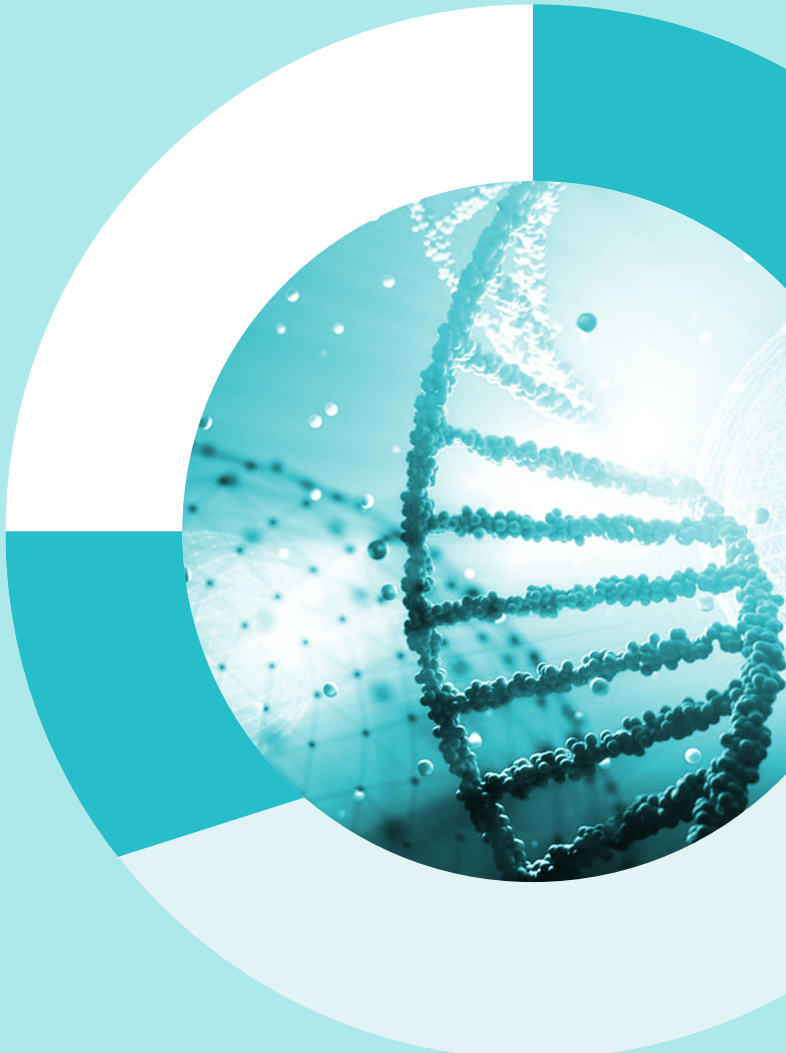
ISSN:2149-7893 E-ISSN: 2536-507X

CYPRUS

JOURNAL OF MEDICAL SCIENCES

Indexed in the Web of Science

Volume: 8 Issue: 6 December 2023



Official Journal of Cyprus Turkish Medical Association

galenos yayınevi

www.cyprusjmedsci.com

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

EDITORIAL BOARD

Publisher Contact
Address: Molla Gürani Mah. Kaçamak Sk. No: 21/1 34093 İstanbul, Türkiye
Phone: +90 (530) 177 30 97
E-mail: info@galenos.com.tr/yayin@galenos.com.tr
Web: www.galenos.com.tr **Publisher Certificate Number:** 14521

Publication Date: December 2023
E-ISSN: 2536-507X
ISSN: 2149-7893
International scientific journal published bi-annually.

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

EDITORIAL BOARD

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

EDITORIAL BOARD

Biostatistical Editors

National Advisory Board

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

EDITORIAL BOARD

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

EDITORIAL BOARD

International Advisory Board

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

EDITORIAL BOARD

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

EDITORIAL BOARD

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

EDITORIAL BOARD

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

AIMS AND SCOPE

Cyprus Journal of Medical Sciences (Cyprus J Med Sci), the official organ of Cyprus Turkish Medical Association.

This journal is an international, open access, scientific, peer-reviewed journal in accordance with independent, unbiased, and double-blinded peer-review principles. As of 2022, the journal has become a bimonthly publication, publishing in February, April, June, and August, October and December. The journal's publication language is English. (E-ISSN:2536-507X)

The aim of the journal is to publish original research papers of the highest scientific and clinical value in all medical fields. Cyprus Journal of Medical Sciences also publishes reviews, rare case report and letters to the editors.

The target audience of the journal includes healthcare professionals physicians, and researchers who are interested or working in in all fields of medicine.

The editorial and publication process of the Cyprus Journal of Medical Sciences are shaped in accordance with the guidelines of the International Committee of Medical Journal Editors (ICMJE), World Association of Medical Editors (WAME), Council of Science Editors (CSE), Committee on Publication Ethics (COPE), European Association of Science Editors (EASE), and National Information Standards Organization (NISO). The journal is in conformity with the Principles of Transparency and Best Practice in Scholarly Publishing.

Cyprus Journal of Medical Sciences is indexed in Web of Science-Emerging Sources Citation Index, TUBITAK ULAKBIM TR Index, EBSCO, J-GATE and Gale.

All manuscripts must be submitted via the online submission system, which is available at www.cyprusjmedsci.com. The journal guidelines, technical information, and the required forms are available on the journal's web page.

All expenses of the journal are covered by the Cyprus Turkish Medical Association. Potential advertisers should contact the Editorial Office. Advertisement images are published only upon the Editor-in-Chief's approval.

Statements or opinions expressed in the manuscripts published in the journal reflect the views of the author(s) and not the opinions of the Cyprus Turkish Medical Association, editors, editorial board, and/or publisher; the editors, editorial board, and publisher disclaim any responsibility or liability for such materials.

All published content is available online, free of charge at www.cyprusjmedsci.com.

Open Access Policy

This journal provides immediate open access to its content on the principle that making research freely available to the public supports a greater global exchange of knowledge.

Author(s) and copyright owner(s) grant access to all users for the articles published in the Cyprus Journal of Medical Sciencesas free of charge. Articles may be used provided that they are cited.

Open Access Policy is based on rules of Budapest Open Access Initiative (BOAI) By "open access" to [peer-reviewed research literature], we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.

Creative Commons

Material Disclaimer

Statements or opinions stated in articles published in the journal do not reflect the views of the editors, editorial board and/or publisher; The editors, editorial board and publisher do not accept any responsibility or liability for such materials. All opinions published in the journal belong to the authors.

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

INSTRUCTIONS TO AUTHORS

Copyright Agreement and Acknowledgement of Authorship Form

ICMJE Form

Cyprus Journal of Medical Sciences (Cyprus J Med Sci) is the scientific, peer-reviewed, open-access international publication organ of Cyprus Turkish Medical Association. The journal is published bimonthly in February, April, June, and August, October and December. The journal's publication language is English.

The journal aims to publish original research papers of the highest scientific and clinical value in all medical fields. Cyprus Journal of Medical Sciences also publishes reviews, rare case reports and letters to the editors.

The target audience of the journal includes healthcare professionals, physicians, and researchers who are interested or working in all fields of medicine.

To read the Article Processing Charge (APC) Policy, please click here.

EDITORIAL AND PUBLICATION PROCESS

The editorial and publication process of the Cyprus Journal of Medical Sciences are shaped in accordance with the guidelines of the International Committee of Medical Journal Editors (ICMJE), World Association of Medical Editors (WAME), Council of Science Editors (CSE), Committee on Publication Ethics (COPE), European Association of Science Editors (EASE), and National Information Standards Organization (NISO). The journal is in conformity with the Principles of Transparency and Best Practice in Scholarly Publishing.

Originality, high scientific quality, and citation potential are the most significant criteria for a manuscript to be accepted for publication. Manuscripts submitted for evaluation should not have been previously presented or already published in an electronic or printed medium. The journal should be informed of manuscripts that have been submitted to another journal for evaluation and rejected for publication. The submission of previous reviewer reports will expedite the evaluation process. Manuscripts that have been presented in a meeting should be submitted with detailed information on the organization, including the name, date, and location of the organization.

PEER REVIEW PROCESS

Manuscripts submitted to Cyprus Journal of Medical Sciences will go through a double-blind peer-review process. Each submission will be reviewed by at least two external, independent peer reviewers who are experts in their fields in order to ensure an unbiased evaluation process. The editorial board will invite an external and independent editor to manage the evaluation processes of manuscripts submitted by editors or by the editorial board members of the journal. The Editor in Chief is the final authority in the decision-making process for all submissions.

ETHICAL PROCEDURES

An approval of research protocols by the Ethics Committee in accordance with international agreements (World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects," amended in October 2013) is required for experimental, clinical, and drug studies and for some case reports. If required, ethics committee reports or an equivalent official document will be requested from the authors. For manuscripts concerning experimental research on humans, a statement should be included that shows that written informed consent of patients and volunteers was obtained following a detailed explanation of the procedures that they may undergo. For studies carried out on animals, the measures taken to prevent pain and suffering of the animals should be stated clearly. Information on patient consent, the name of the ethics committee, and the ethics committee approval number should also be stated in the "Materials and Methods" section of the manuscript. It is the authors' responsibility to protect the patients' anonymity carefully.

For photographs that may reveal the identity of the patients, signed consent of the patient or their legal representative should be enclosed, and the publication approval must be provided in the "Materials and Methods" section. However, the identities of the patients should be concealed in the photographs.

PLAGIARISM

Cyprus Journal of Medical Sciences is extremely sensitive about plagiarism. All submissions are screened by a similarity detection software (iThenticate by CrossCheck) at any point during the peer-review and/or production process. Even if you are the author of the phrases or sentences, the text should not have unacceptable similarity with the previously published data.

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

INSTRUCTIONS TO AUTHORS

When you are discussing others' (or your own) previous work, please make sure that you cite the material correctly in every instance.

In the event of alleged or suspected research misconduct, e.g., plagiarism, citation manipulation, and data falsification/fabrication, the Editorial Board will follow and act following COPE guidelines.

PREPRINT

Authors must provide the journal with the preprint server deposition of their article accompanying its DOI during initial submission.

Cyprus Journal of Medical Sciences does not consider preprint publications before publication. In other words, authors are allowed to present and discuss their findings on a non-commercial preprint server before submission to the journal.

If the article is published in the Cyprus Journal of Medical Sciences, it is the responsibility of the authors to update the archived preprint and link it to the published version of the article.

AUTHORSHIP

Each person listed as an author should fulfill the authorship criteria recommended by http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html). The ICMJE recommends that authorship is based on the following four criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND

2. Drafting the work or revising it critically for important intellectual content; AND

3. Final approval of the version to be published; AND

4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

In addition to being accountable for the parts of the work he/she has done, an author should be able to identify which co-authors are responsible for specific other parts of the work. Also, authors should have confidence in the integrity of the contributions of their co-authors.

All those designated as authors should meet all four criteria for authorship, and all who meet the four criteria should be identified as authors. Those who do not meet all four criteria should be acknowledged on the title page of the manuscript.

Cyprus Journal of Medical Sciences requires corresponding authors to submit a signed and scanned version of the Copyright Agreement and Acknowledgement of Authorship form (available for download www.cyprusjmedsci.com) during the initial submission process to act appropriately on authorship rights and to prevent ghost or honorary authorship. If the editorial board suspects a case of “gift authorship,” the submission will be rejected without further review. As part of the submission of the manuscript, the corresponding author should also send a short statement declaring that he/she accepts to undertake all the responsibility for authorship during the submission and review stages of the manuscript.

DISCLOSURE AND CONFLICTS OF INTEREST

All sources of financial support should be disclosed. All authors ought to disclose a meaningful conflict of interest in the process of forming their study. Any financial grants or other support received for a submitted study from individuals or institutions should be disclosed to the Editorial Board of the Cyprus Journal of Medical Sciences. The ICMJE Potential Conflict of Interest Disclosure Form should be filled in and submitted by all contributing authors to disclose a potential conflict of interest. The journal’s Editorial Board determines cases of a potential conflict of interest of the editors, authors, or reviewers within the scope of COPE and ICMJE guidelines.

The Editorial Board of the journal handles all appeal and complaint cases within the scope of COPE guidelines. In such cases, authors should get in direct contact with the editorial office regarding their appeals and complaints. When needed, an ombudsperson may be assigned to resolve claims that cannot be resolved internally. The Editor in Chief is the final authority in the decision-making process for all appeals and complaints.

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

INSTRUCTIONS TO AUTHORS

COPYRIGHT AND LICENSE

A Creative Commons license is a public copyright license that provides free distribution of copyrighted works or studies. Authors use the CC license to transfer the right to use, share or modify their work to third parties.

Open access is an approach that supports interdisciplinary development and encourages collaboration between different disciplines. Therefore, Cyprus Journal of Medical Sciences contributes to the scientific publishing literature by providing more access to its articles and a more transparent review process.

The journal's content is licensed under a Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) which permits third parties to share and adapt the content for non-commercial purposes by giving the appropriate credit to the original work.

DISCLAIMER

Statements or opinions expressed in the manuscripts published in Cyprus Journal of Medical Sciences reflect the views of the author(s) and not the opinions of the editors, the editorial board, or the publisher; the editors, the editorial board, and the publisher disclaim any responsibility or liability for such materials. The final responsibility regarding the published content rests with the authors.

MANUSCRIPT PREPARATION

The manuscripts should be prepared in accordance with ICMJE-Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals (updated in December 2019). Authors are required to prepare manuscripts in accordance with the CONSORT guidelines for randomized research studies, STROBE guidelines for observational original research studies, STARD guidelines for studies on diagnostic accuracy, PRISMA guidelines for systematic reviews and meta-analysis, ARRIVE guidelines for experimental animal studies, and TREND guidelines for non-randomized public behavior.

Manuscripts can only be submitted through the journal's online manuscript submission and evaluation system, available at www.cyprusjmedsci.com. Manuscripts submitted via any other medium and submissions by anyone other than one of the authors will not be evaluated.

Manuscripts submitted to the journal will first go through a technical evaluation process where the editorial office staff will ensure that the manuscript has been prepared and submitted in accordance with the journal's guidelines. Submissions that do not conform to the journal's guidelines will be returned to the submitting author with technical correction requests.

Authors are required to submit the following:

- Copyright Agreement and Acknowledgement of Authorship Form, and
- ICMJE Potential Conflict of Interest Disclosure Form (should be filled in by all contributing authors) during the initial submission. These forms are available for download at www.icmje.org.

Preparation of the Manuscript

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

The full title of the manuscript as well as a short title (running head) of no more than 50 characters,

- Name(s), affiliations, highest academic degree(s), and ORCID IDs of the author(s),
- Grant information and detailed information on the other sources of support,
- Name, address, telephone (including the mobile phone number), and e-mail address of the corresponding author,
- Acknowledgment of the individuals who contributed to the preparation of the manuscript but who do not fulfill the authorship criteria.

Abstract: An abstract should be submitted with all submissions except for Letters to the Editor. The abstract of Original Articles should be structured with subheadings (Background/Aims, Material and Methods, Results and Conclusion). Please check Table 1 below for word count specifications.

Keywords: Each submission must be accompanied by a minimum of three to a maximum of five keywords for subject indexing at the end of the abstract. The keywords should be listed in full without abbreviations. The keywords should be selected from the National Library of Medicine, Medical Subject Headings database. (https://www.nlm.nih.gov/mesh/MBrowser.html).

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

INSTRUCTIONS TO AUTHORS

Main Points: All submissions except letters to the editor should be accompanied by 3 to 5 "main points", which should emphasize the most noteworthy results of the study and underline the principle message that is addressed to the reader. This section should be structured as itemized to give a general overview of the article. Since "Main Points" target the experts and specialists of the field, each item should be written as plain and straightforward as possible.

Manuscript Types

Original Articles: This is the most important type of article since it provides new information based on original research. Acceptance of original papers will be based upon the originality and importance of the investigation. The main text of original articles should be structured with Introduction, Material and Methods, Results, and Discussion subheadings. An original article can be signed by maximum 6 authors unless it is a multi-center study or that it required extensive labour. Please check Table 1 for the limitations for Original Articles.

Clinical Trials

Cyprus Journal of Medical Sciences adopts the ICMJE's clinical trial registration policy, which requires that clinical trials must be registered in a publicly accessible registry that is a primary register of the WHO International Trials Registry Platform (ICTRP) or in ClinicalTrials.gov.

Instructions for the clinical trials are listed below.

Clinical trial registry is only required for the prospective research projects that study the relationship between a health-related intervention and an outcome by assigning people.

- To have their manuscript evaluated in the journal, author should register their research to a public registry at or before the time of first patient enrollment.
- Based on most up to date ICMJE recommendations, Cyprus Journal of Medical Sciences accepts public registries that include minimum acceptable 24-item trial registration dataset.
- Authors are required to state a data sharing plan for the clinical trial registration. Please see details under "Data Sharing" section.
- For further details, please check ICMJE Clinical Trial Policy at

http://www.icmje.org/recommendations/browse/publishing-and-editorial-issues/clinical-trial-registration.html

Data Sharing

As of 1 January 2019, a data sharing statement is required for the registration of clinical trials. Authors are required to provide a data sharing statement for the articles that reports the results of a clinical trial. The data sharing statement should indicate the items below according to the ICMJE data sharing policy:

Whether individual deidentified participant data will be shared

- What data in particular will be shared
- Whether additional, related documents will be available
- When the data will be available and for how long
- By what access criteria will be shared

Authors are recommended to check the ICMJE data sharing examples at

http://www.icmje.org/recommendations/browse/publishing-and-editorial-issues/clinical-trial-registration.html

While submitting a clinical trial to Cyprus Journal of Medical Sciences;

- Authors are required to make registration to a publicly accessible registry according to ICMJE recommendations and the instructions above.
- The name of the registry and the registration number should be provided in the Title Page during the initial submission.
- Data sharing statement should also be stated in the Title Page even the authors do not plan to share it.

Statistical analysis to support conclusions is usually necessary. Statistical analyses must be conducted in accordance with international statistical reporting standards (Altman DG, Gore SM, Gardner MJ, Pocock SJ. Statistical guidelines for contributors to medical journals. Br Med J 1983: 7; 1489-93). Information on statistical analyses should be

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

INSTRUCTIONS TO AUTHORS

provided with a separate subheading under the Materials and Methods section and the statistical software that was used during the process must be specified.

Units should be prepared in accordance with the International System of Units (SI).

Editorial Comments: Invited brief editorial comments on selected articles are published in The Cyprus Journal of Medical Sciences. Editorials should not be longer than 1000 words excluding references. Editorial comments aim to provide a brief critical commentary by reviewers with expertise or with high reputation in the topic of the research article published in the journal. Authors are selected and invited by the journal to provide such comments. Abstract, Keywords, and Tables, Figures, Images, and other media are not included.

Review Articles: Reviews prepared by authors who have extensive knowledge on a particular field and whose scientific background has been translated into a high volume of publications with a high citation potential are welcomed. These authors may even be invited by the journal. Reviews should describe, discuss, and evaluate the current level of knowledge of a topic in clinical practice and should guide future studies. The subheadings of the review articles should be planned by the authors. However, each review article should include an "Introduction" and a "Conclusion" section. Please check Table 1 for the limitations for Review Articles.

Case Reports: There is limited space for case reports in the journal and reports on rare cases or conditions that constitute challenges in diagnosis and treatment, those offering new therapies or revealing knowledge not included in the literature, and interesting and educative case reports are accepted for publication. The text should include Introduction, Case Presentation, and Discussion with an unstructured abstract. Please check Table 1 for the limitations for Case Reports.

Letters to the Editor: This type of manuscript discusses important parts, overlooked aspects, or lacking parts of a previously published article. Articles on subjects within the scope of the journal that might attract the readers' attention, particularly educative cases, may also be submitted in the form of a "Letter to the Editor." Readers can also present their comments on the published manuscripts in the form of a "Letter to the Editor." Abstract, Keywords, and Tables, Figures, Images, and other media should not be included. The text should be unstructured. The manuscript that is being commented on must be properly cited within this manuscript.

Table 1. Limitations for each manuscript type

Type of manuscript	Word limit	Abstract word limit	Reference limit	Table limit	Figure limit
Original Article	4000	250 (Structured)	35	6	5 or total of 10 images
Review Article	5000	250	50	6	10 or total of 15 images
Case Report	1200	200	15	No tables	4 or total of 8 images
Letter to the Editor	400	No abstract	5	No tables	No media

Tables

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. A descriptive title must be placed above the tables. Abbreviations used in the tables should be defined below the tables by footnotes (even if they are defined within the main text). Tables should be created using the "insert table" command of the word processing software and they should be arranged clearly to provide easy reading. Data presented in the tables should not be a repetition of the data presented within the main text but should be supporting the main text.

Figures and Figure Legends

Figures, graphics, and photographs should be submitted as separate files (in TIFF or JPEG format) through the submission system. The files should not be embedded in a Word document or the main document. When there are figure subunits, the subunits should not be merged to form a single image. Each subunit should be submitted separately through the submission system. Images should not be labeled (a, b, c, etc.) to indicate figure subunits. Thick and thin arrows, arrowheads, stars, asterisks, and similar marks can be used on the images to support figure legends. 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. The minimum resolution of each submitted figure should be 300 DPI. To prevent delays in the evaluation process, all submitted figures should be clear in resolution and large in size (minimum dimensions: 100 × 100 mm). Figure legends should be listed at the end of the main document.

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

INSTRUCTIONS TO AUTHORS

All acronyms and abbreviations used in the manuscript should be defined at first use, both in the abstract and in the main text. The abbreviation should be provided in parentheses following the definition.

When a drug, product, hardware, or software program is mentioned within the main text, product information, including the name of the product, the producer of the product, and city and the country of the company (including the state if in USA), should be provided in parentheses in the following format: "Discovery St PET/CT scanner (General Electric, Milwaukee, WI, USA)"

All references, tables, and figures should be referred to within the main text, and they should be numbered consecutively in the order they are referred to within the main text.

Limitations, drawbacks, and the shortcomings of original articles should be mentioned in the Discussion section before the conclusion paragraph.

References

Both in-text citations and the references must be prepared according to the Vancouver style.

While citing publications, preference should be given to the latest, most up-to-date publications. Authors are responsible for the accuracy of references If an ahead-of-print publication is cited, the DOI number should be provided. Journal titles should be abbreviated in accordance with the journal abbreviations in Index Medicus/MEDLINE/PubMed. When there are six or fewer authors, all authors should be listed. If there are seven or more authors, the first six authors should be listed followed by "et al." In the main text of the manuscript, references should be cited using Arabic numbers in parentheses. The reference styles for different types of publications are presented in the following examples.

Journal Article: Yazıcı A. The efficacy of endoscopic ventilation tube insertion in pediatric populations. Cyprus J Med Sci. 2019; 4(2): 73-6.

Book Section: Suh KN, Keystone JS. Malaria and babesiosis. Gorbach SL, Barlett JG, Blacklow NR, editors. Infectious Diseases. Philadelphia: Lippincott Williams; 2004.p.2290-308.

Books with a Single Author: Sweetman SC. Martindale the complete drug reference. 34th ed. London: Pharmaceutical Press; 2005.

Editor(s) as Author: Huizing EH, de Groot JAM, editors. Functional reconstructive nasal surgery. Stuttgart-New York: Thieme; 2003.

Conference Proceedings: Bengisson S. Sothemin BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92.

Proceedings of the 7th World Congress on Medical Informatics; 1992 Sept 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992. pp.1561-5.

Scientific or Technical Report: Cusick M, Chew EY, Hoogwerf B, Agrón E, Wu L, Lindley A, et al. Early Treatment Diabetic Retinopathy Study Research Group. Risk factors for renal replacement therapy in the Early Treatment Diabetic Retinopathy Study (ETDRS), Early Treatment Diabetic Retinopathy Study Kidney Int: 2004. Report No: 26.

Thesis: Yılmaz B. Ankara Üniversitesindeki öğrencilerin beslenme durumları, fiziksel aktiviteleri ve beden kitle indeksleri kan lipidleri arasındaki ilişkiler. H.Ü. Sağlık Bilimleri Enstitüsü, Doktora Tezi. 2007.

Manuscripts Accepted for Publication, Not Published Yet: Slots J. The microflora of black stain on human primary teeth. Scand J Dent Res. 1974.

Epub Ahead of Print Articles: Cai L, Yeh BM, Westphalen AC, Roberts JP, Wang ZJ. Adult living donor liver imaging. Diagn Interv Radiol. 2016 Feb 24. doi: 10.5152/dir.2016.15323. [Epub ahead of print].

Manuscripts Published in Electronic Format: Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis (serial online) 1995 Jan-Mar (cited 1996 June 5): 1(1): (24 screens). Available from: URL: http:/ www.cdc.gov/ncidodIElD/cid.htm.

REVISIONS

When submitting a revised version of a paper, the author must submit a detailed "Response to the reviewers" that states point by point how each issue raised by the reviewers has been covered and where it can be found (each reviewer's comment, followed by the author's reply and line numbers where the changes have been made) as well as an annotated copy of the main document. Revised manuscripts must be submitted within 30 days from the date of the decision letter. If the revised version of the

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

INSTRUCTIONS TO AUTHORS

manuscript is not submitted within the allocated time, the revision option may be canceled. If the submitting author(s) believe that additional time is required, they should request this extension before the initial 30-day period is over.

Accepted manuscripts are copy-edited for grammar, punctuation, and format by professional language editors. Once the publication process of a manuscript is completed, it is published online on the journal's webpage as an ahead-of-print publication before it is included in its scheduled issue. A PDF proof of the accepted manuscript is sent to the corresponding author and their publication approval is requested within 2 days of their receipt of the proof.

CYPRUS
JOURNAL OF MEDICAL SCIENCES
Indexed in Web of Science
Volume: 8 | Issue: 6 | December 2023

CONTENTS

ORIGINAL ARTICLES

CASE REPORTS

INDEX

RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2023.2023-41
Cyprus J Med Sci 2023;8(6):397-401

Comparison of the Timing of Cranioplasty Surgery After Decompressive Craniectomy

Gürkan Berikol[1], Aykut Akpınar[2]

[1]Department of Neurosurgery, University of Health Sciences Türkiye, Taksim Training and Research Hospital, İstanbul, Türkiye
[2]Department of Neurosurgery, University of Health Sciences Türkiye, Haseki Training and Research Hospital, İstanbul, Türkiye

Abstract

BACKGROUND/AIMS: We aimed to compare and evaluate the results of cranioplasty (CP) performed in the early period (within the first 1 month) and in the late period (from the 90th day onwards) in patients who had previously undergone decompressive craniectomy.

MATERIALS AND METHODS: A total of 138 patients who underwent CP in our hospital between 2016 and 2022 were included in this study. The patients were grouped as follows based on the interval between their craniectomy and CP: group 1, within the first 30 days; group 2, 31-90 days; group 3, 91-180 days; group 4, 181-360 days; and group 5, day 361 or later.

RESULTS: Our study included 94 men and 44 women who had undergone CP between 2016 and 2022. While groups 2 (p=0.011), 3 (p=0.040) and 4 (p=0.037) had statistically significant differences in comorbidities, group 5 (p=0.17) did not. The difference in infection developments (p=0.010) and their diagnosis (p=0.040) was statistically significant only between group 1 and group 4. In group 4, the number of patients with SVO was higher than that in the other groups. The duration of hospitalization was 20.13±19.42 days in group 1 and 28.39±30.96 in the other groups (p=0.137). Bone reabsorption was 2.91±7.59, 8.12±8.20, 11.37±10.07, 9.65±11.33, and 6.66±10.73 days in groups 1, 2, 3, 4 and 5, respectively. The midline shift was 1.87±2.018 and 0.51±1.19 in those patients with a craniectomy area >100 cm^2 and <100 cm^2 area, respectively. This difference was statistically significant (p=0.001).

CONCLUSION: By performing CP in the early period, early mobilization of the patient can be ensured and the risk of developing complications can be minimized.

Keywords: Cerebral edema, cranioplasty, decompressive craniectomy

INTRODUCTION

Cranioplasty (CP) is a cosmetic surgery which enhances neurological recovery by preserving the patient's neural tissues and balancing intracranial pressure, which normalizes the cerebrospinal fluid (CSF) and blood circulation.[1-5]

Decompressive craniotomy is frequently used in patients with raised intracranial pressure who cannot be treated medically at the point of connecting to life.[3] It is frequently performed in patients with traumatic brain injury, cerebral infarction, subarachnoid hemorrhage, intracranial hematoma, encephalitis, sinus thrombosis, postoperative tumor or aneurysm.

The complication rate following CP is high (0.9-40.4%),[4] and these complications include bone resorption (BR), seizures, hydrocephalus, bleeding, and infection.[1,4,6]

The recommended timing of performing CP differs in the literature; thus, there is no consensus. However, it is generally recommended that it be performed approximately 90 days after craniectomy.[3,4,7-13] Factors such as the patient's age, general condition, the presence of systemic

To cite this article: Berikol G, Akpınar A. Comparison of the Timing of Cranioplasty Surgery After Decompressive Craniectomy. Cyprus J Med Sci 2023;8(6):397-401

ORCID IDs of the authors: G.B. 0000-0001-6434-8143; A.A. 0000-0002-5049-3259.

Address for Correspondence: Gürkan Berikol
E-mail: dr.berikol@gmail.com
ORCID ID: orcid.org/0000-0001-6434-8143

Received: 04.04.2023
Accepted: 06.08.2023

diseases, infection, surgical site condition, and etiology affect the timing of CP.[14]

There is no consensus regarding the timing of performing CP. We aimed to compare and evaluate the results of CPs performed in the early period (within the first 1 month) with those performed in the late period (on or after the 90th day) in patients who had previously undergone decompressive craniectomy.

MATERIALS AND METHODS

Patient Selection

A total of 138 patients who underwent CP at our hospital between 2016 and 2022 were included in this study. The patients were divided into the following groups based on the interval between their craniectomy and CP: group 1, first 30 days; group 2, 31-90 days; group 3, 91-180 days; group 4, 181-360 days; and group 5, day 361 or later. The following data were retrospectively examined: the timing of the CP, the patient's age, diagnosis, the duration of their surgery, the materials used in CP, their preoperative and postoperative Glasgow Coma Scores (GCS), the bone tissue resorption percentages of the patients, seizures, hydrocephalus, postoperative bleeding, fluid or air collection, wound infection, reoperations and durations.

Surgical Procedure

In all patients, preoperative antibiotics were administered prophylactically and continued postoperatively until drain removal. Bone flap resorption was calculated based on the percentage reduction in flap area (% BR) by comparing the preoperative craniotomy defect with the post-CP bone flap area via computed tomography (CT). Field calculations were performed using OsiriX MD.

Autogenous bone flaps were hidden in the abdomen or lateral thigh. According to the pre-op resorption status, the titanium plate was completed with methyl methacrylate (MMA) and stabilized with a self-tapping screw or non-absorbable silk suture. The patient underwent cranial CT examination.

Ethical Approval

This study was approved by the University of Health Sciences Türkiye, Haseki Training and Research Hospital Ethics Committee (approval number: 224-2022, date: 21.12.2022). Written informed consent was obtained from the patient and/or their relatives before being included this retrospective study.

Statistical Analysis

Statistical analysis was performed using SPSS (v 20.0; SPSS Inc., Chicago, IL, USA). Descriptive data are expressed as frequencies, cross-table, rates, arithmetic means, and standard deviations. Data were analyzed using Student's t-test and correlation. The groups were compared with the test variables using the Independent samples t-test. A p-value of <0.05 was considered statistically significant.

RESULTS

In our study, 138 patients who underwent CP between 2016 and 2022 were included. The patients were grouped based on the interval between their craniectomy and CP, and 5 groups were formed. The groups were compared among themselves, and group 1 and all other groups were compared. The demographic characteristics and first diagnoses of the patients are shown in Table 1. The preoperative time, material used, BR, preoperative and postoperative GCS, cranial defect area, postoperative hematoma formation or collection, development of epileptic seizure or hydrocephalus, infection, risk of reoperation, midline shift, comorbidity, and pneumocephalus in CP were compared between the groups. When group 1 was compared with all the other groups, significant differences were found in terms of age, preoperative time, BR, preoperative GCS, and midline peeling due to sunken skin flap (Table 2). In group 1, the CP area was smaller (p=0.00), the incidence of comorbidities (p=0.012) and Trephened syndrome development (p=0.001) was lower, and the presence of air in chamber postoperatively (p=0.009) was lower than in the other groups; with these differences being statistically significant. No statistically significant difference was found between the first group and the other groups in terms of sex, postoperative bleeding, collection, reoperation rate and time, and post-CP incidences of seizure or the need for ventriculoperitoneal shunt, when compared using the Independent t-test.

Postoperatively, air was present in 106 patients, which was found to be significant only in group 2 (p=0.013). In terms of comorbidities, there was a statistically significant difference between groups 2 (p=0.011), 3 (p=0.040), and 4 (p=0.037). No statistically significant difference was found in group 5 (p=0.17).

Infection was less common in group 1 and more common in group 4; this difference was statistically significant (p=0.010). The incidence of cerebrovascular disease was found to be higher in those patients in group 4 than in the patients in the other groups. However, there was no statistically significant difference among the other groups.

Table 1. Demographic features and diagnoses of the patients

Cranioplasty groups	Male	Female	Comorbidity							Diagnosis				
			DM	HT	CAD	HT and DM	HT and CVH	HT, DM, CVH	None	CVD	T	PT	PA	ICH
Group 1	25	11	0	6	3	1	0	0	26	1	14	14	0	7
Group 2	19	13	1	9	4	5	0	0	13	11	8	7	0	6
Group 3	24	5	1	8	4	3	0	0	13	5	8	3	1	12
Group 4	16	13	0	7	0	4	3	0	15	7	11	7	2	2
Group 5	10	2	0	1	0	2	0	1	8	2	6	4	0	0
Total	94	44	2	31	11	15	3	1	75	26	47	35	3	27

DM: Diabetes mellitus, HT: Hypertension, CAD: Coronary artery disease, CVD: Cerebrovascular diseases, T: Trauma, PT: Postoperative tumor, PA: Postoperative aneurysm, ICH: Intracranial hemorrhage.

Autogenous grafts, MMA, titanium mesh, and bone matrix were used for the CP. Group 1 included patients with post-traumatic open wounds, collapse fractures, and multiple-part fractures, and patients with tumors were common. Therefore, the MMA graft was used more than the other materials. Autogenous grafts were used more often in group 2 than in the other groups, and this difference was statistically significant (p=0.017) (Table 3).

Seven patients with very early-stage CP underwent reoperation. Four were re-operated on due to infection; MRSA growth was observed in one patient and *Escherichia coli* in another. Two patients underwent surgery because of bleeding in the hostel, and one patient was operated on due to the early development of extra-axial collections and seizures.

Of the 27 patients who underwent reoperation, 19 developed a collection. Of these 19 patients, five underwent CP soon after the craniectomy; this was not statistically significant. Postoperatively, 38 patients developed bleeding in the hospital, and 12 of them underwent reoperation. In the very early period, two patients underwent reoperation. This was not statistically significant.

The two groups based on bone flap areas (<100 cm^2 and ≥100 cm^2) were compared with each other. BR and midline slip were higher and length of stay was longer in the group with a bone flap <100 cm^2 than in the group with a bone flap <100 cm^2 (Table 4).

Table 2. Comparison of the characteristics of the groups formed based on the timing of cranioplasty

	Group 1, (n=30)	Group 2, (n=32)	Group 3, (n=29)	Group 4, (n=29)	Group 5, (n=12)
Age	34.91±20.62 (p=0.002)	47.12±18.28 (p=0.012)	49.79±16.10 (p=0.002)	42.37±15.67 (p=0.113)	43.33±16.80 (p=0.208)
Pre-op time	11.38±13.01 (p=0.000)	73.87±30.18 (p=0.00)	146.75±35.08 (p=0.00)	270.00±74.35 (p=0.00)	1015.83±895.80 (p=0.00)
Bone resorption	2.91±7.59 (p=0.001)	8.12±8.20 (p=0.008)	11.37±10.07 (p=0.000)	9.65±11.33 (p=0.006)	6.66±10.73 (p=0.190)
Pre-op GCS	4.61±0.64 (p=0.001)	4.03±0.89 (p=0.003)	4.13±0.83 (p=0.012)	4.13±0.74 (p=0.008)	4.08±0.90 (p=0.032)
Post-op GCS	4.69±0.52 (p=0.141)	4.50±0.62 (p=0.167)	4.55±0.63 (p=0.393)	4.58±0.50 (p=0.402)	4.41±0.66 (p=0.145)
Midline shift	0.30±0.66 (p=0.001)	1.18±1.46 (p=0.002)	1.65±1.73 (p=0.000)	1.06±2.05 (p=0.040)	1.83±2.75 (p=0.03)
Hospitalization period (days)	20.13±19.42 (p=0.137)	29.28±32.75 (p=0.161)	25.17±24.01 (p=0.354)	31.55±35.80 (p=0.106)	26.16±31.45 (p=0.43)

Pre-op: Preoperative, Post-op: Postoperative, GCS: Glasgow Coma Score.

Table 3. Materials used for cranioplasty

	CP material					Total
	Autogenous	MMA	Titanium	MMA or titanium with autogenous	Bone matrix	
Group 1	22	11	1	1	1	36
Group 2	29	2	1	0	0	32
Group 3	21	3	1	4	0	29
Group 4	14	11	1	2	1	29
Group 5	3	6	1	2	0	12

CP: Cranioplasty, MMA: Methyl methacrylate.

