels have been evaluated in various studies. For instance, research has demonstrated that elevated homocysteine can lead to cell proliferation and subsequently contribute to colorectal cancer through oxidative effects (14). In another example,

a statistically significant increase in homocysteine levels was observed in the group with osteoarthritis (15). Furthermore, homocysteine levels in female patients with gallstones were significantly higher than those in the control group (12). In our study, we found that homocysteine was significantly higher and folate and vitamin B12 were significantly lower in the patient group. In the ROC analysis, the sensitivity was found to be 92.11% (95% CI = 78.6-98.3%) when the cut-off homocysteine value was accepted as 11.2 (µmol/L). We think that levels above this value can be used as a diagnostic criterion for hemorrhoidal disease. Considering that the hemorrhoids in the anal region are composed of smooth muscle, connective tissue and vascular structures, we think that the endothelial integrity is disrupted by the oxidative effect in hyperhomocysteinemia, the release of nitric oxide, an important vasodilator molecule, and the collagen in the connective tissue are damaged, thus facilitating the development of hemorrhoids. Decreased levels of vitamin B12 and folat prevent the excretion of homocysteine from the body and support hyperhomocysteinemia. In a study, homocysteine, folic acid, and vitamin B12 levels were evaluated in pregnant individuals with habitual abortion and it was reported that folic acid and vitamin B12 levels were low, while homocysteine levels were high. (16). Both vitamin deficiency and hyperhomocysteinemia are particularly prevalent in Asia (14).

An element that is important in many metabolic processes in the body is copper. Some of those; redox reactions, cellular respiration, neuropeptide transmission, connective and bone tissue development, angiogenesis, antioxidant defense (17). Superoxide dismutase (SOD), cytochrome c oxidase, lysyl oxidase, and tyrosinase are some of the enzymes that need copper to function. In copper deficiency, it has been shown that the SOD enzyme activity in the antioxidant system decreases, so the oxidant system efficiency increases (4). In excess of copper, hydroxyl radical is formed by Fenton reaction, which causes oxidative damage (18). It has been shown that copper levels increase in breast, ovarian, lung, stomach, and colon cancers (19). In addition, it has been shown that especially iron-containing proteins are lipoylated in the tricarboxylic acid cycle with an increase in copper, so that these proteins cannot function and cause cell death by accumulating (20).

In this study, copper levels were found to be significantly higher in the patients. We think that high copper levels damage the hemorrhoidal tissue by forming hydroxyl ions with the Fenton reaction, and may contribute to the development of the disease by causing angiogenesis and inflammation in the hemorrhoidal tissue. Among the parameters in our study, Vitamin B12 was found to be a significant factor in determining the disease risk in the Multivariate Logistic Regression analysis. It has been determined that the risk of hemorrhoidal disease decreases by 1.04% with each unit increase in vitamin B12.

CONCLUSION

As a result, we think that homocysteine, copper, folate, vitamin B12 levels should be determined in patients with or showing symptoms of hemorrhoidal disease. One significant limitation of this study is the relatively small number of participants included in our research,

which may limit the generalizability of our findings. Furthermore, it is essential to acknowledge that our study exclusively comprised male participants, thus potentially restricting the applicability of our results to a broader population. Future research should aim to include a more diverse and representative sample to address these limitations and enhance the external validity of our findings.

Ethical Approval: Ethics committee approval for this study Adıyaman University Received from the Clinical Research Ethics Committee of the University Clinical Research Ethics Committee (Approval number: 2022/2-17, Decision date: 16/02/2023).

Peer-review: Externally peer-reviewed**.**

Author Contributions: Concept: GC, Design: GC, MG, Data Collection and Processing: GC, MG, Analysis and/or Interpretation: GC, SS, MO Writing: GC, SS, MO

Conflict of Interest: The authors declare that they have no conflict of interest.

Financial Disclosure: This project was supported by the scientific research unit of Adiyaman University within the scope of the project numbered TIPFMAP/2022-0011.

