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Aims and Scope

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 three times a year, in April, August, and December. As of 2020, the journal has become a quarterly publication, publishing in March, June, September, and December. The journal's publication language is English.

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 processes of the journal 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 (doaj.org/bestpractice).

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Processing and publication are free of charge with the journal. No fees are requested from the authors at any point throughout the evaluation and publication process. 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.

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Instruction to Authors

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Editorial And Publication Process
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Originality, high scientific quality, and citation potential are the most important 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, www.wma.net) 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 releases of the patient or their legal representative should be enclosed, and the publication approval must be provided in the Materials and Methods section.

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.

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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.

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

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If the article is published in 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.

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Each person listed as an author should fulfill the authorship criteria recommended by the International Committee of Medical Journal Editors (ICMJE - www.icmje.org). 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 in the title page of the manuscript.

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Declaration Of Interest
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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 - http://www.icmje.org/icmje-recommendations.pdf). 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.cyprusjmedsci.com.

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 email 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 I 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).

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" targeting 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

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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 I 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 I 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.

Clinical trial and data sharing policy of the journal will be valid for the articles submitted from I February 2020.

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

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

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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.

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.

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)"

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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/ncidodIEID/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 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. 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.

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Knowledge and Barriers of Critical Care Nurses Regarding Evidence-Based Practices in Ventilator-Associated Pneumonia Prevention

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BACKGROUND/AIMS
To investigate the knowledge among nurses who work in critical care units on the prevention of ventilator-associated pneumonia (VAP) and their barriers of adherence to preventive measures.

MATERIAL and METHODS
The study was performed using descriptive cross-sectional design in two hospitals in Jordan, which included 185 critical care nurses. The data were collected between June-July 2017. The questionnaire was covered 30 questions related to knowledge of VAP prevention as well as eight statements about barriers of adherence to VAP prevention guidelines. Data were evaluated using descriptive statistics, Kruskal–Wallis test, and Mann–Whitney U tests.

RESULTS
The findings of the present study revealed that nurses' overall mean of knowledge on VAP prevention were adequate level (19.6 ± 3.43 out of 30) with low-level knowledge regarding prevention strategies of VAP. Lack of equipment's (65.9%), forgetting to practice the sterile techniques (54.1%), and lack of time to deliver proper infection control (53.0%) were the main barriers mentioned by Jordanian critical care nurses of VAP prevention. Nurse's with high experience and master degree showed significantly better knowledge of VAP prevention than their other groups.

CONCLUSION
Achieving an adequate knowledge of VAP prevention is an important feature for reinforcing patient care outcomes. The results of this study highlighted to necessity of creating new strategies for improving knowledge of critical care nurses and removing their barriers regarding VAP prevention.

Keywords: Critical care nurses, intensive care unit, ventilator associated pneumonia, ventilator bundle

INTRODUCTION

Ventilator-associated pneumonia (VAP) is the most serious acquired infections in intensive care units (ICUs) for patients undergoing mechanical ventilation.[1] The infection can progress after intubation between 48 or 72 hours. In some cases, it may be related to healthcare providers.[2] VAP is considered the most significant cause of death in ICU.[3,4] Lately, it is estimated that between 9-13% deaths were as a result of ventilator assistance devices.[5] VAP accounts for 25% of all types of ICUs acquired infections.[6] Consequently it leads to prolonged hospitalization and ICUs stay.[7] Moreover, it contributes to increased length of mechanical ventilation, which increases the cost of treatment to approximately $40,000 per patient.[8]

In developing countries, multiple studies indicated a significant increase in VAP incidence. In northern India, the incidence of 40.1 VAP infections/1,000 ventilator days.[9] In Costa Rica, the incidence of 44.3 VAP infections/1,000 ventilator days.[10] In another study, In Iran, is 21.6% or 9.96 per 1,000 days of ventilation.[11] Multiple factors contribute to the increasing rate of VAP such as tracheostomy, reintubation, impaired consciousness, and presence of an endotracheal tube.[12] There is a few accurate information on VAP prevalence in Jordan hospitals, nevertheless a study found a prevalence rate of

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29 cases per 1,000 ventilator-days and a mortality rate of 53% related to VAP.[13] A few studies have been performed among Jordanian critical care nurses to assess their compliance and knowledge of VAP, yet, still not effectively and questionable. For instance, in a two-group post-test design study among critical care nurses, they demonstrated moderate compliance.[14] In pre- and post-intervention study majority of nurses revealed low knowledge level regarding VAP preventative measures, risk factors and pathophysiology.[15] An observational study, after 5 months of observations, revealed more than half of nurses had "insufficient compliance."[16] In another study, Aloush et al., survey was performed for three countries: Jordan, Saudi Arabia, Egypt, the study showed insufficient compliance for both nurses and hospitals.[17] That leads to adverse outcomes, and impact the quality of care.

There were many barriers in Jordan that impede nurses with respect to VAP prevention practices, the most common ones are; lack of equipment, low level of compliance with infection-control standards,[18] lack of time and work load,[15] lack of education, resources, and experience.[17] Hence, it is susceptible to increasing VAP incidence.