Table 4. Comparison of groups based on the craniectomy area width (α<100 cm^2 and α≥100 cm^2)

	(α<100 cm^2), (n=80)	(α≥100 cm^2), (n=58)	p
Age	41.50±19.45	46.10±16.74	0.113
Pre-op time	196.15±463.23	195.82±191.87	0.996
Bone resorption	4.68±8.16	11.72±10.45	0.001
Pre-op GCS	4.53±0.61	3.81±0.86	0.001
Post-op GCS	4.71±0.50	4.37±0.61	0.001
Midline shift	0.51±1.19	1.87±2.018	0.001
Hospitalization period	18.45±19.15	36.98±35.37	0.001
Reoperation time	18.12±22.3	4.16±3.25	0.149
Duration (classification)	2.35±1.40	3.01±1.05	0.003

Pre-op: Preoperative, Post-op: Postoperative, GCS: Glasgow Coma Score.

DISCUSSION

Although CP appears to be a simple procedure, complication rates are high (10.9-50%).[11,15] In addition to easy dissection, the other advantages in early-stage CP include lower blood loss and a shorter surgical time.[4,8,11] In addition, it can provide early normalization of cerebral blood flow.[16] Furthermore, better neurological recovery and fewer complications are observed.[2,9,11] Studies have demonstrated a high complication rate due to the risk of hydrocephalus in the early postoperative period and increased length of stay.[6,10] Especially with the prolongation of the interval between decompressive craniectomy and CP, the risk of seizure and midline shift may increase. Other studies have demonstrated that there is no difference in complications between CP being performed in the early and late periods.[7,13] It is recommended that CP be performed at the earliest between the 15th and 30th days.[3] After the CSF dynamics and blood circulation are normalized after CP, neurocognitive functions improve.[2,5,7,16] Although there was no statistically significant difference in the preoperative GCS and postoperative GCS in our study group, the GCS was better in both the early and late groups. With early surgery, the risk of developing midline shift and Trephened syndrome reduces due to CPs effect on cerebral blood flow and CSF circulation.

There may be signs of infection, hyperemia, swelling, temperature increase, and abscess in the surgical field after CP. There is a risk of infection, especially following trauma and decompression of the frontal sinus and in those patients with comorbidities and long hospital stays.[15] Although the infection rates following CP are reportedly 7-22%,[17] there was one study where this rate was as high as 33%.[16] In our study, infection was observed in 27 patients (19.56%); and it was observed in four patients (11.11%) in the very early period. In the first month, two patients following CP demonstrated microbial growth. One patients had MRSA growth and the other had *E. coli* growth.

The risk of post-CP seizures can be as high as 30.3%, but early surgery can reduce this risk.[12]

In our study, seven patients (5.07%) developed post-CP seizures. One patient (2.7%) developed a seizure in the very early period. Patients were more prone to seizures if they developed postoperative bleeding, fluid collection, or infection. Four patients underwent reoperation. Reoperation was performed in one patient in the very early group and in three patients in the late period.

There are studies reporting that it increases the risk of multiple skull fractures, age <30 years, large bone defects, post-traumatic hydrocephalus and shunt operations, low GCS, infection, prolonged interval prior to CP, and BR.[18] Especially in children, BR can reach up to 66.7%.[18] Studies indicate that BR is high in those patients aged <18 years and that the risk of reoperation is high.[11] Avascular necrosis in bone flaps reduces with osteoblastic/osteoclastic cell activity and regression of collagen matrix enzymes.[19] The rate of BR due to bone thinning, decreases in density, and osteolysis can be as high as 31.7%,[18] 46.3% in the study by Zhang et al.[20], or 46.3% in the study by Stieglitz et al.[21] Furthermore, it was higher in those with a greater melting point.[18-22]

In our study, the rate of BR was 2.91%±7.59% in the first 30 days and 9.31%±9.97% after the 31st day. The BR and short time-to-surgery were found to be statistically significant (p=0.001). Furthermore, in group 1, most of the patients had a CP defect <100 cm^2. In patients with a flap area >100 cm^2, the BR was statistically higher than in those with a flap area <100 cm^2 (p=0.00). The correlations between low GCS scores, the presence of comorbidities, long hospitalization, midline spur, postoperative bleeding, seizures, and the CP flap area were statistically significant. The BR was 5.76%±11.87% in those patients aged <19 years (n=13) and 7.84%±9.59% in those aged >19 years. Although the sample was small, the BR was lower in the younger group than in the older group (p=0.47). When the very early CP group was compared with the other groups, there was no statistically significant difference in terms of postoperative bleeding, collection or the rate of reoperation.

The rate of reoperation after CP is reportedly 1.4%-32%.[8] While the total number of patients who underwent reoperation was 27 (19.56%) in our study, 7 (19.44%) in the very early group underwent reoperation. The reoperation rates in our study are consistent with those in the literature. There was no significant difference between the groups.

When group 1 and all other CP groups were compared, group 1 had younger patients, fewer comorbidities, shorter time-to-CP, better preoperative and postoperative GCS, lower midline slip, CP area <100 cm^2, and lower BR.

If the bone flap area was >100 cm^2, the BR was greater. BR was found to be statistically associated with a low GCS score, the presence of comorbidities, longer hospitalization periods, midline shift, postoperative bleeding, and seizures. Although the BR rate was lower in patients aged <19 years, it was not statistically significant. However, our study sample was small.

Study Limitations

Our study was a retrospective study with a small sample size. Further studies with larger sample sizes are required to externally validate our findings.

CONCLUSION

In the early period of CP, lower age, fewer comorbidities, better GCS, lower brain edema and less midline shift are important factors. In the early period, protection of brain tissue from external factors and the normalization of CSF and blood flow with CP can ensure early mobilization of the patient and minimize the risk of developing complications.

MAIN POINTS

- The time between decompressive craniectomy and cranioplasty is important.
- The results of cranioplasty applied at a young age and in the early period are more successful.
- Performing cranioplasty in the early period can provide protection to the brain tissue from external factors. Normalization of cerebrospinal fluid and blood flow can provide early mobilization of the patient.

ETHICS

Ethics Committee Approval: This study was approved by the University of Health Sciences Türkiye, Haseki Training and Research Hospital Ethics Committee (approval number: 224-2022, date: 21.12.2022).

Informed Consent: Written informed consent was obtained from the patient and/or their relatives before being included this retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: G.B., A.A., Concept: G.B., A.A., Design: G.B., A.A., Data Collection and/or Processing: G.B., A.A., Analysis and/or Interpretation: G.B., A.A., Literature Search: G.B., A.A., Writing: G.B., A.A.

DISCLOSURES

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

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

REFERENCES

1. Baldo S, Tacconi L. Effectiveness and safety of subcutaneous abdominal preservation of autologous bone flap after decompressive craniectomy: a prospective pilot study. World Neurosurg. 2010; 73(5): 552-6.
2. Malcolm JG, Rindler RS, Chu JK, Chokshi F, Grossberg JA, Pradilla G, et al. Early Cranioplasty is Associated with Greater Neurological Improvement: A Systematic Review and Meta-Analysis. Neurosurgery. 2018; 82(3): 278-88.
3. Morton RP, Abecassis IJ, Hanson JF, Barber JK, Chen M, Kelly CM, et al. Timing of cranioplasty: a 10.75-year single-center analysis of 754 patients. J Neurosurg. 2018; 128(6): 1648-52.
4. Piazza M, Grady MS. Cranioplasty. Neurosurg Clin N Am. 2017; 28(2): 257-65.
5. Posti JP, Yli-Olli M, Heiskanen L, Aitasalo KMJ, Rinne J, Vuorinen V, et al. Cranioplasty after severe traumatic brain injury: effects of trauma and patient recovery on cranioplasty outcome. Front Neurol. 2018; 9: 223.
6. Goedemans T, Verbaan D, van der Veer O, Bot M, Post R, Hoogmoed J, et al. Complications in cranioplasty after decompressive craniectomy: timing of the intervention. J Neurol. 2020; 267(5): 1312-20.
7. Aloraidi A, Alkhaibary A, Alharbi A, Alnefaie N, Alaglan A, AlQarni A, et al. Effect of cranioplasty timing on the functional neurological outcome and postoperative complications. Surg Neurol Int. 2021; 12: 264.
8. Bader ER, Kobets AJ, Ammar A, Goodrich JT. Factors predicting complications following cranioplasty. J Craniomaxillofac Surg. 2022; 50(2): 134-9.
9. Bjornson A, Tajsic T, Kolias AG, Wells A, Naushahi MJ, Anwar F, et al. A case series of early and late cranioplasty-comparison of surgical outcomes. Acta Neurochir (Wien). 2019; 161(3): 467-72.
10. Malcolm JG, Rindler RS, Chu JK, Grossberg JA, Pradilla G, Ahmad FU. Complications following cranioplasty and relationship to timing: A systematic review and meta-analysis. J Clin Neurosci. 2016; 33: 39-51.
11. Piedra MP, Nemecek AN, Ragel BT. Timing of cranioplasty after decompressive craniectomy for trauma. Surg Neurol Int. 2014; 5: 25.
12. Shih FY, Lin CC, Wang HC, Ho JT, Lin CH, Lu YT, et al. Risk factors for seizures after cranioplasty. Seizure. 2019; 66: 15-21.
13. Yadla S, Campbell PG, Chitale R, Maltenfort MG, Jabbour P, Sharan AD. Effect of early surgery, material, and method of flap preservation on cranioplasty infections: a systematic review. Neurosurgery. 2011; 68(4): 1124-9.
14. Sahoo NK, Tomar K, Thakral A, Kumar S. Failures in cranioplasty - A clinical audit & review. J Oral Biol Craniofac Res. 2021; 11(1): 66-70.
15. Frassanito P, Fraschetti F, Bianchi F, Giovannenze F, Caldarelli M, Scoppettuolo G. Management and prevention of cranioplasty infections. Childs Nerv Syst. 2019; 35(9): 1499-506.
16. Alkhaibary A, Alharbi A, Alnefaie N, Oqalaa Almubarak A, Aloraidi A, Khairy S. Cranioplasty: a comprehensive review of the history, materials, surgical aspects, and complications. World Neurosurg. 2020; 139: 445-52.
17. Cheah PP, Rosman AK, Cheang CK, Idris B. Autologous Cranioplasty post-operative surgical site infection: does it matter if the bone flaps were stored and handled differently? Malays J Med Sci. 2017; 24(6): 68-74.
18. Barzaghi LR, Parisi V, Gigliotti CR, Giudice L, Snider S, Dell'Acqua A, et al. Bone resorption in autologous cryopreserved cranioplasty: quantitative evaluation, semiquantitative score and clinical significance. Acta Neurochir (Wien). 2019; 161(3): 483-91.
19. Movassaghi K, Ver Halen J, Ganchi P, Amin-Hanjani S, Mesa J, Yaremchuk MJ. Cranioplasty with subcutaneously preserved autologous bone grafts. Plast Reconstr Surg. 2006; 117(1): 202-6.
20. Zhang J, Peng F, Liu Z, Luan J, Liu X, Fei C, et al. Cranioplasty with autogenous bone flaps cryopreserved in povidone iodine: a long-term follow-up study. J Neurosurg. 2017; 127(6): 1449-56.
21. Stieglitz LH, Fung C, Murek M, Fichtner J, Raabe A, Beck J. What happens to the bone flap? Long-term outcome after reimplantation of cryoconserved bone flaps in a consecutive series of 92 patients. Acta Neurochir (Wien). 2015; 157(2): 275-80.
22. Leão RS, Maior JRS, Lemos CAA, Vasconcelos BCDE, Montes MAJR, Pellizzer EP, et al. Complications with PMMA compared with other materials used in cranioplasty: a systematic review and meta-analysis. Braz Oral Res. 2018; 32: e31.

RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2023.2023-5
Cyprus J Med Sci 2023;8(6):402-405

The Awareness Level of Obstructive Sleep Apnea Syndrome Among Primary Care Medical Staff

Pınar Gelener[1], Füsun Yıldız[2]

[1]Department of Neurology, University of Kyrenia Faculty of Medicine, Kyrenia, North Cyprus
[2]Department of Pulmonology, Cyprus International University Faculty of Medicine, Nicosia, North Cyprus

Abstract

BACKGROUND/AIMS: Despite obstructive sleep apnea syndrome (OSAS) being a prevalent condition, it is under-recognized and underestimated by many workers in the medical field. We aimed to assess the awareness level of primary care medical staff towards OSAS during daily practice in a tertiary referral university hospital.

MATERIALS AND METHODS: A prospective study was conducted among medical staff. The participants were asked to answer a 24-question survey regarding the risk factors, symptoms and complications of OSAS. One sleep expert reviewed and approved the checklist questionnaire. The demographic data of the participants, their background regarding OSAS, their recognition of the symptoms, diagnostic tests and consequences including cardiovascular, neurobehavioral and urologic diseases were investigated. The OSAS points were calculated for each participant in order to assess their awareness levels. The OSAS points were compared between different occupation, age and gender groups.

RESULTS: Data was available from 137 participants of whom 39% were males and 61% were females. The median age was 25 (22-33) years. Of the participants, 26.8% were medical doctors, 20% were medical students working as intern doctors, 15.2% were nurses and 37.5% were other occupations. Only 1.9% of them had never heard about OSAS. The most common source of information regarding OSAS was during their medical or paramedical training and research (61.7%). Only 12.5% of the participants attended lectures or conferences about sleep disorders during their postgraduate training or practice. Of the participants, only 38.3% of the participants identified male gender as being a risk factor. More than half of the participants identified smoking (80.8%), alcohol (59.5%) and obesity (82.8%) as non-structural risk factors for OSAS. Only 40.6% of the participants had information that enlarged neck circumference (men: >43 cm; women: >37 cm) was a characteristic physical finding. The recognition level of the symptoms were as follows: snoring (74.2%), respiratory breaks (86.7%), daytime somnolence (57.4%), daytime fatigue (33.8%) and morning headache (66.1%). Of the participants, 77.9% identified the need for polysomnography for the evaluation of patients. The recognition level of serious consequences were as follows; motor vehicle accidents (51.4%), hypertension (28%), diabetes (19%), cardiac arrhythmia (62.5%), stroke (43%), dementia (26%), nocturia (17%) and sexual dysfunction (37%). The mean OSAS awareness point was 10.77±4.86. The medical doctors' and medical students' OSAS awareness points were statistically significant higher than the other occupation groups. There was a positive weak correlation between participants' ages and their awareness levels.

CONCLUSION: According to these results, although most of medical staff have some idea about the common symptoms and risks of sleep apnea, they do not have enough knowledge about its possible consequences. It is necessary to develop education programs in order to increase OSAS awareness among practicing primary care staff, especially among non-doctor groups, in order to enhance their daily patient encounters.

Keywords: Awareness, medical staff, obstructive sleep apnea syndrome

*This study was presented and rewared as the best poster presentation at "Türk Toraks Derneği 22. Yıllık Kongresi" which was endorsed by the American Thoracic Society and European Respiratory Society in 2019.

To cite this article: Gelener P, Yıldız F. The Awareness Level of Obstructive Sleep Apnea Syndrome Among Primary Care Medical Staff. Cyprus J Med Sci 2023;8(6):402-405

ORCID IDs of the authors: P.G. 0000-0002-8681-9847; F.Y. 0000-0003-4810-7301.

Address for Correspondence: Pınar Gelener
E-mail: drpinargelener@gmail.com
ORCID ID: orcid.org/0000-0002-8681-9847

Received: 13.02.2023
Accepted: 26.05.2023

INTRODUCTION

Obstructive sleep apnea syndrome (OSAS) is a prevalent condition well characterized by the recurrent collapse of the upper airway and repetitive episodes of desaturations and arousals during sleep.[1]

It is typically characterized by symptoms of loud snoring, witnessed apneas, excessive daytime sleepiness, fatigue and morning headache.[2,3]

The complications related with OSAS include neurocognitive, cardiovascular, metabolic and urogenital consequences such as daytime sleepiness, depression, stroke, dementia, hypertension, diabetes and impotence.[1]

Despite high prevalence rates of about 7% in middle-aged adults, up to 90% of patients do not receive a diagnosis, thus suggesting that many remain unrecognized and untreated.[4,5] Treatment reduces long term complications and so recognition of these patients is crucial.

Increased awareness of the presenting symptoms and the possible consequences of this syndrome by healthcare providers is expected to decrease the number of undiagnosed and untreated cases.

To date, there has been no survey examining the levels of awareness and knowledge of OSAS among health care providers. In this study, we aimed to assess the awareness levels of primary care medical staff towards OSAS during their daily practice in our region and our hospital.

MATERIALS AND METHODS

A prospective study was conducted in January and February, 2019 at a training and educational hospital. Ethical approval was obtained from University of Kyrenia Ethics Committee (approval number: RY-2018-08). The subjects included the medical staff consisting of medical doctors, supervisors, dieticians, nurses, call center workers, pharmacists, physiotherapists, health and emergency technicians, all of whom were actively working in our hospital.

The paper version of the questionnaire was handed out to participants by the authors. The subjects were made aware of the aims of this study and that the survey was voluntary.

The participants were asked to answer a 24-question survey regarding the risk factors, symptoms and complications of OSAS. The questionnaire was based on the guidelines for clinical practice in OSAS which mainly included the risk factors, common symptoms and consequences of the disease. The survey questions were prepared by the authors themselves. One sleep expert reviewed and approved the checklist questionnaire. The participants were asked to select either "*true*", "*false*" or "*don't know*" as their answers.

The demographic data of the participants, their background and postgraduate education (if present) about OSAS, their recognition of the symptoms, their knowledge of diagnostic tests and consequences including cardiovascular, neurobehavioral and urologic diseases were investigated.

OSAS points were calculated by using the correct number of questions answered by the participants in order to assess their awareness level. One point was given for each correct question so the maximum awareness point was 22 (out of 22 questions).

Statistical Analysis

The SPSS Statistics for Windows, version 22.0 (SPSS Inc., Chicago, Ill., USA) was used as the statistical analysis program. Descriptive statistics were used for the demographic and clinical characteristics. The data were stated as mean ± standard deviation, n (%) and median (25^{th} percentiles-75^{th} percentiles). Histograms, Q-Q graphics and the Shapiro-Wilk tests of normality were used to assess the normal distribution of means. Continuous data variables are presented as the median and interquartile range (25^{th}-75^{th} quartiles). Categorical variables are presented as n (%). Chi-square analysis was performed for the analysis of categorical variables. The two Independent samples t-test was used to compare OSAS points and gender. The ANOVA test was used to compare OSAS points and occupation. The Tukey test was used for multiple comparisons. The relation between the OSAS point and age was evaluated by Spearman correlation analysis and scatter plot. A p-value of <0.05 was considered to be statistically significant.

RESULTS

Data was available from 137 participants of whom 39% were males and 61% were females. The median age was 25 years (22-33) and the range 22-66 years. Of the participants, 26.8% were medical doctors, 20% were faculty of medicine students working as intern doctors in the same hospital, 15.2% were nurses and 37.5% were other occupations such as pharmacists, laboratory and emergency technicians (Table 1).

The most common source of information about OSAS was during their medical or paramedical education and training (61.7%, n=84). Only 12.5% (n=17) of the participants attended lectures or conferences about sleep disorders during their postgraduate training or practice. All of these participants were medical doctors.

Of the participants, only 38.3% of the participants identified male gender as being a risk factor. More than half of the participants identified smoking (80.8%) alcohol consumption (59.5%) and obesity (82.8%) as non-structural risk factors for OSAS. Only 40.6% of the participants had information regarding enlarged neck circumference (men: >43 cm; women: >37 cm) being a characteristic physical finding. The results for the risk factors are shown in Table 2.

The recognition level of the symptoms were as follows: respiratory breaks (86.7%), snoring (74.2%), morning headache (66.1%), daytime somnolence (57.4%) daytime fatigue (33.8%) and nocturia (17.7%).

Table 1. Descriptive statistics of the participants

Variables	Descriptive statistics
Age	25.0 (22.0-33.0)
Gender	
Female	54 (39)
Male	83 (61)
Occupation	
Medical doctors	30 (26.8)
Medical students	23 (20.5)
Nurses	17 (15.2)
Others	42 (37.5)
OSAS points	10.77±4.86

The data is stated as; mean ± standard deviation, n (%) and median (25^{th} percantiles-75^{th} percentiles), OSAS: Obstructive sleep apnea syndrome.

Of the participants, 77.9% identified the need for polysomnography for the evaluation of patients. The recognition level of serious consequences were as follows; motor vehicle accidents (51.4%), hypertension (28.6%), diabetes (19.8%), cardiac arrhythmia (62.5%), stroke (43.3%), dementia (26%), and sexual dysfunction (37.7%). The results for the awareness of symptoms and complications of OSAS are shown in Figure 1.

For the consequences including hypertension, diabetes, stroke, dementia, nocturia and sexual dysfunction more than 50% of the participants answered "*don't know.*"

The mean OSAS awareness point was 10.77±4.86 among all participants (Table 1). The medical doctors' and medical students' OSAS awareness points were statistically significant higher than the nurses and the other occupation groups. The nurses' awareness scores were similar to both groups. There was no difference between gender and awareness points (Table 3).

There was a positive weak correlation between the participants' age and their OSAS awareness levels (Figure 2).

DISCUSSION

Obstructive sleep apnea is a common disorder of repetitive pharyngeal collapse leading to oxygen desaturation, hypercapnia and sleep fragmentation which may contribute to cardiovascular, metabolic and neurocognitive effects. It is regarded as a global health problem with increasing prevalence.[3]

According to different studies from Canada, Oklahoma and Australia which surveyed primary care and sleep clinic patients, it was found that primary care providers do not routinely screen for symptoms of OSAS or refer high-risk patients to sleep specialists.[6-9]

We assessed the awareness and attitudes towards OSAS of primary care medical staff who were actively working in our hospital.

One of the major results of our study was that primary medical staff do not have enough awareness on overall OSAS. According to the overall mean OSAS awareness points, less than half of the questions were answered correctly. Although more than half of the participants recognized the common risk factors of obesity, smoking and alcohol consumption, the least known risk factor was enlarged neck circumference. Another important result was that the awareness level was highest among the medical doctors and medical students when compared to the others.

The symptoms which were best known included respiratory breaks, snoring, morning headache and daytime somnolence. In the study by Arous et al.[4], the general population was investigated in Lorraine, France.

Table 2. The responses of the participants regarding to the risk factors of OSAS

(n=136)	Yes	No	Don't know
Smoking	80.8% (n=110)	3.6% (n=5)	15.4% (n=21)
Alcohol consumption	59.5% (n=81)	7.3% (n=10)	33% (n=45)
Obesity	82.3% (n=112)	7% (n=10)	10.2% (n=14)
Enlarged neck circumference	40.6% (n=54)	6.01% (n=8)	53.3% (n=71)

OSAS: Obstructive sleep apnea syndrome.

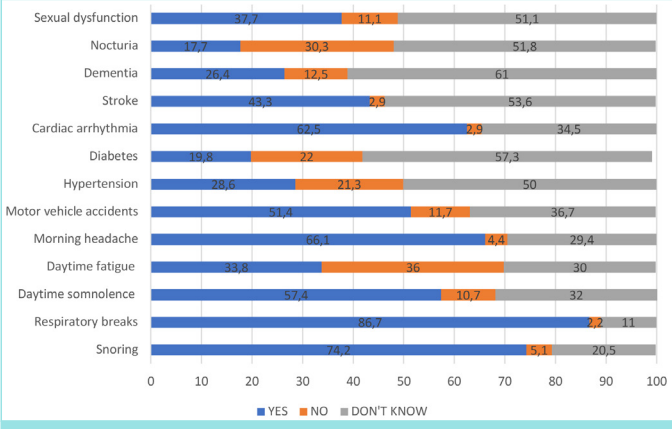


Figure 1. The results for the awareness level of symptoms and complications of OSAS in percentages.

OSAS: Obstructive sleep apnea syndrome.

Table 3. The comparison of total OSAS points according to gender and occupation

Variables	OSAS points	p
Gender		
Female (n=53)	10.87±4.62	0.776
Male (n=83)	10.62±5.25	
Occupation		
Medical doctor (n=30)	13.70±4.43[a]	<0.001
Medical student (n=23)	11.96±3.74[a]	
Nurse (n=17)	10.59±4.06[a,b]	
Others (n=42)	8.98±4.75[b]	

The data is stated as mean ± standard deviation. The same letters in the same column represent the similarity between occupations whereas different letters represent difference. OSAS: Obstructive sleep apnea syndrome.

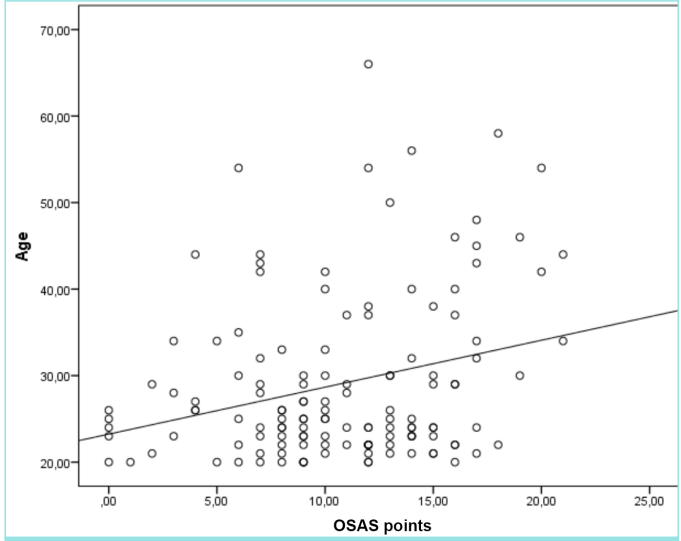


Figure 2. Scatter plot showing the relation between the OSAS points and age. There is a statistically significant (p=0.001) relation between age and OSAS points. This relation was weak positive (r=0.273).

OSAS: Obstructive sleep apnea syndrome.

More than 75% were well-aware of these symptoms. In another study by Sia et al.[1] from Singapore, 60% of the participants were aware of these symptoms.

It is known that nocturia is high among OSAS patients. The least-known symptom in our study was nocturia, which is parallel to the study by Arous et al.[4].

Of the participants, the majority identified the need for polysomnography for the evaluation of patients.

The least known complications of OSAS in our study group were hypertension, diabetes, stroke, dementia and sexual dysfunction. These were not recognized by the majority of the participants. Motor vehicle accidents and cardiac arrhythmia were recognized by the majority of the participants.

Therefore, it is an important finding in the present study that medical staff are not sufficiently aware of the link between OSAS and cardiovascular and neurobehavioral complications, especially dementia and diabetes. Another interesting finding was that cardiac arrhythmia was correctly identified by a large number in both our study and the study by Arous et al.[4].

Another alarming awareness shortfall was the lack of information about dementia. Only 26% of the participants were aware of this, whereas in the study by Arous et al.[4], this rate was 17.88% and in the study by Sia et al.[1], it was 0.6%.[1]

Only a small percentage of the participants had attended lectures or conferences about sleep disorders during their postgraduate practice. All of these participants were medical doctors. According to these results, developing postgraduate educational programs especially targeting non-doctor medical staff groups is crucial.

Study Limitations

The present study had certain limitations. One limitation was the multiple-choice design with a "*don't know*" option in which the respondents may avoid answering definitively in order to get better scores for awareness. Additionally, we examined behaviors at a single institution and our findings may not be generalizable to other busy primary care practices. Larger-scale studies are needed to extrapolate the awareness of OSAS to a wider population.

CONCLUSION

According to these results, although most of medical staff had some idea regarding the common risk factors and symptoms, they did not have enough knowledge about important consequences, including hypertension, diabetes, stroke, dementia, nocturia and sexual dysfunction. According to these results, it is necessary to develop educational programs and information campaigns in order to increase OSAS awareness among practicing primary care staff, especially in non-medical doctor groups in order to enhance their patient encounters. Routine screening and assessment for OSAS in primary care settings will be another important precaution, with this being currently recommended widely in the literature.

MAIN POINTS

- The doctors' and medical students' OSAS awareness scores were higher than the nurses and the other occupation groups.
- The least known risk factor for OSAS was enlarged neck circumference.
- The consequences of OSAS including dementia and sexual dysfunction were not recognized by the majority of the participants.

ETHICS

Ethics Committee Approval: Ethical approval was obtained from University of Kyrenia Ethics Committee (approval number: RY-2018-08).

Informed Consent: It wasn't obtained.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Concept: F.Y., Design: P.G., F.Y., Data Collection and/or Processing: P.G., Analysis and/or Interpretation: P.G., F.Y., Literature Search: P.G., Writing: P.G.

DISCLOSURES

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

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

REFERENCES

1. Sia CH, Hong Y, Tan LWL, van Dam RM, Lee CH, Tan A. Awareness and knowledge of obstructive sleep apnea among the general population. Sleep Med. 2017; 36: 10-7.
2. Lindberg E, Benediktsdottir B, Franklin KA, Holm M, Johannessen A, Jögi R, et al. Women with symptoms of sleep-disordered breathing are less likely to be diagnosed and treated for sleep apnea than men. Sleep Med. 2017; 35: 17-22.
3. Jordan AS, McSharry DG, Malhotra A. Adult obstructive sleep apnoea. Lancet. 2014; 383(9918): 736-47.
4. Arous F, Boivin JM, Chaouat A, Rumeau C, Jankowski R, Nguyen DT. Awareness of obstructive sleep apnea-hypopnea syndrome among the general population of the Lorraine Region of France. Eur Ann Otorhinolaryngol Head Neck Dis. 2017; 134(5): 303-8.
5. Chen X, Wang R, Zee P, Lutsey PL, Javaheri S, Alcántara C, et al. Racial/Ethnic Differences in Sleep Disturbances: The Multi-Ethnic Study of Atherosclerosis (MESA). Sleep. 2015; 38(6): 877-88.
6. Miller JN, Berger AM. Screening and assessment for obstructive sleep apnea in primary care. Sleep Med Rev. 2016; 29: 41-51.
7. Bailes S, Baltzan M, Rizzo D, Fichten CS, Grad R, Wolkove N, et al. Sleep disorder symptoms are common and unspoken in Canadian general practice. Fam Pract. 2009; 26(4): 294-300.
8. Grover M, Mookadam M, Armas D, Bozarth C, Castleberry T, Gannon M, et al. Identifying patients at risk for obstructive sleep apnea in a primary care practice. J Am Board Fam Med. 2011; 24(2): 152-60.
9. Burgess KR, Havryk A, Newton S, Tsai WH, Whitelaw WA. Targeted case finding for OSA within the primary care setting. J Clin Sleep Med. 2013; 9(7): 681-6.

RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2023.2022-41
Cyprus J Med Sci 2023;8(6):406-410

Epilepsy After Neonatal Seizures: Etiologies, Clinical and Developmental Outcomes

Burçin Şanlıdağ[1], Mehmet Alp Dirik[2], Eray Dirik[1]

[1]Department of Pediatrics Neurologist, Near East University Hospital, Nicosia, North Cyprus
[2]Department of Radiology, Dr. Suat Günsel University of Kyrenia Hospital, Kyrenia, North Cyprus

Abstract

BACKGROUND/AIMS: The newborn period has the highest risk of seizures and the majority of these seizures are symptomatic. Children with neonatal seizures have a higher risk of epilepsy. The aim of the present study was to identify etiological factors, clinical characteristics, and seizure control in children with epilepsy with a history of neonatal seizures.

MATERIALS AND METHODS: Children who were diagnosed with epilepsy between January, 2014 and January, 2021 were evaluated. Among 220 epileptic children, the ones who had a history of newborn seizures and a follow-up of more than 5 years were enrolled in this study.

RESULTS: Among the 41 patients, 14 (34.1%) were girls and 27 (65.9%) were boys. The mean age at the diagnosis of epilepsy was 3.2 months. Etiological factors were demonstrated in 26 (63.4%) of the patients. Hypoxic-ischemic encephalopathy was the main cause and it was reported in 13 (31.7%) patients. Twenty-five (61%) patients had both mental and motor retardation, whereas 1 (2.4%) patient only had mental retardation. Abnormal findings on magnetic resonance imaging (MRI) were documented in 27 (65.9%) of the patients. A statistically significant association was found among mental motor retardation and the presence of abnormality on MRI scans. Seizures were controlled in 27 (65.9%) of the patients, whereas 14 (34.1%) of the patients had refractory seizures.

CONCLUSION: Epileptic children with previous neonatal-onset seizures had a higher incidence of mental motor retardation and refractory epilepsy. The onset age of epilepsy was during early infancy. Abnormal findings on MRI scans were warning signs for poor prognosis and related to mental and motor retardation, but not related to seizure control.

Keywords: Epilepsy, newborn seizure, developmental delay, magnetic resonance imaging, seizure control

INTRODUCTION

The neonatal period is the period of life in which the incidence of seizures is the highest. Incidence was documented in 2.6 out of 1,000 live births, whereas it was documented in 8.6% of infants who were hospitalized in newborn intensive care units.[1,2] The majority of newborn seizures are acute symptomatic seizures. Acute symptomatic seizures are seizures which are triggered by precipitating factors such as hypoglycaemia, asphyxia, or trauma. Hypoxic ischemic encephalopathy (HIE), metabolic disturbances such as hypoglycaemia, hypocalcaemia, hypomagnesemia, intracranial haemorrhage (ICH), ischemic stroke, and central nervous system infections are the main underlying etiologies.[3,4]

In addition, neonatal seizures may have a poor prognostic effect on brain development, which may result in developmental delay, cognitive disorders, epilepsy or cerebral palsy.[5-8]

*Study performed in Near East University and Dr. Suat Günsel University in North Cyprus.

To cite this article: Şanlıdağ B, Dirik MA, Dirik E. Epilepsy After Neonatal Seizures: Etiologies, Clinical and Developmental Outcomes. Cyprus J Med Sci 2023;8(6):406-410

ORCID IDs of the authors: B.Ş. 0000-0003-1011-475X; M.A.D. 0000-0001-9427-2821; E.D. 0000-0002-4429-6478.

Address for Correspondence: Burçin Şanlıdağ
E-mail: burcinsanlidag@yahoo.com
ORCID ID: orcid.org/0000-0003-1011-475X

Received: 16.09.2022
Accepted: 28.02.2023

Epilepsy was reported at rates of up to 56% in different studies of children who had neonatal seizures. The risky period for the emergence of epilepsy after neonatal period seizures was demonstrated to be within the first year of life.[9-15]

The risk factors for future epilepsy in cases with symptomatic seizures in neonates were revealed to be premature birth, low scores of APGAR, abnormal neurological examination, low blood pH levels within the first day of life, abnormalities on background activity within electroencephalogram (EEG) records, status epilepticus and the presence of brain injury.[15] Children with brain insult have a high risk of epilepsy.[7,11] Thus, neuroimaging is an important diagnostic tool for the etiological workup of children with epilepsy. International guidelines for neuroimaging recommend magnetic resonance imaging (MRI) for all children with epilepsy before the age of 2 years.[16]

Children with seizures starting before the age of 2 years demonstrated poor seizure control, poor cognitive and behavioural outcomes in addition to lower rates of being seizure-free in follow-up. Symptomatic causes of epilepsy are more frequent within that group of patients.[17-20]

The aim of the present study was to identify the clinical characteristics and seizure control of children diagnosed with epilepsy with a history of newborn onset seizures.

MATERIALS AND METHODS

This study was designed as a retrospective study. Among 220 patients between 0-18 years old who were examined in the department of child neurology from January, 2014 to January, 2021, those diagnosed with epilepsy with a record of newborn onset seizures were enrolled in this study. Children with follow-up periods of more than 5 years were evaluated. This study was approved by the Ethics Committee of Near East University (approval number: YDU/2018/55-524, date: 22.02.2018). No informed consent was taken as this study was designed as a retrospective study. The clinical data of the patients, neonatal EEG records, the MRI results were obtained from the patients' files and/or hospital databases.

Epilepsy is defines as ≥2 untriggered seizures 24 hours apart or a single unprovoked seizure with a high-risk of recurrence such as seizure with an underlying structural abnormality in addition to epileptiform EEG.[21]

Neurodevelopmental outcomes were based on neurological examination and/or Denver tests.

Interictal EEGs records were performed according to the international 10-20 system, using the NicoletOne device by positioning the electrodes on the scalp. Silver-silver chloride electrodes were used and conductive paste was used to fill the space between the electrodes and the skin. A 16-channel EEG was taken. Low-pass filter, high-pass filter, and notch filter (70 Hz, 1 Hz, and 50 Hz respectively) at a rate of 30 mm/second were applied. Records of a minimum of 30 minutes were taken in sleep and awake states. Subsequently, the EEG records were evaluated by a paediatric neurologist. The diagnosis of epilepsy was made by the existence of two or more unprovoked seizures and the findings of EEG records.

Forty-one patients underwent an MRI scan. MRI was performed using a 1.5 Tesla and 3 Tesla Siemens scanner with a specialized paediatric protocol for epilepsy.

The protocol consisted of (a) sagittal spin-echo T1-weighted, (b) axial fast spin-echo T2 weighted, (c) fast multiplanar coronal oblique inversion recovery, (d) fast fluid-attenuated coronal oblique inversion recovery, (e) axial diffusion (single shot, echoplanar spin echo), b=1,000 multi directions, and (f) three-dimensional axial spoiled gradient echo. MRIs were initially performed without the use of contrast material. In cases with suspicious findings during the scan, gadolinium was used to characterize the lesion better.