REFERENCES

1. Sheikh P, Régnier C, Goron F, Salmat G. The prevalence, characteristics and treatment of hemorrhoidal disease: results of an international web-based survey. Journal of comparative effectiveness research. 2020;9(17):1219-32.
2. Sandler RS, Peery AF. Rethinking what we know about hemorrhoids. Clinical Gastroenterology and Hepatology. 2019;17(1):8-15.
3. Efthymakis K, Neri M. The role of Zinc L-Carnosine in the prevention and treatment of gastrointestinal mucosal disease in humans: a review. Clinics and Research in Hepatology and Gastroenterology. 2022;46(7):101954.
4. Lopez J, Ramchandani D, Vahdat L. Copper depletion as a therapeutic strategy in cancer. Met Ions Life Sci. 2019;19:303-30.
5. Członkowska A, Litwin T, Dusek P, Ferenci P, Lutsenko S, Medici V, et al. Wilson disease. Nature reviews Disease primers. 2018;4(1):21.
6. Hasan T, Arora R, Bansal AK, Bhattacharya R, Sharma GS, Singh LR. Disturbed homocysteine metabolism is associated with cancer. Experimental & molecular medicine. 2019;51(2):1-13.
7. Hermann A, Sitdikova G. Homocysteine: biochemistry, molecular biology and role in disease. MDPI; 2021. p. 737.
8. Kaplan P, Tatarkova Z, Sivonova MK, Racay P, Lehotsky J. Homocysteine and mitochondria in cardiovascular and cerebrovascular systems. International

journal of molecular sciences. 2020;21(20):7698.

9. Langan RC, Goodbred AJ. Vitamin B12 deficiency: recognition and management. American family physician. 2017;96(6):384-9.
10. Shulpekova Y, Nechaev V, Kardasheva S, Sedova A, Kurbatova A, Bueverova E, et al. The concept of folic acid in health and disease. Molecules. 2021;26(12):3731.
11. Murray LK, Smith MJ, Jadavji NM. Maternal oversupplementation with folic acid and its impact on neurodevelopment of offspring. Nutrition reviews. 2018;76(9):708-21.
12. Cikim G, Hatipoglu HS, Susam S. Evaluation of homocysteine, vitamin, and trace element levels in women with gallstones. Journal of Trace Elements in Medicine and Biology. 2023;78:127177.
13. Kumar T, Sharma GS, Singh LR. Homocystinuria: therapeutic approach. Clinica Chimica Acta. 2016;458:55-62.
14. Liu Z, Cui C, Wang X, Fernandez-Escobar A, Wu Q, Xu K, et al. Plasma levels of homocysteine and the occurrence and progression of rectal cancer. Medical science monitor: international medical journal of experimental and clinical research. 2018;24:1776.
15. Çıkım G, Veranyurt Ü. Evaluation of homocysteine and vitamin d levels in osteoarthritis patients. Medical Sciences. 2021;16(2):68-73.
16. Çıkım G, Abdullah T. Habituel Abortus Olan Gebelerde Homosistein Folik Asid ve Vit B12 Seviyelerinin Değerlendirilmesi. Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi Dergisi. 2021;16(3):417-20.
17. Gaetke LM, Chow-Johnson HS, Chow CK. Copper: toxicological relevance and mechanisms. Archives of toxicology. 2014;88:1929-38.
18. Prasad S, Gupta SC, Tyagi AK. Reactive oxygen species (ROS) and cancer: Role of antioxidative nutraceuticals. Cancer letters. 2017;387:95-105.
19. Khoshdel Z, Naghibalhossaini F, Abdollahi K, Shojaei S, Moradi M, Malekzadeh M. Serum copper and zinc levels among Iranian colorectal cancer patients. Biological trace element research. 2016;170:294-9.
20. MA, Dixon SJ. Copper-induced cell death. Science. 2022;375(6586):1231-2.

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci

October 2023; 9(4): 728-736

CASE REPORT

DOI: 10.19127/mbsjohs.1301302

A Digital and Conventional Approach to the Rehabilitation of Complete Edentulous Patient with a Toronto Infrastructure Design Hybrid Prosthesis: A Case Report

Elif Çelik[1(ID)], Ahmet Serkan Küçükekenci[2(ID)]

[1]Department of Prosthodontics, Faculty of Dentistry, Ordu University, Ordu, Turkey.
[2]Department of Prosthodontics, Faculty of Dentistry, Ordu University, Ordu, Turkey.

Received: 24 May 2023, Accepted: 19 August 2023, Published online: 29 October 2023

Abstract

This case describes the prosthetic treatment of a completely edentulous patient treated with the "Toronto Bridge" technique, an implant-supported (all-on-four/all-on-five) hybrid prosthesis.