In critical care units, VAP prevention is prioritized for intubated patients.[19] Many organizations such as the European Respiratory Society,[1] The Society for Healthcare Epidemiology of America[3] has launched a concept "ventilator bundle" to decrease VAP mortality and enhance prevention, it comprises several clinical practice guidelines. These guidelines combinations such as oropharyngeal hygiene, suction endotracheal secretions,[3] the elevation of the head at 30-45° and facilitating early mobilization.[20] Even though considered as low-costs and nonpharmacological practices as well as efficient for preventing VAP, yet still Jordanian critical care nurses showed insufficient capacity.[21] Substantial evidence shows that the implementation of a VAP prevention bundle is a proven way in respect to providing an efficacious reduction in VAP rates,[22] improving patient safety, and enhancing the quality of care.[23]

Determination the knowledge among critical care nurses related to VAP prevention, and the barriers to the obligation to implement evidence preventives may be useful in improving their awareness, thus leading to better practices and preventing this important problem in Jordan. Thus, this study aims to investigate the knowledge of VAP prevention guidelines and determine the barriers which impede to the obligation of preventive strategies among critical care nurses. In this context, the research questions were:

- What is the knowledge level of critical care nurses on the prevention of VAP?
- What are the barriers which may prevent critical care nurses to adhere to preventive measures of VAP?
- Is there any difference between descriptive characteristics and knowledge of the nurses working in critical care units on the prevention of VAP?

MATERIAL and METHODS

Study Design

The study was designed in a descriptive cross-sectional. It was conducted at two randomly hospitals in the middle and northern region in Jordan. The King Abdullah University Hospital is an affiliated hospital to the largest and leading university of Jordan which is located in the northern part of Jordan. The hospital consists of 15 floors and 683 beds, 12 operating theaters, 78-intensive care beds for adult and child patients. It has care bundles for VAP prevention. The Islamic hospital located in the middle part of Jordan, it has a capacity of 300 beds, eight operating theaters and 25 intensive care beds and hospital protocol for prevention of VAP.

Study Population

The study population was composed of 193 registered nurses who were working at day or night shift in ICU departments of the hospitals. A total of 132 nurses were working in the ICU units in the first hospital and 61 nurses in ICU in second hospital. Nurses work in the ICUs with at least one year experience, willing to participate and hold a bachelor's degree were involved in the study. Nurses who have a diploma degree in nursing and trainees were out of the study.

Study Instrument

A questionnaire which was used as a data collection tool in this study by the researchers was based on recent evidence-based guidelines of VAP prevention.[1,3] The questionnaire composed of three sections. The first section with eight questions included the demographic characteristics of the nurses. The second section had questions regarding the knowledge needed in the prevention of VAP, which had 30 questions with two options; true option was marked 1, false option was 0, questionnaire contains eight items negative statements (items 4, 7, 9, 11, 17, 19, 20, and 23) were recorded to compute a percent correct statements response rate. The last section consisted of eight questions with three response options of "Always/Sometimes/Never" designed to determine the barriers to adherence to VAP prevention measures.

In the current study, Cronbach's α was showed an acceptable range of 0.77. Questionnaire content was assessed for clarity and acceptability by three ICU nurse specialists and necessary revisions were made based on their recommendations. Then, a pilot study was implemented in 10 nurses, since there was not reported any difficulty and obscurity in questionnaire content, these nurses were included in the main sample. Researchers were using the English language for survey content because it is the official language for teaching at all of the nursing faculties in Jordan.

Data Collection

Data were collected in a period from 20 June to July 20, 2017 by using self-completion method filled out the study questionnaire. Before collecting data, researchers sent an official letter from the principal investigator, along with hospital director permission to nurse manager of ICUs in both hospitals to encourage critical care nurses to participate in this study, as well as informing them the results will not affect your annual evaluation. After encouragement and explanation the purpose of the study we distributed the questionnaires depending on the hospital size, each participant received a copy of the informed consent and questionnaire. During data collection, researchers avoided the period's nurses were providing treatment and care to patients, to avoid stressing participants that could affect the proficiency of the data collection process. Duration of questionnaire between 10 to 15 minutes, after completion, researchers collected it immediately to obviate data miss, also we informed

them you can keep it with you and give back to researchers, inside the sealed envelope without using any employee information's to ensure privacy. Ethical approval was secured from the Near East University Institutional Reviews Board (IRB) and permission was obtained from the director of the hospitals. Written informed consent was sought from all participants.

Statistical Analysis

All survey papers were kept in a closed locker in investigator office, as well as data were inserted to the Statistical Package for the Social Sciences, version 22.0 (IBM SPSS Corp.; Armonk, NY, USA) using numeric codes and saved on password computer. Descriptive statistic included frequency and percentages were performed to describe characteristics of the nurses, knowledge prevention and barriers of VAP. The highest score of knowledge prevention was 30 and the lowest 0. Mean knowledge prevention (≥15) were reflected as inadequate knowledge; while score more than (>15) were indicated adequate knowledge. A nonparametric tests Kruskal–Wallis test and Mann–Whitney U test was used to compare knowledge in prevention concerning demographic characteristics. $P < .05$ sets a significance.