Statistical Analysis

For analysis, the Statistical Package for Social Sciences (SPSS) (version 17.0; IBM, Armonk, NY) was used. The used tests were the chi-squared test, Fisher's exact test, and descriptive statistics. A p-value less than 0.05 was considered to be statistically significant.

RESULTS

Forty-one patients were enrolled in this study. Fourteen (34.1%) were girls and 27 (65.9%) were boys. The mean age at diagnosis with epilepsy was 3.2 months.

Parental consanguinity was present in 6 patients (14.6%). Familial epilepsy was detected in 4 patients (9.8%), of whom 2 of the patients' mothers had epilepsy and the other two had epilepsy in relatives other than their parents or siblings.

Etiological factors were documented in 26 (63.4%) patients. Etiological factors were categorized as brain insult (hypoxic-ischemic encephalopathy, haemorrhage, or stroke), metabolic disorder, syndrome, or others, as shown in Table 1.

No relation between seizure type and etiological factors was revealed.

Neuroimaging (MRI) revealed pathological findings in 27 (65.9%) of the patients and 14 (34.1%) of the patients had normal MRI. The MRI findings are shown in Table 2.

Twenty-five (61%) patients had both mental and motor retardation and 1 (2.4%) patient had mental retardation without motor retardation.

The presence of structural abnormality on MRI was shown to have a statistically significant relation with mental-motor retardation (p=0.003).

The mean age at the initiation of treatment was 3.2 months.

Table 1. Identified etiological factors in patients

Etiological factor	Number of patients	% of patients
Brain insult - Hypoxic-ischemic encephalopathy; - (term-born /preterm born) - haemorrhage-stroke	18 13 8/5 5	43.9
Metabolic disorder -Canavan disease -Krabbe disease -Methylmalonic acidemia	3	7.3
Syndrome	2	4.9
Others (cardiopathy, external hydrocephaly, pachygyria)	3	7.3
Total	26	63.4

Among the patients, 26 (63.4%) of them were using one antiepileptic treatment, 12 (29.3%) of them were using 2, and 3 (7.3%) of them were using 3 or more antiepileptic treatments.

The mean follow-up period was 67.2 months.

When the patients were evaluated in order to determine if they had been seizure-free for the previous 1 year of follow-up, it was found that 27 (65.9%) of the patients had had no seizures, whereas 14 (34.1%) of the patients had experienced seizures. During the follow up, antiepileptic treatment was stopped in 7 (17.1%) patients. This data is shown in Figure 1.

No relations reaching statistical significance were documented between MRI findings and the age at the onset of epilepsy, seizure control, or antiepileptic treatment ($p>0.05$).

No correlation between refractory seizures and seizure etiology was noted.

DISCUSSION

Seizures have the highest prevalence during the neonatal period.[1,2] Post-neonatal epilepsy has been reported at rates as high as 56% in different studies.[9-12] Etiology is an important predictor for future epilepsy.[12]

Etiological factors were documented in 26 (63.4%) of the patients within this study group. Among them, the majority had a brain insult (22%). Within the group of patients with a brain insult, hypoxia was the leading cause, which was documented in 8 (19.5%) term and 5 (12.2%) premature newborn. The second most common etiology was ICH and stroke. Similarly, in a study evaluating the etiological profiles of seizures in term neonates, perinatal asphyxia was the leading etiological factor, and secondly, perinatal arterial ischemic strokes were observed.[12] HIE also constitutes approximately 40% of all neonatal seizures.[22,23] Within term and late premature infants, the most commonly seen reason for seizures are ischemic, ICH, metabolic and electrolyte disturbances, and infectious causes.[22,24,25] More specifically, HIE increases the risk of newborn seizures in term neonates three-fold in comparison to premature neonates.[2] Within that study, the number of epileptic children who were born at term was higher than those who were born preterm. Additionally, the presence of seizures in cases of HIE has been suggested to be a sign of a more severe outcome.[26] In other studies, cerebral palsy was reported to be a very important risk factor for future epilepsy with an 8-fold increased risk.[7,11,27] The most commonly seen neurological problems in children after neonatal seizures are developmental delay, epilepsy, and cerebral palsy.[5-8] Supporting those findings in the literature, in this study, 25 (61%) of the children had mental motor retardation in which 13 (31.7%) of them were due to HIE.

Table 2. MRI findings

MRI findings	Number	%
Normal	14	34.1
Term HIE	8	19.5
Periventricular leukomalacia	5	12.2
Haemorrhage-stroke	5	12.2
Developmental brain abnormalities (holoprosencephaly, meningomyelocele, corpus callosum agenesis, cortical dysplasia)	5	12.2
Suggestive of metabolic disorder	3	7.3
Increased signal intensity	1	2.4
Total	41	100

MRI: Magnetic resonance imaging, HIE: Hypoxic ischemic encephalopathy.

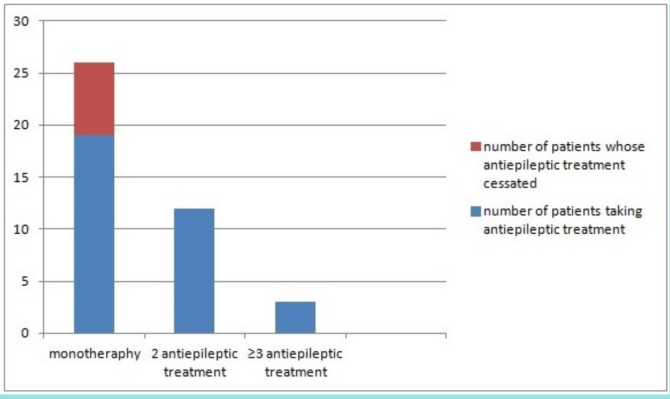


Figure 1. Treatment in follow-up.

In another study, pathological findings in neonatal cerebral ultrasound and familial epilepsy were reported as independent risk factors for future epilepsy, highlighting the genetic and prenatal etiology of seizures.[28] Other than brain injuries, newborn period seizures were also reported to cause an increase in the risk of epilepsy.[13] In contrast to our study, developmental brain abnormalities were the leading cause of epilepsy with a rate of 21% in an infancy onset epilepsy cohort. It has been documented that the incidence of epilepsy is higher in underdeveloped countries. This is postulated to be related to higher cases of brain insult, CNS infections, and trauma-related cases in underdeveloped countries.[29,30]

In this study population, pathological MRI findings were present in 65.9% of the patients. Although there is no similar study to compare with, a population-based study evaluating newly diagnosed epileptic infants reported the etiological relevance of abnormality in 51% of patients. An MRI abnormality rate of 57% was documented in cases younger than 2 years old in a hospital-based cohort.[31]

Among the 41 patients in this study, 25 (60.9%) among them had both mental and motor retardation and 1 (2.4%) patient had only mental retardation without motor retardation. Studies have reported global developmental delay in 30-50% of children after neonatal seizures.[5,6,32] Various risk factors had been linked to poor prognosis after neonatal seizures including low birth weight, prematurity, severe HIE, low APGAR scores, high-grade intraventricular haemorrhage, persistent abnormal background activity on EEG records, seizures starting before 24 hours and after 72 hours of life, status epilepticus, CNS infections and brain insult shown by MRI.[4,15,22,33,34] Despite knowledge of certain indicators of poor prognosis, the prediction of individual outcomes is still challenging in cases with acute symptomatic seizures within the newborn period.[19] Additionally, regarding cases of epilepsy in the infantile period, high rates of patients were reported to have developmental and cognitive impairments in long-term follow-up.[17-19]

Abnormality on MRI was found to be significantly related to the presence of mental-motor retardation in this study. However, no correlation was documented between seizure control in the last year

of follow-up and MRI findings. Pisani and Spagnoli[26] reported that symptomatic epilepsy groups of patients had worse seizure control in addition to higher rates of developmental impairment. In another study supporting our findings, MRIs without significant lesions were found to be related to a low risk of neurodevelopmental impairment and recurrent seizures. This highlights the importance of MRI imaging not only for the demonstration of underlying etiological disorders, but also for the estimation of long-term outcomes.[35,36]

The mean age at the time of diagnosis of epilepsy and the onset of antiepileptic drugs was 3.2 months in our study group of patients. During the first year of life, there is an increased risk for the emergence of post-neonatal epilepsy.[13,14] Similarly, it has been reported that symptomatic reasons for epilepsy are more common during the infancy period of life.[20]

Within this study, 26 (63.4%) of the patients were using one antiepileptic drug regimen, 12 (29.3%) of them were using 2 drugs and 3 patients (7.3%) were using 3 or more antiepileptic drugs. Twenty-seven (65.9%) of the patients had had no seizures during the previous 1-year period, whereas 14 (34.1%) of the patients had experienced ongoing seizures. A higher rate of seizures refractory to initial medication during the newborn period was documented by Glass et al.[22] in another study in patients with etiological factors of HIE, stroke, and ICH. Children with seizures starting before the age of 2 years were also reported to have poor seizure control.[17,18] No statistically significant relation between structural lesions on MRI and treatment response was found in this study.

Study Limitations

The main limitation of the present study was its retrospective manner.

CONCLUSION

In conclusion, epileptic children with neonatal-onset seizures were found to have 63.4% of underlying etiological factors. Although no statistically significant relationship could be demonstrated between seizure control and MRI findings, the presence of structural abnormalities on MRI was found to have a statistically significant correlation with mental-motor developmental delays. The incidence of refractory seizures and mental-motor retardation is high in epileptic children with neonatal seizures. Therefore, it can be postulated that MRI findings can be a warning sign for upcoming developmental delays. In this way, MRI results may guide the early initiation of rehabilitation which can decrease long-term adverse effects and improve outcomes.

MAIN POINTS

- Epileptic children with neonatal-onset seizures were found to have 63.4% of underlying etiological factors.
- The presence of structural abnormalities on MRI was found to correlate with mental-motor retardation, but was not related to seizure control.
- The incidence of refractory seizures and mental-motor retardation was high in epileptic children with neonatal onset seizures.
- Early MRI imaging is important in children with neonatal seizures, not only for the etiological factors, but also to estimate possible developmental delays and improve outcomes.

ETHICS

Ethics Committee Approval: This study was approved by the Ethics Committee of Near East University (approval number: YDU/2018/55-524, date: 22/02/2018).

Informed Consent: No informed consent was taken as this study was designed as a retrospective study.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Concept: B.Ş., M.A.D., E.D., Design: B.Ş., M.A.D., E.D., Data Collection and/or Processing: B.Ş., M.A.D., E.D., Analysis and/or Interpretation: B.Ş., M.A.D., E.D., Literature Search: B.Ş., M.A.D., E.D., Writing: B.Ş., M.A.D., E.D.

DISCLOSURES

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

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

REFERENCES

1. Ronen GM, Penney S, Andrews W. The epidemiology of clinical neonatal seizures in Newfoundland: a population-based study. J Pediatr. 1999; 134(1): 71-5.
2. Sheth RD, Hobbs GR, Mullett M. Neonatal seizures: incidence, onset, and etiology by gestational age. J Perinatol. 1999; 19(1): 40-3.
3. Shellhaas R. Etiology and prognosis of neonatal seizures. UpToDate. 2017.
4. Kaminiów K, Kozak S, Paprocka J. Neonatal Seizures Revisited. Children (Basel). 2021; 8(2): 155.
5. Pellegrin S, Munoz FM, Padula M, Heath PT, Meller L, Top K, et al. Neonatal seizures: Case definition & guidelines for data collection, analysis, and presentation of immunization safety data. Vaccine. 2019; 37(52): 7596-609.
6. Pisani F, Piccolo B, Cantalupo G, Copioli C, Fusco C, Pelosi A, et al. Neonatal seizures and postneonatal epilepsy: a 7-y follow-up study. Pediatr Res. 2012; 72(2): 186-93.
7. Yıldız EP, Tatlı B, Ekici B, Eraslan E, Aydınlı N, Calışkan M, et al. Evaluation of etiologic and prognostic factors in neonatal convulsions. Pediatr Neurol. 2012; 47(3): 186-92.
8. Anand V, Nair PM. Neonatal seizures: Predictors of adverse outcome. J Pediatr Neurosci. 2014; 9(2): 97-9.
9. Clancy RR, Legido A. Postnatal epilepsy after EEG-confirmed neonatal seizures. Epilepsia. 1991; 32(1): 69-76.
10. Khan RL, Nunes ML, Garcias da Silva LF, da Costa JC. Predictive value of sequential electroencephalogram (EEG) in neonates with seizures and its relation to neurological outcome. J Child Neurol. 2008; 23(2): 144-50.
11. Ronen GM, Buckley D, Penney S, Streiner DL. Long-term prognosis in children with neonatal seizures: a population-based study. Neurology. 2007; 69(19): 1816-22.
12. Garfinkle J, Shevell MI. Cerebral palsy, developmental delay, and epilepsy after neonatal seizures. Pediatr Neurol. 2011; 44(2): 88-96.
13. Glass HC, Hong KJ, Rogers EE, Jeremy RJ, Bonifacio SL, Sullivan JE, et al. Risk factors for epilepsy in children with neonatal encephalopathy. Pediatr Res. 2011; 70(5): 535-40.

14. Fox CK, Glass HC, Sidney S, Lowenstein DH, Fullerton HJ. Acute seizures predict epilepsy after childhood stroke. Ann Neurol. 2013; 74(2): 249-56.

15. Glass HC, Grinspan ZM, Shellhaas RA. Outcomes after acute symptomatic seizures in neonates. Semin Fetal Neonatal Med. 2018; 23(3): 218-22.

16. Gaillard WD, Chiron C, Cross JH, Harvey AS, Kuzniecky R, Hertz-Pannier L, et al. Guidelines for imaging infants and children with recent-onset epilepsy. Epilepsia. 2009; 50(9): 2147-53.

17. Battaglia D, Randò T, Deodato F, Bruccini G, Baglio G, Frisone MF, et al. Epileptic disorders with onset in the first year of life: neurological and cognitive outcome. Eur J Paediatr Neurol. 1999; 3(3): 95-103.

18. Czochańska J, Langner-Tyszka B, Losiowski Z, Schmidt-Sidor B. Children who develop epilepsy in the first year of life: a prospective study. Dev Med Child Neurol. 1994; 36(4): 345-50.

19. Altunbaşak S, Incecik F, Hergüner O, Refik Burgut H. Prognosis of patients with seizures occurring in the first 2 years. J Child Neurol. 2007; 22(3): 307-13.

20. Eltze CM, Chong WK, Cox T, Whitney A, Cortina-Borja M, Chin RF, et al. A population-based study of newly diagnosed epilepsy in infants. Epilepsia. 2013; 54(3): 437-45.

21. Fisher RS, Acevedo C, Arzimanoglou A, Bogacz A, Cross JH, Elger CE, et al. ILAE official report: a practical clinical definition of epilepsy. Epilepsia. 2014; 55(4): 475-82.

22. Glass HC, Shellhaas RA, Wusthoff CJ, Chang T, Abend NS, Chu CJ, et al. Contemporary Profile of Seizures in Neonates: A Prospective Cohort Study. J Pediatr. 2016; 174: 98-103.

23. Weeke LC, Groenendaal F, Toet MC, Benders MJ, Nievelstein RA, van Rooij LG, et al. The aetiology of neonatal seizures and the diagnostic contribution of neonatal cerebral magnetic resonance imaging. Dev Med Child Neurol. 2015; 57(3): 248-56.

24. Vasudevan C, Levene M. Epidemiology and aetiology of neonatal seizures. Semin Fetal Neonatal Med. 2013; 18(4): 185-91.

25. Glass HC. Neonatal seizures: advances in mechanisms and management. Clin Perinatol. 2014; 41(1): 177-90.

26. Pisani F, Spagnoli C. Acute symptomatic neonatal seizures in preterm neonates: etiologies and treatments. Semin Fetal Neonatal Med. 2018; 23(3): 191-6.

27. Mert GG, Incecik F, Altunbasak S, Herguner O, Mert MK, Kiris N, et al. Factors affecting epilepsy development and epilepsy prognosis in cerebral palsy. Pediatr Neurol. 2011; 45(2): 89-94.

28. Pisani F, Piccolo B, Cantalupo G, Copioli C, Fusco C, Pelosi A, et al. Neonatal seizures and postneonatal epilepsy: a 7-y follow-up study. Pediatr Res. 2012; 72(2): 186-93.

29. Fodjo, J. N. S. Definition, Classification, and Burden of Epilepsy. In: Misciagna S, editor. Epilepsy - Update on Classification, Etiologies, Instrumental Diagnosis and Treatment. London: IntechOpen; 2020.

30. Ba-Diop A, Marin B, Druet-Cabanac M, Ngoungou EB, Newton CR, Preux PM. Epidemiology, causes, and treatment of epilepsy in sub-Saharan Africa. Lancet Neurol. 2014; 13(10): 1029-44.

31. Hsieh DT, Chang T, Tsuchida TN, Vezina LG, Vanderver A, Siedel J, et al. New-onset afebrile seizures in infants: role of neuroimaging. Neurology. 2010; 74(2): 150-6.

32. Garfinkle J, Shevell MI. Prognostic factors and development of a scoring system for outcome of neonatal seizures in term infants. Eur J Paediatr Neurol. 2011; 15(3): 222-9.

33. Kharoshankaya L, Stevenson NJ, Livingstone V, Murray DM, Murphy BP, Ahearne CE, et al. Seizure burden and neurodevelopmental outcome in neonates with hypoxic-ischemic encephalopathy. Dev Med Child Neurol. 2016; 58(12): 1242-1248.

34. Pinchefsky EF, Hahn CD. Outcomes following electrographic seizures and electrographic status epilepticus in the pediatric and neonatal ICUs. Curr Opin Neurol. 2017; 30(2): 156-64.

35. Ramantani G, Schmitt B, Plecko B, Pressler RM, Wohlrab G, Klebermass-Schrehof K, et al. Neonatal Seizures-Are We there Yet? Neuropediatrics. 2019; 50(5): 280-93.

36. Osmond E, Billetop A, Jary S, Likeman M, Thoresen M, Luyt K. Neonatal seizures: magnetic resonance imaging adds value in the diagnosis and prediction of neurodisability. Acta Paediatr. 2014; 103(8): 820-6.

RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2021.2021-121
Cyprus J Med Sci 2023;8(6):411-417

Effect of Pre-Postoperative Music Intervention on Anxiety, Pain and Patient Comfort in Patients Undergoing Retrograde Intrarenal Surgery

Telman Gazi[1], Yeliz Ciğerci[2], Mustafa Karalar[3]

[1]Graduate Education Institute, Afyonkarahisar Health Sciences University, Afyonkarahisar, Türkiye
[2]Department of Nursing, Afyonkarahisar Health Sciences University Faculty of Health Sciences, Afyonkarahisar, Türkiye
[3]Department of Urology, Afyonkarahisar Health Sciences University Faculty of Medicine, Afyonkarahisar, Türkiye

Abstract

BACKGROUND/AIMS: The aim of this study was to evaluate the effect of preoperative and postoperative music intervention on anxiety, perceived pain severity and patient comfort in patients undergoing retrograde intrarenal surgery (RIRS).

MATERIALS AND METHODS: This prospective and quasi-experimental study included a total of 58 patients undergoing RIRS between May 14th and December 31st, 2019. The patients were divided into 2 groups. Group 1, the music intervention group, included 30 patients, and group 2, the control group, had 28 patients. The primary outcome of this study was anxiety levels and the secondary outcomes were pain severity and patient comfort. The visual analog scale-anxiety (VAS-A) was used to evaluate the patients' anxiety levels while the VAS was used for the evaluation of pain severity.

RESULTS: A significant difference was found between the groups in terms of VAS-A scores measured in the preoperative and postoperative periods ($p<0.001$, $p=0.024$, respectively). In both measurements, the group 1 VAS-A score was significantly lower than group 2. When the postoperative VAS pain scores of patients were examined; pain severity in group 1 was lower compared to group 2 and significant difference was found between the groups ($p=0.017$). More patients in group 1 were found to feel in comfort than in the control ($p=0.006$).

CONCLUSION: It was observed that music intervention during the preoperative and postoperative periods reduced pain, anxiety, and increased patient comfort in RIRS patients. For this reason, it is thought that it is appropriate to use music intervention in patients undergoing RIRS.

Keywords: Retrograde intrarenal surgery, music intervention, anxiety, pain, patient comfort.

INTRODUCTION

The European Urological Association guidelines recommend Retrograde Intrarenal Surgery (RIRS) as the standard treatment for kidney stones under 2 cm.[1] It is a common endourological procedure with high success rates.[2,3] In addition, it is considered a safe method, as major complications after RIRS rarely occur.[3]

Anxiety might cause the patients to worry that they cannot control their bodies or life, and they may fear organ or tissue loss.[4] Anxiety is one of the most frequent psychological reactions in patients awaiting surgery.[5] This anxiety can be at different levels depending on the nature of the underlying disease, the organ to be operated on, and the meaning and importance of this condition for the person.[4] Increased levels of preoperative anxiety are associated with both psychological

To cite this article: Gazi T, Ciğerci Y, Karalar M. Effect of Pre-Postoperative Music Intervention on Anxiety, Pain and Patient Comfort in Patients Undergoing Retrograde Intrarenal Surgery. Cyprus J Med Sci 2023;8(6):411-417

ORCID IDs of the authors: T.G. 0000-0001-5086-418X; Y.C. 0000-0002-9858-0837; M.K. 0000-0003-1915-2277.

Address for Correspondence: Yeliz Ciğerci
E-mail: yeliz.cigerci@afsu.edu.tr
ORCID ID: orcid.org/0000-0002-9858-0837

Received: 17.05.2021
Accepted: 21.12.2021

and somatic negative outcomes. As a result, anxiety has been proven to be associated with increased autonomic fluctuations, increased anesthetic requirements, and increased postoperative pain.[5-7] As a result of these complications, it has been reported that the healing process and the duration of the hospital stay are prolonged.[6] It is also recognized as a risk factor for mortality.[5] Therefore, it is very important to identify the patient's current anxiety status to be able to help them.[6] There is limited information in the literature regarding anxiety in RIRS patients. Di Mauro et al.[8] examined the quality of life, anxiety, depression, intervention-related satisfaction, and pain in patients undergoing RIRS and mini-percutaneous nephrolithotomy (mPCNL) in their study. As a result of their study, anxiety scores were reported to be higher in the RIRS group [7.00 (4.00-14.00)] compared to the mPCNL group [3.00 (0.00-7.00)].

Postoperative pain, an inevitable experience for most patients who have surgery, is a factor which also affects the recovery process. In Western societies, it has been reported that more than 75% of patients reported having moderate, severe or unbearable levels of pain in the postoperative period, while the incidence of pain in the postoperative period in Türkiye was between 30% and 97%.[9] Inadequate pain control leads to severe pain and may increase the risk of atelectasis, respiratory dysfunction, anxiety, and prolonged stress.[10] Therefore, postoperative pain should be controlled.

In patients undergoing urological procedures, severe postoperative pain which continues despite the use of analgesics is a significant problem.[3] In the literature, it has been shown that one of the main reasons for re-visiting the hospital after urinary system surgery is pain.[11] The quality of life of patients with high levels of pain and anxiety is negatively affected, and the duration of hospitalization is prolonged. For this reason, it is very important to reduce the pain and preoperative anxiety of patients. Currently, in addition to pharmacological methods for pain management, non-pharmacological methods are often used.[12] Music has been considered a non-pharmacological alternative treatment method for many diseases since ancient times. Music intervention has been reported to be beneficial in patients in order to promote relaxation and relieve perceived pain.[13,14]

In the current literature, it has been shown that music reduces pain and anxiety levels in patients undergoing urinary system surgery/intervention, increases procedural satisfaction and also increases patient willingness to undergo the procedure again.[13,15,16] However, there was no study found in the literature investigating the effects of music intervention in patients undergoing RIRS.

Aim

Therefore, with this study, we aimed to investigate the effects of preoperative and postoperative music intervention on anxiety, perceived pain severity, and comfort in patients undergoing RIRS. While the evaluation of the anxiety levels was the primary outcome of this study, the evaluation of pain intensity and patient comfort were the secondary outcomes. The results of this study are expected to be a reference for RIRS practices in order to improve the quality of health care.

MATERIALS AND METHODS

Study Design and Settings

This prospective and quasi-experimental type study was performed in the urology clinic of a university hospital in Türkiye. The study was conducted following the Declaration of Helsinki. Approval of the protocol was obtained from the Afyonkarahisar Health Sciences University Clinical Research Ethics Committee (approval number: 2019/165, date: 03.05.2019). Before the application, all of the participants were informed about this study. They indicated their agreement to participate by signing a written consent form.

Participants

Eligibility Criteria

This study included patients who were 18 years of age or older, had elective RIRS, had no hearing/speech disabilities, had no mental problems, had no diagnosed psychiatric disorders, had no depression, planned surgery under general anesthesia, and who volunteered to participate in this study.

Exclusion Criteria

Those patients who were under the age of 18, had hearing/speech impairments, had mental problems, had a diagnosed psychiatric disorder, were diagnosed with depression, were planned for surgery under spinal anesthesia or those who did not volunteer to participate in this study were not included.

Sample Size and Sampling

Power analysis was performed to calculate the sample size of this study. Accordingly, the effect size of this study was 0.7819; the alpha value was 0.05 and the theoretical power was 0.80, and the minimum sample number was 54 (group 1=27, group 2=27). For the main hypotheses of the research, post-hoc G-power was used. Sufficient power was observed to be reached, and its power was found to be a minimum value of 0.84. After initial assessments, randomization of the participants into two groups was performed via the draw method. The patients were asked to choose a piece of paper from a box with the names of the groups written. Patients who chose group 1 were allocated to the music intervention group (n=27) and patients who chose group 2 were allocated to the control group (n=27). After each draw, the paper with the group number on it was put back into the box. In this way, all patients were randomized.

A total of 92 patients undergoing RIRS were considered for their eligibility. This study was completed with 30 patients in the intervention group and 28 in the control group as 13 patients did not meet the inclusion criteria (four of them did not want to participate, 15 of them with other reasons and 2 patients developed complications during surgery) (Figure 1).

Measurements

The "Personal Information Form", "Visual Analog Scale-Anxiety (VAS-A)", "VAS" and "Patient Comfort" were used in the collection of data. The researcher performed the data collection, which took about 10 minutes, in the patient's room.

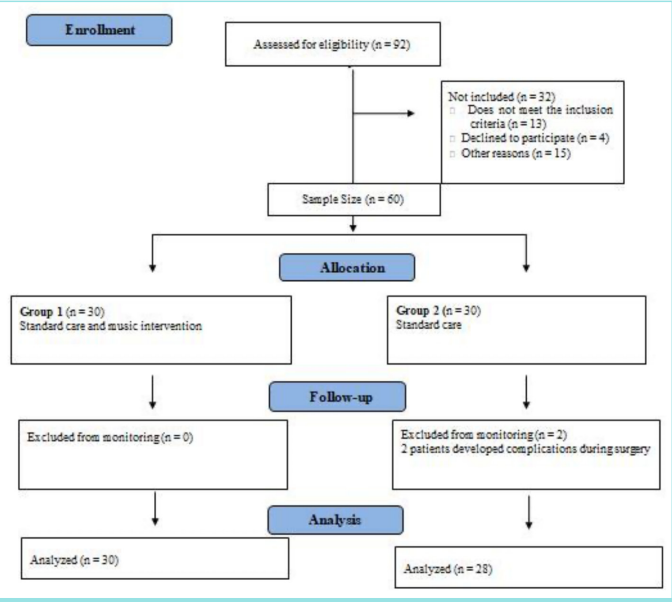


Figure 1. Flow chart of the study participants.

Personal Information Form: This form, which was developed by the researcher, includes 6 closed-ended questions on demographic characteristics (age, gender, marital status, educational level), and also on stone localization and size.

Visual analog scale-anxiety: Determining the anxiety levels of the RIRS patients was the primary outcome of this study. The patients' anxiety levels were measured using VAS-A. The patient's anxiety increases as the anxiety level approaches 10. This scale was developed by Cline et al.[17]. There is a concurrent validity correlation between VAS-A and the Spielberger State-Trait Anxiety Inventory (from r=0.49[16] to r=0.82[19]).[18] This indicates that the VAS-A scale, although brief, is a reliable and accurate measurement tool. Patients were asked to mark with a pen on the 10 cm line, by cutting it, (0=not anxious at all, 10=extremely anxious) to the appropriate place for their anxiety levels (15 minutes after the music intervention which was conducted before surgery and on postoperative 1st day).

Visual Analog Scale: Determining the pain severity of the RIRS patients was the secondary outcome of this study. Pain severity was measured with VAS. The VAS scale is a one-dimensional scale commonly used today in the assessment of pain severity. This scale was developed by Woodforde and Merskey[19] with a scoring range of 0 to 10, with a score of 0 representing "*no pain at all*" and a score of 10 representing "*my pain is as bad as it could possibly be*". The patients were asked to mark with a pen on a 10 cm line by cutting it to the appropriate place for the severity of their pain (15 minutes after the music intervention on postoperative 1st day).

Patient comfort: In this study, based on a review of the literature,[20] patient comfort was evaluated with a single question with 5 possible answers, namely "*No discomfort*", "*Minimal discomfort*", "*Mild discomfort*", "*Moderate discomfort*" and "*Severe discomfort*". Patients rated their comfort status and levels on postoperative day 1.

Data Collection and Interventions

In this study carried out with two groups of patients from May 14th to December 31st, 2019, all patients in both groups included were admitted in single rooms. This was done so that any other patients admitted to the clinic would not be adversely affected. The RIRS of all of the patients were performed by the same surgical team. Admittance of the patients who were scheduled for RIRS was completed on the morning of the surgery due to the protocols of the clinic. The first interview with the patients was made on the morning of the surgery, on the day of their admittance. The patients were visited in their rooms and both verbal and written information was provided to them about this study by the researcher.

Group 1 (music intervention group): The "*Personal Information Form*" was completed by interviewing the patients on the morning of the surgery. Afterwards, the researcher asked the patients about the type of music they would like to listen to.

Through its effect on the limbic system, music creates pleasant psychophysiological reactions and aims to divert attention from harmful stimuli. It is also highlighted that individual preferences should be considered when selecting music for relaxation.[21] The music selection can have different effects on each patient. Only the patients themselves can decide which music will relax or strain them.[22] Therefore, the patients' wishes should be taken into account in order to get the maximum benefit from the music intervention. In this study, a pre-set music selection was not used, taking into account the music preferences of the patients. The music that was listened to included the type of music that the patients wanted to listen to at that moment. After admittance of the patients to the clinic was completed, the type of music they preferred to listen to was determined during the interview with the patients (Turkish folk music, Turkish pop music, arabesque music or religious music). Patients listened to their preferred type of music with headphones, using devices such as smartphones and tablets. Disposable covers, which were changed for each patient, were used for the headphones. The patients listened to the music for 15 minutes one hour before the surgery. The patients' anxiety levels were measured 45 minutes before the surgery. The patients were visited on the 1st postoperative day and they listened to their preferred type of music for 15 minutes. Then, the levels of anxiety, pain, and comfort of the patients were measured.

Group 2 (control group): This group consisted of patients who received standard health care services in the hospital where this study was carried out. These patients did not listen to music. The "*Personal Information Form*" and VAS-A were completed during the interview conducted by the researcher with the patients on the morning of the surgery. The patients were visited on the 1st postoperative day and their levels of anxiety, pain, and comfort were measured.

Statistical Analysis

Data analysis was performed with the SPSS (SPSS Inc., Chicago, IL, USA) for Windows 25.0. Descriptive statistical methods (number, percentage, mean standard deviation, median, minimum, and maximum) were used to evaluate the data. The chi-squared test was used to confirm the homogeneity of the participants in both groups. An independent sample t-test was used to compare the measurement of group 1 and

group 2 in repeated measurements in which the normal distribution assumption was provided in the analysis of the data. In repeated measurements where the normal distribution assumption was not provided, the Wilcoxon signed-rank test, and the Mann-Whitney U test were used to compare the measurement of group 1 and group 2. The existence and the strength of the association between the categorical variables were examined with Cramer's V coefficient. A p-value <0.05 was accepted statistically significant.

RESULTS

Demographic Characteristics

The demographic characteristics of the patients for both groups are shown in Table 1. No statistically significant difference was found between the groups in regards to their demographic characteristics. The mean age of the patients was 47.73±16.80 years in group 1 and 47.00±15.14 years in group 2. More than half of the patients were male (group 1=60.0%, group 2=60.7%) and most of them were married (group 1=73.3%, group 2=85.7%). In both groups, the majority of the participants were primary school graduates (group 1=56.7%, group 2=50.0%). The stone localization of the patients was determined to be mostly the renal pelvis with 46.7% in group 1 and 53.6% in group 2. The stone sizes were determined to be similar in the two groups (group 1=10.33±5.20 mm, group 2=11.36±6.20 mm).

Table 1. Demographic characteristics, stone localization, and size

Feature		Group 1		Group 2		X^2/Z	p
		n	%	n	%		
Age (mean ± SD)		47.73±16.80		47.00±15.14		0.052	0.959**
Gender	Male	18	60.0	17	60.7	0.003	0.956*
	Female	12	40.0	11	39.3		
Marital status	Single	8	26.7	4	14.3	1.353	0.245*
	Married	22	73.3	24	85.7		
Education level	Illiterate	0	0.0	2	7.1	3.000	0.607*
	Primary	17	56.7	14	50.0		
	Secondary	2	6.7	3	10.7		
	High school	8	26.7	5	17.9		
	Graduate	3	10.0	4	14.3		
Location of the stone	Lower calyx	2	6.7	2		0.874	0.928*
	Middle calyx	2	6.7	1	3.6		
	Renal pelvis	14	46.7	15	53.6		
	Ureteropelvic	9	30.0	7	25.0		
	Proximal ureter	3	10.0	3	10.7		
Size of stone (mm) (mean ± SD)		10.33±5.20		11.36±6.20		0.814	0.416**

*Chi-squared test, **Mann-Whitney U test, SD: Standard deviation.

Anxiety

The anxiety levels of patients are presented in Table 2. The anxiety scores of the patients in group 2 were found to be higher in both the preoperative and the postoperative period, and a statistically significant difference was found between group 1 and group 2 in preoperative period (p<0.001). The mean VAS-A scores of the patients in the postoperative period showed a positive change in both groups compared to the preoperative period, and the difference was statistically significant in both groups (p=0.019 for group 1, p=0.009 for group 2).

Pain

When examining the presence of postoperative pain, it was observed that the number of patients who stated that they had pain was similar (group 1 was 43.3% and group 2 was 57.1%) and no statistically significant difference was found between the groups (p>0.05) (Table 3). When examining the pain intensity of the patients with postoperative pain, the pain intensity of the patients in group 1 [1.27; 95% confidence interval (CI): 0.65 to 1.88] was found to be lower than the pain of the patients in group 2 (3.00; 95% CI: 1.71 to 4.29), and this difference was determined to be significant between the groups (p=0.017) (Figure 2).

Patient Comfort

When examining the comfort status of the patients in the postoperative period, more patients in group 1 (93.3%) were found to feel *in comfort* compared to group 2 (64.3%), and this difference between the groups was determined to be statistically significant (p=0.006). The strength of the association was found to be at a moderate level (V=0.358). The comfort levels of the patients who stated that they felt *in comfort* in the postoperative period were found to be higher in group 1, but there was no statistically significant relationship between the groups (p=0.086) (Table 4).

DISCUSSION

This study revealed the positive effects of music intervention in terms of pain, anxiety and patient comfort in RIRS patients.

The preoperative anxiety levels of those patients who will undergo surgery should be determined and necessary measures should be taken to minimize their anxiety. Music intervention, which is applied to reduce the anxiety experienced by the patient, also reduces the level of cortisol which increases in the body as a result of stress. It has been noted that this ensures that vital signs are stable and can speed up the healing process by creating physiological changes in the body.[7] In the literature, music has been reported to have an anxiolytic and analgesic effect.[16]

Table 2. Anxiety parameters of the patients

Measurements	Group 1			Group 2			p*
	Median, (min.-max.)	HR (95% CI)		Median, (min.-max.)	HR (95% CI)		
		Lower bound	Upper bound		Lower bound	Upper bound	
Preoperative VAS-A score	2.00 (0-7)	1.46	3.21	5.00 (0-10)	3.92	5.93	<0.001
Postoperative VAS-A score	0.00 (0-6)	0.48	1.78	3.00 (0-10)	1.89	4.53	0.024
p**	0.019			0.009			

VAS-A: Visual Analog Scale-anxiety, *Mann-Whitney U test, **Wilcoxon signed-rank test, CI: Confidence interval, HR: Hazard ratios, min.: Minimum, max.: Maximum.

In this study, in which the effect of music intervention on anxiety, perceived pain intensity and patient comfort in patients who underwent RIRS was examined, the anxiety levels of patients undergoing RIRS were examined in both the preoperative and postoperative periods. In both periods, the anxiety scores of the patients in the intervention group were significantly lower compared to the control. This indicates that the patients in the music intervention groups had lower anxiety levels than the control group. This result shows that music intervention is effective in reducing patients' anxiety. Our study finding supports the positive effects of music intervention on anxiety, which have also been reported in the literature.[13,15,16,23-27] However, some studies report that music is not effective on anxiety in patients who have undergone a transrectal prostate biopsy.[28,29] This difference may be associated with the differences in the interventions used on the patients as well as the music intervention methods applied.