A 42-year-old male patient applied to our clinic for aesthetic and functional problems. After clinical and radiographic examination, the all-on-five treatment concept for the edentulous maxilla and an all-on-four treatment concept for the edentulous mandible were planned. In the maxilla, two distal implants were placed at 30-45° angles, and three straight implants were placed in the anterior region. In the mandible, two distal implants were positioned at the anterior to mental foramina at an angle of 30-45°and two straight implants were placed in the anterior region. The digital impressions were taken, and the infrastructures and veneers were designed according to the "Toronto Bridge" protocol. The infrastructures and veneers were fabricated by milling zirconium blocks and cemented. The occlusion was rechecked for any interferences.

This case report showed successful results for the all-on-four/five treatment concept "Toronto Bridge" prostheses at a six-month follow-up, and no complications were observed. This case report suggests that the implant-supported prosthetic treatment of a completely edentulous patient treated with the "Toronto Bridge" treatment technique provides esthetics, phonetics, oral hygiene, and oral comfort, which may be an alternative to an acrylic resin or porcelain fused metal fixed restorations.

Keywords: Edentulous, Implant-Supported Dental Prosthesis, Dental Esthetics, Zirconium

Suggested Citation: Çelik E, Küçükekenci A.S. A Digital and Conventional Approach to the Rehabilitation of Complete Edentulous Patient with a Toronto Infrastructure Design Hybrid Prosthesis: A Case Report. Mid Blac Sea Journal of Health Sci, 2023;9(4):728-736.

Address for correspondence/reprints:

Ahmet Serkan Küçükekenci

Telephone number: +90 (452) 212 12 89

E-mail: aykacasli@yahoo.com

Note: This manuscript has been presented at the 26th BASS Congress, Skopje, North Macedonia, 11-14 May 2023.

INTRODUCTION

Severe atrophy of the alveolar ridge after the loss of teeth usually occurs in the edentulous jaw, increasing over time. Complete dentures and implant-supported removable partial or fixed dentures are among the treatment options for this type of edentulism. Removable prostheses used in the solution of complete or partial edentulism are among the prosthesis's patients have the most difficulty using. With the spread of implant applications, dental implants have shown stabilization and retention-enhancing effects in fixed restorations and removable prostheses (1).

The main purpose of implant treatment, which is used in many cases from simple to complex, is to avoid using complete dentures by applying implant-supported fixed dentures or to increase the retention and stability of complete dentures. The treatment option may vary depending on the anatomical limitations, the patient's preference, and surgical interventions to restore the patient's soft tissue and bone (2). Treatment of edentulous jaws with atrophic alveolar ridges with implants; is often complicated by problems such as poor bone quality in the posterior region, insufficient bone quantity due to long-term edentulism, and anatomical limitations of the alveolar bone income. Several implant rehabilitations can be performed depending on the quality and quantity of residual bone, the level of atrophy, and nerve positions (3). Grafting may be an appropriate treatment option to obtain the bone required for implant placement. However, this treatment often requires meticulous surgical procedures, complications can develop, and therefore it requires more time, and the cost of treatment can be high. Therefore, it is a treatment option with low acceptance by the patient (4). To avoid grafting procedures and to make the most effective use of the pre-existing bone, the alternative of placing the implants at an angle has been recommended (5). The name of this technique is the All-on-four technique, and in 2003 Malo et al. started to be used it for the first time as a modern technique in implant prosthesis rehabilitation and appeared in atrophic full arch mandibula and maxilla in 2005 (6). The two anterior implants are placed axially. The two posterior implants are angled distally to reduce the cantilever length and allow the prosthesis to be applied to up to 12 teeth. Anterior implants are placed perpendicular to the lateral incisor region in the mandible and maxilla; posterior implants are placed distally inclined just in front of the mental foramen in the mandible and parallel to the anterior wall of the maxillary sinus in the upper jaw. Anterior implants are placed perpendicular to the occlusal plane, and posterior implants are inclined approximately 30-45° distally (7). In patients with higher risk factors regarding the quality and quantity of residual bone, treatment concepts such as all-on-5 or all-on-6 can be considered with the

placement of additional implants without changing the number of angled distal implants.