RESULTS

Once completed, 185 out of 193 completed the questionnaire with a response rate of 95.9%, eight of them did not fill the questionnaire. The mean age of the participants was the 26-30 age group (55.1%). Females composed the majority of the participants (58.4%). Most of the participants had bachelor's degrees (89.2%). The majority of the nurses had an experience of fewer than 5 years as registered nurses (60.1%).

The majority of the nurses had already received VAP education (71.4%). The participants mentioned educational resources where they had received the related education, with external courses making up 24.9%, the highest rate in this respect. As far as the quality of VAP education was concerned, most of the nurses (86.9%) held the opinion that the education was "Satisfactory." The majority of the nurses mentioned that they wanted to be educated on VAP (79.5%) (Table 1).

Concerning the knowledge of evidence-based guidelines of VAP prevention, they had an adequate overall mean knowledge, with (19.6 ± 3.43). The results of the study showed that the highest correct response rates were delivered in terms of; elevating the head of the bed to 30-45° (89.2%), regular oral care with chlorhexidine (88.7%), followed by adequate hand hygiene (88.6%), continual education for ICU nurses (88.1%), proper sterilization and disinfection of respiratory care equipment (87.6%), VAP is the cause of highest mortality among nosocomial infections (86.5%), and assess readiness of the patient to extubate daily (84.9%) (Table 2).

Table 3 shows the barriers the nurses have to face in respect of adherence to VAP prevention guidelines. Findings revealed that most of the nurses responded in the option of "sometimes" with respect to the barriers nurses face regarding adherence to VAP prevention guideline. The option of "Shortage of staff in the ICU" got most of the answers. In "always" option (51.4%) and "Lack of VAP Prevention Knowledge" (49.7%). As far as the answers in the option of "sometimes" are concerned, it was the items of "Lack of equipment such as gloves and face masks" (65.9%), "Hospital system insufficiencies" (54.1%), and "Lack of time to deliver proper infection control" (53.0%).

TABLE I. Demographic Characteristics of the Nurses (N = 185)

Demographic characteristics	N	%
Age (mean :28.1)		
≤25 years	44	23.8
26-30 years	102	55.1
≥31	39	21.1
Gender		
Male	77	41.6
Female	108	58.4
Education degree		
Bachelor's	165	89.2
Master degree	20	10.8
Working experience in the ICU		
≤5 years	114	61.6
6-10 years	62	33.5
≥11 years	9	4.9
Previous VAP education		
Yes	132	71.4
No	53	28.6
*Education resource (N = 132)**		
Nursing school	20	10.8
External courses	46	24.9
Web resources	17	9.2
In-service education	32	17.3
Other	13	7.0
*Quality of the VAP education (N = 132)**		
Satisfied	114	86.9
Dissatisfied	18	13.1
Need for education on VAP		
Yes	147	79.5
No	38	20.5

*Percentages were calculated based on the number of nurses who had received education previously (N = 132).

Regarding the correlation between nurses' age, years of ICU experience and previous VAP education with knowledge of evidence-based guidelines of VAP prevention revealed no statically significant differences. The study revealed that nurses with ≤25 years old had higher VAP prevention knowledge mean rates (19.7 ± 3.2) than other age groups. The nurses who had ≥11 years of experience showed higher mean rates (20.6 ± 3.6) on VAP prevention knowledge than the groups with 6-10 and ≤5 years. The nurses who had previous VAP education had high mean prevention knowledge (19.8 ± 3.3) than nurses without VAP education (Table 4).

DISCUSSION

The main focus of the present study was to determine knowledge of critical care nurses toward VAP prevention guidelines and the barriers which they face in respect of adherence to preventive measures in critical care units. In the current study, the mean overall knowledge of VAP prevention was adequate, contrary to previous studies which reported mean scores knowledge were relatively low.[24-26] The explanations of higher mean scores might be related to the participant's effective memory since most of them were fresh graduates, which could easily remember what they had learned. Another explanation may be attributed to the revising and correcting which was made to create a new questionnaire on knowledge regarding VAP prevention. In the current study, our participants had highest correct answers about elevating the head of the bed to 30-45°, regular oral care with chlorhexidine, adequate hand

TABLE 2. Nurses' General Knowledge of VAP Prevention (N = 185)