Pain is one of the major symptoms leading patient to seek help from health professionals. Also, it has been noted that due to untreated pain, the quality of life of patients decreases, while the length of hospital stay and mortality rate increases.[30] For patients undergoing urological intervention, postoperative pain which does not go away despite the use of analgesics may be significantly important.[3] Studies investigating pain in RIRS patients such as by Singh et al.[31] showed that 1st and 2nd day pain scores were significantly higher in those patients undergoing RIRS than in those undergoing Extracorporeal Shock Wave Lithotripsy, while Di Mauro et al.[8] showed that the pain of the mPCNL group was lower compared to the RIRS group. Music, an effective method of reducing pain when used in combination with opioid drugs, is widely used in the treatment of acute and chronic pain.[7] Music intervention is known to reduce pain by activating the cingulo-frontal cortex.[13] In the literature, it has been noted that music is effective against pain in urology patients.[13,15,16,23-27] However, Packiam et al.'s[29] study reported that music did not affect pain in patients undergoing transrectal prostate biopsy. In our study, when patients were asked whether they had pain on the first postoperative day, fewer patients in the music group were found to experience pain when compared to the control group. Additionally, in this study, on the first postoperative day, we investigated the perceived pain severity of the patients. The pain severity of those patients in the intervention group was significantly lower when compared to those in the control. Our study results revealed that musical intervention was effective in reducing postoperative pain severity in RIRS patients.

Table 3. Postoperative pain status of the groups

		Group 1		Group 2		p
		n	%	n	%	
Postoperative pain	Pain	13	43.3	16	57.1	0.293
	No pain	17	56.7	12	42.9	

Chi-squared test.

With the patients entering into the surgical intervention setting, basic stress causes, such as fear of death, the unknown, as well as the perception of pain, reach their highest level.[32] The comfort of the patients who will undergo surgical intervention is very important for both the emotional and physiological status of the patient. Patients who are provided high-level comfort for relief, who are prepared for the procedure in more comfortable and suitable positions and who continue the process in this way experience fewer problems.[33] In this study, more patients in group 1, compared to the other group, were seen to be in more comfort. Öztürk et al.[15], in their study with patients who listened to music during urodynamic interventions, concluded that listening to music increased patients' comfort and satisfaction. Although the patient groups of the studies are different, our results are similar to their study. Therefore, these results suggest that music may be a factor affecting patient comfort positively.

Study Limitations

This study had some limitations. The sample of this study was composed of Turkish patients who underwent RIRS in the urology clinic of a university hospital in western Türkiye. Therefore, the results cannot be generalized to all RIRS patients.

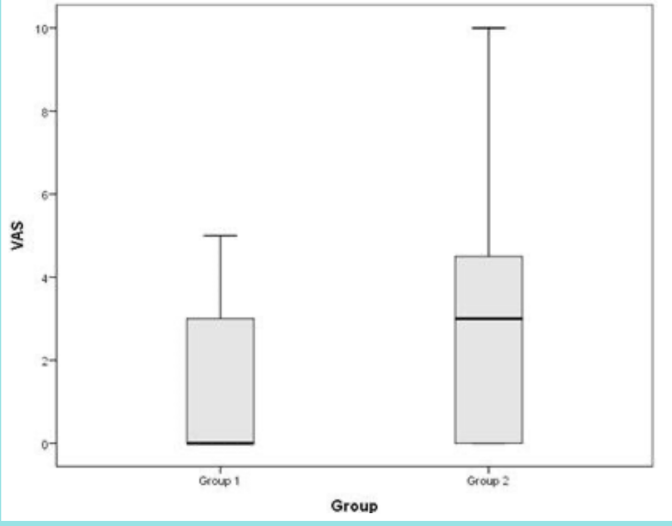


Figure 2. Pain parameters of the patients, (test value: -2.486, p=0.017*).

Table 4. Patients' comfort status and levels

		Group 1		Group 2		p	Cramer's V
		n	%	n	%		
Postoperative patient comfort	Yes, in comfort	28	93.3	18	64.3	**0.006***	0.358
	No, not in comfort	2	6.7	10	35.7		
Postoperative patient comfort level**	Uncomfortable	1	4.0	0	0.0	0.086	
	Unsure	1	4.0	4	22.2		
	Comfortable	16	57.1	12	66.7		
	Very comfortable	10	35.7	2	11.1		

*Chi-squared test, **Only those who answer yes.

CONCLUSION

This study's results revealed that music intervention reduced anxiety, pain and helped in providing better patient comfort in those patients undergoing RIRS. Based on this study's results, music intervention can be considered as an effective and safe method to reduce pain and anxiety in cases where RIRS is performed. Therefore, we recommend the use of music intervention, with the type of music determined by the patients themselves, for those patients who will undergo RIRS.

MAIN POINTS

- In this study, music intervention reduced the anxiety and pain levels of patients who underwent RIRS.
- Music helps to provide better patient comfort in patients undergoing RIRS.
- Music intervention may be considered an effective and safe method to reduce pain and anxiety in those patients undergoing RIRS.

Acknowledgments: The authors thank to all the patients and the medical team of the Urology Clinic of Hospital of Afyonkarahisar Health Sciences University for participating in the study.

ETHICS

Ethics Committee Approval: Approval of the protocol was obtained from the Afyonkarahisar Health Sciences University Clinical Research Ethics Committee (approval number: 2019/165, date: 03.05.2019).

Informed Consent: Before the application, all of the participants were informed about this study. They indicated their agreement to participate by signing a written consent form.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: Y.C., Design: T.G., Y.C., M.K., Supervision: T.G., Y.C., M.K., Materials: T.G., Y.C., Data Collection and/or Processing: T.G., Y.C., Analysis and/or Interpretation: T.G., Y.C., Literature Search: T.G., Y.C., Writing: T.G., Y.C., M.K., Critical Review: T.G., Y.C., M.K.

DISCLOSURES

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

Financial Disclosure: This study was funded by Afyonkarahisar Health Science University Scientific Research Projects Commission (project number: 19.LIS.004).

REFERENCES

1. Türk C, Skolarikos A, Neisius A, Petrik A, Seitz C, Thomas K. EAU guidelines on urolithiasis, European Association of Urology. 2019.
2. Traxer O, Thomas A. Prospective evaluation and classification of ureteral wall injuries resulting from insertion of a ureteral access sheath during retrograde intrarenal surgery. J Urol. 2013; 189(2): 580-4.
3. Oğuz U, Şahin T, Şenocak Ç, Özyuvalı E, Bozkurt ÖF, Reşorlu B, et al. Factors associated with postoperative pain after retrograde intrarenal surgery for kidney stones. Turk J Urol. 2017; 43(3): 303-8.
4. Yılmaz E, Aydın E. The effect of pre and postoperative anxiety in quality of recovery in patients undergoing surgery. Fırat Sağlık Hizmetleri Dergisi 2013; 8: 79-95.
5. Zemła AJ, Nowicka-Sauer K, Jarmoszewicz K, Wera K, Batkiewicz S, Pietrzykowska M. Measures of preoperative anxiety. Anaesthesiol Intensive Ther. 2019; 51(1): 64-9.
6. Celik F, Edipoglu IS. Evaluation of preoperative anxiety and fear of anesthesia using APAIS score. Eur J Med Res. 2018; 23(1): 41.
7. Ciğerci Y, Kısacık ÖG, Özyürek P, Çevik C. Nursing music intervention: A systematic mapping study. Complement Ther Clin Pract. 2019; 35: 109-20.
8. Di Mauro D, La Rosa VL, Cimino S, Di Grazia E. Clinical and psychological outcomes of patients undergoing Retrograde Intrarenal Surgery and Miniaturised Percutaneous Nephrolithotomy for kidney stones. A preliminary study. Arch Ital Urol Androl. 2020; 91(4): 256-60.
9. Eti Aslan F, Kula Şahin S, Secginli S, Bülbüloğlu S. Hastaların, ameliyat sonrası ağrı yönetimine ilişkin hemşirelik uygulamalarından memnuniyet düzeyleri: Bir sistematik derleme [Patient satisfaction with nursing practices about postoperative pain management: A systematic review]. Agri. 2018; 30(3) :105-15.
10. Acar K, Acar H, Demir F, Eti Aslan F. Determınıng the ıncıdence of postsurgıcal paın and amount of analgesıc use postsurgıcal paın and analgesıc. ACU Sağlık Bil Derg. 2016; 2: 85-91.
11. Zargar-Shoshtari K, Anderson W, Rice M. Role of emergency ureteroscopy in the management of ureteric stones: analysis of 394 cases. BJU Int. 2015; 115(6): 946-50.
12. Özveren H. Non-pharmacological methods at pain management. Huhemfad-Johufon. 2011; 18(1): 83-92
13. Karalar M, Keles I, Doğantekin E, Kahveci OK, Sarici H. Reduced Pain and Anxiety with Music and Noise-Canceling Headphones During Shockwave Lithotripsy. J Endourol. 2016; 30(6): 674-7.
14. Nelson K, Adamek M, Kleiber C. Relaxation Training and Postoperative Music Therapy for Adolescents Undergoing Spinal Fusion Surgery. Pain Manag Nurs. 2017; 18(1): 16-23.
15. Öztürk E, Hamidi N, Yikilmaz TN, Özcan C, Başar H. Effect of Listening to Music on Patient Anxiety and Pain Perception during Urodynamic Study: Randomized Controlled Trial. Low Urin Tract Symptoms. 2019; 11(1): 39-42.
16. Kyriakides R, Jones P, Geraghty R, Skolarikos A, Liatsikos E, Traxer O, et al. Effect of Music on Outpatient Urological Procedures: A Systematic Review and Meta-Analysis from the European Association of Urology Section of Uro-Technology. J Urol. 2018; 199(5): 1319-27.
17. Cline ME, Herman J, Shaw ER, Morton RD. Standardization of the visual analogue scale. Nurs Res. 1992; 41(6): 378-80.
18. Chlan LL, Weinert CR, Heiderscheit A, Tracy MF, Skaar DJ, Guttormson JL, et al. Effects of patient-directed music intervention on anxiety and sedative exposure in critically ill patients receiving mechanical ventilatory support: a randomized clinical trial. JAMA. 2013; 309(22): 2335-44.
19. Woodforde JM, Merskey H. Some relationships between subjective measures of pain. J Psychosom Res. 1972; 16(3): 173-8.
20. Ekkelenkamp VE, Dowler K, Valori RM, Dunckley P. Patient comfort and quality in colonoscopy. World J Gastroenterol. 2013; 19(15): 2355-61.
21. Çetinkaya F. The effects of listening to music on the postoperative nausea and vomiting. Complement Ther Clin Pract. 2019; 35: 278-83.
22. Stouffer JW, Shirk BJ, Polomano RC. Practice guidelines for music interventions with hospitalized pediatric patients. J Pediatr Nurs. 2007; 22(6): 448-56.

23. Zhang ZS, Wang XL, Xu CL, Zhang C, Cao Z, Xu WD, et al. Music reduces panic: an initial study of listening to preferred music improves male patient discomfort and anxiety during flexible cystoscopy. J Endourol. 2014; 28(6): 739-44.

24. Yeo JK, Cho DY, Oh MM, Park SS, Park MG. Listening to music during cystoscopy decreases anxiety, pain, and dissatisfaction in patients: a pilot randomized controlled trial. J Endourol. 2013; 27(4): 459-62.

25. Raheem OA, Mirheydar HS, Lee HJ, Patel ND, Godebu E, Sakamoto K. Does Listening to Music During Office-Based Flexible Cystoscopy Decrease Anxiety in Patients: A Prospective Randomized Trial. J Endourol. 2015; 29(7): 791-6.

26. García-Perdomo HA, Montealegre Cardona LM, Cordoba-Wagner MJ, Zapata-Copete JA. Music to reduce pain and anxiety in cystoscopy: a systematic review and meta-analysis. J Complement Integr Med. 2018; 16(3).

27. Akbas A, Gulpinar MT, Sancak EB, Karakan T, Demirbas A, Utangac MM, et al. The effect of music therapy during shockwave lithotripsy on patient relaxation, anxiety, and pain perception. Ren Fail. 2016; 38(1): 46-9.

28. Tsivian M, Qi P, Kimura M, Chen VH, Chen SH, Gan TJ, et al. The effect of noise-cancelling headphones or music on pain perception and anxiety in men undergoing transrectal prostate biopsy. Urology. 2012; 79(1): 32-6.

29. Packiam VT, Nottingham CU, Cohen AJ, Eggener SE, Gerber GS. No Effect of Music on Anxiety and Pain During Transrectal Prostate Biopsies: A Randomized Trial. Urology. 2018; 117: 31-5.

30. Eti Aslan F, Badir A. Ağri kontrol gerçeği: Hemşirelerin ağrinin doğasi, değerlendirilmesi ve geçirilmesine ilişkin bilgi ve inançlari [Reality about pain control: the knowledge and beliefs of nurses on the nature, assessment and management of pain]. Agri. 2005; 17(2): 44-51.

31. Singh BP, Prakash J, Sankhwar SN, Dhakad U, Sankhwar PL, Goel A, et al. Retrograde intrarenal surgery vs extracorporeal shock wave lithotripsy for intermediate size inferior pole calculi: a prospective assessment of objective and subjective outcomes. Urology. 2014; 83(5): 1016-22.

32. Yılmaz E, Çeçen D, Toğaç HK, Mutlu S, Kara H, Aslan A. The Effect on Patient Comfort of Nursing Care during Perioperative Period. Manisa Celal Bayar University Journal of Institute of Health Science. 2018; 5(1) :3-9.

33. Terzi B, Kaya N. Konfor Kuramı ve Analizi. Journal of Anatolia Nursing and Health Science. 2017; 20: 67-74.

RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2023.2023-4
Cyprus J Med Sci 2023;8(6):418-424

What do Somalian Nurses Know About Esophageal Cancer? A Cross-Sectional Study

Zahra Salad Nageye[1], Işıl Işık Andsoy[2], Ayfer Bayındır Çevik[3]

[1]Department of Nursing, Karabük University-Institute of Health Sciences, Karabük, Türkiye
[2]Department of Nursing, Karabük University Faculty of Health Sciences, Karabük, Türkiye
[3]Department of Nursing, Bartın University Faculty of Health Sciences, Bartın, Türkiye

Abstract

BACKGROUND/AIMS: Esophageal cancer (EC) is increasing in Somalia. To be a knowledgeable nurse, it is essential to create awareness in the public and individuals regarding screening. This study aimed to assess the knowledge of EC among Somalian nurses.

MATERIALS AND METHODS: A cross-sectional study was conducted among Somalian nurses to elicit information regarding their knowledge of EC at Banadir Government Hospital in Mogadishu, Somalia. Data were collected using a self-designed questionnaire.

RESULTS: The Somalian nurses' mean age was 25.15±1.4 years. 47.6% had visited a doctor 1-2 times within the prior year, 60.5% were not willing to be screened for EC, and 80.3% were willing to receive further education on this issue. Barrett's esophagus (70.1%), reflux (70.1%), alcohol use (85.0%), smoking (68.0%), and gender (68.7%) were most commonly known as being the risk factors for EC, while the least known risk factors were race, obesity, non-steroid anti-inflammatory drugs, diet, the presence of *FOXF1* and *BARX1* genes and low socioeconomic status. The nurses' knowledge rates about risk factors, diagnosis/symptoms, and treatment were found to be moderate. Visiting a doctor within the past year was a significant predictor for having correct knowledge regarding the diagnosis, symptoms and treatment of the Somalian nurses who participated in this study ($p<0.005$).

CONCLUSION: We found that Somalian nurses' knowledge was moderate. Knowledge may be raised among Somalian nurses by establishing continuous education programs regarding ECs.

Keywords: Esophageal cancer, Somalian nurses, knowledge

INTRODUCTION

Esophageal cancer (EC) is the eighth most common type of cancer and the sixth leading cause of death around the world. It has an aggressive nature and a low survival rate, and changeability based on geographic location.[1-3] Most EC cases are diagnosed in less developed countries. It is estimated that about 600,000 people were diagnosed with EC in 2018, including 3.2% of all cancer diagnoses.[4] Its prevalence is higher in males in all regions[5] and EC is responsible for the second-highest rate of cancer-related deaths in South Africa.[6]

Somalia is located in the East African region. Unfortunately, Somalia is a vulnerable country due to conflicts, war, and political issues, all of which have destroyed the health system. In Somalia, mortality is frequently due to obstetric, nutritional problems, infectious diseases, and cancer. No literature demonstrates the real cancer data in Somalia.

*This manuscript is produced from Zahra Salad Nageye's master's thesis.

To cite this article: Salad Nageye Z, Işık Andsoy I, Bayındır Çevik A. What do Somalian Nurses Know About Esophageal Cancer? A Cross-Sectional Study. Cyprus J Med Sci 2023;8(6):418-424

ORCID IDs of the authors: Z.S.N. 0000-0002-0123-0524; I.I.A. 0000-0002-5271-4203; A.B.Ç. 0000-0002-8667-4094.

Address for Correspondence: Işıl Işık Andsoy
E-mail: isilandsoy@karabuk.edu.tr
ORCID ID: orcid.org/0000-0002-5271-4203

Received: 30.01.2023
Accepted: 04.05.2023

The population-based EC incidence is unknown, however, the first retrospective study focused on the distribution of cancer patients in Mogadishu, Somalia indicated that the five most common cancers in all cases were esophagus, non-Hodgkin lymphoma, liver, breast, and skin. Four hundred three cancer cases were diagnosed between 2016 and 2017. One study revealed that EC is one of the most common cancers (21.7%) for both genders in new cancer cases between 2017 and 2020 in Somalia.[7] Notably, incidence rates are on the rise and causative factors include lifestyle, dietary changes, and environmental events. It was noted that environmental risk factors have an impact on this population.[8] In Somalia, alcohol consumption is prohibited on religious terms and there is no alcohol production or sales. It was stated that the considerable increase in the nitrogenous ingredients in those foods cooked over coal fires was an important factor for EC. Furthermore, extremely hot brass and tea consumption habits and chewing the Khat plant are also very widespread in Somalia.[9] Studies have showed that there was a higher incidence of EC among khat plant users in some African countries.[10,11] Additionally, EC affects physical and mental health, as well as the quality of life.[12]

Cancer screening is essential for early detection and effective treatment processes. Delayed cancer detection and screening difficulties facing Somalia are exacerbated by an absence of healthcare professionals. With no active or effective formal educational institutions during the war between 1991 and 2012, there was little to no training for a generation of healthcare providers.[13,14] Since the installation of the government in 2012, Somalia has prioritized developing its health professional workforce.[15] Nurses go abroad to get postgraduate education. According to our knowledge, Türkiye is one of the countries where Somalian nurses choose postgraduate education. In all aspects of the fight against cancer, the government is aware of nurses' contribution as being a crucial part of a team. Nurses are responsible for providing health promotion, evaluating risk, and caring for people receiving cancer treatment. Adequately knowledgeable nurses can play instrumental roles in cancer control and can create awareness. Nurses should address cancer risks including smoking, obesity, nutrition, and environmental factors.[16] Nurses knowledgeable about EC may effectively create awareness in the society. To the best of our knowledge, there has been a lack of studies which have focused on evaluating Somalian nurses' knowledge levels of EC. Therefore, we aimed to evaluate Somalian nurses' knowledge levels regarding EC risk factors, its diagnosis, screening, and treatment.

MATERIALS AND METHODS

Study Design and Setting

This prospective cross-sectional study was conducted in Banadir Government Hospital in Mogadishu, Somalia from February to September, 2020. The Banadir Teaching Hospital which was built as part of a Chinese project in 1977 is the largest in Mogadishu, Somalia.

Sample Population

The total number of Somalian nurses who were working in Mogadishu Banadir Government Hospital was 160. All were invited to participate, and of those, 147 (respond rate: 99.8%) gave verbal consent and participated in this study. The inclusion criteria were being licensed nurses in a permanent position, being aged between 18 to 65, and being willing to participate in this study.

Study Tools

Data were collected using a self-designed questionnaire which was prepared by the researchers in line with the literature.[3,4,17-21] It was designed in English and its content was checked by three academicians. The questionnaire consists of two parts with a total of 41 items. Part 1, which has 16 items, was used to assess sociodemographic data (e.g., age, gender, educational level, working state, marital status, alcohol use, and nutritional habits). Part 2, which consists of 25 items, was used to evaluate the nurses knowledge regarding EC risk factors (14 items), diagnosis and screening methods (7 items), and treatment (4 items). This survey's Cronbach α-value was found to be 0.698, 0.706, and 0.646, respectively. A pilot study was carried out on three nurses in order to evaluate the reliability of this questionnaire, and these nurses were excluded from the sample. All selected nurses were invited to join the study after being told the aims of the study, and their confidentiality was ensured. Data were collected in the hospital. Filling out the questionnaire took approximately fifteen minutes.

Data Processes and Scoring Systems

In scoring for all the questions about EC, 1 was given for correct answers, and 0 to those who gave wrong answers or had no idea. As the answers to the questions were 1 point for "true" and 0 for "false", internal consistency was calculated by the Kuder-Richardson method (KR-20).[22] In this study, the number of correct answers was divided by the number of questions, their percentages were calculated and a knowledge index was obtained. The number of correct responses when multiplied by four yielded the total score, which ranged from 0-100. Scores of ≤50, 51-70, and ≥70 were rated as *poor*, *moderate*, or *good* respectively.[23-25]

Ethical Consideration

Permission was obtained from the Karabük University Ethics Committee (no: 77192405099-E50699) and written approval was also obtained from the Mogadishu Banadir Government Hospital (approval number: 27105693-806.01.03-1697). We explained the aims of this study and received informed written consent from each nurse. This study conformed to the principles of the Declaration of Helsinki.

Statistical Analysis

The SPSS (IBM) for Windows 20.0 program was used. The distribution of the sociodemographic characteristics and the nurses' knowledge rates of EC were evaluated by descriptive statistics. Linear regression was used to evaluate some factors related to the nurses' correct knowledge rates. A p-value less than 0.05 was statistically significant.

RESULTS

Sociodemographic Characteristics, Health Checks and Screening of the Somalian Nurses

Table 1 shows the sociodemographic distribution of the Somalian nurses. The nurses' mean age was 25.15±1.4 years. 50.3% of nurses were male, 51.0% were married, 57.1% had a master's degree education, 46.3% had 0-1 years of work experience and 27.8% worked in internal clinics.

Table 2 shows Somalian nurses' health checks and EC screening. Of the study population, 47.6% had visited a doctor 1-2 times within the previous year, 40.8% had had a health check within the prior two years,

Table 1. Socio-demographic characteristics of the Somalian nurses (n=147)

Characteristics	Number (%)
Age groups	
18-29	84 (57.1)
30-40	47 (32.0)
≥41	16 (10.9)
Mean age ± SD	25.15±1.4
Gender	
Female	73 (49.7)
Male	74 (50.3)
Marital status	
Single	72 (49.0)
Married	75 (51.0)
Education	
Associate degree	22 (15.0)
Undergraduate	41 (27.9)
Master's degree	84 (57.1)
Work experience	
0-5 years	68 (46.3)
6-10 years	40 (27.2)
11-15 years	27 (18.4)
≥15 years	12 (8.2)
Clinic	
Internal medicine	40 (27.8)
Surgery	33 (22.9)
Intensive care unit	30 (20.8)
Operating theatre	21 (14.6)
Emergency	20 (13.9)

SD: Standard deviation.

Table 2. Somalian nurses' health checks, and esophageal cancer screening (n=147)

Characteristics	Number (%)
Visiting a doctor within the previous year	
I never went	38 (25.9)
1-2 times	70 (47.6)
3-4 times	39 (26.5)
Health check status	
within the previous year	58 (39.5)
more than two years previously	60 (40.8)
Do not remember	29 (19.7)
Existence of EC in first-degree relatives (yes)	38 (25.9)
Willingness to have screening for esophageal cancer (yes)	58 (39.5)
Barriers to screening for esophageal cancer	
I did not find it necessary	57 (38.7)
Nobody suggested	38 (25.9)
Fear of cancer diagnosis	38 (25.9)
Fear of the screening procedures	14 (0.5)
Willingness to receive training (yes)	118 (80.3)

EC: Esophageal cancer.

25.9% had a family history of cancer, 39.5% were willing to be screened for EC, and 80.3% were willing to receive training on EC.

Somalian Nurse's Answers Regarding Esophageal Cancer and Predictors of Their Knowledge

Table 3 shows the Somalian nurses' answers to questions about EC. The most commonly known risk factors were gender (68.7%), age (63.2%),

Table 3. Somalian nurses' answers about esophageal cancer

Items	Yes		No		No idea	
Risk factors	**n**	**%**	**n**	**%**	**n**	**%**
1. Women are at lower risk than men.	101	68.7	33	22.4	13	8.8
2. Being over 55 years of age increases the cancer risk.	93	63.2	47	32	7	4.8
3. The susceptibility is higher in white than in black people.	71	48.3	45	30.6	31	21.1
4. Barrett's esophagus increases EC cancer.	103	70.1	30	20.4	14	9.5
5. Reflux complaints are more common in EC.	103	70.1	37	25.1	7	4.8
6. Obesity is a risk factor.	45	30.6	81	55.1	21	14.3
7. Alcohol use is a risk factor.	125	85.0	18	12.2	4	2.8
8. Smoking increases the EC risk.	100	68.0	38	25.9	9	6.1
9. A diet rich in fiber, fruits, and vegetables decrease EC risk.	79	53.7	44	29.9	24	16.4
10. Low socioeconomic status is not a risk factor.	83	56.5	48	32.7	16	10.8
11. *FOXF1* and *BARX1* genes increase the risk.	51	34.7	42	28.6	54	36.7
12. The use of proton pump inhibitors and aspirin reduces the risk.	69	46.9	41	27.9	37	25.2
13. Statins reduce the risk.	71	48.3	51	34.7	25	17
14. Excessive intake of non-steroidal anti-inflammatory drugs increases the risk of EC.	49	33.3	74	50.3	24	16.4
Diagnosis/symptoms						
15. Endoscopy is a diagnostic method but it has little importance.	98	66.7	43	29.3	6	4.0
16. The biopsy method is the certain diagnosis method.	110	74.8	30	20.4	7	4.8
17. Other diagnostic methods are MR, CT, PET CT, and endoscopic ultrasound.	105	71.4	25	17	17	11.6
18. Common symptoms are dysphagia, reflux, chest inflammation, or pressure sensation.	99	67.3	31	21.1	17	11.6
19. Weight loss and indigestion may be symptoms.	123	83.7	16	10.9	8	5.4
20. Cough and hoarseness may be other symptoms.	66	44.9	70	47.6	11	7.5
21. One of the late symptoms may be hematemesis.	86	58.5	33	22.4	28	19.1
Treatment						
22. Neoadjuvant treatment method is used after surgery.	79	53.7	46	31.3	22	15
23. Surgery is a major treatment.	93	63.3	44	29.9	10	6.8
24. Radiotherapy is used with neoadjuvant treatment.	88	59.8	37	25.2	22	15

EC: Esophageal cancer, MR: Magnetic resonance, CT: Computed tomography, PET: Positron emission tomography.

Barrett's esophagus (70.1%), reflux (70.1%), alcohol use (85.0%), and smoking (68.0%). The least known risk factors were race, obesity, non-steroidal anti-inflammatory drugs, diet, *FOXF1* and *BARX1* genes, and sociological status. The nurses' most commonly known symptoms/diagnosis were unexplained weight loss and indigestion, dysphagia, reflux, and chest inflammation, while for screening, it was biopsy (74.8%), magnetic resonance (MR), computed tomography (CT), positron emission tomography (PET)/CT, and endoscopic ultrasound (71.4%) and endoscopy (66.7%). The nurses' most commonly known treatment of EC was surgery (63.3%).

Table 4 shows the Somalian nurses' correct knowledge rates of EC risk factors, diagnosis/screening, and treatment. The nurses' correct knowledge rates of risk factors, diagnosis/screening, and treatment were found to be *moderate* (range=51 to 70) (respectively; 55.53±17.75; 66.76±24.35; 62.75±27.03.

Table 5 shows that the frequency of visiting a doctor in the prior year was a significant predictor for knowledge of diagnosis/screening and treatment among the nurses.

DISCUSSION

This present study aimed to identify EC risk factors, diagnosis, screening and treatment knowledge, and associated factors among Somalian nurses. The important findings of this study were that Somali nurses have a *moderate* level of knowledge about EC and frequent visits to the doctor for health check-ups increased their correct diagnosis, symptom, and treatment knowledge rates. Previous studies have reported risk factors for many cancers, including EC, are gender, increasing age, smoking, alcohol use, low fruit and vegetable intake, inadequate or low fiber diets, and cancer in first-degree relatives.[26-28] Most Somali nurses have sufficient knowledge about these major risk factors. It is known that being male and over 55 age poses more risk for EC.[7] In addition, a meta-analysis reported that alcohol consumption and smoking increase the risk of developing cancer in a dose-dependent manner.[26] Many Somali nurses agreed with this knowledge.

When considering the habits of Somali nurses' health checks, and EC screening, it was found that about half of them had been for a health check-up 1-2 times within the prior year. In addition, a quarter of the nurses have EC in a first-degree relative. Nurses need to have regular health checks for EC, which is known to have a high genetic predisposition. However, more than half of the nurses were not willing to be screened for EC and a significant portion (38.7%) considered EC screenings unnecessary. The most important reason for this may be that they may not have had a desire for screening because they had regular health checks. In addition, the nurses were willing to receive training on EC. In this context, it can be said that this working group takes care of and are well aware of their own health.

Table 4. Somalian nurses' correct knowledge rates

	Mean ± SD	Median (min.-max.)
Risk factors	55.53±17.75	50 (0-100)
Diagnosis and symptoms	66.76±24.35	71.42 (0-100)
Treatment	62.75±27.03	75 (0-100)
Total correct knowledge rate	59.83±17.70	60 (0-100)

SD: Standard deviation, min.: Minimum, max. Maximum.

Barrett's esophagus is one of the most important risks for EC. In patients with Barrett's esophagus, a multicenter study showed an increased risk of dysplasia by 3.3% per year of age.[3,21] Also, other studies have shown Barrett's EC is usually diagnosed on routine screening, and its prevalence is higher in males around the world.[5,28] In the present

Table 5. Multivariate stepwise logistic analysis of predictors

Predictors of risk factors correct rate	**R=0.312 R^2=0.097**	**F=1.767**	**Sig. F=0.089**	
	B	**95% CI**	**SE**	**p-value**
Age	-1.327	-6.407-3.753	2.500	0.606
Gender (male)	0.488	-5.494-6.470	3.025	0.872
Marital status	4.283	-2.467-11.034	3.414	0.212
Education	0.531	-3.832-4.893	2.206	0.810
Work experience	-5.090	-11.193-1.013	3.085	0.101
Working clinics	1.353	-1.608-4.315	1.497	0.368
Visiting doctor within the previous year	2.732	-2.821-8.284	2.807	0.332
Predictors of diagnosis and symptoms correct rate	**R=0.396 R^2=0.157**	**F=3.146**	**Sig. F=0.003**	
Age	-6.164	-12.803-0.474	3.357	0.069
Gender (male)	2.037	-5.780-9.857	3.953	0.607
Marital status	8.198	-0.625-17.020	4.461	0.068
Education	3.895	-1.806-9.596	2.883	0.179
Work experience	0.561	-4.168-5.290	2.391	0.815
Working clinics	1.917	-0.914-4.747	1.431	0.183
Visiting doctor in the past year	-8.581	-13.991--3.170	2.736	0.002
Predictors of treatment correct rate	**R=0.348 R^2=0.121**	**F=2.318**	**Sig. F=0.023**	
Age	-2.967	-10.316-4.381	3.716	0.426
Gender (male)	1.774	-6.879-10.427	4.375	0.686
Marital status	5.946	-3.819-15.711	4.938	0.231
Education	1.550	-4.760-7.860	3.191	0.628
Work experience	-1.169	-6.403-4.065	2.647	0.659
Working clinics	0.930	-2.202-4.063	1.584	0.558
Frequency of visiting doctor within the previous year	-9.784	15.773- 3.796	3.028	0.002
Presence of EC in first-degree relatives	4.791	-5.184-14.767	50.044	0.344
Predictors of total knowledge score	**R=0.360 R^2=0.130**	**F=2.511**	**Sig. F=0.014**	
Age	-2.944	-7.837-1.946	2.474	0.236
Gender (male)	1.127	-4.634-6.889	2.913	0.699
Marital status	5.645	-0.857-12.148	3.288	0.088
Education	1.636	-2.566-5.837	2.124	0.443
Work experience	-0.065	-3.550-3.420	1.762	0.941
Working clinics	0.333	-1.753-2.419	1.055	0.752
Visiting doctor within the previous year	-6.007	-9.994- 2.019	2.016	0.003
Presence of EC in first-degree relatives	6.116	-0.526-12.758	3.359	0.071

Sig.: Significant, CI: Confidence interval, B: Coefficient; SE: Standard error.

study, many Somalian nurses agreed that Barrett's esophageal disease is the leading cause of EC. This shows the nurses are familiar with the common causes of EC.

Susceptibility genes for EC are starting to be discovered, which may help in the determination of high-risk groups needing more preventive measures.[26] The literature has reported that three genes (*CRTC1*, *FOXP1*, and *BARX1*) play a role in the development of EC and Barrett's esophagus.[29] Although the information about these genes is limited, the fact that a significant number of the nurses (34.8%) know about these genes can be attributed to their encountering EC cases and having detailed information.

Low socioeconomic status is important in the development of EC due to its effect on nutrition and lifestyle. In addition, reflux is the most important risk factor for the development of Barrett's Esophagus and EC.[26] The relationship between EC and low socioeconomic status and long-term reflux complaints was answered correctly by most nurses.

Early diagnosis is important in cancer prevention. For this reason, regular doctor check-ups are important for these screenings, and cancer awareness should be increased with training in the community.[17] Gastroesophageal cancer guidelines offer suggestions for reflux and/or Barrett's esophagus during screening and surveillance of patients.[30] The nurses agreed that, based on their knowledge of diagnosis and screening, endoscopy plays a minor role in the diagnosis of cancer. Additionally, the nurses thought that the definitive diagnostic method is a biopsy of the esophagus. There is no standard or routine screening test for EC and endoscopy is not a recommended screening method for the entire population.[31] However, for the diagnosis of EC, flexible endoscopy with biopsy is the primary method. MR, CT, PET/CT, and endoscopic ultrasound are other diagnostic methods used in EC.[32] It was seen that the nurses had the desired knowledge levels on this subject.

It is also important to determine patient anamnesis in the diagnosis of this disease. Our study indicates most nurses agreed on the common symptoms of EC including dysphagia, reflux, chest pain or sensation, weight loss, indigestion, cough, and hoarseness. Additionally, many Somalian nurses knew hematemesis to be one of the late symptoms of EC. In a study conducted in Iran, it was found that more than one alarming symptom (such as weight loss, dysphagia, GI bleeding, or persistent vomiting) is important in the diagnosis of two-thirds of cancers.[33] In this study, the nurses knew most of the alarm symptoms required for the diagnosis of EC.

Survival in cancer also depends on the successful management of treatment.[26] In a study conducted in Canada, it was reported that neoadjuvant, adjuvant chemotherapy, and esophagectomy surgical treatment are frequently applied for the treatment of EC.[34] In this study, regarding the management and treatment of EC, most Somali nurses were aware of the treatment of EC such as neoadjuvant chemotherapy, surgery, or radiotherapy.

Somalian nurses' correct knowledge rates of risk factors, diagnosis/screening, and treatment were found to be *moderate*. Additionally, it was promising that most of them were willing to receive further education on this issue. This result may be attributed to the high incidence of EC (27%) in the population meaning that nurses encounter EC frequently.[8] However, we have not found any research other than our study which compares the knowledge levels of nurses on EC.

The frequency of nurses' visits to doctors within the previous year was found to be associated with the correct diagnosis, symptom, and treatment knowledge rates of EC. Regular doctor visits may have led to an increase in the knowledge of nurses on the mentioned subjects. The fact that almost half of these frequent doctor visits were made with the aim of check-ups shows the importance that nurses give to their health. In the literature, there is a study examining the cancer screening behaviors of nurses and midwives.[35] Unfortunately, there was no comparable data for nurses' EC screening in that study.

Study Limitations

This current study has several limitations. Firstly, the COVID-19 pandemic occurred between the starting and ending dates of this study, and in Somalia, the Mogadishu hospital was a pandemic hospital where all clinics were converted into COVID-19 services. Correspondingly, difficulties were experienced when reaching nurses due to virus risks. The hard work of Somalian nurses during the outbreak and the psychological issues caused by COVID-19 may have affected the nurses' responses. Results may depend on information given by participants and may be open to bias. The extent of truthful responses or confirming the participants' claims is not fully known in a descriptive study and so their responses must be taken at face value. Additionally, comparing knowledge about EC among different populations is challenging. There is a lack of studies evaluating EC knowledge in different populations. This may limit the discussion of this study data. Additionally, there is also a lack of standardized, validated questionnaires to compare results from different populations. The strength of this study is that, as far as we know, this current study is the first descriptive study which evaluates nurses' knowledge about EC in Somalia. However, the data were obtained from participants in Mogadishu, Somalia, so this cannot be generalized to other regions of the country or the world.

CONCLUSION

In this present study, The Somalian nurses had *moderate* knowledge. Considering the increasing incidence of EC around the world, we strongly suggest planning educational programs for nurses regarding increasing their knowledge of EC, including its risk factors, diagnosis, screening, and treatment modalities. The presence of nurses who have adequate knowledge about EC cancer in Somalian society will undoubtedly lead to patients receiving earlier diagnosis, and more successful treatment processes. Future studies are needed to compare the knowledge of Somalian nurses with nurses from different communities regarding EC.