Different connection systems between prosthetic infrastructures and implant fixtures in screw-retained rehabilitation are available today. Particularly in full-arch implant-supported rehabilitations, the Multi-Unit Abutment systems are widely used to achieve a passive prosthetic fit in the case of implants with various sizes and angled parallelisms (8). Patients are not only concerned about functional chewing but also about esthetics lost due to increased life expectancy and tooth loss. The patients' expectations have increased with the development of implantology, CAD/CAM, and other digital systems. Today, edentulous patients consider the implant-mounted fixed prosthesis first with this expectation. It is essential to fix by screwing in extremely atrophic jaws to provide aesthetics and phonation and to remove it from the mouth in case of any fracture or repair in the prosthesis, especially in full arc implant-supported prostheses in the lower and upper jaws. There are two options for the construction of implant-supported fixed prostheses. The first of these options is fixed prostheses that can be cemented with transmucosal abutments or metal-ceramic implant-supported fixed prostheses used with screw abutments for prosthetic retention (9). One of the types of fixed prosthesis on the implant is implant-supported hybrid prosthesis (1). Hybrid prostheses in dentistry are fixed prostheses consisting of screwed artificial teeth arranged on a rigid (metal or titanium) infrastructure and consisting of at least 4 implants with implant diameters that should be as wide as possible and an acrylic resin prosthesis base (10). However, these prostheses can be made on a variable number of implants, but ideally, the largest possible number of implants should be placed (9).

The inert structure of porcelain is minimally affected by staining and abrasions, providing permanent aesthetics. It can also be prepared by making metal-supported porcelain crowns on metal infrastructures formed as cut teeth to gain a more natural and aesthetic gingival appearance. Infrastructures can be produced from chromium-cobalt (Cr-Co) with the lost wax technique or from titanium and zirconium in addition to Cr-Co by the CAD/CAM milling technique. Factors such as the shape and dimensions of the infrastructure of hybrid prostheses, passive compatibility with the implant platform, the number and distribution of implants, aesthetics, and oral hygiene affect the success of these prostheses (11). The first criterion to be taken as a basis when deciding on the construction of this type of prosthesis is the inter arch distance. However, lip support, a high smile line in the upper jaw, and a low lip line in the lower jaw during speech are other aesthetic parameters to be considered. It is reported that the inter arch distance should be 12-15 mm to ensure the passive fit of implant-

supported fixed prostheses in the mandibular arch. Because the high temperature used during the firing of the porcelain can cause an expansion in the metal infrastructure during firing and shrinkage during cooling, thus preventing the passive seating of the restoration (1). Therefore, providing passive compatibility between the metal infrastructure and the implants in implant-supported hybrid prostheses becomes an important factor (12). It has been reported that better aesthetic results can be obtained in cases where the interarch distance is sufficient (13). In the treatment of patients using hybrid prostheses, it has been observed that these prostheses provide more chewing function and psychological satisfaction than traditional prostheses. Occlusal forces have increased significantly following implant-supported prostheses (14). Mandibular implant-supported hybrid prostheses are also used successfully in edentulous patients who cannot adapt to the long-term use of conventional complete dentures (15).

CASE REPORT

A 42-year-old edentulous male patient was applied to the Department of Prosthodontics, Ordu University, due to aesthetic and functional problems. The patient had no relevant medical history. After clinical and radiographic examination and according to the patient's request, the all-on-five treatment concept for the edentulous maxilla was planned. An all-on-four treatment concept is for the edentulous mandible with a fixed prosthesis. Surgery was performed under local anaesthesia under aseptic conditions in an outpatient environment. In the maxilla, two distal implants were placed at an angle of 30-45°. Three straight implants were placed in the anterior region of the maxilla. In the mandible, two distal implants were positioned at the anterior to mental foramina at an angle of 30-45°. Two straight implants were placed in the anterior region of the mandible (Implance, BL 4.3; A.G.S. Medical, Trabzon, Turkey). After waiting 3 months for osteointegration of dental implants, gingival formers were taken. Two weeks later, conventional impressions were taken using the open tray technique. After, cast models were poured with Type III dental stone (Whip Mix Dental Stone; Whip Mix Corp, Louisville, Kentucky, U.S.A.) (Fig 1.)

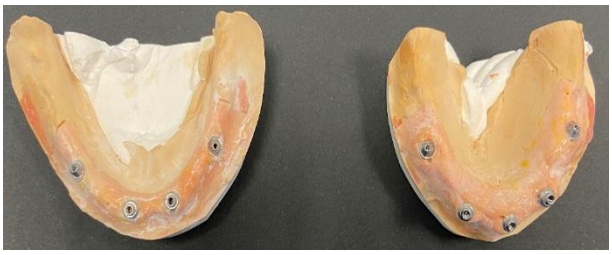

Fig. 1. Conventional cast models obtained after open tray impression.