Statements on VAP	T\F	Correct answer N	Correct answer %
The ventilator associated pneumonia (VAP) is pneumonia that occurs > or equal 48 hours after endotracheal intubation	T	151	81.6
VAP is cause of highest mortality rate among nosocomial infections	T	160	86.5
VAP is the most prevalent infection in intensive care units	T	140	75.7
Automated control of endotracheal tube cuff pressure is important because it decreases the risk for VAP	T	102	55.1
Over feeding a ventilated patient is associated with increased the risk for VAP	T	144	77.8
Continuous education to ICU nurses on prevention of nosocomial infection is associated with decreased rates of VAP	T	165	88.1
If possible, intubation should be avoided to prevent VAP	T	135	73.0
Whenever feasible, noninvasive positive pressure ventilation should be used to prevent VAP	T	98	53.0
It is necessary to manage patients without sedation whenever possible to prevent VAP	T	113	61.1
Benzodiazepines should always be preferred to manage agitation	F	107	57.8
Sedation should be interrupted daily to prevent VAP	T	119	64.3
It is necessary to assess readiness to extubate of the patient daily to prevent VAP	T	157	84.9
Pairing spontaneous breathing trials with spontaneous awakening trials is not necessary	F	123	66.5
Minimizing pooling of secretions above the endotracheal tube cuff is necessary to prevent VAP	T	128	69.2
Changing the ventilator circuit regularly is necessary to prevent VAP	F	47	25.4
Elevating the head of the bed to 30-45 is important in prevention of VAP	T	165	89.2
Early exercise and mobilization may increase the possibility of VAP	F	88	47.6
Regular oral care with chlorhexidine is necessary to prevent VAP	T	165	88.7
Proper sterilization and disinfection of respiratory care equipment is important to prevent VAP	T	162	87.6
Oral route is recommended for endotracheal intubation to prevent VAP	T	118	63.8
Prophylactic probiotics may be useful to prevent VAP	T	134	72.4
Ultrathin polyurethane endotracheal tube cuffs may lower VAP rates	T	68	36.8
Saline instillation before tracheal suctioning may cause to VAP	F	70	37.8
Mechanical tooth brushing may be useful in prevention of VAP	T	109	58.9
Closed/in-line endotracheal suctioning reduce the risk of VAP	F	48	25.9
Kinetic beds reduce the risk of VAP and recommended	F	63	34.1
Adequate hand hygiene between patients and change gloves is important to prevent the VAP	T	164	88.6
Prone positioning intermittently may prevent VAP and recommended	F	105	56.8
Using selective oral or digestive decontamination to reduce risk VAP	T	129	69.7
Care bundles may be useful in reducing VAP	T	149	80.5

T, true; F, false.

TABLE 3. Barriers of Nurses to Adherence to VAP Prevention Guidelines (N = 185)

Statements about barriers	Always N	Always %	Sometimes N	Sometimes %	Never N	Never %
Lack of VAP prevention knowledge	92	49.7	76	41.1	17	9.2
Lack of educational programs on VAP such as in-service education or courses	89	48.1	82	44.3	14	7.6
Shortage of staff in the ICU	95	51.4	70	37.8	20	10.8
Lack of equipment such as gloves and face masks	40	21.6	122	65.9	23	12.4
Lack of written VAP protocol at the hospital	72	38.9	89	48.1	24	13.0
Hospital system insufficiencies	76	41.1	90	48.6	19	10.3
Lack of time to deliver proper infection control	66	35.7	98	53.0	21	11.4
Forgetting to practice the sterile technique	68	36.8	100	54.1	17	9.2

hygiene, continual education for ICU nurses proper sterilization and disinfection of equipment, assessing the readiness of the patient for intubation and importance of care bundles. There is evidence in the relevant literature about these preventive measures. A study found that head-of-bed elevation to 30-45° significantly decreases the prevalence of VAP.[27] A recent study shows that Jordanian nurses were using, more than Saudi Arabia and Egypt nurses, chlorhexidine solution.[17] Another study held among Jordanian nurses that showed around two-third of them wash their hands before and after performing patient care.[18] It also revealed significant improvement among nurses after VAP training.[23] A review study concluded the asepsis is the main mode of mechanical ventilation pneumonia prevention.[28] A study found a substantial decreasing of incidence and risk of VAP after implementation of the ventilator care bundle.[29]

Although the high level of correct answers in respect of several strategies, results revealed the participants had a low level of correct knowledge regarding interventions which are considered as high and moderate interventions like; noninvasive positive pressure ventilation, minimizing pooling of secretions above the endotracheal tube cuff, oral route, noninvasive positive pressure, selective oral or digestive decontamination, and patients without sedation with studies.[15,30,31] These findings are attributed to several reasons; shortage of staff and resources,[15]

TABLE 4. Relationship between Knowledge of VAP Prevention and Demographic Characteristics of the Nurses

Demographic characteristics	VAP knowledge prevention mean		SD
Age			
≤25 years	19.3		3.4
26-30 years	19.7		3.2
≥31 years	19.4		4.0
P		.744	
ICU experience			
≤5 years	19.5		3.4
6-10 years	20.4		3.2
≥11 years	20.6		3.6
P		.249	
Education degree			
Bachelor's	19.4		3.3
Master degree	20.6		3.8
P		.161	
Previous VAP education			
Yes	19.8		3.3
No	19.0		3.5
P		.160	

lack of administration of antibiotics[13] lack of unit policies,[32] and nurse–patient ratio.[16]