MAIN POINTS

- Esophageal cancer (EC) is increasing in Somalia. EC screening and awareness are essential for early detection and effective treatment.
- Adequately knowledgeable nurses can play many vital roles in the early detection of EC and screening awareness.
- There are limited studies which have focused on evaluating Somalian nurses' knowledge levels of esophageal cancer.

Acknowledgments: This manuscript was created by Zahra Nageye, who is the author of the master's thesis. We would like to thank all of the Somalian nurses who took part in this study.

ETHICS

Ethics Committee Approval: Permission was obtained from the Karabük University Ethics Committee (no: 77192405099-E50699) and written approval was also obtained from the Mogadishu Banadir Government Hospital (approval number: 27105693-806.01.03-1697).

Informed Consent: We explained the aims of this study and received informed written consent from each nurse.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Z.S.N., Concept: Z.S.N., I.I.A., A.B.Ç., Design: Z.S.N., I.I.A., A.B.Ç., Data Collection and/or Processing: Z.S.N., Analysis and/or Interpretation: I.I.A., A.B.Ç., Literature Search: Z.S.N., I.I.A., A.B.Ç., Writing: I.I.A., A.B.Ç.

DISCLOSURES

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

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

REFERENCES

1. GLOBOCAN 2020: New Global Cancer Data | UICC. 2021. Available from https://www.uicc.org/news/globocan-2020-new-global-cancer-data
2. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2015. CA Cancer J Clin. 2015; 65(1): 5-29.
3. Uhlenhopp DJ, Then EO, Sunkara T, Gaduputi V. Epidemiology of esophageal cancer: update in global trends, etiology and risk factors. Clin J Gastroenterol. 2020; 13: 1010-21.
4. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018; 68(6): 394-424.
5. Huang J, Koulaouzidis A, Marlicz W, Lok V, Chu C, Ngai CH, et al. Global Burden, Risk Factors, and Trends of Esophageal Cancer: An Analysis of Cancer Registries from 48 Countries. Cancers (Basel). 2021; 13(1): 141.
6. Loots E, Sartorius B, Madiba TE, Mulder CJ, Clarke DL. Is Clinical Research in Oesophageal Cancer in South Africa in Crisis? A Systematic Review. World J Surg. 2017; 41(3): 810-6.
7. Baş Y, Hassan HA, Adıgüzel C, Bulur O, Ibrahim İA, Soydan S. The distribution of cancer cases in Somalia. Semin Oncol. 2017; 44(3): 178-86.
8. Tahtabasi M, Mohamud Abdullahi I, Kalayci M, Gedi Ibrahim I, Er S. Cancer Incidence and Distribution at a Tertiary Care Hospital in Somalia from 2017 to 2020: An Initial Report of 1306 Cases. Cancer Manag Res. 2020; 12: 8599-611.
9. McCormack VA, Menya D, Munishi MO, Dzamalala C, Gasmelseed N, Leon Roux M, et al. Informing etiologic research priorities for squamous cell esophageal cancer in Africa: A review of setting-specific exposures to known and putative risk factors. Int J Cancer. 2017; 140(2): 259-71.
10. Al-abed AA, Tamil AM, Al-Dubai SAR. Case-control study on risk factors associated with esophageal cancer in Yemen. BMC Public Health. 2012; 12: A11.
11. Dessalegn B, Enqueselassie F, Kaba M, Assefa M, Addissie A. Risk factors of oesophageal cancer at health facilities in Addis Ababa, Ethiopia: Unmatched case control study. Front Oncol. 2022; 12: 997158.
12. Zhang L, Zhou X. The effect of clinical psychological nursing procedure on the improvement of life quality of patients with esophageal cancer. J Clin Med Prac. 2016; (18): 67-9.
13. WHO. WHO country cooperation strategy at a glance: Somalia. Geneva: World Health Organization; 2014. http://apps.who.int/iris/bitstream/10665/136871/1/ccsbrief_som_en.pdf
14. Gele A. Challenges facing the health system in Somalia and implications for achieving the SDGs. European Journal of Public Health. 2020; 30(5): 424.
15. Yalahow A, Hassan M, Foster AM. Training reproductive health professionals in a post-conflict environment: exploring medical, nursing, and midwifery education in Mogadishu, Somalia. Reprod Health Matters. 2017; 25(51): 114-23.
16. Challinor JM, Galassi AL, Al-Ruzzieh MA, Bigirimana JB, Buswell L, So WKW, et al. Nursing's Potential to Address the Growing Cancer Burden in Low- and Middle-Income Countries. J Glob Oncol. 2016; 2(3): 154-63.
17. WHO. Cancer - Screening and early detection. 2020. https://www.who.int/europe/news-room/fact-sheets/item/cancer-screening-and-early-detection-of-cancer
18. Chen Y, Tong Y, Yang C, Gan Y, Sun H, Bi H, et al. Consumption of hot beverages and foods and the risk of esophageal cancer: a meta-analysis of observational studies. BMC Cancer. 2015; 15: 449.
19. Meves V, Behrens A, Pohl J. Diagnostics and Early Diagnosis of Esophageal Cancer. Viszeralmedizin. 2015; 31(5): 315-8.
20. Harris C, Croce B, Munkholm-Larsen S. Esophageal cancer. Ann Cardiothorac Surg. 2017; 6(2): 190.
21. Huang FL, Yu SJ. Esophageal cancer: Risk factors, genetic association, and treatment. Asian J Surg. 2018; 41(3): 210-5.
22. Bademci V. A Study on the Kuder-Richardson 20, Cronbach's alpha, Hoyt's analysis of variance, generalizability theory and score reliability. Dicle University Ziya Gökalp Faculty of Education Journal. 2011; 17: 173-93 (Turkish).
23. Andegiorgish AK, Kidane EA, Gebrezgi MT. Knowledge, attitude, and practice of breast Cancer among nurses in hospitals in Asmara, Eritrea. BMC Nurs. 2018; 17: 33.
24. Akintunde AA, Akintunde T', Opadijo OG. Knowledge of heart disease risk factors among workers in a Nigerian University: A call for concern. Niger Med J. 2015; 56(2): 91-5.
25. Negesa LB, Magarey J, Rasmussen P, Hendriks JML. Patients' knowledge on cardiovascular risk factors and associated lifestyle behaviour in Ethiopia in 2018: A cross-sectional study. PLoS One. 2020; 15(6): e0234198.
26. Chung CS, Lee YC, Wu MS. Prevention strategies for esophageal cancer: Perspectives of the East vs. West. Best Pract Res Clin Gastroenterol. 2015; 29(6): 869-83.
27. Uludağ SS, Akinci O, Ergün S, Erginöz E, Sanli AN, Kepil N, et al. The 33-year retrospective analysis of esophageal carcinomas: Cerrahpaşa experience. Nam Kem Med J. 2021; 9 (1): 67-71.
28. Yang CS, Chen X, Tu S. Etiology and Prevention of Esophageal Cancer. Gastrointest Tumors. 2016; 3(1): 3-16.
29. Becker J, May A, Gerges C, Anders M, Veits L, Weise K, et al. Supportive evidence for FOXP1, BARX1, and FOXF1 as genetic risk loci for the development of esophageal adenocarcinoma. Cancer Med. 2015; 4(11): 1700-4.
30. Emedicine. Esophageal Cancer Guidelines (2022). https://emedicine.medscape.com/article/277930-guidelines
31. National Cancer Institute. 2022. https://www.cancer.gov/types/esophageal/patient/esophageal-screening-pdq

32. Lordick F, Mariette C, Haustermans K, Obermannová R, Arnold D; ESMO Guidelines Committee. Oesophageal cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol. 2016; 27(Suppl 5): v50-7.

33. Khademi H, Radmard AR, Malekzadeh F, Kamangar F, Nasseri-Moghaddam S, Johansson M, et al. Diagnostic accuracy of age and alarm symptoms for upper GI malignancy in patients with dyspepsia in a GI clinic: a 7-year cross-sectional study. PLoS One. 2012; 7(6): e39173.

34. Habbous S, Yermakhanova O, Forster K, Holloway CMB, Darling G. Variation in Diagnosis, Treatment, and Outcome of Esophageal Cancer in a Regionalized Care System in Ontario, Canada. JAMA Netw Open. 2021; 4(9): e2126090.

35. Nicholls R, Perry L, Gallagher R, Duffield C, Sibbritt D, Xu X. The personal cancer screening behaviours of nurses and midwives. J Adv Nurs. 2017;73(6):1403-20.

RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2022.2021.240
Cyprus J Med Sci 2023;8(6):425-434

Relationship Between Professional Attitudes of Nurses and Their Attitudes Toward Change

Arzu Gönel[1], Handan Sezgin[2]

[1]Department of Emergency, Dr. Burhan Nalbantoğlu State Hospital, Nicosia, North Cyprus
[2]Department of Nursing, Eastern Mediterranean University Faculty of Health Sciences, Famagusta, North Cyprus

Abstract

BACKGROUND/AIMS: The factors which influence professional attitudes and organizational change ideally ensure the quality of efficient patient care. This study aimed to determine the relationships between nurses' professional attitudes and their attitudes toward change.

MATERIALS AND METHODS: This study used a descriptive, cross-sectional, and correlational research design. A total of 376 nurses working in four state hospitals in North Cyprus were interviewed between June and July, 2016. Data were collected using a Socio-demographic Form, the Attitudes toward Change Scale (ATCS) and the Inventory of Professional Attitude at Occupation.

RESULTS: The professional attitudes of the participant nurses were relatively high (135.82±21.31), whereas their attitudes toward change were moderate (59.0±9.95); there was a positive relationship between professional attitudes and attitudes toward change among the nurses. The problem areas of nurses regarding change are *change outcomes and management style of change*. Scale scores were higher for those nurses who had higher professional positions, were members of professional organizations, contributed to institutional change, followed developments in health sciences and the nursing literature, were able to use computers and were more open-minded to change ($p<0.05$).

CONCLUSION: A positive correlation was found between the nurses' professional attitudes and their attitudes toward change. The nurses had a high degree of professionalism and did not show any reaction toward change. The positive impact of nurses' professional attitudes on the change process should be considered in order to determine the resistance points and conduct programs to facilitate necessary changes. Nurses should be informed about the reasons, processes, and outcomes of changes.

Keywords: Nurses, professionalism, professional attitudes, attitudes toward change

INTRODUCTION

Professionalism refers to the expertise, knowledge, qualifications, attitudes, and behaviors in line with professional standards which should be possessed by all individuals responsible for performing the roles and responsibilities of a particular profession.[1] In order to attain the status of perfect professionalization, professional attitudes have been an important subject in the nursing curriculum for more than half a century. The rising number of studies on the quality of health show that nurses who were competent in terms of healthcare were gradually replaced by nurses with high levels of professionalism.[2] This has increased the demand for nurses who were aware of their roles and responsibilities and can adapt to changing professional life, act autonomously, think critically, and internalize ethical values; thereby, providing top-quality healthcare services to patients.[3,4]

Today, rapidly evolving organizations face difficulties in adapting to changes. Such changes should be gradually adopted in a conscious and planned manner. Change may not only provide solutions to existing problems, but may also create new problems. One of the most

To cite this article: Gönel A, Sezgin H. Relationship Between Professional Attitudes of Nurses and Their Attitudes Toward Change. Cyprus J Med Sci 2023;8(6):425-434

ORCID IDs of the authors: A.G. 0000-0001-6801-292X; H.S. 0000-0002-0313-5782.

Address for Correspondence: Handan Sezgin
E-mail: handan.sezgin@emu.edu.tr
ORCID ID: orcid.org/0000-0002-0313-5782

Received: 12.11.2021
Accepted: 06.10.2022

important problems during the process of change is the resistance to change. Resistance may be defined as the behaviors of employees which result in unexpected delays, increases in costs, and instability in the process of change.[5]

Organizational changes in health institutions aim to decrease costs, sustain productivity, and increase patient and employee satisfaction.[6] However, a hospital is an institution where individuals with different expertise and education levels work together to achieve a common goal. This situation necessitates coping with various difficulties when there is a demand to make changes in nursing services within that institution. To manage these difficulties, nurses, who are primarily and considerably affected by the process of organizational change, should take part in this process.[7] Attempts to realize this goal will contribute to the success of targeted organizational change and improve the quality of healthcare.[3] Nurses implement and keep a close watch on organizational changes. Nurses are the primary agents who determine the quality of healthcare, and health managers should be responsive to the expectations of nurses stemming from organizational changes.[6]

A professional nursing environment, a positive emotional climate, and structural empowerment, which provides access to information, support, and opportunities, has a positive impact on nurses' readiness for organizational changes.[8] However, there are economic, sociological, psychological, and rational reasons for resistance to organizational change.[5]

Managing resistance to change is a subject which has attracted researchers studying the factors influencing administrative success. However, we have not found any studies on the relationship between the professional attitudes of nurses and their attitudes toward change. In the literature, it was seen that some factors have negative effects on the professional attitudes of nurses and their attitudes toward change, such as insufficient resource provision of the institution, the management's attitude, an inability to adapt to current developments, a failure to grasp the research methodology and results, and low autonomy.[7-9] This information suggests that there may be a relationship between these concepts.

This study aimed to determine the relationship between nurses' professional attitudes and their attitudes toward change. The findings of this research are expected to fill a gap in the literature focusing on the relationship between the professional attitudes of nurses and their attitudes toward change. Additionally, our findings may also help health managers develop strategies which may contribute to the active participation of nurses in the processes of organizational change and help them to adapt to changing organizational structures.

Research Questions

- What are the professional attitudes levels of nurses?

- What are the attitudes toward change levels of nurses?

- Do nurses' descriptive characteristics impact their professional attitudes and their attitudes toward change?

- Is there a relationship between the professional attitudes of nurses and their attitudes toward change?

MATERIALS AND METHODS

Research Design

This study employed a descriptive, cross-sectional, and correlational research design. The population of the study comprised 627 nurses working in four different public hospitals in the Turkish Republic of Northern Cyprus (TRNC), with 391 in Nicosia, 135 in Famagusta, 69 in Kyrenia, and 32 in Lefka. The data was collected between June and July 2016 from 376 nurses who met the inclusion criteria for the study, without any sample selection.

Sample Collection

The study was conducted with official permission from the head nurses of the hospitals. The researcher visited 402 nurses working in the first and second shifts (shift 1: 07-14:00, shift 2: 14-21:00, shift 3: 9-07:00) in their respective clinics and explained the research's purpose. Research forms were distributed to 383 nurses who agreed to participate in the study. The researcher collected the full-filled forms from the clinics the following day. Seven forms that were incompletely filled out were excluded from evaluation.

Inclusion criteria: Nurses who voluntarily agreed to participate in this study and those working in the first or second shifts were included.

Exclusion criteria: Nurses working at the same institution for less than one year, those on maternity, sickness, or annual leave, and those who did not complete the forms were excluded from this study. This study used the STROBE guidelines and the EQUATOR checklist for reporting cross-sectional studies (Supplementary 1).

Data Collection

Sociodemographic form: The socio-demographic form included variables such as age, gender, marital status, education level, employment status, professional experience and position, length of service in the institution, professional organization membership, experience/thoughts about change, and the following of developments in health sciences and nursing literature. This form was developed by researchers in line with the literature.[2,10,11]

Attitudes Toward Change Scale (ATCS): Developed by Seren and Baykal,[10] ATCS has 29 items and four sub-dimensions, namely *institutional policy in change* (12 items), *change outcomes* (8 items), *resistance to change* (5 items), and *management style in change* (4 items). Twenty-four items of this scale are positive, whereas five are negative. The items are scored on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*); negative items are reverse scored. The raw score of the scale varies between 29 and 145. By converting the raw score to 100 in terms of absolute value, scale points between 20 and 100 are obtained (there are 80 points between these two points). The average score of this scale is obtained by using the formula 80\2+20:60. In this study, the relationship between the nurses' professional attitudes and their attitudes toward change, as well as their descriptive characteristics which may make a difference in the nurses' scale scores, were investigated. The total score ranged from 20 to 100, with a mean ATC score of 60. Higher scores indicate a more positive attitude toward change. The Cronbach's alpha of the original scale and our study were 0.92 and 0.90, respectively.

Inventory of Professional Attitude at Occupation: Developed by Erbil and Bakır,[1] the Inventory of Professional Attitude at Occupation (IPAO) is appropriate for professional nurses and midwives. The Likert-type inventory consists of 32 items on issues such as professional training and development, interpersonal relations, and attitudes toward problems. Items are scored on a 5-point Likert scale ranging from 1 (*it does not fit me at all*) to 5 (*it fits me completely*). The total score ranges from 32 to 160, with higher scores indicating higher professional attitudes.[1] The Cronbach's alpha of the original inventory and our study were 0.89 and 0.97 respectively.

Ethical Considerations

We obtained permission from the Ethics Committee of Okan University (approval number: 06/06/2016-11), and institutional permission from the TRNC Department of Inpatient Treatment Institutions (16.05.2016). This study adhered to the principles of data collection laid out by the Declaration Helsinki. The nurses were informed about the aims and scope of the research and written informed consent was obtained from all participants.

Statistical Analysis

The collected data were analyzed using IBM-SPSS Version 21. Frequency was used to determine the descriptive and professional characteristics of the nurses. Scores obtained from the scales were analyzed using descriptive statistics, including the mean, standard deviation, minimum and maximum values. Mann-Whitney U and Kruskal-Wallis tests were used to compare the descriptive characteristics of the nurses with the scores obtained from the scales. Differences between the categories of independent variables were evaluated using the Mann-Whitney U test. Spearman's correlation analysis was used to evaluate the relationships between the scales. The significance level was set at $p<0.05$.

RESULTS

In this study, the relationship between the nurses' professional attitudes and their attitudes toward change, as well as the descriptive characteristics which can make a difference in the nurses' scale scores were investigated. Of the total sample, 85.64% of the participants were female, 72.34% were married, 60.37% had bachelor's degrees, 9.84% had completed postgraduate education, 46.81% were aged between 31 and 40 years, 92.02% were bedside nurses, 30.32% had five years or less length of service in the institution, and 30.05 % had between 6-10 years of professional experience (Table 1). In North Cyprus, bedside nurses are directly responsible for patient care. They always work in three shifts, that is, they work in turns to ensure a continuous service.

Table 1. Descriptive characteristics of the nurses (n=376)

Demographic variable	Number (n)	Percentage (%)
Gender		
Female	322	85.64
Male	54	14.36
Marital status		
Married	272	72.34
Single	104	27.66
Education level		
Vocational school of health	29	7.71
Associate	83	22.07
Bachelor's	227	60.37
Postgraduate	37	9.84
Age		
30 years or below	129	34.31
31-40 years	176	46.81
41 years or above	71	18.88
Professional experience		
5 years or below	65	17.29
6-10 years	113	30.05
11-15 years	92	24.47
16-20 years	46	12.23
21 years or above	60	15.96
Length of service in the institution		
5 years or below	114	30.32
6-10 years	108	28.72
11-15 years	77	20.48
16-20 tears	31	8.24
21 years or above	46	12.23
Professional position		
Chief nurse	7	1.86
Nurse supervisor	23	6.12
Bedside nurse	346	92.02
Total	376	100.00

Table 2. Distribution of the participants according to their characteristics related to innovation and change (n=376)

Characteristic	Number (n)	Percentage (%)
Professional organization member		
Yes	316	84.04
No	60	15.96
An institutional change in their institution		
Yes	274	72.87
No	102	27.13
Participation in institutional change		
Yes	285	75.80
No	91	24.20
Believes that institution is open to change		
Yes	239	63.56
No	137	36.44
Follows developments in health sciences		
Yes	339	90.16
No	37	9.84
Follows scientific literature on nursing		
Yes	296	78.72
No	80	21.28
Uses computers		
Yes	353	93.88
No	23	6.12
Believes that s/he is open to innovations		
Yes	361	96.01
No	15	3.99
Total	376	100.00

As illustrated in Table 2, 84.04% of the participants were members of a nursing organization, 72.87% had experienced a change in the institutions they worked at, 75.8% reported their participation in the process of a change, and 63.56% considered their organization to be open to change. Of the total participants, 90.16% followed developments in health sciences, and 78.72% followed scientific literature on nursing. Of the total, 93.88% were able to use a computer, and 96.01% perceived themselves as being open to innovations.

Levels of IPAO and Factors Associated with IPAO

The nurses' IPAO scores were found to be high (135.82±21.31) (Table 3). The IPAO scores were higher for those participants who held higher professional positions, were members of professional organizations, contributed to organizational change, followed developments in health sciences and nursing literature, were able to use computers, and were mentally open to change ($p<0.05$; Table 4).

Levels of ATCS and Factors Associated with ATCS

Table 3 shows that the mean ATCS of the participants were at medium levels (59.0±9.95). The score of the *resistance to change* (65.74±12.43) subscale was found to be above the average. Scores above the average indicate that there is no resistance to change, and even that nurses have a more positive attitude towards change.[9] The subscale scores of *change outcomes* (56.28±12.13) and *management style in change* (56.64±12.62) were below average. It was determined that the problem areas of nurses regarding change are the *change outcomes* and the *management style of change*.

Overall the ATCS of bedside nurses were found to be lower than those of nurses with higher professional positions. For the *change outcomes* subscale, those participants who were between the ages of 31 and 40 years, and had professional experience of 6-10 years obtained lower scores and those who had a length of service in the institution of 16-20 years obtained high scores.

Those participants who were members of professional organizations and followed developments in health sciences scored higher on the ATCS and all its subscales. Nurses who believed in the openness of their organizations for change, reported changes in their organizations, contributed to organizational change, were able to use a computer, and followed the scientific literature on nursing obtained higher scores on the ATCS and its subscales of *institutional policy*, *change outcomes*, and *management style in change* ($p<0.05$; Table 5).

Table 3. Descriptive statistics of nurses' scores from the professional attitude inventory and attitude towards change scale (n=376)

Variable	x̄	SD	Min.	Max.
IPAO	135.82	21.31	32.00	160.00
ATCS	59.00	9.95	28.97	96.55
Institutional policy in change	58.79	14.36	20.00	100.00
Change outcomes	56.28	12.13	17.50	87.50
Resistance to change	65.74	12.43	28.00	100.00
Management style in change	56.64	12.62	20.00	100.00

IPAO: Inventory of Professional Attitude at Occupation, ATCS: Attitudes Towards Change Scale, ATCS's sub-dimensions: *Institutional policy in change*, *change outcomes*, *resistance to change*, *management style in change*; x̄: Mean; SD: Standard deviation, Min.: Minimum, Max.: Maximum

Table 4. Distribution scores of the participants from IPAO according to certain descriptive characteristics (n=376)

Variable	n	IPAO Av. rank	Statistic
Age			
≤30 years[1]	129	189.46	X^2=2.00; p=0.37
31-40 years[2]	176	181.81	
≥41 years[3]	71	203.35	
Professional experience			
≤5 years[1]	65	207.87	X^2=6.89; p=0.14
6-10 years[2]	113	168.16	
11-15 years[3]	92	189.47	
16-20 years[4]	46	201.87	
≥21 years[5]	60	194.09	
Length of service in the institution			
≤5 years[1]	114	200.59	X^2=6.12; p=0.19
6-10 years[2]	108	174.25	
11-15 years[3]	77	176.53	
16-20 years[4]	31	190.61	
≥21 years[5]	46	210.61	
Professional position			
Chief nurse[1]	7	221.86	**X^2=12.23; p=0.00**** $p^{1,3}$=0.005 $p^{2,3}$=0.001
Nurse supervisor[2]	23	262.46	
Bedside nurse[3]	346	182.91	
Institutional change			
Yes	274	192.94	U=12757.50 p=0.19
No	102	176.57	
Participation in institutional change			
Yes	285	198.19	**U=10204.50 p=0.00****
No	91	158.14	
Believes that institution is open to change			
Yes	239	196.33	U=14499.00 p=0.06
No	137	174.83	
Follows developments in the health sector			
Yes	339	193.86	**U=4456.00 p=0.00****
No	37	139.43	
Follows scientific literature on nursing			
Yes	296	199.88	**U=8472.00 p=0.00****
No	80	146.40	
Uses computers			
Yes	353	193.33	**U=2353.00 p=0.00****
No	23	114.30	
Believes that s/he is open to innovations			
Yes	361	192.87	**U=1130.50 p=0.00****
No	15	83.37	

IPAO: Inventory of Professional Attitude at Occupation, ATCS: Attitudes Towards Change Scale, X^2: Kruskal-Wallis, U: Mann-Whitney U, $p^{1,2,3}$: Mann-Whitney U, *p<0.05, **p<0.001.

Table 5. Distribution of scores of the participants from ATCS according to certain descriptive characteristics (n=376)

Variable	n	ATCS	Institutional policy in change	Change outcomes	Resistance to change	Management style in change
		Av. rank	Av. rank	Av. rank	Av. rank	Av. rank
Age						
≤30 years[1]	129	191.47	188.92	198.22	193.58	187.32
31-40 years[2]	176	183.06	186.63	173.88	185.76	186.20
≥41 years[3]	71	196.59	192.38	207.08	186.06	196.36
X^2		0.93	0.14	**6.36**	0.44	0.48
p		0.63	0.93	**0.04*** $p^{1,2}$=0.046 $p^{2,3}$=0.036	0.80	0.79
Professional experience						
≤5 years[1]	65	213.05	209.55	220.02	210.19	203.29
6-10 years[2]	113	174.85	183.54	161.16	179.53	180.73
11-15 years[3]	92	180.71	181.01	182.24	186.07	177.84
16-20 years[4]	46	203.05	190.27	211.91	194.85	194.16
≥21 years[5]	60	188.39	185.18	197.48	180.76	199.11
X^2		6.40	3.19	**15.62**	3.92	3.49
p		0.17	0.53	**0.00**** **$p^{1,2}$=0.000** **$p^{2,4}$=0.005**	0.42	0.48
Length of service in the institution						
≤5 years[1]	114	201.50	201.21	203.89	194.13	191.82
6-10 years[2]	108	175.54	180.49	164.93	192.63	181.80
11-15 years[3]	77	172.30	176.12	168.86	172.87	179.30
16-20 years[4]	31	212.13	198.13	233.21	181.90	207.58
≥21 years[5]	46	197.90	190.03	208.42	195.47	198.55
X^2		6.69	3.40	**16.84**	2.39	2.51
p		0.15	0.49	**0.00**** $p^{1,2}$=0.007 $p^{2,4}$=0.002 $p^{3,4}$=0.005	0.66	0.64
Professional position						
Chief nurse[1]	7	213.21	221.71	195.71	151.29	223.14
Nurse supervisor[2]	23	244.52	235.39	235.91	194.30	219.33
Bedside nurse[3]	346	184.28	184.71	185.20	188.87	185.75
X^2		**7.00**	5.37	4.77	0.90	2.89
p		**0.03*** $p^{2,3}$=0.003	0.07	0.09	0.64	0.24
Institutional change						
Yes	274	203.98	202.90	200.43	189.31	199.97
No	102	146.93	149.81	156.47	186.33	157.68
U		**9,733.50**	**1,0028.00**	**10,706.50**	13,753.00	**10,830.50**
p		**0.00****	**0.00****	**0.00****	0.81	**0.00****
Participation in institutional change						
Yes	285	208.03	204.10	207.11	192.73	200.55
No	91	127.34	139.65	130.21	175.24	150.76
U		**7,401.50**	**8,522.00**	**7,663.50**	11,761.00	**9,533.50**
p		**0.00***	**0.00****	**0.00****	0.18	**0.00****

Table 5. Continued

Variable	n	ATCS	Institutional policy in change	Change outcomes	Resistance to change	Management style in change
		Av. rank	Av. rank	Av. rank	Av. rank	Av. rank
Believes that institution is open to change						
Yes	239	219.60	219.74	213.67	185.83	214.65
No	137	134.25	134.01	144.59	193.16	142.88
U		**8,939.00**	**8,906.00**	**10,355.50**	15,733.00	**10,121.00**
p		**0.00****	**0.00****	**0.00****	0.53	**0.00****
Follows developments in the health sector						
Yes	339	196.14	195.76	196.18	184.86	193.21
No	37	118.50	121.97	118.16	221.89	145.39
U		**3,681.50**	**3,810.00**	**3,669.00**	**5,036.00**	**4,676.50**
p		**0.00****	**0.00****	**0.00****	**0.046***	**0.01***
Follows scientific literature on nursing						
Yes	296	200.91	200.33	198.00	188.53	196.91
No	80	142.57	144.72	153.35	188.38	157.37
U		**8,165.50**	**8,337.50**	**9,028.00**	11,830.00	**9,349.50**
p		**0.00****	**0.00****	**0.00****	0.99	**0.00****
Uses computer						
Yes	353	192.75	192.42	192.28	187.98	191.29
No	23	123.20	128.39	130.50	196.46	145.65
U		**2,557.50**	**2,677.00**	**2,725.50**	3,876.50	**3,074.00**
p		**0.00****	**0.01***	**0.01***	0.72	**0.047***
Believes that s/he is open to innovations						
Yes	361	192.00	192.00	191.72	186.56	190.51
No	15	104.37	104.30	110.93	235.10	140.17
U		**1,445.50**	**1,444.50**	**1,544.00**	2,008.50	1,982.50
p		**0.00****	**0.00****	**0.00****	0.09	0.07

ATCS: Attitudes Towards Change Scale, ATCS's sub-dimensions: *Institutional policy in change*, *change outcomes*, *resistance to change*, *management style in change*, X^2: Kruskal-Wallis, U: Mann-Whitney U, p[1,2,3,4,5]: Mann-Whitney U, *p<0.05, **p<0.001.

IPAO and ATCS Correlation

The results showed a positive correlation between the scores obtained from the IPAO and the ATCS and its subscales (r=0.30, p=0.00). This finding showed that higher scores obtained from the ATCS and its subscales were parallel to an increase in the IPAO score. We also found a positive and moderate correlation between the scores obtained from the *institutional policy*, *change outcomes* (r=0.56, p=0.00), and *management style in change* subscales of the ATCS (r=0.56, p=0.00). Furthermore, there was a negative and weak correlation between the *resistance to change* and *management style in change* subscales of the ATCS (r=-0.11, p=0.04). These findings suggest that an increase in the score obtained from *resistance to change* results in a decrease in the *management style in change* subscale (p<0.05; Table 6).

DISCUSSION

This study focused on the relationship between nurses' professional attitudes and their attitudes toward change and the nurses' descriptive characteristics which make a difference in their scale scores. This discussion is presented under the headings in which the findings are presented.

Levels of IPAO and Factors Associated with IPAO

The nurses in this study obtained high IPAO scores (135±21.31, 32-160), which implies that the professional attitudes of the participants were at high levels.[1,12,13] Another study conducted on participants from 74 hospitals in seven European countries found that the professional attitudes of physicians (n=2,067) and nurses (n=2,805) were high and there were no significant differences between these two professional groups.[7] Unlike this study, a study with 180 Iranian nurses found that the nurses had moderate professional attitudes.[14] This difference may be explained by the number of participants, social and educational factors which may influence professionalism and the number of nurses with managerial status.

Similar to our findings, in other studies, descriptive characteristics, including, age, gender, educational level, professional experience, and length of service in the institution did not have an impact on the IPAO scores of nurses.[11,12,15] In the literature, there are studies showing differences where IPAO scores increase with age and professional experience. This difference may be explained in terms of the different number of samples taken, the institutions where the nurses work, age, and the professional experience averages between the studies.[12,14,16,17] If a nurse working in the same service for a long time does the same

Table 6. Correlation between the scores obtained from IPAO and ATCS

Variable		IPAO	ATCS	Institutional policy in change	Change outcomes	Resistance to change	Management style in change
IPAO	r	1					
	p	-					
ATCS	r	0.30	1				
	p	0.00**	-				
Institutional policy in change	r	0.24	0.92	1			
	p	0.00**	0.00**	-			
Change outcomes	r	0.31	0.77	0.56	1		
	p	0.00**	0.00**	0.00**	-		
Resistance to change	r	0.15	0.19	0.03	0.09	1	
	p	0.00**	0.00**	0.55	0.09	-	
Management style in change	r	0.14	0.62	0.54	0.44	-0.11	1
	p	0.01**	0.00**	0.00**	0.00*	0.04*	-

IPAO: Inventory of Professional Attitude at Occupation, ATCS: Attitudes Towards Change Scale, ATCS's sub-dimensions: *Institutional policy in change*, *change outcomes*, *resistance to change*, *management style in change*. r: Spearman's correlation test, *p<0.05 **p<0.001.

job continuously, it may make them feel more professional than a new nurse, and it may have a positive effect between professional experience and IPAO.[18] Studies conducted with nurses and medical students found that women had higher IPAO scores.[11,19,20] The goals of the student nurses were different from the working nurses. In addition, it has been reported that access to high-paid and qualified job positions was lower for females than for males.[21] This situation may be explained by the higher number of females who receive education and work in the health sector. In our study, although the lowest IPAO scores belonged to the graduates of health vocational high schools, no statistical difference was found between the other groups. Tarhan et al.[22] found that as the education level of nurses working in military hospitals (n=156) increased, their IPAO scores also increased. It has been claimed that not only the level of education sufficient for professionalism, but also the quality of the education, as well as other factors affecting professionalism, should be investigated.[13]

The literature shows that nurses working in executive positions; a state that besides his education level and professional experience, he has higher responsibility to fulfill duties and demands, independence and autonomy related to work.[3,13,23] Professional nursing attitudes are related to self-learning behaviors. The more active this behavior is, the higher the ability to practice nursing is. Following developments in health sciences and scientific literature on nursing contributes to the professional nursing attitude.[12,20] The IPAO scores of those who were members of professional organizations were higher.[4,7,18] Local nursing organizations in North Cyprus, to which the nursing profession is affiliated, work very actively compared to many other countries. They also use political power to defend the rights and interests of nurses, act in unity, and find solutions to problems. This power motivates nurses under difficult working conditions, it can also be said that it plays an important role in providing a qualified service to society and promoting professionalization. The rate of the nurses participating in this study following developments in the health sector and the literature was at a perfect level. In addition, it was determined that the nurses used computers at a very high rate and they stated that they are open to developments. For these nurses, it was observed that the IPAO scores were also higher. It has been shown in the literature that the level of professionalization affects learning, increases participation in scientific and research activities, and increases autonomy. It has been highlighted that this increased the structural strength, professional management, and business success of the institution, which leads to increased quality of care and patient satisfaction.[24]

The high IPAO scores in this study can be explained by the high autonomy and self-regulation skills of people who seek, question, and improve themselves, which are closely related to professional attitudes in nursing. This result also reveals the existence of a positive relationship between IPAO and ATCS, which are affected by similar characteristics.[25]

Levels of ATCS and Factors Associated with ATCS

The ATCS of the participants were at medium levels (59.00±9.95, minimum: 28.97-maximum: 96.55). It can be said that the nurses' general attitudes towards change were not negative. Seren and Baykal's[10] study showed that the ATCS of nurses working in state hospitals (56.94±11.36) were lower than those working in private hospitals (70.34±11.25). It has been stated that in environments with a culture of cooperation, resistance to change is lower than in environments with a power culture.[5,26] The *resistance to change* subscale scores of the scale were above average. It can be said that nurses with higher scores do not resist change and may even be compatible with it. On the other hand, the low scores in the subscales of *change outcomes*, *management style in change*, and *institutional policy in change* are noteworthy. These reflect nurses' dissatisfaction with the management style of change and their concern about the consequences of change.[26]

They may be caused by a mismatch between the demands of the nurses and the priorities of the hospital management regarding the change.[9,27] Successful change in healthcare can be sustained by the participation of both management and employees, and a management style with strong leadership which supports employees and takes into account their ideas and their resistance to change.[6,28,29]

Age, professional experience, years worked at the institution, and higher professional positions affected the *change outcomes* subscale scores. Younger nurses can easily adapt to change and technological developments with their new knowledge. They are productive and eager to learn in the early years of their profession. Age runs parallel to

professional experience. Experienced participants can participate in the change process by perceiving the need for change with their practices.[9] One-fifth of the participants with higher professional positions had a higher education level and 16-20 years of professional experience. Since they took part in the process of change, nurses with higher professional positions could develop a more positive attitude towards change compared to bedside nurses.[25,29]

While changes were experienced in working conditions, administrative structures, and functions of hospitals, nurses were mostly left out of decision making regarding the change process.[25,30] In our study, the high participation of nurses in the change process in their institutions (75.80%) can be explained by their membership of professional organizations (84.04%). We believe that professional organizations in North Cyprus, with their strong structures, provide nurses with information about the reasons and benefits of change, and offer the opportunity to participate in change activities.[26] It can be said that those who are open to change, investigative and innovative see change as an opportunity and a source of motivation. The most important reason why health professionals react to change is the necessity of acquiring new skills. Worrying about not being able to perform what is expected of them and being unsuccessful due to possible changes in their duties is an important risk perception.[8] In our study group, of those who followed the scientific literature (78.77%) and innovations in the health sector (90.16%), who could use computers (93.88%), and those who believed they were open to innovations (96.01%), it was observed that their attitude towards change were also positive. The literature emphasizes that professionals with these characteristics have a broad perspective.[11,12] It was highlighted that a broad perspective can increase adaptation to change while also facilitating cooperation with different disciplines and institutions.[5,9]

IPAO and ATCS Correlation

As the IPAO scores of the participant nurses increased, their scores obtained from the ATCS and its subscales increased. There was a statistically significant positive correlation between the two scales (r=0.30, p=0.00). The reason why we found a weak relationship between these two concepts may be due to the scales we used. The fact that the relationship is positive indicates that professional attitude positively affects *resistance to change*. Although we could not find a high level of correlation between the two scales, we identified common factors which positively affect both professional attitude and *resistance to change*. These are as follows; professional position, being a member of professional organizations, contributing to institutional change, following developments in health sciences and the nursing literature, being able to use a computer, and being more open-minded to change related to professional and personal development. Mareš[9] explains that resistance to change in health professionals is based on structural (adequate resource provision, management attitude, creation of evidence-based care guides), environmental (political, economic, and socio-cultural resources), and personal (intellectual level, perception, and understanding, motivation and psychology) factors.[3,8] The findings of this study revealed influential personal factors. Successful change initiatives are influenced not only by individual factors, but also by professional nursing practices and a positive work environment.[3]

Regarding the subscales of the ATCS, we found that scores obtained from the *change outcomes* and *management style* increased parallel to an increase in *institutional policy in change*. We may suggest that institutions which are supportive of workers and are open to communication may accomplish the management process of change.[29] In addition, the scores obtained from the *change outcomes* and *management style* were positively correlated.[6] It may be that nurses who experienced the positive effects of the change were more likely to cooperate with the administrators.[29] As the scores of the *resistance to change* subscale increased, there was a decrease in the scores obtained from the *management style in change*. Manageable resistance to change may decrease conflicts between the nurses and the administration and increase cooperation.