Base plaques were produced, and the vertical dimension of the jaws was determined with a base plaque using closing wax. Scanbodies were taken onto the cast models for digital impression. Digitally impressions of models were made with an extra-oral scanner (E4; 3Shape, Copenhagen, Denmark) (Fig. 2).

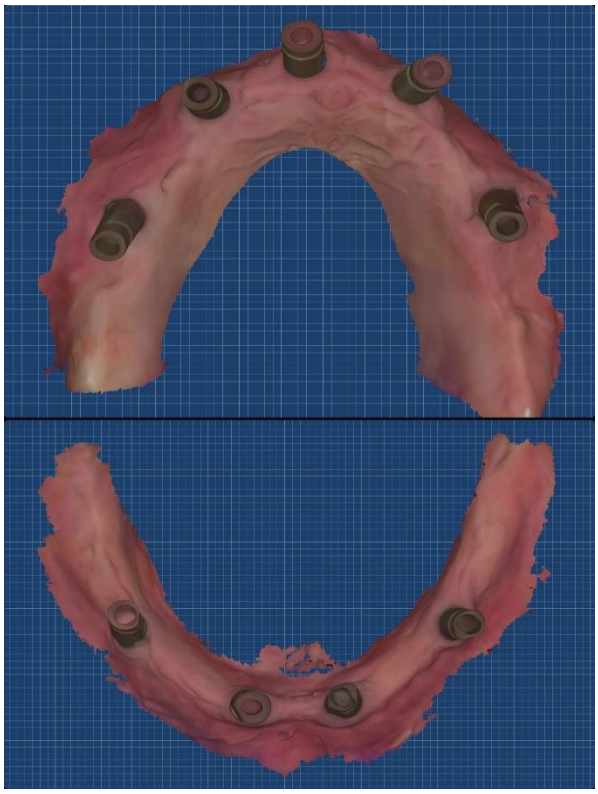

Fig. 2. Digital models obtained after extra-oral scanning.

The vertical records of models were taken the same way. The infrastructures and veneers were designed according to the "Toronto Bridge" protocol by using the Exocad software program (Exocad DentalCAD; Exocad GmbH, Germany) (Fig. 3).

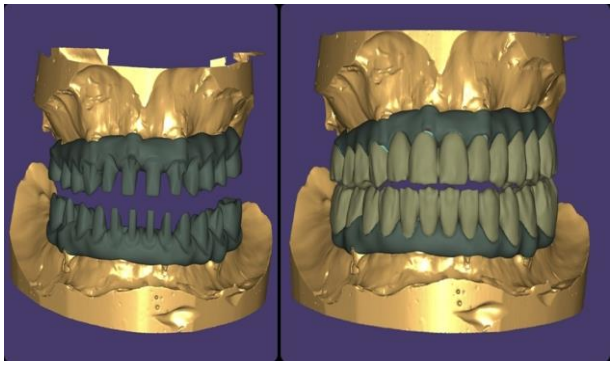

Fig. 3. Digital design of infrastructures and cut-back veneers.

The diagnostic dentures (try-in) were fabricated for the control of interocclussion, vertical dimension, gingival appearance and passive fitting of infrastructures by using the resin-based polymer liquid (NextDent Try-In; 3D Systems Co, Rock Hill, SC) and 3D dental printer (NextDent 5100; 3D Systems Co, Rock Hill, SC) (Fig 4.).