Regarding the items which were coded as negative statements, although it is considered as high and moderate interventions; except that participants reported a low level of knowledge, which indicated that comprehensive training is needed under supervision in-service education units. In the current study, around half of the nurses thought benzodiazepines should be always preferred to manage agitation, although the recommended is other agents.[33] In this study, findings were consistent with study[34] nurse's beliefs that changing of ventilator circuit should be regular, while the change is only recommended if there is clear soiling or malfunctioning. In early exercise and mobilization, nearly half of nurses reported it to contribute to increasing the possibility of VAP, whilst the early exercise reduces prolonged hospitalization.[34] In this study, findings are comparable with other studies in which nurses contrary believed the closed/in-line endotracheal suctioning is recommended, whilst the recommended is closed-suction system.[30,31,34] Majority of nurses reveals that kinetic beds and prone positioning may reduce the risk of VAP, while both of them generally are not recommended.[3] This reveals that closed-suction system and ventilator circuit were changed continually during daily practice, which is congruous with another study.[24] That may be attributed to nonupdate VAP guidelines and absence or few qualified ICU nurses with a specific degree of VAP prevention, another reason it may be associated with VAP education resource, more than one third of our participants said that they had received an external course and less frequently in in-service training and nursing school, that corroborate with studies conducted among Jordanian ICU nurses that found a majority of nurses gained their knowledge not directly from nursing schools and in in-service training.[15,16]

Concerning the barriers of the nurses on adherence to VAP prevention guidelines, most of them selected the option of "sometimes" in this respect. The items that attracted the answers in the option of "sometimes" were regarding lack of equipment such as gloves and face masks, forgetting to practice the sterile technique and lack of time, which was congruous with regional study among Jordanian critical care nurses, also indicate the limited of infection control equipment's is unsafe practice in Jordan hospitals and forms a significant challenge.[18] On the other hand, the items of "Shortage of staff in the ICU," "lack of VAP knowledge," and "lack of educational programs" attracted the majority of the answers in the option of "always." These results were in agreement with several studies; in one study, the author indicates the small number of staff in the ICU, and it constitutes the main barrier.[35] Another Jordanian critical care nurse who works with equal nurses: patient ratio reflects better VAP compliance than others.[16] However, the adequate number of nurses in ICUs may reduce the VAP rate and ICU length stay. Lack of VAP knowledge, and educational programs presented main barriers among Jordanian critical care nurses.[15,17] Sufficient nurses' knowledge contribute to provide perfect patient care, create a trust to apply optimal decisions and enhance ventilated patients outcomes.[24]

In the current study, we observed the expert's nurses and the master degree revealed an adequate knowledge, when nurses' degree level and experience increased, their level and experience of knowledge as well increased, which is congruence with studies.[26,31] Availability of an expert ICU qualification contributes a significantly better for VAP prevention.

On the other hand, nurses who received previous VAP education showed adequate knowledge than their colleagues who did not receive, these findings were supported by studies that revealed that continuous education and training enhanced both knowledge and compliance related to VAP preventive measures and significant practical improvement were seen after education sessions.[24] Continuing education programs are necessary to improve nurses' knowledge of VAP prevention, and nursing administrators and hospitals should be utilizing a systemic strategic and educational plan of VAP prevention.

There were some limitations. First, no sample selection method was used. Second, we have been unable to find out the impact of work climate of VAP knowledge prevention among critical care nurses; third, the study was conducted only at two hospitals and it can be difficult to generalize and apply it to other nursing populations.

In conclusion, the basic knowledge of VAP among nurses was adequate level. The study findings reflect that nurses gained this knowledge from daily routine and their schools, which is considered fundamental nursing skills. However, participants needed education on VAP to improve nursing skills and enhance patient's outcomes.

Policymakers and hospitals administrators should pay attention to implement and update VAP prevention guidelines, which would be useful for improving the quality of nursing care and increasing awareness of the nurses to make the right decisions. In additional, deans of nursing faculties should revise the undergraduate nursing curriculum in Jordan and incorporate acute care initiatives.

The results yielded showed main barriers nurses mentioned, these barriers may inhibit both the development and motivation of the personnel and increase the incidence of VAP

complications, both national and institutional regulations are necessary to prevent barriers of VAP prevention.

Ethics Committee Approval: Ethical committee approval was received from the Near East University Institutional Reviews Board (IRB) (Reference number: 2017\47-420).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed. Written informed consent was sought from all participants.

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Assessment of the Healthy Lifestyle Behaviors and Associated Factors among First-Year Medical Students in Northern Cyprus

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BACKGROUND/AIMS
Health professionals play crucial roles in promoting healthy lifestyles to reduce the burden of noncommunicable diseases worldwide. The aim of the study was to assess the healthy lifestyle behaviors of the first-year medical students in Northern Cyprus and explore the related factors that influence their behaviors.

MATERIAL and METHODS
This was a cross-sectional study using a self-administrated questionnaire to collect information from 345 first-year medical students with a response rate of 88%. A composite healthy lifestyle index was constructed as an outcome measurement of healthy lifestyles based on the eight lifestyle factors, namely, sleeping hours, diet, physical activity, body-mass index, sun protection, using a seatbelt, smoking, and alcohol intake.