Study Limitations

Although this study had a good response rate and included nurses working in all state hospitals, there were certain limitations. A self-report questionnaire was used in this study, which may have led to response bias. Responses to the questionnaire may only be reflective of the respondent's experience and may not be fully indicative of the practice within their hospital. Additionally, there were no comparisons between hospitals. The results of this research can only be generalized to the four state hospitals in North Cyprus from where the data were collected.

CONCLUSION

This study found a positive relationship between the nurses' professional attitudes and their attitude towards change. It was determined that the professional attitudes of the nurses were at a high level and their attitudes towards change were at a mid-level. The nurses participating in this study had high degrees of professionalism and did not show any reaction to toward change. It was determined that the problem areas regarding change are the *change outcomes* and the *management style of change*.

With regards to the nurses' descriptive characteristics and behaviors; higher professional positions, being a member of professional organizations, contributing to institutional change, following developments in health sciences and nursing literature, being able to use a computer, and being more open-minded to change related to professional and personal development had positive effects on their professional attitudes and attitude towards change.

For the success of change, executive nurses can create a professional environment where open communication is maintained positively. Structural resources should be created and environmental regulations should be made in order to develop personal factors which positively affect nurses' resistance to change and professional attitude. During the process of change, administrators should help health professionals to take responsibility and express themselves. Nurses should be informed that the resources which will be used during the institutional change may provide more effective and qualified solutions for patient needs and the working environment of the nurses. Programs which facilitate change should be implemented by determining the nurses' resistance levels and reasons for resistance to change. Qualitative studies are recommended before planning changes to determine the reasons for nurses' resistance to change. It is recommended that administrators should encourage nurses to become members of a professional organization, to follow scientific literature and to participate in scientific events.

MAIN POINTS

- Common factors affecting nurses' professional attitudes and perspectives on change should be determined and personal development programs should be carried out.
- Bedside nurses should be informed about the reasons, processes, and outcomes of organizational changes.
- During the change process, it is recommended that all employees be allowed to take responsibility and express themselves.
- Administrative support should be given to nurses for their graduate education, professional innovations, and publications.

ETHICS

Ethics Committee Approval: We obtained permission from the Ethics Committee of Okan University (approval number: 06/06/2016-11), and institutional permission from the TRNC Department of Inpatient Treatment Institutions (16.05.2016).

Informed Consent: The nurses were informed about the aims and scope of the research and written informed consent was obtained from all participants.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: A.G., H.S., Design: A.G., H.S., Supervision: H.S., Data Collection and/or Processing: A.G., Analysis and/or Interpretation: H.S., Literature Search: A.G., H.S., Writing: A.G., Critical Review: H.S.

DISCLOSURES

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

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

REFERENCES

1. Erbil N, Bakır A. View of Developing inventory of professional attitude at occupation. J Hum Sci. 2009; 6(1): 290-302.
2. Çelik S, Hisar F. The influence of the professionalism behaviour of nurses working in health institutions on job satisfaction. Int J Nurs Pract. 2012; 18(2): 180-7.
3. Afzal M, Hussain M, Gilani SA. Determine the association of Nurses Leadership Practices with Staff Retention and Practices of Quality Care. Eur Acad Res. 2019; 12(3): 1710-24.
4. Rabie T. Construct validity and internal consistency of Hall's Professionalism Scale: tested on South African nurses. BMC Res Notes. 2019; 12(1): 486.
5. Tunçer P. Developing inventory of professional attitude at occupation | Journal of Human Sciences. J Hum Sci. 2013; 32(1): 373-406.
6. Bessie L. Marquis, Carol Jorgensen Huston. Leadership Roles and Management Functions in Nursing: Theory and Application Ninth Edition [Internet]. Ninth Edit. Marquis BL, Carol Jorgensen Huston, editors. 9th Edition Wolters Kluwer Health/ Lippincott Williams & Wilkins. Woltesr Kluwer; 2017. p. 240-319.
7. Lombarts KM, Plochg T, Thompson CA, Arah OA; DUQuE Project Consortium. Measuring professionalism in medicine and nursing: results of a European survey. PLoS One. 2014; 9(5): e97069.
8. El-Sayed F, Seada A, El-Guindy H. Factors associated with nurses' readiness for organizational change at Beni Sueif University Hospital. Egyption Nurs J. 2017; 14(2): 141-51.
9. Mareš J. Resistance of health personnel to changes in healthcare. Elsevier Kontakt. 2018; 20(3): e262-72.
10. Seren Ş, Baykal Ü. The examination of organizational culture and attitude against change in hospitals that have received a quality certificate. J Anatolia Nurs Heal Sci. 2007; 10(2): 1-11.
11. Karadağ A, Hisar F, Çelik B, Göçmen Baykara Z. Determining professionalism in Turkish students nurses. International Journal of Human Sciences. 2016; 13(1): 674-82.
12. Çelik Durmuş S, Erdem Y. Professionalism attitude of a public university faculty of health science nursing department students. DEUHYOED. 2019; 12(2): 126-33.
13. Kim-Godwin YS, Baek HC, Wynd CA. Factors influencing professionalism in nursing among Korean American registered nurses. J Prof Nurs. 2010; 26(4): 242-9.
14. Shohani M, Zamanzadeh V. Nurses' Attitude towards professionalization and factors influencing It. J Caring Sci. 2017; 6(4): 345-57.
15. Bayraktar D, Yilmaz H, Leyla K. Examination of professional attitudes of nurses employee in a university hospital. J Ege Univ Nurs Fac. 2016; 32(3): 65-74.
16. Yuksekol OD, Atalay M. Evaluation of professionalism of nurses in the city center of Elazığ, Turkey. Int J Heal Serv Res Policy. 2017; 2(1): 14-20.
17. Fantahun A, Demessie A, Gebrekirstos K, Zemene A, Yetayeh G. A cross sectional study on factors influencing professionalism in nursing among nurses in Mekelle Public Hospitals, North Ethiopia, 2012. BMC Nurs. 2014; 13(1): 10.
18. Karadas G, Karatepe OM. Unraveling the black box: The linkage between high-performance work systems and employee outcomes. Empl Relations. 2019; 41(1): 67-83.
19. Ak B. Professional attitudes of the nursing students and associated factors. 2018; 27(4): 232-42.
20. Selic P, Cerne A, Klemenc-Ketis Z, Petek D, Svab I. Attitudes toward professionalism in medical students and its associations with personal characteristics and values: a national multicentre study from Slovenia raising the question of the need to rethink professionalism. Adv Med Educ Pract. 2019; 10: 437-46.
21. Gobillon L, Meurs D, Roux S. Estimating gender differences in access to jobs. J Labor Econ. 2015; 33(2): 317-63.
22. Tarhan G, Kılıç D, Yıldız E. Investigation of the relationship between attitudes towards the nursing profession and occupational professionalism. Gulhane Med J. 2016; 58: 411-6.
23. Takada N, Asakura K, Sugiyama S. Developing and validating the Japanese version of professional attitude scale for nurses. Int Nurs Rev. 2021; 68(1): 24-33.
24. Wynd CA. Current factors contributing to professionalism in nursing. J Prof Nurs. 2003; 19(5): 251-61.
25. Çelebi Çakıroğlu O, Harmancı Seren AK. The relationship between attitudes towards change and five factor personality traits in nurses. J Psychiatr Nurs. 2019; 10(3): 211-7.
26. Bilgin N, Kutlu A. Investigation of The Effects of The Organizational Commitment of Nurses on Attitudes Against Change. IOSR J Nurs Heal Sci. 2018; 7(4): 1-5.
27. Cleary M, Kornhaber R, Thapa DK, West S, Visentin D. A Systematic Review of Behavioral Outcomes for Leadership Interventions Among Health Professionals. J Nurs Res. 2020; 28(5): e118.

28. Movahedi A, Bidkhori M, Arazi T, Khaleghipour M, Amini F. The Relationship Between Positive Perceptions Toward Organizational Politics and the Work-Related Outcomes of Nurses. J Nurs Res. 2020; 28(4): e104.

29. Amarantou V, Kazakopoulou S, Chatzoglou P, Chatzoudes D. Attitude Toward Change: Factors Affecting Hospital Managerial Employees' Resistance to Change. In: Springer Nature. 2017. p. 251-7.

30. Macphee M, Suryaprakash N. First-line nurse leaders' health-care change management initiatives. J Nurs Manag. 2012; 20(2): 249-59.

Supplement Link 1: http://glns.co/5980e

RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2023.2023-32
Cyprus J Med Sci 2023;8(6):435-440

The Logarithmic Ratio of Positive Lymph Nodes Predicts Survival in Patients with Larynx Squamous Cell Carcinoma

Nuket Özkavruk Eliyatkın[1], Asuman Feda Bayrak[2], Akif İşlek[3], Hacer Sena Kılıç[4], Safiye Aktaş[5]

[1]Department of Pathology, İzmir Katip Çelebi University Faculty of Medicine, İzmir, Türkiye
[2]Department of Otorhinolaryngology, İzmir Katip Çelebi University Faculty of Medicine, İzmir, Türkiye
[3]Department of Otorhinolaryngology, Acıbadem Eskişehir Hospital, Eskişehir, Türkiye
[4]Department of Pathology, İzmir Katip Çelebi University Hospital, İzmir, Türkiye
[5]Department of Basic Oncology, Dokuz Eylül University Institute of Oncology, İzmir, Türkiye

Abstract

BACKGROUND/AIMS: The Lymph node staging system provides significant information for laryngeal squamous cell carcinoma (LSCC) prognosis. Additional parameters are suggested in order to improve the prognostic capacity of lymph node staging. This study aimed to investigate the prognostic value of different lymph node staging methods.

MATERIALS AND METHODS: The long-term survival data and pathological features of fifty-two patients with LSCC were obtained retrospectively. The effects of metastatic lymph node count (MLNC), metastatic lymph node ratio (MLNR), and the logarithmic ratio of positive lymph nodes (LODDS) on disease-free survival (DFS), disease-specific survival, and overall survival (OS) were analyzed. Significant cut-off values for MLNR and LODDS were calculated using receiver operating characteristic analysis. In addition, Kaplan-Meier survival analysis with log-rank was used for comparisons of nodal disease-related study groups.

RESULTS: Cancer recurrence was similar between the groups by T-stage (0.963), N-stage (0.935), MLNR groups (0.297), and LODSS groups (0.244). However, the recurrence rate was significantly lower in tumors with a severe lymphoid response (0.004) and with a total dissected number of lymph nodes ≥18 (0.037). Total lymph node count (0.303), total MLNC (0.768), MNLR (0.656), and LODDS (0.356) values were similar in those patients with and those without cancer recurrence (p>0.05). No significant cut-off value was detected for either DFS or OS for MLNR or LODDS values (p=0.672, area under the curve (AUC): 0.672, 95% confidence interval (CI): 0.365-0.706; p=0.352, AUC: 0.578, 95% CI: 0.411-0.746; p=0.450, AUC: 0.615, 95% CI: 0.222-1; p=0.450, AUC: 0.615, 95% CI: 0.230-0.999, respectively).

CONCLUSION: MLNR and LODDS were significant in improving the prognostic value of TNM staging in LSSC.

Keywords: Larynx squamous cell carcinoma, metastatic lymph node ratio, the logarithmic ratio of positive lymph nodes

INTRODUCTION

Squamous cell carcinomas of the larynx (LSCC) are the most common type of head and neck carcinoma which begins from the squamous epithelium of the larynx.[1] The primary treatment is surgery, but there are treatment options which combine surgery with radiotherapy or radio-chemotherapy. The tumor, lymph node, metastasis (TNM) staging system in 8th edition of the American Joint Committee on Cancer (AJCC) defined the N-stage as the status of the lymphatic field which determines the patient's prognosis.[2] Since this cancer has an occult

To cite this article: Özkavruk Eliyatkın N, Bayrak AF, İşlek A, Kılıç HS, Aktaş S. The Logarithmic Ratio of Positive Lymph Nodes Predicts Survival in Patients with Larynx Squamous Cell Carcinoma. Cyprus J Med Sci 2023;8(6):435-440

ORCID IDs of the authors: N.Ö.E. 0000-0002-7784-5699; A.F.B. 0000-0001-8403-3018; A.İ. 0000-0001-7058-3457; H.S.K. 0000-0003-0308-3457; S.A. 0000-0002-7658-5565.

Address for Correspondence: Nuket Özkavruk Eliyatkın
E-mail: nuket.ozkavruk.eliyatkin@ikcu.edu.tr
ORCID ID: orcid.org/0000-0002-7784-5699

Received: 10.04.2023
Accepted: 07.08.2023

course, more than half of the patients are in advanced stages when they are diagnosed.[3] LSCC predisposes to metastasis of the neck lymph nodes, which has a significant impact on survival.[4] Thus, the status of lymph node involvement is recognized as a known prognostic factor in LSCC.[5] However, evaluating N status alone in the TNM system does not cover all dimensions in prognostic evaluation. Therefore, it is clear that stronger parameters are required over time to make the prognostic adequacy of N-status more meaningful. It has recently been reported that in those patients with lymph node-positive head and neck cancer, surgically removing fewer than 18 lymph nodes is associated with a poor prognosis.[6] In addition, an N-staging by the count of metastatic lymph nodes (MLNC) has been discussed instead of the AJCC N system.[7,8] A more recent recommendation is the metastatic lymph node ratio (MLNR), which is defined as the ratio of MLNC to total lymph node count (TLNC).[7-12] Many recent study results indicate that MLNR should be considered in determining survival. Consequently, it seems to be quite a strong new prognostic parameter. It has been shown that the log-odds value of positive lymph nodes (LODDS) can be beneficial in determining the prognosis of various solid cancers.[13,14] However, it is unclear which lymph node classification system might better predict prognosis for LSCC patients than the current AJCC system.

This study aimed to investigate the predictive effects of MLNC, MLNR and LODDS classifications on survival in LSCC patients.

MATERIALS AND METHODS

A retrospective study was designed by reviewing archive records. Patients with a definitive diagnosis of LSCC who had undergone laryngectomy at a tertiary referential hospital between April, 2008 and December, 2020 were identified. Ethics committee approval was obtained before this study was carried out from the affiliated İzmir Katip Çelebi University (approval number: 0539, date: 24.11.2022).

Eligibility criteria: Those patients who had undergone a total laryngectomy and neck dissection were included in this study. Patients with previous neck dissection or laryngeal surgery, radiation therapy, multiple primary lesions, stage 4C, residual tumor after surgery or closed surgical margin to the tumor, or those followed up for <1 year after surgery were excluded from this study. Finally, a total of 52 patients who met the eligibility criteria were included in this study. The pathological specimens of the selected patients were re-evaluated histopathologically. Patients who were lost during follow-up visits or those deceased with perioperative complications were not included in the final analysis. The socio-demographic data of the patients (e.g. age, gender, smoking habits etc.) and follow-up information (e.g. visit times, recurrence, or death) were recorded. The recurrence rate, overall survival (OS) rate, time to recurrence, and the rate of tumor-related mortality loss were also determined. Localization, T-stage, grade of the tumor, perineural and lymphovascular invasion, lymph node status, and surgical margins were examined in the pathology specimens. Inflammatory response to tumor (TILs) was scored as follows: 0=absent, 1=mild, 2=moderate, and 3=prominent and evaluated separately. Additionally, ipsilateral or contralateral nodes, TLNC, MLNC and MLNR were recorded. Four groups were identified for MLNR as follows: MLNR=0 as group 1, 0< MLNR ≤0.199 as group 2, 0.2≤ MLNR ≤0.39 as group 3, and MLNR ≥0.4 as group 4. Also, five groups were identified for LODDS; LODDS ≤-1.5 as group 1, -1.5< LODDS ≤-1.0 as group 2, -1.0< LODDS ≤-0.5 as group 3, -0.5< LODDS ≤0 as group 4, and LODDS >0 as group 5 (no patients were included in group 5 as none were seen).[15]

Statistical Analysis

Statistical analysis was performed with SPSS 22.0 program (IBM Corp., Armonk, NY, USA). Nominal variables between groups were compared with χ^2 test. The normality distribution of scale variables was evaluated by Kolmogorov-Smirnov test and the Mann-Whitney U test was performed to compare recurrence groups (non-parametric distribution). The cut-off values for MLNR and LODDS were determined by receiver operating characteristic (ROC). Kaplan-Meier survival analysis and log-rank comparisons were performed in the nodal disease-related classification groups.

RESULTS

Within the scope of this study, 52 patients from 65 advanced LSCC patients were enrolled in the final analysis according to the eligibility criteria. The average age of the patients was 60.1±8.7 years, with 3 (5.8%) female and 49 (94.2%) male patients. During the mean follow-up period of 42.7±29.6 (minimum: 1, maximum: 84) months, 18 patients (34.6%) developed cancer recurrence, and 4 (7.7%) died. The numbers of ipsilateral, contralateral and bilateral TLNCs were 55 (median, range, 17-107), 58 (median, range, 30-87), and 52 (median, range, 36-157) respectively. The count of ipsilateral and contralateral and bilateral MLNCs were 2 (range, 0-5), 1 (range, 1-3), and 5 (range, 1-10) respectively. MLNR was 0.039±0.082 on average and the highest number of patients (n=26, 50.0%) were included in the group of MLNR group 2 (0.01-0.19). LODDS was -1.600±0.525 on average and the highest number of patients (n=33, 63.5%) were included in the group of MLNR group 1 (≤-1.5). A general summary of the findings is given in Table 1. No statistically significant group was found in terms of cancer recurrence in the T-stage (0.963), N-stage (0.935), MLNR groups (0.297), or LODSS groups (0.244). However, the recurrence rate was significantly lower

Table 1. An overall summary of findings

		Count	Column (n, %)
Gender	Male	49	94.2%
	Female	3	5.8%
Smoking status	No	3	5.8%
	Yes	49	94.2%
T-stage	T3	20	38.5%
	T4	32	61.5%
N-stage	0	24	46.2%
	1	10	19.2%
	2A	2	3.8%
	2B	8	15.4%
	2C	6	11.5%
	3	2	3.8%
Neural Invasion	None	45	86.5%
	Present	7	13.5%
Vascular Invasion	None	40	76.9%
	Present	12	23.1%
Lymphoid response	None	12	23.1%
	Mild	12	23.1%
	Moderate	15	28.8%
	Severe	13	25.0%

Table 1. Continued

		Count	Column (n, %)
Lateralization of nodal metastasis	None	24	46.2%
	Ipsilateral	20	38.5%
	Contralateral	4	7.7%
	Bilateral	4	7.7%
Lymph node metastasis	None	24	46.2%
	Present	28	53.8%
TLNC	<18	3	5.8%
	≥18	49	94.2%
Distant metastasis	None	38	73.1%
	Present	14	26.9%
Recurrence	None	34	65.4%
	Present	18	34.6%
Survival	Ex	4	7.7%
	Survive	48	92.3%
Post-op RT	None	7	13.5%
	Present	45	86.5%
Post-op CT	None	31	59.6%
	Present	21	40.4%
MLNR groups	1.00	24	46.2%
	2.00	26	50.0%
	3.00	1	1.9%
	4.00	1	1.9%
LODDS groups	1.00	33	63.5%
	2.00	12	23.1%
	3.00	5	9.6%
	4.00	2	3.8%
	Mean ± SD	**Minimum**	**Maximum**
Age	60.12±7.71	38.00	83.00
Right neck TLNC	27.33±14.46	0.00	54.00
Right neck MLNC	0.71±1.40	0.00	6.00
Left neck TLNC	32.04±20.45	0.00	127.00
Left neck MLNC	0.75±1.51	0.00	8.00
TLNC (right and left)	59.37±29.93	4.00	157.00
MLNC (right and left)	1.46±2.14	0.00	10.00
MLNR	0.04±0.08	0.00	0.50
LODDS	-1.60±0.53	-2.33	0.00

TLNC: Total lymph node count, Post-op RT: Postoperative radiotherapy, Post-op CT: Postoperative chemotherapy, MLNR: Metastatic lymph node ratio, LODDS: The log-odds value of positive lymph nodes, MLNC: Metastatic lymph node count, SD: Standard deviation.

in tumors with a severe lymphoid response and with a total dissected number of lymph nodes ≥18 (0.004 and 0.037) (Table 2). TLNC (0.303), total MLNC (0.768), MNLR (0.656), and LODDS (0.356) values were found to be similar in those patients with and those without cancer recurrence (p>0.05) (Table 3). According to ROC analysis, no significant cut-off value was obtained for either disease-free survival (DFS) or OS for MLNR or LODDS values [p=0.672, area under the curve (AUC): 0.672, 95% confidence interval (CI): 0.365-0.706; p=0.352, AUC: 0.578, 95% CI: 0.411-0.746; p=0.450, AUC: 0.615, 95% CI: 0.222-1; p=0.450, AUC: 0.615, 95% CI: 0.230-0.999, respectively, Figure 1, 2]. Also, no significant cut-off value affecting DFS or OS was found for MLNC (p=0.780 and 0.744).

N-stage and lateralization of nodal metastasis were not statistically significant for DFS function according to Kaplan-Meier survival function analysis. However, there was a significant difference between MLNR, LODDS and lymphoid response groups (log-rank: 0.955, 0.244, 0.013, 0.009, and 0.044 respectively, Figure 3-7). Again, N-stage and lymphoid response were not statistically significant for OS function according to Kaplan-Meier survival function analysis. A significant difference was found between the MLNR groups, LODDS groups and lateralization of nodal metastasis groups (log-rank= 0.627, 0.133, <0.001, <0.001, 0.009, and 0.003 respectively, Figure 8-12).

DISCUSSION

The most common head and neck cancer in the worldwide is laryngeal cancer. In recent years, LSCC has been noted for its very poor survival rates.[16] In general, a balance is attempted in the treatment in terms of the patient's quality of life, minimizing morbidity, and achieving a full cure. However, there is no single common approach to optimally manage the treatment of all patients. Therefore, the optimal approach is still controversial. Options such as a non-surgical approach (organ-sparing treatment) or a surgical approach (without organ preservation, such as primary total or partial laryngectomy) have been extensively discussed. Especially with two important studies on this subject, it has become even more controversial.[17,18] However, since most LSCC patients are diagnosed at an advanced stage, applying more radical treatment approaches becomes mandatory. Aside from the traditional AJCC staging system, some parameters such as patient age, surgical margin condition, and poor histopathological features are now routinely used for prognostic assessment and adjuvant therapy evaluation. The conventional AJCC staging system, on the other hand, loses its predictive power over time. Therefore, new parameters are required to optimize patient treatment and best manage patients, and an increasing number of markers are being defined.

In recent years, the value of the counts of dissected lymph nodes has been emphasized. However, there is debate about number of dissected lymph nodes which should be removed to be considered an adequate resection. This is because a variety of factors influence the number of lymph nodes dissected during routine surgical procedures. These are factors which are completely independent of tumor biology. In a similar fashion to the patient's anatomical structure, this may be related to the patient, as well as the surgeon's and pathologist's experience. Depending on such conditions, the patient's stage may also change. Dissection of ≥18 lymph nodes has been shown to improve OS and local control in head and neck cancers with nodal metastasis (N^+). According to one study, the total number of lymph nodes is not related to survival in patients with N-laryngeal carcinoma.[19] TLNC has been shown in studies including all head and neck cancers, including both N^- and N^+ laryngeal cancers, to be effective in OS.[20,21] Our study included both N^- and N^+ patients, and only 3 of them had a TLNC of less than 18. The fact that the recurrence rate was significantly lower in cases with a TLNC of 18 or above supports this finding.

Recent research has found that the MLNC has a better prognostic value than the commonly used AJCC N-staging system. In addition to the AJCC 8th N-stage, staging according to MLNRs grouped according to their N

Table 2. Comparison of nominal variables between recurrence groups and chi-square statistics

		Recurrence				p
		None		Present		
		Count	Row (n, %)	Count	Row (n, %)	
Gender	Male	31	63.3%	18	36.7%	0.543
	Female	3	100.0%	0	0.0%	
Smoking status	No	3	100.0%	0	0.0%	0.194
	Yes	31	63.3%	18	36.7%	
T-stage	T3	13	65.0%	7	35.0%	0.963
	T4	21	65.6%	11	34.4%	
Lateralization of nodal metastasis	None	16	47.1%	8	44.4%	0.422
	Ipsilateral	12	35.3%	8	44.4%	
	Contralateral	4	11.8%	0	0.0%	
	Bilateral	2	5.9%	2	11.1%	
Lymphoid response	None	6	17.6%	6	33.3%	0.004
	Mild	5	14.7%	7	38.9%	
	Moderate	10	29.4%	5	27.8%	
	Severe	13	38.2%	0	0.0%	
N-stage	N0	16	66.7%	8	33.3%	0.935
	N1	6	60.0%	4	40.0%	
	N2	11	68.8%	5	31.3%	
	N3	1	50.0%	1	50.0%	
Neural invasion	None	29	64.4%	16	35.6%	0.539
	Present	5	71.4%	2	28.6%	
Vascular invasion	None	26	65.0%	14	35.0%	0.915
	Present	8	66.7%	4	33.3%	
Lymph node metastasis	None	16	66.7%	8	33.3%	0.546
	Present	18	64.3%	10	35.7%	
TLNC (cut-off 18)	<18	0	0.0%	3	16.7%	0.037
	≥18	34	100.0%	15	83.3%	
Distant metastasis	None	24	63.2%	14	36.8%	0.416
	Present	10	71.4%	4	28.6%	
Survival	Ex	1	25.0%	3	75.0%	0.114
	Survive	33	68.8%	15	31.3%	
Post-op RT	None	6	85.7%	1	14.3%	0.221
	Present	28	62.2%	17	37.8%	
Post-op CT	None	23	74.2%	8	25.8%	0.093
	Present	11	52.4%	10	47.6%	
MLNR groups	MLNO=0	16	66.7%	8	33.3%	0.297
	MLNO (0.01-0.19)	18	69.2%	8	30.8%	
	MLNO (0.2-0.39)	0	0.0%	1	100.0%	
	MLNO (≥0.4)	0	0.0%	1	100.0%	
LODDS groups	LODDS (≤-1.5)	23	69.7%	10	30.3%	0.244
	-1.5< LODDS ≤-1.0	7	58.3%	5	41.7%	
	-1.0< LODDS ≤-0.5	4	80.0%	1	20.0%	
	-0.5< LODDS ≤0	0	0.0%	2	100.0%	
	LODDS >0	0	0.0%	0	0.0%	

TLNC: Total lymph node count, Post-op RT: Postoperative radiotherapy, Post-op CT: Postoperative chemotherapy, MLNR: Metastatic lymph node ratio, LODDS: The log-odds value of positive lymph nodes, Ex: Exitus.

Table 3. Comparison of scale variables between recurrence groups and Mann-Whitney U test statistics

	Recurrence				p
	None		Present		
	Mean	SD	Mean	SD	
Age	60	9	61	9	0.787
Tumor size	3.4	0.8	3.3	1.1	0.703
Right neck TLNC	28	13	25	17	0.544
Right neck MLNC	1	1	1	2	0.420
Left neck TLNC	32	14	32	29	0.346
Left neck MLNC	1	2	1	1	0.838
TLNC	60.71	23.43	56.83	40.13	0.303
MLNC	1.32	1.87	1.72	2.61	0.768
MLNR	0.03	0.04	0.06	0.13	0.656
LODDS	-1.66	0.47	-1.48	0.61	0.356

TLNC: Total lymph node count, MLNC: Metastatic lymph node count, MLNR: Metastatic lymph node ratio, LODDS: The log-odds value of positive lymph nodes, SD: Standard deviation.

stage, MLNC and MLNR were performed in a fairly large series, and MLNC and MLNR were discovered to have a much stronger prognostic value than many of the other systems used. In our study, in addition to TLNC, MLNC, MNLR, we also calculated LODDS values. Since MLNR and LODDS values did not provide a remarkable cut-off value for DFS or OS, we divided them into subgroups as the N^0 stage and the N^2 stage. For DFS and OS, we found no difference between these groups. However, for both DFS and OS, we discovered a significant difference between the MNLR and LODDS groups. Similar to our findings, a study on the LODDS value found it to be an important determinant for both DFS and OS.[22]

It has been emphasized that MLNR is also important for many tumors. The conventional AJCC staging system has been losing its power over time. More personal parameters are needed. Attempting to predict the prognosis based on the LODDS value, as well as the MLNR rate and incorporating them into patient management appears to affect both DFS and OS.

Study Limitations

We are aware that our study had significant limitations. Although we knew the smoking status, we could not evaluate alcohol status due to a lack of data. More importantly, the number of patients was limited. However, it was possible to evaluate the long-term follow-up of the patients in this group. Currently, the present study is an initial one for research into the predictive values of both MLNR and LODDS in long-term survival in our country's patient population with laryngeal squamous cell carcinoma.

CONCLUSION

As with all cancers, predictive markers are very important for appropriate treatment planning and outcome during follow-up in laryngeal carcinomas. These markers are far more important for cancers which are generally detected at a late stage, such as laryngeal carcinoma. Adding values such as MLNR and LODDS to the conventional AJCC staging system can make it more powerful.

MAIN POINTS

- The conventional AJCC staging system needs to be updated over time in order to better predict prognosis in cancer patients. More personal disease parameters are recommended to be added to the conventional staging.
- It has been emphasized that MLNR is important for many tumors.
- Attempting to predict the prognosis based on the LODDS value, as well as the MLNR rate, and incorporating them into patient management appears to affect both DFS and OS.

ETHICS

Ethics Committee Approval: Ethics committee approval was obtained before this study was carried out from the affiliated İzmir Katip Çelebi University (approval number: 0539, date: 24.11.2022).

Informed Consent: Retrospective study.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: N.Ö.E., A.F.B., H.S.K., Concept: N.Ö.E., A.F.B., A.İ., H.S.K., Design: N.Ö.E., A.F.B., H.S.K., Data Collection and/or Processing: N.Ö.E., A.F.B., Analysis and/or Interpretation: N.Ö.E., A.F.B., A.İ., S.A., Literature Search: N.Ö.E., A.F.B., H.S.K., S.A., Writing: N.Ö.E., A.İ.

DISCLOSURES

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

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

REFERENCES

1. Yan K, Agrawal N, Gooi Z. Head and Neck Masses. Med Clin North Am. 2018; 102(6): 1013-25.

2. Wu Y, Zhang Y, Zheng X, Dai F, Lu Y, Dai L, et al. Circular RNA circCORO1C promotes laryngeal squamous cell carcinoma progression by modulating the let-7c-5p/PBX3 axis. Mol Cancer. 2020; 19(1): 99.

3. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018; 68(6): 394-424.

4. Bayır Ö, Toptaş G, Saylam G, İzgi TC, Han Ü, Keseroğlu K, et al. Occult lymph node metastasis in patients with laryngeal cancer and relevant predicting factors: a single-center experience. Tumori. 2022; 108: 439-49.

5. Sano D, Yabuki K, Takahashi H, Arai Y, Chiba Y, Tanabe T, et al. Lymph node ratio as a prognostic factor for survival in patients with head and neck squamous cell carcinoma. Auris Nasus Larynx. 2018; 45(4): 846-53.

6. Divi V, Harris J, Harari PM, Cooper JS, McHugh J, Bell D, et al. Establishing quality indicators for neck dissection: Correlating the number of lymph nodes with oncologic outcomes (NRG Oncology RTOG 9501 and RTOG 0234). Cancer. 2016; 122(22): 3464-71.

7. Ho AS, Kim S, Tighiouart M, Gudino C, Mita A, Scher KS, et al. Association of quantitative metastatic lymph node burden with survival in hypopharyngeal and laryngeal cancer. JAMA Oncol. 2018; 4(7): 985-9.

8. Choi Y, Bin-Manie M, Roh JL, Cho KJ, Lee YS, Choi SH, et al. Metastatic lymph node burden predictive of survival in patients undergoing primary surgery for laryngeal and hypopharyngeal cancer. J Cancer Res Clin Oncol. 2019; 145(10): 2565-72.

9. Ryu IS, Roh JL, Cho KJ, Choi SH, Nam SY, Kim SY. Lymph node density as an independent predictor of cancer-specific mortality in patients with lymph node-positive laryngeal squamous cell carcinoma after laryngectomy. Head Neck. 2015; 37(9): 1319-25.

10. Süslü N, Hoşal AS, Sözeri B. Prognostic value of metastatic lymph node ratio in node-positive head and neck carcinomas. Am J Otolaryngol. 2010; 31(5): 315-9.

11. Prabhu RS, Hanasoge S, Magliocca KR, Hall WA, Chen SA, Higgins KA, et al. Lymph node ratio influence on risk of head and neck cancer locoregional recurrence after initial surgical resection: implications for adjuvant therapy. Head Neck. 2015; 37(6): 777-82.

12. Cayonu M, Tuna EU, Acar A, Dinc ASK, Sahin MM, Boynuegri S, et al. Lymph node yield and lymph node density for elective level II-IV neck dissections in laryngeal squamous cell carcinoma patients. Eur Arch Otorhinolaryngol. 2019; 276(10): 2923-7.

13. Hou X, Wei JC, Xu Y, Luo RZ, Fu JH, Zhang LJ, et al. The positive lymph node ratio predicts long-term survival in patients with operable thoracic esophageal squamous cell carcinoma in China. Ann Surg Oncol. 2013; 20(5): 1653-9.

14. Ramacciato G, Nigri G, Petrucciani N, Pinna AD, Ravaioli M, Jovine E, et al. Prognostic role of nodal ratio, LODDS, pN in patients with pancreatic cancer with venous involvement. BMC Surg. 2017; 17(1): 109.

15. La Torre M, Nigri G, Petrucciani N, Cavallini M, Aurello P, Cosenza G, et al. Prognostic assessment of different lymph node staging methods for pancreatic cancer with R0 resection: pN staging, lymph node ratio, log odds of positive lymph nodes. Pancreatology. 2014; 14(4): 289-94.

16. Megwalu UC, Sikora AG. Survival outcomes in advanced laryngeal cancer. JAMA Otolaryngol Head Neck Surg. 2014; 140(9): 855-60.

17. Wolf GT, Fisher SG, Hong WK, Hillman R, Spaulding M, Laramore GE, et al. Induction chemotherapy plus radiation compared with surgery plus radiation in patients with advanced laryngeal cancer. N Engl J Med. 1991; 324(24): 1685-90.

18. Forastiere AA, Goepfert H, Maor M, Pajak TF, Weber R, Morrison W, et al. Concurrent chemotherapy and radiotherapy for organ preservation in advanced laryngeal cancer. N Engl J Med. 2003; 349(22): 2091-8.

19. Roberts TJ, Colevas AD, Hara W, Holsinger FC, Oakley-Girvan I, Divi V. Number of positive nodes is superior to the lymph node ratio and American Joint Committee on Cancer N staging for the prognosis of surgically treated head and neck squamous cell carcinomas. Cancer. 2016; 122(9): 1388-97.

20. Divi V, Chen MM, Nussenbaum B, Rhoads KF, Sirjani DB, Holsinger FC, et al. Lymph node count from neck dissection predicts mortality in head and neck cancer. J Clin Oncol. 2016; 34(32): 3892-7.

21. Cramer JD, Speedy SE, Ferris RL, Rademaker AW, Patel UA, Samant S. National evaluation of multidisciplinary quality metrics for head and neck cancer. Cancer. 2017; 123(22): 4372-81.

22. Wang Q, Tan Z, Zheng C, Wang J, Zheng G, Huang P, et al. Number of Positive Lymph Nodes Combined with the Logarithmic Ratio of Positive Lymph Nodes predicts Survival in Patients with Non-Metastatic Larynx Squamous Cell Carcinoma. J Cancer. 2022; 13(6): 1773-84.