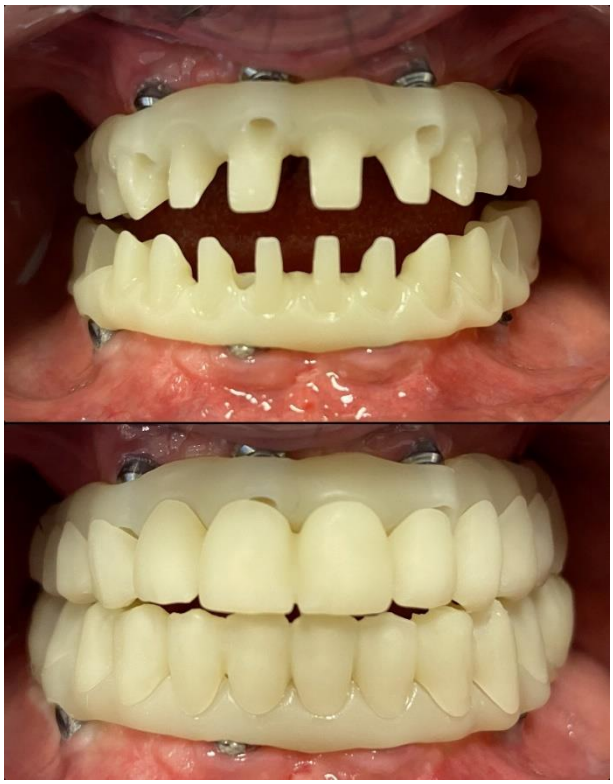

Fig. 4. Intra-oral photographs of 3D-printed try-in infrastructures and cut-back veneers.

After control and the patient's consent, the final infrastructures were fabricated by milling zirconium blocks (Ceramill Zi; Amann Girrbach AG, Koblach, Austria) with a milling machine (Motion 2; Amann Girrbach AG, Koblach, Austria) (Fig. 5). After the passive infrastructure fitting was controlled according to the Sheffield Passivity Test (Single Screw Test). When the infrastructure compatibility was checked, the gingival porcelain and

gingival shaping for pink aesthetics were done and checked in the mouth (Fig. 6).

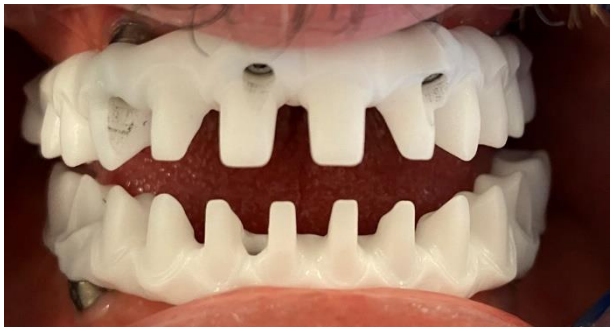

Fig. 5. Intra-oral photographs of zirconia infrastructures.

Fig. 6. Intra-oral photographs of gingival porcelain applied zirconia infrastructures.

Triple, double, and single crowns were fabricated by milling monolithic zirconia blocks (Ceramill Zolid fx; Amann Girrbach AG, Koblach, Austria). The buccal surface of crowns was veneered with feldspathic ceramic (G.C. Initial; G.C. America Inc, Alsip, IL, U.S.A.). The veneered restorations were glazed. Titanium caps that were comfortable for the multi-unit abutments were cemented in the zirconium infrastructure with the help of dual-cure resin cement (RelyX U200; 3M Espe, Seefeld, Germany) after applying to the primer agent (Z Prime Plus; Bisco Inc, Schaumburg, U.S.A.). Screw-retained Toronto infrastructure was placed onto the multi-unit abutments and screwed with 20 Newtons torque according to the manufacturer's instructions. Screw holes were closed with teflon and composite resin (Filtek Z250; 3M ESPE, St. Paul, MN, U.S.A.). The primer agent was applied to the crowns' inner surface and the zirconia infrastructure's corresponding surface and cemented with dual-cured resin cement. The excess cement was cleaned from the edges. Lateral and protrusive movements of the mandibula were rechecked (Fig. 7).