RESULTS
Of all, 49.3% of the students were female and the mean age of the participants was 18.9 ± 1.28 years. About 59% of the students had unhealthy lifestyles, with high prevalence in all subfactors: smoking (47.5%), inadequate diet (49.4%), physical inactivity (45.8%), insufficient sleep (29.4%), no sunlight protection (77.4%), no seat belt while driving (42%), alcohol intake (38.2%), and abnormal body-mass index (31.2%). The boys were significantly more prone to risky behaviors than girls. Having negative perceptions of own health (OR = 2.2; confidence interval [CI]: 1.26-3.86) and body image (OR = 1.9; CI: 1.22-3.22) were positively associated with having unhealthy lifestyles.

CONCLUSION
Unhealthy behaviors were prevalent among the first-year medical students, and males were at higher risks. These findings highlighted the needs to develop gender-specific healthy lifestyle counseling programs into the first-year medical curriculum, integrated with sexual education and family planning components.

Keywords: Healthy lifestyles, risk factors, medical students, Northern Cyprus

INTRODUCTION

Noncommunicable diseases (NCDs), such as cardiovascular diseases, diabetes, cancers, mental disorders, and respiratory diseases, have become the leading causes of deaths globally. NCDs were responsible for 38 million deaths in 2012, and it was projected to increase to 52 million by 2030.[1,2] The leading behavioral health risks that underlie these deaths are high blood pressure (responsible for 13% of global deaths), tobacco use (9%), insufficient physical activity (6%), overweight and obesity (5%), alcohol use (5.9%), unsafe sex (5%), insufficient sleep, and traffic-related accidents.[1,3-6] It was estimated that promoting and adopting a healthy lifestyle among people and reducing all these risks would reduce the deaths and disability-adjusted life years lost by three-quarters and could increase the global life expectancy by almost 10 years.[3,5,7-9]

According to the World Health Organization (WHO), a healthy lifestyle is a way of living to lower the risk of being seriously ill and prolong life expectancy with an improved quality of life (QoL).[10] Health professionals can play a key role in advising and educating patients about the benefits of healthy lifestyle behaviors to prevent major lifestyle diseases.[8,11] In

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order to effectively promote a healthy lifestyle to their patients and its' impact on QoL, it is crucial for medical students, doctors, and physicians have positive attitudes and practice of healthy behaviors.[11-13]

Several studies conducted among the medical students in the US, Turkey, Netherlands, Germany, Australia, and Colombian have shown positive associations between practicing healthy behaviors such as having adequate physical activities, eating regularly, and having a normal body mass index (BMI) with higher confidence and willingness in promoting and counseling their patients about healthy living.[11,12,14-17] Moreover, studies also suggested that encouraging healthy lifestyle among medical students could maintain their own health as individuals and, consequently, contribute more effectively and efficiently to the healthcare system in the future.[11,12,18] As future physicians, medical students are expected to have greater knowledge and positive attitude toward healthy behaviors compare to nonmedical students. They are also expected to have better understanding of the long-term health consequences of smoking, drinking alcohol, inadequate diet, and other unhealthy habits. However, there is no evidence to indicate that they have a better practice of healthy habits even though they have greater knowledge compared to their counterparts.[19,20]

A number of studies have demonstrated that medical students tend to develop unhealthy behaviors as coping strategies due to the high demand for medical training and a high risk of burnout and stress.[11,15,18,21,22] Numerous studies have indicated that many medical students experience changes in their life patterns and develop unhealthy dietary habits along with sleep deprivation during the medical school years, particularly in the first year. As a result, the prevalence of smoking, alcohol intake, physical inactivity, irregular diet, obesity, and overweight among medical students were as high as among their peers in other faculties or in general populations.[20-26]

These studies have revealed that lack of time, inadequate management of time and stress, lack of sleep, and other mental health problems such as depression and fatigue were the main reasons for medical students could not have time to involve in other recreational activities and to follow proper dietary habits.[19,27,28] There are several studies conducted among Turkish medical students that have revealed the high prevalence of hazardous health behaviors.[29-31] For instance, one of these studies revealed that the prevalence of smokers was 24.8%, alcohol intake was 19.8%, physical inactivity was 64%, insufficient sleep was 13%, more than 50% of the participants did not have proper dietary intakes, 26.5% of them were overweight or obese, and about 9% did not use condoms. Male students were shown to have higher risks compared to females in all aspects.[30]

As the health habits of medical students may influence their attitude in counseling their patients about healthy living and preventive interventions, some studies have focused on developing interventions and specific strategies to encourage medical students to adopt and keep up healthy behaviors.[12,32,33] Various educational interventions were developed to improve the knowledge level regarding healthy behaviors, and promoting self-care among medical students have shown significant effectiveness, particularly among the first-year students.[13,18,34,35] This is a well-researched area around the world, yet, there is no single research conducted in Turkish Republic of Northern Cyprus in this specific arena. Thus, in this study, we sought to examine the practice of healthy lifestyle behaviors of the first-year medical students from one of the biggest universities in Northern Cyprus and to explore the related factors that influencing their behaviors.