Figures 1-12 link: http://glns.co/e857q

RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2021.3409
Cyprus J Med Sci 2023;8(6):441-448

A Comprehensive Study on Determination of Nutrition Knowledge and Nutrition Status in Adult Women

Özge Duralı[1], Sedef Duran[2]

[1]Department of Public Health, Trakya University Institute of Health Sciences, Edirne, Türkiye
[2]Department of Nutrition and Dietetics, Trakya University Faculty of Health Sciences, Edirne, Türkiye

Abstract

BACKGROUND/AIMS: Nutrition has direct effects on healthy growth, quality of life and lifespan. Studies have shown that most people are unable to fully grasp the healthiness and nutritional value of foods, and the relationships between diseases and diet. Due to these reasons, the aim of this study was to investigate the nutrition knowledge and the nutritional behaviors of women and the factors affecting them.

MATERIALS AND METHODS: The questionnaire that was used for data collection includes two major sections. In first part of this questionnaire, the sociodemographic and lifestyle characteristics of the participants were investigated. In second section, the Adult Nutrition Knowledge Level (YETBID) Scale was used. The YETBID Scale includes both a fundamental nutritional and food-health knowledge part, and a food preference part. This study was conducted with 380 adult women aged 20-49 years via a face-to-face questionnaire method between June and September, 2019. The test for conformity to normal distribution was provided by the t-test in quantitative data, and the Kolmogorov-Smirnov test was applied to qualitative data.

RESULTS: The important indicators having significant relationships with nutrition knowledge levels were found to be education level, age, marital status, dieting, percentage of income allocated to kitchen expenditure, having an illness, and having prior nutritional education. The important indicators having significant relationships with food preference were found to be having an illness and having prior nutritional education. In the food preference section, the ratio of correct answers was generally higher than the nutrition knowledge part.

CONCLUSION: The results showed that an adult woman's nutrition knowledge level and food preference can be affected by many factors. However, more research should be performed on this topic in order to obtain more information.

Keywords: Food preferences, nutrition, nutritional status, nutritional knowledge level, woman

INTRODUCTION

The first aim of the individual, family and society is being healthy and productive. Indicators of being healthy and productive can be listed as being advanced physically, spiritually, mentally and socially.[1] Due to this reason, human health must be maintained as a whole in order for these structures to function without any lifelong problems. There are many factors which affect human health in negative manners. The most important factors can be listed as heredity, nutrition, climate, physical environment, housing, education and cultural opportunities.[2] By investigating environmental factors carefully, one can see the importance of nutrition more clearly.

Nutrition is the most fundamental need of human health. Nutrition can be defined as the ability of people to take in the nutrients they need for their growth, development, healthy and productive life, and the ability to use these nutrients appropriately. In cases where adequate and balanced nutrition is not provided, results such as growth deficiency,

To cite this article: Duralı Ö, Duran S. A Comprehensive Study on Determination of Nutrition Knowledge and Nutrition Status in Adult Women. Cyprus J Med Sci 2023;8(6):441-448

ORCID IDs of the authors: Ö.D. 0000-0002-6021-4655; S.D. 0000-0003-3279-8099.

Address for Correspondence: Özge Duralı
E-mail: ozgedurali@trakya.edu.tr
ORCID ID: orcid.org/0000-0002-6021-4655

Received: 19.10.2020
Accepted: 28.01.2021

increases in diseases, long and difficult disease processes and decreases in quality of life become inevitable.[3] Moreover, from a wider point of view, negative consequences such as increases in health expenditures and decreases in the welfare of society may also occur.[4]

According to some studies, wrong eating habits are one of the most significant causes of common health problems such as cardiovascular diseases, obesity, hypertension, osteoporosis, many cancer types and anemia.[5] It is a fact that having these kinds of diseases will directly affect individuals' quality of life. One of the best ways of protecting society from wrong nutritional habits and their drawbacks is to provide them with nutritional knowledge and the necessary encouragement.[6] With this approach in mind, individuals in society can be kept healthy and their quality of life can be improved.[7]

Women have important needs, such as growth, development, resistance to diseases and health protection.[8] It is also a well-known fact that women's health is affected by their nutritional status. Apart from physical differences such as nutrition, age, growth and development, women's nutritional needs also change during special periods such as menstruation, pregnancy, lactation and menopause.[9]

In today's world, women have moved away from their traditional role and they are involved in the workplace life. They have become more efficient and productive with their increasing responsibilities. Women contribute to the economic burden of the family with their responsibilities at every stage of their working life.[10] Though the role of women in society has changed year-by-year, women still have a major responsibility for the nutritional knowledge of the family.[11] It has been shown that the mother's nutritional habits have a direct effect on her children's habits.[12] This also indicates that the mother's nutritional knowledge and food preferences are practiced by the whole family.[13] Therefore, women's guidance in nutritional knowledge and food preference studies are a good guide for us to analyze the general situation of society. For this reason, this study was conducted on women aged between 20 and 49 years of age and the aim of this study was to investigate the nutrition knowledge and nutritional behaviors of women and the factors affecting them.

MATERIALS AND METHODS

The number of women between 20-49 years belonging to family health centers in Edirne was determined to be 41,989 according to the most recent population data provided by Turkish Statistical Institute (TURKSTAT). Based on a sample size calculation formula, the minimum required sample number was determined to be 368 women by accepting a 95% confidence level and taking the margin of error as 0.05. Following this, data were collected between the dates of June and September, 2019 with 457 voluntary participants. Written informed consent was obtained from the women who agreed to participate in this study. The inclusion criteria were determined as follows; being registered in a family health center in Edirne, Türkiye, being a woman between 20-49 years old, not being pregnant and answering all questions completely. After the exclusion of 77 volunteers, this study was conducted with 380 women.

The questionnaire which was used for data collection includes two major sections. Questions about general knowledge and nutritional behaviors were asked to the participants in the first part of questionnaire. In the sociodemographic characteristics section of questionnaire, the participants were asked twenty-four questions. Even though majority of the questions were multiple choice questions, there were also open-ended questions. Moreover, two questions allow participants to select multiple options. In this section, the participants' information such as their age, height, weight, smoking habits, alcohol use, marital status, education level, working status, vitamin-mineral use, general habits about meals, prior knowledge about nutrition, willingness to obtain further nutritional knowledge and their diet status were investigated.

In the second part of the questionnaire, the YETBID scale is made up from two sections which are the fundamental nutritional and food-health knowledge section, and the food preference section. In this study, an additional section which aimed to collect general knowledge and nutritional behaviors of participants was also used.

There are twenty propositions in the fundamental nutritional and food-health knowledge section of the YETBID scale, with twelve in the food preference section. In these two sections of the YETBID scale, a 5-point Likert scale is used. Those who "*absolutely agree*" with the correct propositions in these sections received four points, "*agree*" was given three points, "*indecisive*" received two points, "*disagree*" was awarded one point, and lastly those who "*absolutely disagree*" received zero points. In the wrong propositions, the order of the points was changed and "*absolutely disagree*" received maximum points, while "*absolutely agree*" received minimum points. The individual characteristics of the participants are given in Table 1.

In the first section of the fundamental nutritional knowledge questionnaire, the weighting of the propositions were 50% for vitamin-minerals, 20% for fat (lipid), 10% for carbohydrates, 10% for proteins, 5% for fiber, and lastly 5% for salt. In the fundamental nutrition and food-health knowledge section, the highest obtainable score was 80, while the lowest was 0. Accordingly, the highest score of the participants in this section was 80, while the lowest score was 13.

In the food preference section, the participants were questioned about their food preparation, cooking and consumption methods. This

Table 1. Individual characteristics of participants

	Answer	n	%
Health problem	No	306	80.5
	Yes	74	19.5
Smoking	Non-smoker	256	67.4
	Smoker	86	22.6
	Occasional smoker	38	10.0
Alcohol use	Non-drinker	212	55.8
	Drinker	58	15.3
	Occasional drinker	110	28.9
Marital status	Single	239	62.9
	Married	131	34.5
	Divorced	10	2.6
Working status	Not working	208	54.7
	Working	172	45.3
Education status	Primary or below	27	7.2
	High school	58	15.2
	University or above	295	77.6
	Total	**380**	100.0

section contains correct and incorrect statements on carbohydrate, fat, protein, fiber, liquid and salt consumption. The highest score in the food preference section was 48, while the lowest was 0. As a result, the highest score of the participants was 48, while the lowest was 5.

This study was conducted in accordance with the Helsinki Declaration Principles. This study was carried out with the permission of Trakya University Faculty of Medicine Scientific Research Ethics Committee (approval number: TÜTF-BAEK 2019/211). Moreover, a consent form including the text "The data obtained from this questionnaire that we will apply to you will only be used for scientific purposes and participants will not be subjected to any measurement and evaluation" was declared to the participants and signed by them.

Statistical Analysis

Statistical analysis of the data obtained from this study was analyzed with the SPSS statistics 25.0 program (IBM, USA). The significance level was taken as $p<0.05$. The mean and standard deviations of the quantitative data were calculated. The frequencies and percentages of the qualitative data are shown. The suitability of the quantitative data for normal distribution was checked by Kolmogorov-Smirnov and Shapiro-Wilk tests. Student's t-test was used in paired tests which fitted the normal distribution. The Mann-Whitney U test was performed for paired data which did not comply with the normal distribution. The Independent t-test for comparison of independent groups was used. The One-Way ANOVA test was used for quantitative variables with at least three groups. Differences between the groups were determined by the post-hoc test.

RESULTS

The participants were separated into three groups according to their ages in years, as "20-29", "30-39" and "40-49". The nutritional knowledge scores of these groups were examined and their means were found to be 53.17±7.997 for "20-29", 51.88±8.666 for "30-39" and lastly 55.05±7.904 for "40-49". A significant difference was found between these groups in terms of their nutritional knowledge scores (p=0.020). These results are given in Table 2.

Nutritional knowledge scores were compared according to diet status. The mean score of dieters was calculated as 55.43±9.705 and the mean score of non-dieters was calculated as 52.90±7.869. The results showed a significant difference between these groups (p=0.028).

Table 2. Nutritional knowledge and food preference scores by age groups

	Age groups (years)	n	$\bar{X} \pm SD$	F	p
Nutritional knowledge score	20-29	173	53.17±7.997	3.937	**0.02***
	30-39	107	51.88±8.666		
	40-49	100	55.05±7.904		
	Total	**380**	**53.30±8.230**		
Food preference score	20-29	173	37.68±7.314	0.929	0.396
	30-39	107	37.61±6.842		
	40-29	100	38.77±6.770		
	Total	**380**	**37.95±7.042**		

One-Way variance analysis (ANOVA). *p<0.05. $\bar{X}$: Mean, SD: Standard deviation.

The nutritional knowledge score and food preference score were compared according to the percentage of income allocated to the kitchen expenditures of the participants. When the mean scores were examined, it is seen that there were significant differences between the groups (p=0.004). Detailed analyses with the post-hoc test showed that the scores of the group which allocated 40% of their income to kitchen expenditure were significantly different from the group which gave 10% or below and from those who allocated 20% (p=0.019, p=0.013). The highest nutritional knowledge mean score belonged to the group which allocated 10% or below (56.61±8.452), while the lowest mean score belonged to the group which allocated 40% (50.85±7.949) of their income to kitchen expenditure.

The mean of the nutritional knowledge scores of those participants whose education group was "primary or below" was found to be 51.30±8.462, 49.17±8.506 for "high school", and 54.30±7.888 points for "university or higher". The mean score of all participants was found to be 53.30±8.230. Significant differences were found between the groups (p<0.001). Detailed post-hoc tests showed a significant difference between the "high-school" and "university or higher" education level groups (p<0.001).

Marital status, nutritional knowledge scores and food preference scores are compared in Table 3. The marital status groups are categorized as "single", "married" or "divorced". There were significant differences between these groups in their nutritional knowledge scores (p=0.019). Detailed post-hoc test showed a significant difference between the "single" and "married" groups (p=0.014). The mean nutritional knowledge score of the "single" group was found to be 52.43±8.289, while it was 54.93±7.837 for the "married" group.

The participants were grouped according to their condition of having an illness or not. Their nutritional knowledge scores and food preference scores were compared. Significant differences were found between individuals in terms of their nutritional knowledge scores (p=0.004). The mean score of the group "without health problems" was 52.58±8.110, while it was 56.30±8.098 in the group "with health problems."

Diseases related to nutrition were grouped. A significant difference was found between those with and those without nutritional diseases (p=0.004). While the mean score was 52.81±8.122 in those participants "without nutritional diseases", the mean score was 56.26±8.333 in those participants "with nutritional diseases." The mean overall score was 53.33±8.230 points.

The nutritional knowledge scores and food preference scores of the participants were compared according to their prior nutritional knowledge. There was a significant difference in the nutritional knowledge scores between those who had prior knowledge about nutrition and those who did not (p<0.001). The mean nutritional knowledge scores of the group who did not have prior nutrition knowledge were calculated as being 51.31±8.407 points. On the other hand, the score of the group having prior knowledge about nutrition was 56.15±7.6 points.

There was a significant difference in food preference scores between those with prior nutrition knowledge and those without (p=0.009). The mean of the food preference scores was found to be significantly higher in those who had prior nutrition knowledge than those who did not. The mean score of the group having prior nutrition knowledge found to

be 39.21±6.047 points, while it was only 37.14±7.843 points for those who did not. These results are given in Table 3.

A significant difference was found between those individuals with and those without disease in terms of their food preference score (p=0.037). The mean food preference score of the group without disease was found to be 37.49±7.2, while the score of the group with disease was found to be 39.85±6.022 points. These results are given in Table 4.

DISCUSSION

This study was conducted in order to determine the nutritional knowledge levels and nutritional preferences of adult women. The mean of the fundamental nutrition and nutritional-health knowledge section was found to be 53.30±8.23 points. In the food preference section, the mean of all participants' scores was found to be 37.95±7.04. The nutritional knowledge scores of the age groups were also examined. The mean scores were found to be 53.17±7.997 for group "20-29", 51.88±8.666 for "30-39" and 55.05±7.904 for "40-49". The mean nutritional knowledge score of the group "40-49" was found to be significantly higher than the other groups.

According to a study in which 803 Belgian women participated, women's knowledge about nutrition showed a significant difference with age (p=0.001). Although the age range of the participants was narrow, significant results were obtained.[14] In another study, 127 athlete trainers' nutrition knowledge was examined. The nutrition knowledge of groups 28-30 years (n=48), 31-40 years (n=28), 41-50 years (n=48), and 51 years or older (n=39) were compared. According to the results, the scores of the 51 years or older group were higher than the others.[15] Another study sharing the same scale was conducted with 104 participants. The nutrition knowledge scores of the 35-50 age group were significantly higher than those of the 18-35 and 51-65 age

Table 3. Nutritional knowledge and food preferences scores with respect to BMI. Education status and marital status

			Nutritional knowledge score			Food preferences score		
	Group	**n**	**$\bar{X}$ ± SD**	**Min.**	**Max.**	**$\bar{X}$ ± SD**	**Min.**	**Max.**
Education status	Primary or below	27	51.30±8.462	36	68	37.15±8.716	22	48
	High school	58	49.17±8.506	13	69	36.47±7.049	10	48
	University or above	295	54.30±7.888	17	80	38.31±6.852	5	48
	Total	380	53.30±8.230	13	80	37.95±7.042	5	48
			p<0.001*			p=0.157		
BMI (kg/m²)	Underweight	24	53.29±6.881	35	68	37.13±7.491	16	48
	Normal	247	53.50±8.258	13	80	37.89±6.937	5	48
	Overweight	75	52.76±8.671	32	74	38.08±7.868	6	48
	Obese	34	53.09±8.177	41	68	38.62±5.635	24	48
	Total	380	53.30±8.230	13	80	37.95±7.042	5	48
			p=0.922			p=0.880		
Marital status	Single	239	52.43±8.289	13	80	37.37±7.358	5	48
	Married	131	54.93±7.837	36	74	38.98±6.273	14	48
	Divorced	10	52.90±9.445	42	68	38.30±7.973	24	48
	Total	380	53.30±8.230	13	80	37.95±7.042	5	48
			p=0.019*			p=0.108		

One-Way variance analysis (ANOVA). *p<0.05. $\bar{X}$: Mean, SD: Standard deviation, BMI: Body mass index, Min.: Minimum, Max.: Maximum.

Table 4. Nutritional Knowledge and food preferences scores with respect to health problems. Prior knowledge and being willing to receive nutritional education

			Nutritional knowledge score		Food preferences score	
	Group	**n**	**$\bar{X}$ ± SD**	**t**	**$\bar{X}$ ± SD**	**t**
Health problem	No	306	52.58±8.110	2. 877	37.49 ±7.200	2.092
	Yes	74	56.30±8.098		39.85±6.022	
			p=0.004*		**p=0.037***	
Having prior knowledge	No	193	51.31±8.407	-5.187	37.14±7.843	-2.639
	Yes	123	56.15±7.600		39.21±6.047	
			p<0.001*		**p=0.009***	
Willing to receive education	No	132	53.39±8.643	0.158	37.47±7.703	-0.965
	Yes	248	53.25±8.019		38.20±6.665	
			p=0.875		p=0.335	

T-test in independent groups. *p<0.05. $\bar{X}$: Mean, SD: Standard deviation.

groups. The reason for this result was found to be education level and socioeconomic level differences between the groups.[16]

Another study was conducted with 1,062 adult volunteers. The participants were grouped according to their age ranges. Four age groups were determined as 18-29, 30-39, 40-49, and 50 years or above. There were significant differences in the nutritional knowledge scores between these groups (p=0.014). Significant differences were found especially between the 18-29 and 40-49 age groups. Among all groups, the highest scores belonged to the 40-49 age group.[17] Another study conducted in Australia examined the nutritional knowledge of 201 participants. Participants aged between 18 and 35 and over 35 years were compared. Significant differences were found between the groups (p<0.05). The nutritional knowledge of those participants over 35 years of age was found to be much higher than the other group.[18]

As can also be seen from the results of our study, the level of knowledge and awareness about nutrition increases in the middle age period. In that period, it was seen that participants improved their knowledge with their experiences. On the other hand, a significant difference was not found between the age groups in the food preference score. The reason for this situation is that having nutritional knowledge does not have any application-related obligations.

There was no significant difference between body mass index (BMI) and the nutritional knowledge scores (p=0.922). The mean scores of the participants in the low and normal BMI groups were found to be slightly higher than the overweight and obese groups. There was no significant difference between the BMI groups in terms of their food preference scores (p=0.88). In a study conducted among 222 university students, nutritional knowledge scores were compared according to BMI groups. In this mentioned study, a significant difference was not found between the groups (p=0.79). However, when the nutritional knowledge scores were compared numerically, the low BMI group's scores were found to be slightly higher than those of the overweight and obese groups.[19] In another study using the same scale, it was shown that the overweight and obese groups' nutritional knowledge scores were higher than the others. According to BMI groups, the nutritional knowledge score comparison data did not show clear results.[16]

Another study was conducted with 1,340 students in order to determine the relationships between BMI groups and nutritional knowledge-food preferences scores. According to these results, there was no significant relationship between nutritional knowledge and food preferences (p=0.156, p=0.654). However, according to the results of the mentioned study, it was found that the low BMI group's mean nutritional knowledge scores was slightly higher than the others. Moreover, the low and normal groups' mean food preferences scores were higher than the others.[20] The results of this other study were similar to those of our study.

Nutritional knowledge and food preference scores were examined according to education levels. A significant difference was found between the groups in terms of their nutritional knowledge scores (p<0.001). The mean scores were 54.30±7.888 for the "university or higher" group, 49.17±8.506 for the "high school" group, and 51.30±8.462 for the "primary or lower" group. The university or higher group had a significantly higher mean score than the other groups. In another study, participants were separated into three groups as "high school or below", "technology and trade high schools" and "higher" education levels. The group having the highest education level scored higher than the other two groups. In that study, the highest education group's mean score was found to be 76.27, while the technology and trade high school group was 69.08, and the high school or below group was 59.87.[18] Similarly, in our study, the mean nutritional knowledge scores of the "high school or below" group was lower than the others. In another study conducted on medical staff, four different groups were formed according to their education levels. Significant differences were found between the groups (p=0.001). The scores of the medicine and master degree groups were significantly higher than the other two groups.[21]

The relationships between meal skipping and nutritional knowledge and food preference scores were also investigated. The results did not show any correlation (p=0.73). In another study conducted on healthcare workers, researchers found a significant relation between skipping meals and nutritional knowledge scores (p=0.039). The mean nutritional knowledge score of those participants skipping meals was found to be 53.85±21.10 points, while for those participants who were not skipping meals, it was found to be 61.83±21.67 points. The mean score of those participants who sometimes skipped meals was 56.61±21.50 points. According to results of this mentioned study, the lowest mean score belonged to those participants skipping meals, while the highest mean score was for those participants not skipping meals.[21] Unlike our study, it was seen that the most frequently skipped meal was breakfast. This might be a result of the personal preferences, habits or working conditions of the participants. In another study conducted on 350 students, the rate of skipping meals was found to be 82.3%. Also, it was stated that 295 out of 350 participants were skipping breakfast.[22] In another study conducted on women living in Cyprus, 22% of the participants declared that they skipped meals. Also, breakfast was the most frequently skipped meal at a rate of 16.3% in the same study.[10] That study also showed that dinner and lunch were the least frequently skipped meals. The reason for this situation, which differs from our study, was that the other studies were conducted in student-centered or student-intensive groups. It was seen that similar results were obtained in student-centered studies. In studies where the majority of participants were working, it was seen that lunch meals were most frequently skipped.

Nutritional knowledge and food preference scores were compared according to illness status. The mean nutritional knowledge score of those who had a disease was 56.30±8.098, while for those who did not have a disease, it was 52.58±8.110. A significant difference was found between these 2 groups (p=0.004). It was seen that the nutritional knowledge score was higher in those participants with a disease. In another study conducted on 104 participants, 17.4% of the research group had at least one health problem. Their results showed that the nutritional knowledge and food preference scores were higher among those people with health problems than among those without health problems.[16] In our study, the food preference scores also showed differences between the ill and healthy participants (p=0.037). The mean food preference scores were higher in those participant who had an illness, similar to their nutritional knowledge scores. The most common diseases in our participants were diabetes, hypertension and hypothyroidism. Another study showed similar results to our study. That study also determined that diabetes, hypertension, hypothyroidism and gastritis were the most common diseases in health care workers.[21]

The participants were grouped according to their marital status. A significant difference found between the groups in terms of their nutritional knowledge scores (p=0.019). The married group had

54.93±7.837 points as their mean score, while the single group had 52.43±8.289. In another study, the mean nutritional knowledge score was calculated to be 56.57±16.98 for singles and 69.30±16.98 for married individuals. A significant difference were found between these two groups ($p<0.05$).[18] In another study, the mean score of singles was found to be 39.2 and the mean score of married individuals was 38.7 points. The researchers did not find any significant difference between the groups ($p=0.591$).[17] As a conclusion for this part, it can be said that living with someone can increase the time that is spent cooking, and the number of meals prepared at home. This may lead to increased interest in nutrition and therefore increased nutritional knowledge.

Participants with or without a prior nutritional knowledge were compared according to their nutritional knowledge score. A significant difference was found between the groups ($p<0.001$). The mean score of the group with prior nutritional knowledge was 56.15±7.600, while the other group's mean score was 51.31±8.407. The food preference scores were also shown to have a significant difference ($p=0.009$). The mean food preference score of the group with a prior knowledge about nutrition was 39.21±6.047, while it was 37.14±7.843 points for the group without. The results did not shown any significant difference between the groups that were willing to receive nutritional education and those who were not, both in their nutritional knowledge ($p=0.875$) and their food preference scores ($p=0.335$).

The "*saturated fat content of fish is higher than red meat*" proposition had the lowest correct response rate, and it was answered correctly by only 17.9% of the participants.

The "*fats contain less energy than protein and carbohydrates*" proposition was answered correctly by 33.7% of the participants. In another study, 34.3% of participants answered correctly the question regarding "*how many calories per gram of protein, fat and carbohydrate*".[21] In brief, it can be said that the mean knowledge level about calorie values of the participants was low.

The "*fruits contain high protein*" proposition was answered correctly by only 41.1% of the participants, which shows us that there is a lack of knowledge in general. Another study conducted on healthcare workers showed that 43% of participants disagree and 34.6% agree with the proposition "*Fruits are good sources of quality protein, iron, vitamin B12 and zinc*".[21] The results of the mentioned study show similarity with our results, and in both studies, the majority of the participants answered the mentioned proposition incorrectly. Moreover, another study stated that 37.4% of their participants answered the same question correctly, which also shows a similarity with our results.[16]

The "*Haricot bean salad contains high fiber*" proposition was answered correctly by 64.7% of our participants. In another study conducted on healthcare workers, it was stated that 66% of the participants choose the correct answers in fiber knowledge related questions.[21]

The "*Vitamin C in orange strengthens immunity and protects against colds and flu infections*" proposition was correctly answered by 96.9% of our participants. It was the proposition which had the highest correct rate.

The "*Vitamin E is a highly effective vitamin for the sense of sight*" proposition was correctly answered by 15.8% of our participants. In that proposition, 31.8% of the participants were indecisive. The overall success rate of answers given to this proposition was low. The most important task of vitamin E in the body is its antioxidant task. Its effects on reproduction have also been demonstrated in animal studies. However, it does not have any significant relation with sight.[2]

The "*Vitamins and minerals provide energy*" proposition was answered incorrectly by many of our participants. Only 31.6% of participants answered this question correctly. Vitamins and minerals do not provide energy. They protect the body against various diseases. However, they do not have any energy value.[2]

The majority of participants answered the propositions in the food preference section correctly. The "*It is better to put 3-4 dried apricots instead of wafers in a child's lunchbox*" proposition was the proposition which was answered correctly with the highest success rate. 92.7% of the participants answered this proposition correctly. The "*Someone who wants to reduce the amount of fat intake from food can prefer skimmed milk*" proposition was answered correctly by 61.3% of the participants. This proposition was the proposition which had the lowest correct rate in that section.

According to the results obtained from the collected data, nutritional knowledge was found to be significantly related with education level, age, marital status, dieting, percentage of income allocated to kitchen expenditure, having an illness and having prior nutritional education. Increasing education levels and age affect nutritional knowledge in a positive manner. Education enhances the reading and research ability of individuals. Due to this reason, educated people are more likely to acquire correct knowledge. This positive relationship between nutritional knowledge scores and the age of the participants can be explained by their increased nutritional experience. On the other hand, the increasing percentage of income allocated to kitchen expenditure affects nutritional knowledge in a negative manner. Results showed that married women scored higher than the others in the nutritional knowledge section. Moreover, dieting women also scored higher than non-dieting ones in this section. Having any illness or having prior nutritional education both affected nutritional knowledge levels positively.

The results of the food preference section showed that being ill and having a prior nutritional education were significantly related to the food preference scores of the participants. Those participants who had an illness scored higher than those who did not in this section. Moreover, those women who had a prior nutritional education scored higher than those who did not.

Our study showed that there are many factors affecting the nutritional knowledge levels and nutritional behaviors of individuals. Increases in age, increases in education levels, marital status, being on a diet, the percentage of the budget allocated to the kitchen (also in relation to the household budget), the presence of any diseases, and having prior nutritional knowledge were the factors which positively affected nutritional knowledge levels. However, the factors affecting nutritional behavior were the presence of any diseases and having a prior nutritional knowledge.

Nutrition is an essential factor which directly affects the health of the individual and the society in many aspects. It is very important to obtain the correct nutritional information in order to provide proper nutrition. However, positive effects can be seen only when correct information turns into correct nutritional behavior. The most important point of our study was to create awareness of this situation.

Study Limitations

This research was carried out on women aged 20-49 living in Edirne city center. This research and its results in the city center of Edirne are limited to the province and the sample, and it is not intended to generalize the findings and results to the whole country. This research was conducted from June to September, 2019 and so this research is limited in time as participants are thought to change over time. Another limitation of this study was the education levels of the participants, which were not homogeneously distributed. The fact that the study was conducted in Edirne city center led to the educational level distribution of the participants not being homogeneous.

CONCLUSION

The results of our study show that having a disease or obtaining nutrition education is necessary for the development of proper nutritional behavior. While many different factors affect obtaining knowledge about nutrition, factors which affect nutritional habits are limited and need to be developed. In addition to increasing nutritional knowledge, performing studies in order to change people's habits and ensuring that the society receives more education on nutrition may be useful practices. More studies and applications are needed on this subject.

MAIN POINTS

- Education level, age, marital status, dieting, percentage of income allocated to kitchen expenditure, having an illness, and having prior nutritional education were significantly associated with nutrition knowledge levels.
- Food preference was affected by having prior nutritional knowledge and having an illness.
- In the food preference section, the ratio of correct answers was generally higher than the nutrition knowledge section.

Acknowledgements: We would like to thank all the participants for helping this study. Main data used for this study have been taken from the MSc thesis of author Özge Duralı.

ETHICS

Ethics Committee Approval: This study was carried out with the permission of Trakya University Faculty of Medicine Scientific Research Ethics Committee (approval number: TÜTF-BAEK 2019/211).

Informed Consent: Written informed consent was obtained from the women who agreed to participate in this study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: Ö.D., S.D., Design: Ö.D., S.D., Supervision: S.D., Materials: Ö.D., Data Collection and/or Processing: Ö.D., Analysis and/or Interpretation: Ö.D., Literature Search: Ö.D., Writing: Ö.D., Critical Review: S.D.

DISCLOSURES

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

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

REFERENCES

1. Owen L, Corfe B. The role of diet and nutrition on mental health and wellbeing. Proc Nutr Soc. 2017; 76(4): 425-6.
2. Baysal A. Beslenme. Ankara, Turkey: Hatiboğlu Publishing House. 2012.
3. Tramontano A, Veronese N, Giantin V, Manzato E, Rodriguez-Hurtado D, Trevisan C, et al. Nutritional status, physical performance and disability in the elderly of the Peruvian Andes. Aging Clin Exp Res. 2016; 28(6): 1195-201.
4. Silveira JA, Taddei JA, Guerra PH, Nobre MR. The effect of participation in school-based nutrition education interventions on body mass index: a meta-analysis of randomized controlled community trials. Prev Med. 2013; 56(3-4): 237-43.
5. O'Brien G, Davies M. Nutrition knowledge and body mass index. Health Educ Res. 2007; 22(4): 571-5.
6. Council NHMR. Australian Dietary Guidelines. Canberra, Australia: National Health and Medical Research Council. 2013.
7. Govindaraju T, Sahle BW, McCaffrey TA, McNeil JJ, Owen AJ. Dietary Patterns and Quality of Life in Older Adults: A Systematic Review. Nutrients. 2018; 10(8): 971.
8. Fontana R, Della Torre S. The Deep Correlation between Energy Metabolism and Reproduction: A View on the Effects of Nutrition for Women Fertility. Nutrients. 2016; 8(2): 87.
9. Ramakrishnan U, Grant F, Goldenberg T, Zongrone A, Martorell R. Effect of women's nutrition before and during early pregnancy on maternal and infant outcomes: a systematic review. Paediatr Perinat Epidemiol. 2012; 26(Suppl 1): 285-301.
10. Nazif S. The assessment of nutritional status and calcium intake of women aged 19-40 living in the turkish republic of northern cyprus. J Nutr Diet. 2013; 41(3): 202-11.
11. Subramanian KR. Social and cultural expectations and changing role of women. Ijemr. 2018; 8(2): 110-7.
12. Lohse B, Rifkin R, Arnold K, Least C. A digital program informs low-income caregivers of preschool-age children about family meals. J Nutr Educ Behav. 2012; 44(3): 256-61.
13. Branca F, Piwoz E, Schultink W, Sullivan LM. Nutrition and health in women, children, and adolescent girls. BMJ. 2015; 351: h4173.
14. De Vriendt T, Matthys C, Verbeke W, Pynaert I, De Henauw S. Determinants of knowledge in young and middle-aged Belgian women and the association with their dietary behaviour. Appetite. 2009; 52(3): 788-92.
15. Cockburn E, Fortune A, Briggs M, Rumbold P. Nutritional knowledge of UK coaches. Nutrients. 2014; 6(4): 1442-53.
16. Batmaz H, Güneş E. Development of A nutrition knowledge level scale for adults and validation-reliability study. 1st International Active Aging and Intergenerational Solidarity Congress. Istanbul Science and Academics Association. Istanbul; 2018.
17. Haklı G, As E, Uçar A, Özdoğan Y, Yılmaz MV, Özçelik AÖ et al. Nutritional knowledge and behavior of adults: their relations with sociodemographic factors. Pak J Nutr. 2016; 15(6): 532.
18. Hendrie GA, Coveney J, Cox D. Exploring nutrition knowledge and the demographic variation in knowledge levels in an Australian community sample. Public Health Nutr. 2008; 11(12): 1365-71.

19. Tütüncü İ, Karaismailoğlu E. Determination of nutrition knowledge levels of university students. Internationl Refereed Academic Sports, Health and Medical Sciences Journal. 2013; 3(6): 29-42.

20. Şanlıer N, Konaklıoğlu E, Güçer E. The relationship between young people›s nutritional knowledge, habits and behaviors and their body mass index. Journal of Gazi Education Faculty. 2009; 29(2): 333-52.

21. Yücel B. Examining of food habits and nutritional knowledge levels of healthcare staff. B.U. Institute of Health Sciences, Master's Thesis, 2015.

22. Gül T. The concept of healthy eating and nutritional habits of college students' attitudes and behaviors: an application on Çukurova University students. Ç.U. Institute of Social Sciences, Master's Thesis, 2011.

CASE REPORT

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2023.2023-50
Cyprus J Med Sci 2023;8(6):449-452

Late-onset Brown-Vialetto-Van Laere Syndrome with Electrophysiological Findings

Ferda Selçuk[1], Mustafa Ertaş[2]

[1]Clinic of Neurology, Dr. Burhan Nalbantoğlu State Hospital, Nicosia, North Cyprus
[2]Department of Neurology, İstanbul University, İstanbul Faculty of Medicine, İstanbul, Türkiye

Abstract

Brown-Vialetto-Van Laere syndrome (BVVLS), a rare neurological disorder, can cause sensorineural hearing loss, bulbar palsy, and breathing problems at any age. Facial weakness, slurred speech, and neck, shoulder, and limb weaknesses are its other features. The prevalence of BVVLS is estimated to be less than 1 in 1,000,000. There are autosomal recessive cases in about half of the familial cases, while there are also sporadic cases. For diagnosis, the clinical presentation is assessed and many tests, such as cerebrospinal fluid analysis, muscle biopsy, brain magnetic resonance imaging, and neurophysiological examinations are also performed. In this report, we discuss the first instance of a 47-year-old male patient from North Cyprus who had sensorineural hearing loss and lower cranial nerve involvement along with electrophysiological abnormalities.

Keywords: Brown-Vialetto-Van Laere syndrome, electrophysiology, late-onset

INTRODUCTION

Brown-Vialetto-Van Laere syndrome (BVVLS) is characterized by progressive pontobulbar palsy with sensorineural deafness. Most frequently, the lower cranial nerves VII to XII are involved.[1-5] Brown[6] originally identified this syndrome in 1894, followed by Vialetto[7] in 1936 and Van Laere[8] in 1966. About half of all cases are sporadic, and its etiopathogenesis is still unknown.[9] There have also been reports of X-linked or autosomal dominant inheritance.[2] The earliest symptoms might appear at any age, from infancy to the third decade.[2] Although it has been proposed that males may be more seriously impacted than females,[1] reported cases show that females are affected more frequently than males.

Initial presenting signs, in addition to sensorineural hearing loss, include slurred speech,[4] facial weakness,[10] and weakness in the neck and shoulders. This condition is frequently regarded as one of the numerous motor neuron diseases.[11]

We present the clinical and electrophysiological findings of the first case of a late-onset sporadic BVVLS in North Cyprus.

CASE PRESENTATION

Clinical History

A 47-year-old male presented with slurred speech, numbness of the mouth, and difficulty with swallowing. He reported that his symptoms had arisen during the previous 6 months. His neurologic examination revealed bifacial weakness, an atrophic tongue with fasciculation, and a weak gag reflex. However, sensory tests and deep tendon reflexes were within normal ranges.

In the following months, difficulty in swallowing and choking progressed, which caused weight loss. Atrophy and the fasciculations in the tongue became apparent (Figure 1). After one year, he had developed hearing loss in the left ear. His hearing deteriorated within two years, leading to total hearing loss on the left side and sensorineural hearing loss on the right side. With medical and symptomatic treatment, it has been four years since the diagnosis.

To cite this article: Selçuk F, Ertaş M. Late-onset Brown-Vialetto-Van Laere Syndrome with Electrophysiological Findings. Cyprus J Med Sci 2023;8(6):449-452

ORCID IDs of the authors: F.S. 0000-0002-2170-4061; M.E. 0000-0003-0606-952X.

Address for Correspondence: Ferda Selçuk
E-mail: ferdaselcuk@yahoo.com
ORCID ID: orcid.org/0000-0002-2170-4061

Received: 17.05.2023
Accepted: 10.11.2023

Figure 1. Atrophy of the tongue

Investigations

There were no abnormalities in the biochemical laboratory tests. Acetylcholine receptor antibody test was found negative. The results of the abdomino-pelvic sonography, chest computed tomography scan, and brain magnetic resonance imaging did not show any abnormalities.

Electromyography (EMG) and nerve conduction studies showed the electrophysiological findings of lower motor neuron damage affected tongue and upper limb muscles on both sides with normal sensory and motor conduction values and chronic neurogenic MUAP changes in tongue, hand and arm muscles together with severely decreased interference pattern and spontaneous denervation activity in the hand muscles, while needle EMG findings of all abdominal and leg muscles were normal, as can be seen in Table 1.