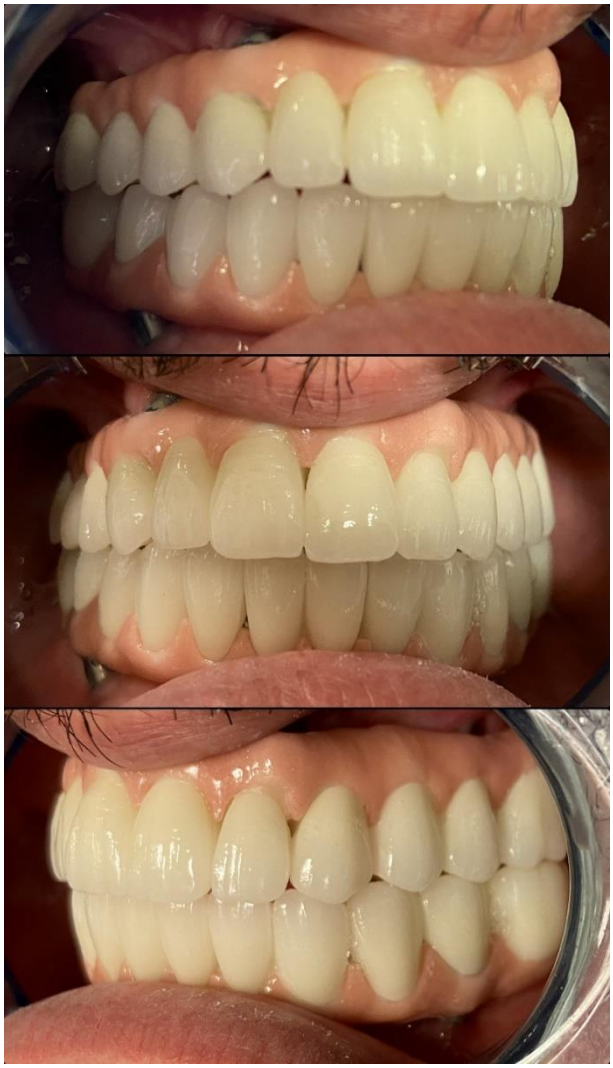

Fig. 7. Intra-oral photographs of the final prosthesis.

Hygiene techniques were explained and demonstrated, and a mouth guard was delivered

to the patient. The patient was called for control and care after 6 months. As a result of panoramic film examination and intraoral examination, no problems were encountered regarding function and aesthetics in prostheses and implants (Fig. 8). The patient was satisfied with the prosthesis, and the patient's quality of life increased. There was no problem in the care of the prosthesis.

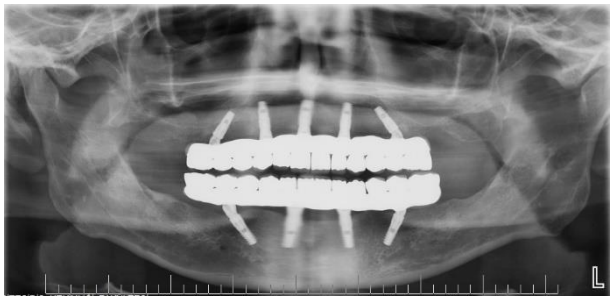

Fig. 8. Panoramic radiograph of the patient after treatment.

DISCUSSION

Nowadays, tilted posterior implants are commonly placed in each jaw without bone grafts and extra surgery appointments. With four and more than four implants placed, there is always the possibility of proceeding with sufficient support without replacing an implant (16). Thus, time and the economy can be saved.

Implant-supported fixed restorations are among the most appropriate treatment options in edentulous patients if sufficient residual bone quantity and quality, appropriate skeletal relationship and interarch distance, and economy are available. Many combinations of materials have been used for this type of restoration, such as metal alloy-acrylic, metal alloy-composite, and metal alloy-ceramic. The use of zirconia for infrastructures is an option that has been proposed. The zirconia infrastructure is an alternative material for these dentures. Although metal-ceramic restorations provide superior mechanical properties, previous studies have shown that zirconium restorations have excellent physical, mechanical, biological, and chemical properties (17). The infrastructures were fabricated using zirconia stabilized with 3 mol % of yttria (3Y-SZ) blocks to obtain high mechanical properties. However, the crowns were fabricated using high translucency 5 mol % Y-SZ blocks to obtain high aesthetics. On the other hand, the crowns were fabricated with cut-back facial and veneered feldspathic ceramic to increase the optical properties.

Although the digital workflow provides many advantages, such as storing-transmitting data, shortening the production process, and minimizing laboratory-related errors, it is stated that the decreased accuracy and precision, especially in full-arch implant-supported restorations impressions obtained with intraoral scanners (18,19). According to previous studies, the open tray technique was used for the impressions. The cast models were scanned using an extra-oral scanner, and impressions were digitized. So, other processes were performed digitally. Thus, a more comfortable infrastructure design was aimed at combining conventional and digital impressions.

CONCLUSION

This case report showed successful results for the all-on-four/five treatment concept "Toronto Bridge" prostheses at a six-month follow-up, and no complications were observed. This case report suggests that the implant-supported prosthetic treatment of a completely edentulous patient treated with the "Toronto Bridge" treatment technique provides esthetics, phonetics, oral hygiene, and oral comfort, which may be an alternative to an acrylic resin or porcelain fused metal fixed restorations.

Ethics Committee Approval: The consent form was filled out by the participant.