Main Points

- Noncommunicable diseases (NCDs) have become the leading causes of deaths globally. A healthy lifestyle is a way of living to lower the risk of being seriously ill and prolong life expectancy with an improved quality of life (QoL).
- Health professionals can play a key role in promoting and educating patients about the benefits of healthy lifestyle behaviors to prevent major NCDs. In order to effectively promote a healthy lifestyle to their patients, it is crucial for medical students, doctors, and physicians have positive attitudes and practice of healthy behaviors.
- This study assessed the practice of healthy lifestyle behaviors of the first-year medical students and to explore the associated factors that influencing their behaviors using a composite healthy lifestyle index which was constructed based on eight lifestyle factors.
- The findings revealed that unhealthy behaviors were prevalent among the first-year medical students, and males were at higher risks. The results also highlighted that medical students have inadequate knowledge and lack of positive attitudes toward healthy behaviors. It is strongly recommend to develop gender-specific healthy lifestyle counseling programs to be integrated into the medical curriculum during the first year.

MATERIAL and METHODS

Study Design

A cross-sectional study was conducted among the first-year medical students, who enrolled in 2016. Written informed consent was taken, and detailed information was provided to the students before the data collection.

Study Participants and Sampling

All first-year medical students from the Faculty of Medicine were invited to take part in the study. The self-administrated questionnaires were asked to answer the questions in the classroom after completing the public health courses. Out of 393 students, 345 students have responded to the questionnaires with a response rate of 88%.

Study Tools

A self-administrated questionnaire was developed by the researchers based on the extensive review of the literature. The questionnaire has consisted of 50 questions with three main components. The first part included 11 questions on sociodemographic characteristics, including nationality, income level, country of origin, marital status, and self-reported height and weight. BMI was calculated using the formula weight/hight^2 (kg m^{-2}) and classified according to the WHO international BMI cutoff points.[3] The second part had eight questions on the general health status of the participants, including self-

TABLE I. Health Factors of the Combined Lifestyle Score of the Participants (n = 345)

Healthy lifestyle score factor	Score	Description	Percentage
Smoking	0	Yes (former or current smoker)	47.5
	1	No (never smoke)	52.5
Dietary intake	0	No (inadequate based on the given definition)	49.4
	1	Yes (regular dietary intake)	50.6
Physical activities	0	No	45.8
	1	Yes (based on the given definition)	54.2
Sleeping hours	0	No (inadequate sleeping hours: <7 or >9 hours)	29.4
	1	Yes (sleeping 7-9 hours a day)	70.6
Sunlight protection	0	No (never used any protection)	77.4
	1	Yes (used sunscreen, hat, sunglasses, and covering clothes)	22.6
Wearing a seatbelt	0	No (did not use)	42.0
	1	Yes (always use)	58.0
Alcohol intake	0	Yes	38.6
	1	No (never consumed alcohol)	61.4
Body mass index	0	Not normal BMI ($\leq$18.4 kg m^{-2} and $\geq$25 kg m^{-2})	31.2
	1	Normal BMI (18.5-24.9 kg m^{-2})	68.8
Composite healthy lifestyles index	8	Score 0-4: unhealthy lifestyle	58.6
		Score 5-8: healthy lifestyle	41.4

perceived body image, medical history, and self-perception of being healthy. The third part consisted of 31 questions related to healthy lifestyle behaviors such as smoking, alcohol intake, sleep patterns, using a seatbelt, sun protection, stress, use of family planning (FP) methods, and using protective methods to prevent Sexually Transmitted Infections (STIs). Also, there were some questions to understand the participant's knowledge level and perceptions of these behaviors.

Definition of the Eight Lifestyle Factors and the Composite Healthy Lifestyle Index

A composite healthy lifestyle index was constructed based on the eight modifiable lifestyle factors and participants received a score (healthy = 1 and unhealthy = 0) for the responses given for each behavior based on the evidence and standard recommendations[36] (Table 1): (1) Having a healthy diet was defined as "the intake of energy and nutrients complying with the needs and features of the body of an individual"[3]; Participants were asked "according to this definition, do you think your diet is sufficient and balanced?" with the answers of "yes, I do" and "No, I don't think so." (2) Participants were considered physically active if they do at least 150 minutes of moderate-intensity aerobic physical activities throughout the week in the last seven days[37]; (3) Having adequate sleeping hours was measured according to the international standards for young adults (18-25 years), which is 7-9 hours per day.[38] This age group was used as a reference as the mean age of the study participants was 18.9 ± 1.28 years; participants were asked "how many hours do they sleep every day" and the scores were given based on the answers (>9 and <7 hours were considered inadequate); (4) Sun protection was measured if used any method to protect from sunlight to avoid the harmful effects of excessive sun exposure; (5) Participants were asked if they always wear a seat belt while driving (or in the vehicle) with the answers of "Yes" and "Never"; (6) Smoking status was assessed using a question "Did you ever smoke or do you currently smoke?" and the answers were categorized as "Yes" and "No." (7) Similar question was used to assess alcohol consumption with the answers of "Yes" and "No"; (8) BMI categories: having a BMI in a range of 18.5-24.9 kg m^{-2} was considered having a "normal weight." The participants with a BMI in the categories of underweight (<18.5 kg m^{-2}), overweight (25.0-29.9 kg m^{-2}), and obese (>30 kg m^{-2}) were classified as having a "not normal weight." The composite healthy lifestyle index was generated by summing up the binary score for each of the eight factors. The value of the healthy lifestyle index was dichotomized, which ranged from 0 (least healthy) to 8 (healthiest). Based on extensive review of literature and experts' opinion, we considered participants with five and above scores to have healthy lifestyles as the scores classified into "unhealthy" (0–4) and "healthy"[5-8] categories.[36,39]