The audiometry test revealed mild sensorineural hearing loss on the right side at high frequencies. However, on the left side, there was severe sensorineural hearing loss with non-measurable speech reception thresholds.

Table 1. Electrophysiological findings

				Voluntary action				
Muscle (innervation)	**Interpretation**	**Fib**	**PSW**	**Amp**	**Dur**	**Polyphazic**	**Stable**	**IP**
Left Interosseous dorsalis I (ulnar ramus profundus, C8, T1)	Mild inactive neuropathy	4/10	4/10	++	++	Normal	Normal	—
Right Interosseous dorsalis I (ulnar ramus profundus, C8, T1)	Mild inactive neuropathy	4/10	4/10	++	++	Normal	Normal	—
Left triceps (radialis, C6, C7, C8)	Severe inactive neuropathy	0/10	0/10	+++	+++	Normal	Normal	—
Right triceps (radialis, C6, C7 C8)	Severe inactive neuropathy	0/10	0/10	+++	+++	Normal	Normal	—
Left deltoideus posterior (axillaris C5, C6)	Mild inactive neuropathy	4/10	4/10	++	++	Normal	Normal	—
Right deltoideus posterior (axillaris C5, C6)	Mild inactive neuropathy	4/10	4/10	++	++	Normal	Normal	—
Left rectus abdominis	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right rectus abdominis	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right biceps (musculacutaneous, C5, C6)	Severe inactive neuropathy	0/10	0/10	+++	+++	Normal	Normal	—
Left biceps (musculacutaneous, C5, C6)	Severe inactive neuropathy	0/10	0/10	+++	+++	Normal	Normal	—
Left gastrocinemius caput lateralis (tibialis, S1, S2)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right gastrocinemius caput lateralis (tibialis, S1, S2)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Left gastrocinemius caput medialis (tibialis, S1, S2)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right gastrocinemius caput medialis (tibialis, S1, S2)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Left ext hallucis longus (peroneus profundus L5, S1)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right ext hallucis longus (peroneus profundus L5, S1)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Left tibialis anterior (peroneus profundus, L4, L5)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right tibialis anterior (peroneus profundus, L4, L5)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Left vastus lateralis (femoralis, L2, L3, L4)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right vastus lateralis (femoralis, L2 L3 L4)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Left rectus femoris (femoralis L2, L3, L4)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right rectus femoris (femoralis, L2, L3, L4)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Left tensor fascia latae (gluteus inferior, L4, L5)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right tensor fascia latae (gluteus inferior, L4, L5)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Left iliopsoas (femoralis, Ll, L2, L3, L4)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Right iliopsoas (femoralis, Ll, L2, L3, L4)	Normal	0/10	0/10	Normal	Normal	Normal	Normal	Normal
Left glossus	Mild inactive neuropathy	4/10	4/10	++	++	Normal	Normal	—
Left glossus	Mild inactive neuropathy	4/10	4/10	++	++	Normal	Normal	—

Fib: Fibrillation, PSW: Positive sharp wave, Amp: Amplitude, Dur: Duration, IP: Interference pattern.

Medication

After the BVVLS diagnosis, the patient received intravenous immunoglobulin (IVIG) treatment at a dose of 0.4 g/kg for 5 days, followed by monthly repeated doses of 0.4 g/kg IVIG for one day for 6 months. However, this treatment did not result in any improvement in his symptoms.

He was also treated with 1,000 mg methylprednisolone for 10 days and continued to receive monthly steroid treatment after IVIG therapy. Although he experienced some improvement in swallowing and speech, it was limited.

In addition, he was prescribed riboflavin (B2) tablets at a daily dose of 300 mg. Supportive care and symptomatic treatment, such as botulinum toxin type A treatment for excessive salivation and a swallowing rehabilitation program were also administered. As a result, the patient's clinical condition stabilized.

DISCUSSION

The rare neurological condition known as BVVLS, a type of motor neuron disorder, is characterized by bilateral hearing loss along with a number of other, primarily motor and cranial nerve dysfunctions.[10] No definitive biochemical or genetic defect has been described, and its diagnosis is primarily dependent on clinical characteristics and electrophysiological tests.[4] The clinical course of BVVL, which varies considerably from case to case, is one of the condition's most intriguing characteristics. It can be fatal[9,10] or it can take a very long time to progress, with some patients still alive 20 to 30 years after the onset of the initial symptoms.[5,12] Respiratory failure is the leading cause of death. The condition can appear at any age, from infancy[5] to the third decade,[13] but it tends to manifest more frequently in the first and second decades.[14] Our patient, however, had a late-onset of symptoms and was 47 years old. The disease can last from 0 (death at presentation) to 45 years.[14]

Nearly all instances begin with sensorineural deafness, which is typically severe and progressive over time. In our case, facial paralysis, slurred speech, and mouth numbness were the most prominent symptoms rather than hearing loss. The patient gradually lost his hearing. Although this is unusual, there have been a few instances where it has been documented in the literature. All of the cases[4,5,10,15,16] eventually developed hearing loss.

BVVL is frequently categorized among the vast array of motor neuron disorders. However, its erratic course and neurophysiological improvement contrast with the prevalent heredodegenerative disease of motor neurons' more stable advance (slow or rapid).[15]

When making a differential diagnosis for BVVL, numerous alternative diseases should always be taken into consideration because they closely resemble BVVL. Another potential diagnosis is amyotrophic lateral sclerosis (ALS). However, sensorineural deafness is not a symptom of ALS, and ALS typically does not present at young ages.[17]

BVVL and the madras motor neuron disease (MMND) are also closely connected medical conditions. Sensorineural deafness, multiple cranial nerve palsies mainly affecting cranial nerves VII, IX, and XII, and muscular atrophy and weakness are all symptoms of MMND. The cranial nerves III and VI have not been observed in MMND. Compared to 50% of BVVL cases, only 15% of MMND patients are familial.[16]

Neurophysiological studies have shown alterations of chronic[1,2,12,15,18-20] or active[1,13,17,21] denervation in muscles, but normal conduction velocities of the motor nerves. In our case, motor nerve conduction investigations were normal, but EMG showed persistent neurogenic alterations in the tongue, arm, and hand muscles along with active denervation.

A specific treatment for BVVL does not exist. In a few instances, steroids and immunoglobulins have been used. Two patients experienced brief stabilization. In the first, steroid treatment temporarily stabilized the situation for at least eight months.[1] Another patient who had IVIG had their illness stabilized for a year.[20] Two further patients who received IVIG did not, however, make any progress.[18] In our situation, steroids stabilized the patient's condition, while IVIG had no effect on the disease. The cornerstones of BVVL management are symptomatic and supportive care. However, the efficacy of the interventions can still be considered anecdotal when treating an uncommon ailment such as BVVL, since it is impossible to conduct randomized controlled trials with the insufficient number of patients available. Regardless, it is possible to generalize for BVVL from the experience of utilizing these treatments in other disorders which are similar, particularly ALS. For instance, in ALS, maintenance of nutrition and assisted ventilation have been shown to increase survival.[17]

It is critical that as BVVL instances are identified, these cases continue to be documented in the literature so that we can better understand this uncommon progressive neurological condition. Due to its rarity and similarities to other neurological illnesses, BVVLS is thought to be underdiagnosed and frequently misdiagnosed. We probably still do not fully understand the clinical range of BVVL. If more cases are reported in the literature, this will make it possible to give affected people and their families a better understanding of the clinical course, prognosis, and treatment of this crippling ailment. In order to contribute to the understanding of this disease, we described the clinical and neurophysiological characteristics of a patient with late-onset sporadic BVVLS in this case report. This is the first instance of BVVLS from Northern Cyprus to be reported.

MAIN POINTS

- The prevalence of BVVLS is estimated to be less than 1 in 1,000,000.
- Due to its rarity and similarities to other neurological illnesses, BVVLS is thought to be underdiagnosed and frequently misdiagnosed.
- The cornerstones of BVVL management are symptomatic and supportive care.
- This is the first instance of BVVLS from North Cyprus to be reported.

ETHICS

Informed Consent: It was obtained.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: F.S., M.E., Concept: F.S., M.E., Design: F.S., M.E., Data Collection and/or Processing: F.S., M.E., Analysis and/or Interpretation: F.S., M.E., Literature Search: F.S., M.E., Writing: F.S., M.E.

DISCLOSURES

Conflict of Interest: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Gallai V, Hockaday JM, Hughes JT, Lane DJ, Oppenheimer DR, Rushworth G. Ponto-bulbar palsy with deafness (Brown-Vialetto-Van Laere syndrome). J Neurol Sci. 1981; 50(2): 259-75.
2. Hawkins SA, Nevin NC, Harding AE. Pontobulbar palsy and neurosensory deafness (Brown-Vialetto-Van Laere syndrome) with possible autosomal dominant inheritance. J Med Genet. 1990; 27(3): 176-9.
3. Koul R, Jain R, Chacko A, Alfutaisi A, Hashim J, Chacko J. Pontobulbar palsy and neurosensory deafness (Brown-Vialetto-van Laere syndrome) with hyperintense brainstem nuclei on magnetic resonance imaging: new finding in three siblings. J Child Neurol. 2006; 21(6): 523-5.
4. Sathasivam S, O'Sullivan S, Nicolson A, Tilley PJ, Shaw PJ. Brown-Vialetto-Van Laere syndrome: case report and literature review. Amyotroph Lateral Scler Other Motor Neuron Disord. 2000; 1(4): 277-81.
5. Voudris KA, Skardoutsou A, Vagiakou EA. Infantile progressive bulbar palsy with deafness. Brain Dev. 2002; 24(7): 732-5.
6. Brown CH. Infantile amyotrophic lateral sclerosis of the family type. J Nerv Ment Dis 1894; 19(11): 707-16.
7. Vialetto E. Contributo alla forma ereditaria della paralisi bulbare progressiva. Riv Sper Freniatr. 1936; 40: 1-24.
8. Van Laere J. Paralysie bulbo-pontine chronique progressive familiale avec surdité. Un cas de syndrome de Klippel-Trenaunay dans la même fratrie. Problèmes diagnostiques et génétiques [Familial progressive chronic bulbo-pontine paralysis with deafness. A case of Klippel-Trenaunay syndrome in siblings of the same family. Diagnostic and genetic problems]. Rev Neurol (Paris). 1966; 115(2): 289-95.
9. Mégarbané A, Desguerres I, Rizkallah E, Delague V, Nabbout R, Barois A, et al. Brown-Vialetto-Van Laere syndrome in a large inbred Lebanese family: confirmation of autosomal recessive inheritance? Am J Med Genet. 2000; 92(2): 117-21.
10. Dipti S, Childs AM, Livingston JH, Aggarwal AK, Miller M, Williams C, et al. Brown-Vialetto-Van Laere syndrome; variability in age at onset and disease progression highlighting the phenotypic overlap with Fazio-Londe disease. Brain Dev. 2005; 27(6): 443-6.
11. Descatha A, Goddet S, Aboab J, Allary J, Gergereau A, Baer M, et al. Cardiac arrest in a patient with Brown-Vialetto-Van Laere syndrome. Amyotroph Lateral Scler. 2006; 7(3): 187-8.
12. Alberca R, Montero C, Ibañez A, Segura DI, Miranda-Nieves G. Progressive bulbar paralysis associated with neural deafness. A nosological entity. Arch Neurol. 1980; 37(4): 214-6.
13. Piccolo G, Marchioni E, Maurelli M, Simonetti F, Bizzetti F, Savoldi F. Recovery from respiratory muscle failure in a sporadic case of Brown-Vialetto-Van Laere syndrome with unusually late onset. J Neurol. 1992; 239(6): 355-6.
14. Nafissi S, Yadegari S, Salimipour H. Review of Brown-Vialetto-Van Laere syndrome and differential diagnosis (In Persian). Tebbe Jonub. 2011; 14: 193-8.
15. Abarbanel JM, Ashby P, Marquez-Julio A, Chapman KR. Bulbo-pontine paralysis with deafness: the Vialetto-Van Laere syndrome. Can J Neurol Sci. 1991; 18(3): 349-51.
16. Summers BA, Swash M, Schwartz MS, Ingram DA. Juvenile-onset bulbospinal muscular atrophy with deafness: Vialetta-van Laere syndrome or Madras-type motor neuron disease? J Neurol. 1987; 234(6): 440-2.
17. McDermott CJ, Shaw PJ. Diagnosis and management of motor neurone disease. BMJ. 2008; 336(7645): 658-62.
18. Davenport RJ, Mumford CJ. The Brown-Vialetto-van Laere syndrome: a case report and literature review. Eur J Neurol. 1994; 1(1): 51-4.
19. Francis DA, Ponsford JR, Wiles CM, Thomas PK, Duchen LW. Brown-Vialetto-Van Laere syndrome. Neuropathol Appl Neurobiol. 1993; 19(1): 91-4.
20. Sztajzel R, Kohler A, Reichart M, Djientcheu VP, Chofflon M, Magistris MR. Syndrome de Brown-Vialetto-Van Laere. Un cas avec anticorps anti-ganglioside GM1 et revue de la littérature [Brown-Vialetto-Van Laere syndrome: a case with anti-ganglioside GM1 antibodies and literature review]. Rev Neurol (Paris). 1998; 154(1): 51-4.
21. Rosemberg S, Lancellotti CL, Arita F, Campos C, de Castro NP Jr. Progressive bulbar paralysis of childhood (Fazio-Londe disease) with deafness. Case report with clinicopathologic correlation. Eur Neurol. 1982; 21(2): 84-9.

CASE REPORT

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2020.1899
Cyprus J Med Sci 2023;8(6):453-456

Endodontic Treatment of Premolar Teeth with Different Root Canal Anatomy: Two Case Reports and Literature Review

Feridun Saklar, Ayşenur Öncü, Sevinç Sevgi, Berkan Çelikten

Department of Endodontics, Ankara University Faculty of Dentistry, Ankara, Türkiye

Abstract

Thorough knowledge of the anatomy and morphology of the root canal system is necessary for successful endodontic treatment. Lack of information about anatomic variations and their properties in different teeth has been shown as being one of the main causes of endodontic treatment failure. Therefore, in our study, we reported on cases using cone-beam computed tomography for the diagnosis of teeth with different root canal structures and operation microscopes in order to enhance effective treatment.

Keywords: Cone-beam computed tomography, dental operating microscope, root canal anatomy

INTRODUCTION

Successful root canal treatment requires a thorough knowledge of both the internal and external anatomy of a tooth. Therefore, the aim of root canal treatment is the shaping and cleaning of pulp spaces and its complete filling with an inert filling material.[1] If a proper root canal shaping procedure is not performed, the treatment prognosis will be poor. Endodontic treatment failure is usually characterized by the presence of post-treatment apical periodontitis, which may be persistent, emergent or recurrent. Major causes of post-treatment disease failure are the inability to locate and debride all canals in the root canal system or the improper obturation of root canals.[2] The success of endodontic therapy depends on the through elimination of the infected pulp tissue and microorganisms, and the complete three-dimensional sealing of the root canal space.[3] Results of retrospective studies have shown that root canals do not only consist of a conical shaped single canal and a single apical foramen, but also multiple teeth openings and apical endings, lateral canals, deltas, accessory canals and other variations. Vertucci examined these types of variations in a root canal anatomy classification in 2005.[4]

The endodontic treatment of teeth showing anatomical variations is more complex than teeth presenting with well-known anatomy. At the same time, this complexity can be overcome by appropriately preparing the endodontic access gap, which allows radiographs to be carefully examined and fully understood before the treatment procedure is performed. However, two-dimensional radiography is inadequate for the diagnosis of extra root canals or root morphology.[5] For these reasons, different imaging techniques and equipment to be used during treatment have been developed recently. Some of these are cone-beam computed tomography (CBCT), micro computed tomography, and the dental operating microscope. CBCT has been increasingly used for dentistry because of its higher correctness compared to two-dimensional radiographs when evaluating the possible presence of pathologies or different types of anatomical variations in teeth. CBCT is a non-invasive and three-dimensional technique which produces images which allow for the measurement and analysis of teeth and other maxillofacial tissues without detriment to samples, which may be considered an advantage over techniques such as histology and scanning electron microscopy.[6] In this way, it has clinical benefits by improving the quality in endodontic treatment. The primary example of this was the addition of the surgical microscope to the endodontic treatment procedure, which is considered to be a useful aid in improving clinicians' ability to detect root canals, especially in teeth with accessory roots.[7]

To cite this article: Saklar F, Öncü A, Sevgi S, Çelikten B. Endodontic Treatment of Premolar Teeth with Different Root Canal Anatomy: Two Case Reports and Literature Review. Cyprus J Med Sci 2023;8(6):453-456

ORCID IDs of the authors: F.S. 0000-0001-5339-9068; A.Ö. 0000-0002-3130-0669; S.S. 0000-0002-2123-8566; B.Ç. 0000-0001-5645-5029.

Address for Correspondence: Ayşenur Öncü
E-mail: dtaysenuroncu@gmail.com
ORCID ID: orcid.org/0000-0002-3130-0669

Received: 20.03.2020
Accepted: 21.07.2020

CASE PRESENTATIONS

Case 1

A 23-year-old male patient presented to the faculty of dentistry department of endodontics with severe pain in the upper right area. It was discovered that there was no systemic disorder in the anamnesis taken from the patient and there was a long-term, throbbing pain complaint which had started spontaneously in the right second premolar tooth of the maxilla. As a result of the clinical examination, the patient was observed to have deep caries on the distal surface of the tooth. In the percussion and palpation test, it was determined that there was no pain or mobility in the tooth. In the electric pulp test, it was noted that the relevant tooth responded earlier and was more vital than the symmetrical tooth. Sinus tract and swelling were not observed in the soft tissues. Radiological examination revealed no periapical pathology in the roots of the tooth and lamina dura (Figure 1). The patient was diagnosed with pulpitis and root canal treatment was planned. The patient was informed about all procedures and an informed consent form was signed.

The tooth was anesthetized with infiltrative nerve block by using ultracaine DS Fort (4% articaine with epinephrine 1/100,000, Hoechst Marion Roussel, Frankfurt, Germany). After preparing an access cavity to the relevant tooth, a rubber-dam was placed for isolation. The pulpal floor was carefully examined with a magnification loupe (2.5x), and three canals were identified. After careful examination, another root canal was found in the buccal root. Accordingly, the pulpal floor revealed in total four canal orifices; three root canals in the buccal roots and one root canal in the palatal root (Figure 2). After all these processes, the root canal lengths were determined using an apex locator with type #15 K file (Dentsply Maillefer, Ballaigues, Sweden). Following working length determination, cleaning and shaping procedures were performed using the ProTaper Universal rotary system (Dentsply-Maillefer, Ballaigues, Switzerland) using the step-down technique to size #F1 in the buccal canals and size #F2 in the palatal canal. Copious irrigation was carried out with 5% NaOCl during instrumentation. After the instrumentation process, the last irrigation was performed with 17% EDTA saline and 5% NaOCl. The root canals were dried with absorbent points, and congruous Protaper Gutta-percha points were placed. Radiologically, the Gutta-percha points were checked and then the root canals were obturated using a resin-based sealer (Dia-Proseal, Diadent) (Figure 3) and the relevant tooth was restored with composite. At the postoperative follow-up of the patient 3 months later, no symptoms were observed.

Case 2

A 21-year-old male patient presented to the faculty of dentistry department of endodontics with severe pain in the posterior mandibular area. The patient had no systemic disease. In the clinical and radiological examination, deep caries was detected in the mandibular right second premolar tooth. In the percussion and palpation test, it was determined that there was no pain or mobility in the tooth. Positive response was

Figure 1. Case 1 preoperative radiographic figure.

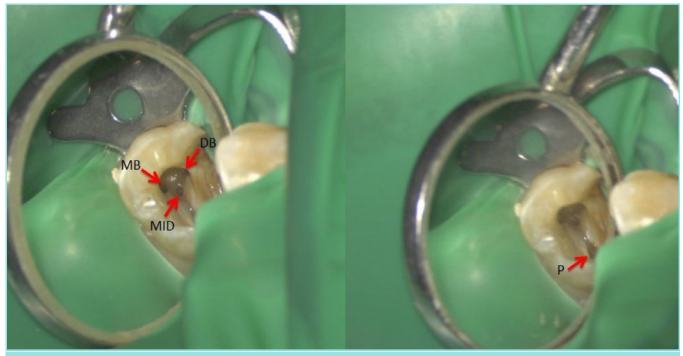


Figure 2. Case 1 intraoral figure.

MB: Mesiobuccal canal, DB: Distobuccal canal, MID: Mid canal, P: Palatine canal

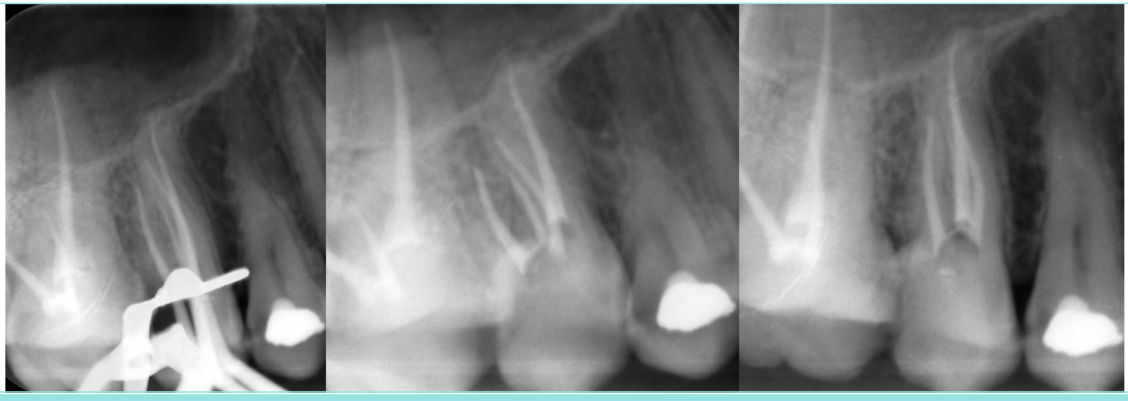


Figure 3. Case 1 intraoperative and postoperative figure.

received in the vitality test (cold test). A diagnosis of irreversible pulpitis was made and root canal treatment was planned. A striking point was observed on the radiography, namely that it was thought that the root canal was divided into several canals in the middle third area of the root. The patient was informed about all procedures and an informed consent form was signed.

Local anesthesia of the patient's right inferior alveolar nerve block was applied with ultracaine DS fort (4% articaine with epinephrine 1/100,000, Hoechst Marion Roussel, Frankfurt, Germany). The caries on the distal surface of the tooth was cleaned and the endodontic access cavity preparation was performed. After pulpal extirpation, the patient was recommended for CBCT imaging for evaluation of the root canal morphology. The patient was recalled for a second appointment. According to a review of the CBCT results, it was found that the root canal was divided into 4 different canals starting from the middle third of the root (Figure 4). The tooth was isolated with a rubber-dam (Figure 5). Access to the root canals was achieved with K files #8 and #10. When the files were positioned, radiographs were taken for evaluation. The root canal working lengths were determined using an apex locator with a type #10 K file (Dentsply Maillefer, Ballaigues, Sweden). The root canals were instrumented to size F1 using ProTaper Universal nickel titanium rotary instruments (Dentsply Maillefer, Ballaigues, Switzerland). The root canals were irrigated with 5% NaOCl during instrumentations. After the canals were dried with paper points, the root canals were filled using the lateral condensation technique with resin-based sealer/Gutta-percha points (Dia-Proseal, Diadent) and the root canal treatment was completed (Figure 6). As a result of the postoperative follow-up of the patient after 3 months, no symptoms were observed.

DISCUSSION

Extensive knowledge of the root canal configuration and variety is essential for the long-term success of endodontic therapy. Hoen and Pink[8] reported that the incidence of cases requiring retreatment due to overlooked roots or canals is 42%. Endodontic success in teeth with a number and morphology of canals that are unusual found requires a correct diagnosis and careful clinical radiographic inspection. Before starting treatment, the tooth should be evaluated due to the possibility of having different morphological variations. Periapical radiographs should be evaluated carefully as they can provide information about morphological variations in teeth. Accurate evaluation of pre-operative radiographs is essential to detect extra roots/canals.[9] However, as in our study, periapical radiography may be inadequate. Therefore CBCT should be used in those patients with different tooth morphology.

To date, single, double, and three rooted maxillary second premolars have been identified, with the number of canals ranging from one to three according to different grades of classifications. On the other hand, four canal maxillary second premolars reports are very rare. Leonardo et al.[10] reported that the inability to detect, locate, negotiate and instrument the canals in multi-rooted teeth plays a significant part in the failure to execute any of the above-said factors and will lead to endodontic failure.[11] Considering these, in our study, three different roots and four different root canals were detected in the first right upper second premolar tooth.

The mandibular second premolar is one of the most difficult teeth for endodontic treatment because of the multiple variations in the

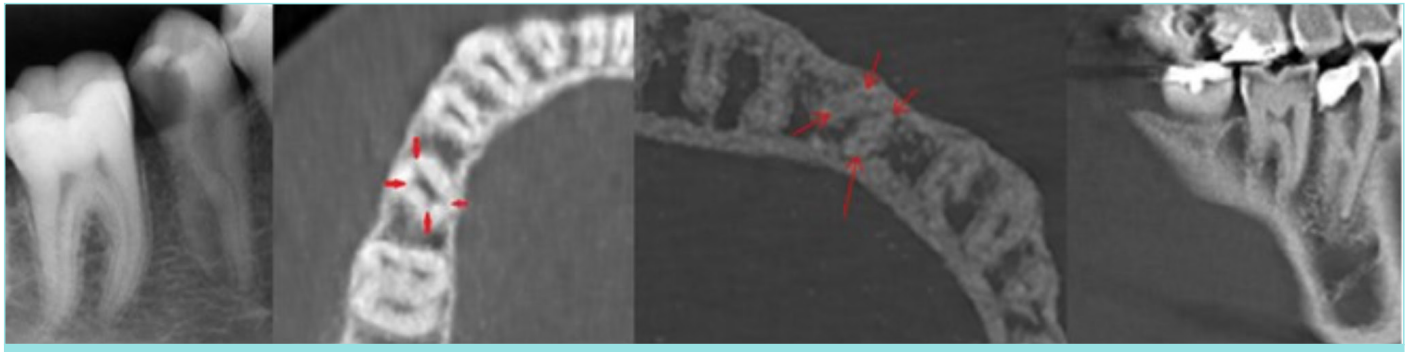


Figure 4. Case 2 preoperative and cone-beam computed tomography figure.

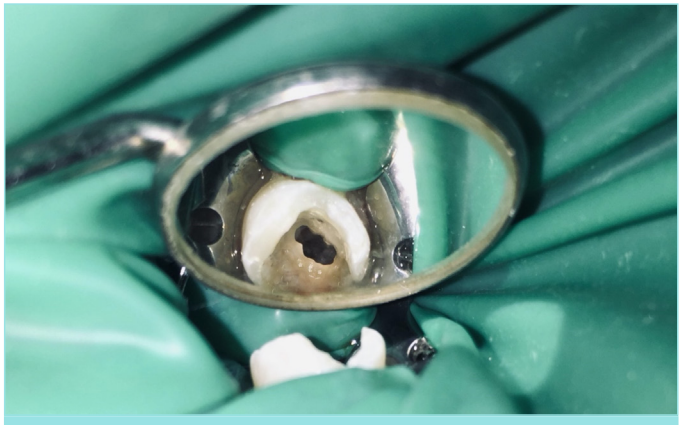


Figure 5. Case 2 intraoral figure.

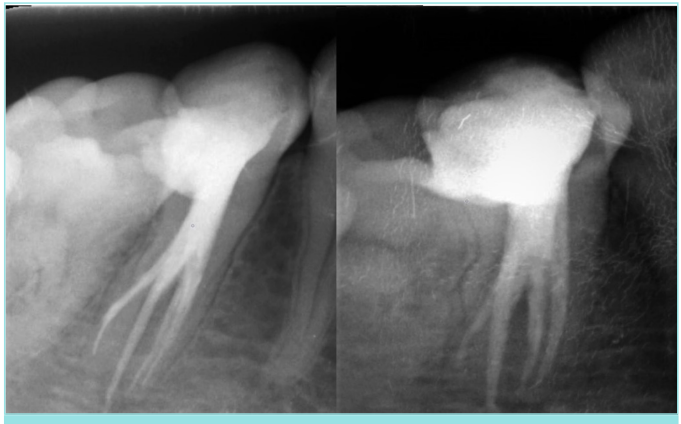


Figure 6. Case 2 postoperative figure.

morphology of its root canal system. Rahimi et al.[12] stated that the incidence of lateral canal (38.7%) and apical delta (4.38%) in mandibular premolars was high. However, the frequency of 3 or 4 canals in lower premolar teeth is rare. In our study, it was found that in case 2, there were two roots and four canals in the right lower 2nd premolar tooth separated in the middle third. CBCT was used in order to understand this anatomical confusion.

Llena et al.[13] reported that mandibular second premolar canal configurations according to the Vertucci criteria are 90.6% type 1, 1.8% type 2, 7.5% type 5, and 0.0% type 6. As a result, most teeth were reported to be type 1 followed by type 5. One first premolar tooth showed a root canal configuration which was not included in Vertucci's classification (one canal in the coronal third of the root, three canals in the middle third, and a single canal in the apical third). In that study, the other reported result was that morphological variation was significantly higher in the first molars than in the second molars.[13]

New technological tools, such as dental study microscopy, greatly enhance the viewing area of root canal holes, allowing the work area to be enlarged and illuminated to a greater extent. Considering these advantages, de Carvalho and Zuolo[14] explained the importance of microscopes, which can significantly improve the prognosis of treatment.[15] In order for the root canal treatment to be successful, a dental microscope was used for the detection of extra canals and the appropriate chemomechanical preparation.

Knowledge of the relevant tooth's root canal anatomy and its variations from the normal is important for the success of root canal treatment. A detailed interpretation of radiographs coupled with accessibility and inspection of the pulpal floor under magnification can play an important role in the root canal treatment of complex root canal anatomy in endodontics.

MAIN POINTS

- Knowledge and understanding of the complexity in root canal anatomy is an important factor for the success of endodontic treatment.
- Today, the effect of magnification on endodontic treatment procedures is an indisputable fact. Therefore, it is advantageous to use dental operation microscopes in the clinic.
- Endodontic diagnosis using cone-beam computed tomography provides 3D imaging which provides a better understanding of complex situations.

ETHICS

Informed Consent: Written informed consent was obtained from the patients who participated in this study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: A.Ö., S.S., Design: A.Ö., S.S., Supervision: F.S., B.Ç., Data Collection and/or Processing: A.Ö., S.S., Analysis and/or Interpretation: F.S., A.Ö., S.S., B.Ç., Literature Search: A.Ö., S.S., Writing: F.S., A.Ö., S.S., B.Ç.

DISCLOSURES

Conflict of Interest: The authors have no conflicts of interest to declare.

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

REFERENCES

1. Somma F, Leoni D, Plotino G, Grande NM, Plasschaert A. Root canal morphology of the mesiobuccal root of maxillary first molars: a micro-computed tomographic analysis. Int Endod J. 2009; 42(2): 165-74.
2. Vertucci FJ, Gegauff A. Root canal morphology of the maxillary first premolar. J Am Dent Assoc. 1979; 99(2): 194-8.
3. Subramaniam Ramachandran V, Shankari V, Rathakrishnan M, Chandrasegaran V, Kumaraguru K. Management of Three Rooted Mandibular First Molar with Six Canals: A Case Report. Cureus. 2019; 11(12): e6280.
4. Vertucci FJ. Root canal morphology and its relationship to endodontic procedures. Endod Top. 2005; 10: 3-29.
5. Buchanan GD, Gamieldien MY, Tredoux S, Vally ZI. Root and canal configurations of maxillary premolars in a South African subpopulation using cone beam computed tomography and two classification systems. J Oral Sci. 2020; 62(1): 93-7.
6. Nejaim Y, Gomes AF, Rosado LPL, Freitas DQ, Martins JNR, da Silva EJNL. C-shaped canals in mandibular molars of a Brazilian subpopulation: prevalence and root canal configuration using cone-beam computed tomography. Clin Oral Investig. 2020; 24(9): 3299-305.
7. Karapinar-Kazandag M, Basrani BR, Friedman S. The operating microscope enhances detection and negotiation of accessory mesial canals in mandibular molars. J Endod. 2010; 36(8): 1289-94.
8. Hoen MM, Pink FE. Contemporary endodontic retreatments: an analysis based on clinical treatment findings. J Endod. 2002; 28(12): 834-6.
9. Javidi M, Zarei M, Vatanpour M. Endodontic treatment of a radiculous maxillary premolar: a case report. J Oral Sci. 2008; 50(1): 99-102.
10. Leonardo MR, Leal JM, Simoes Filho AP. Tratamento dos canais radiculares. Orienta cáo atual [Root canal therapy. Current status]. Rev Fac Farm Odontol Araraquara. 1971; 5(1): 93-102.
11. Sieraski SM, Taylor GN, Kohn RA. Identification and endodontic management of three-canalled maxillary premolars. J Endod. 1989; 15(1): 29-32.
12. Rahimi S, Shahi S, Yavari HR, Reyhani MF, Ebrahimi ME, Rajabi E. A stereomicroscopy study of root apices of human maxillary central incisors and mandibular second premolars in an Iranian population. J Oral Sci. 2009; 51(3): 411-5.
13. Llena C, Fernandez J, Ortolani PS, Forner L. Cone-beam computed tomography analysis of root and canal morphology of mandibular premolars in a Spanish population. Imaging Sci Dent. 2014; 44(3): 221-7.
14. de Carvalho MC, Zuolo ML. Orifice locating with a microscope. J Endod. 2000; 26(9): 532-4.
15. Nagmode PS, Patel AV, Satpute AB, Gupta PL. Endodontic management of mandibular first molars with mid mesial canal: A case series. J Conserv Dent. 2017; 20(2): 137-40.

2023 Referee Index

Abbas Tokyay
Ahmet Serdar Karaca
Ahmet Yüksek
Ali Taner Anuk
Alper Kılıçaslan
Amber Eker
Anıl Gülcü
Asiye Gül
Aslı Akdöner
Aslıhan Taşkıran
Ayhan Yaman
Ayşe Baha
Ayşe Çırakoğlu
Ayşe Ülgen
Ayşegül Akgül Kocabal
Aysel Kükner
Aysun Ekşioğlu
Aysun Ünal
Barış Akdemir
Barış Polat
Barlas Naim Aytaçoğlu
Beliz Belgen Kaygısız
Berk Güçlü
Buket Ertürk Şengel
Burak Bayraktar
Burak Hünük
Burçin Şanlıdağ
Can Sezer
Candan Özoğul
Cemre Elmas
Cenk Conkbayır
Ceren Melahat Dönmezer
Ceylan Ayada
Ching Yun Chen
Deniz Aydın
Duygu Ayaz
Duygu Ersoy
Ebru Melek Benligül
Ediz Necati
Elif Gülbahçe-Mutlu
Emel Aydan Oral
Emil Mammadov
Emine İlaslan
Emine Koç
Emine Ülkü Akçay
Emine Ünal Evren
Eralp Kubilay
Ergül Mutlu Altundağ
Erol Dülger
Esra Cengiz Yanardağ
Etem Çelik
Eviç Zeynep Başar Akgün
Fatma Perim Türker
Fatma Yıldırım
Fazıl Tuncay Aki
Fezile Özdemir
Fırat Özcan
Gözde İyigün
Güray Koç
Habibe Kafes
Hakan Altay
Hakan Yolaçan
Halil Çetingök
Halil İbrahim Seçer
Hamad Dheir
Hasan Hüseyin Kazan
Hatice Kılıç
Hatice Solmaz
Hicran Bektaş
Hilal Seki
Hülya Sungurtekin
Hüseyin Bakkaloğlu
İlker Etikan
İlknur Bektaş
İpek Özmen
İsa Sincer
Işıl İnan Erdoğan
Itır Ebru Zemheri
Kaan Erler
Kemal Bakır
Kemal Tolga Saraçoğlu
Kerem Teralı
Kerime Derya Beydağ
Lale Dinç Asarcıklı
Mehmet Güray Ünsal
Mehmet İlktaç
Melek Akar
Meltem Nalça Andrieu
Meral Bağkur
Meral Torun Bayram
Mesut Demir
Michael Firmage
Mualla Yılmaz
Müge Aydoğdu
Muhammed Enes Aydın
Mustafa Hoca
Mustafa Işın
Nahit Rızaner
Nazan Kılıç Akça
Necati Gökmen
Nezire İnce
Nida Aydın
Nigar Ünlüsoy Dinçer
Nihat Demirhan Demirkıran
Nilgün Mutlu Aksoy
Nilüfer Galip
Nilüfer Güzoğlu
Nuray Bassullu
Nurdan Uras
Nusret Erdoğan
Onur Balaban
Onur Hapa
Onur Yavuz
Osman Cancuri
Özgül Karayurt
Özgür Demir
Özlem Demirel Bozkurt
Özlem Turhan İyidir
Pınar Gelener
Pınar Korkmaz
Pınar Zeyneloğlu
Rahiye Dilhan Kuru
Rakan Ekram
Rasim Moğulkoç
Reskan Altun
Rüveyde Bundak
Safiye Aktaş
Salih Angın
Şebnem Lezize Türkün
Seda Vatansever
Seher Demirer
Seide Karasel

2023 Referee Index

2023 Author Index

2023 Author Index

2023 Author Index

2023 Subject Index

2023 Subject Index

2023 Subject Index

2023 Subject Index