Author Contributions: Concept: ASK, EÇ Design: ASK, EÇ Literature search: ASK, EÇ Data Collection and Processing: EÇ Analysis or Interpretation: ASK Writing: EÇ ASK.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors also decline any financial support from either a pharmaceutical company or a company that provides or produces medical instruments and materials.

REFERENCES

1. Misch CE. Dental implant prosthetics. St Louis: Elsevier Mosby; 2005.p. 224-49.
2. Özdoğan A, İncesu A. Implant supported hybrıd prosthesıs. Atatürk Üniv Diş Hek Fak Derg. 2016;26:366-9.
3. Patzelt SB, Bahat O, Reynolds MA, Strub JR. The all-on-four treatment concept: a systematic review. Clin Implant Dent Relat Res. 2014;16:836-55.
4. Agliardi EL, Romeo D, Panigatti S, de Araujo Nobre M, Malo P. Immediate full-arch rehabilitation of the severely atrophic maxilla supported by zygomatic implants: a prospective clinical study with minimum follow-up of 6 years. Int J Oral Maxillofac Surg. 2017;46:1592-9.
5. Asawa N, Bulbule N, Kakade D, Shah R. Angulated implants: an alternative to bone augmentation and sinus lift procedure: systematic review. J Clin Diagn Res. 2015;9:10-3.
6. Maló P, Rangert B, Nobre M. "All-on-Four" immediate function concept with Brånemark System implants for completely edentulous mandibles: a retrospective clinical study. Clin Implant Dent Relat Res. 2003;5:2-9.
7. Maló P, Rangert B, Nobre M. All-on-4 immediate-function concept with Brånemark System implants for completely edentulous maxillae: a 1-year retrospective clinical study. Clin Implant Dent Relat Res. 2005;7:88-94.
8. Goodacre CJ, Bernal G, Rungcharassaeng K, Kan J.Y.K. Clinical complications with implants and implant prostheses. J Prosthet Dent. 2003;90(02):121–32.
9. Attard NJ, Zarb GA. Long-term treatment outcomes in edentulous patients with

implant-fixed prostheses: the Toronto study. Int J Prosthodont. 2004;17:417-24.

10. Real-Osuna J, Almendros-Marques N, Gay-Escoda C. Prevalence of complications after the oral rehabilitation with implant-supported hybrid prostheses. Med Oral Patol Oral Cir Bucal. 2012;17:e116-21.
11. Gonzalez J. The evolution of dental materials for hybrid prosthesis. Open Dent J. 2014; 8:85-94.
12. Lekholm U, Gunne J, Henry P, Higuchi K, Lindén U, Bergström C, et al. Survival of the Brånemark implant in partially edentulous jaws: a 10-year prospective multicenter study. Int J Oral Maxillofac Implants. 1999;14:639-45.
13. Mughal AJ, Batra R, Kumar M, Bansal A, Jain H. Prosthodontic rehabilitation of edentulous patient with implant supported hybrid prosthesis: A Case Report. Dent J Adv Stud. 2018;6:122-5.
14. Cibirka RM, Razzoog M, Lang BR. Critical evaluation of patient responses to dental implant therapy. J Prosthet Dent. 1997;78:574-81
15. Haraldson T. A photoelastic study of some biomechanical factors affecting the anchorage of osseointegrated implants in the jaw. Scand J Plast Reconstr Surg. 1980;14:209-214.
16. Fortin Y, Sullivan RM. Terminal Posterior Tilted Implants Planned as a Sinus Graft Alternative for Fixed Full-Arch Implant-Supported Maxillary Restoration: A Case Series with 10- to 19-Year Results on 44 Consecutive Patients Presenting for Routine Maintenance. Clin Implant Dent Relat Res. 2017;19:56-68.
17. Carames J, Tovar Suinaga L, Yu YC, Pérez A, Kang M. Clinical Advantages and Limitations of Monolithic Zirconia Restorations Full Arch Implant Supported Reconstruction: Case Series. Int J Dent. 2015;2015:392496.
18. Ender A, Zimmermann M, Mehl A, Accuracy of complete- and partial-arch impressions of actual intraoral scanning systems in vitro. Int J Comput Dent. 2019;22:11–19.
19. Kuhr F, Schmidt A, Rehmann P, Wöstmann B. A new method for assessing the accuracy of full arch impressions in patients. J Dent. 2016;55:68–74.