A pretest for the questionnaires was conducted among 30 students from other faculties prior to the research to improve the clarity, adequacy of the answers and the time spent in completing the questions. Minor revisions were done based on the pretest results.

Statistical Analysis

The data analysis was carried out using Statistical Package for the Social Sciences (SPSS) version 23.0 (IBM SPSS Corp.; Armonk, NY, USA). Descriptive statistics including frequency, percentage, mean, and standard deviation were done to describe the characteristics of the study sample. Distribution of participants' sociodemographic characteristics by the outcome variable (healthy and unhealthy lifestyle) was analyzed using the Chi-square statistics, with a significance level set at $P < .05$. All variables having $P < .05$ were entered in the final model of multivariate logistic regression analysis to identify factors associated with the healthy lifestyle status. As a result, adjusted odds' ratios and 95% confidence intervals (CIs) were presented with the P value set at <.05.

Ethical Approval

The ethical approval was obtained from the Ethical Committee of the Near East University for the study protocol with a project number of 2016/39-324. The questionnaires were anonymous, and informed consent was obtained from all individual participants. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki

TABLE 2. Sociodemographic Characteristics in Relation to the Lifestyle Status of the Participants (n = 345)

	Total		Unhealthy lifestyle		Healthy lifestyle		
	N	%	n	%	n	%	*P*-Value
Age Group (Years)							
16-19	269	78.0	155	57.6	114	42.4	.509
20-25	76	22.0	47	61.8	29	38.2	
Gender							
Male	175	50.7	110	62.9	65	37.1	.099
Female	170	49.3	92	54.1	78	45.9	
Types of the Program							
Turkish	204	59.1	116	56.9	88	43.1	.444
English	141	40.9	86	61.0	55	39.0	
Nationality							
Turkish	204	60.0	118	58.7	83	41.3	.353
Turkish Cypriots	24	7.2	11	45.8	13	54.2	
Others	110	32.8	68	61.8	42	38.2	
Income Level							
High	39	11.6	25	64.1	14	35.9	.637
Medium	282	83.4	162	57.4	120	42.6	
Low	17	5.0	11	64.7	6	35.3	
Medical History of any Chronic Diseases							
Yes	37	10.8	22	59.5	15	40.5	.893
No	30	89.2	179	58.3	128	41.7	

declaration and its later amendments or comparable ethical standards, as revised in 2000.

RESULTS

Distributions of the Healthy Lifestyle Behaviors among Study Participants

Out of the total 345 respondents, about half (49.3%) of them were female. The mean age of the participants was 18.9 ± 1.28 years. As presented in Table 1, about 58.6% of the participants were classified as having unhealthy lifestyles (score 0-4) based on the composite lifestyle index. The proportions of each individual risk factor were also shown to be high among study participants.

Sociodemographic Characteristics and the Lifestyle Status of the Participants

As shown in Table 2, the majority (78%) of the participants were in their late adolescence. More than half of the participants were originally from Turkey and 32.8% of them were mainly from Middle Eastern countries, while only 7.2% of them were originally from Northern Cyprus. Of all, 10.8% of them reported having some form of chronic diseases. Although the proportion of boys who had an unhealthy lifestyle was notably higher than girls, however, the difference in gender was not statistically significant. Similarly, all other sociodemographic characteristics did not demonstrate any statistically significant relationship with their lifestyle status.

Participants' Perceptions and Knowledge in Relation with the Lifestyle Status

The relationships between participants' perception of their own health status, self-body image, and healthy lifestyle behaviors were presented in Table 3. There were significant differences between BMI categories and lifestyle status of the participants, while obese and overweight students tend to have a higher tendency of having unhealthy lifestyles compared to the students with a normal BMI. A notable significant difference was observed between students' self-perception of health, where 74.3% of students who considered themselves not healthy were actually having unhealthy lifestyles. On the other hand, the majority of the students who perceived own body as "not ideal" were more likely to have unhealthy lifestyles than others. A great number of students who often skip any meals were shown to have a significantly higher tendency of unhealthy lifestyles compared to the ones who did not. A significant difference was observed among students who did not have enough sleep with a higher tendency of having unhealthy lifestyles than those who have adequate sleep daily.

The participants were asked a question to examine their perception of being healthy ("What do you do to be healthy?"). Almost half of the participants have indicated that healthy diet, no smoking, no alcohol, good sleep, regular exercise, avoid excessive sunlight, no stress (28.4%), and using a seat belt while driving are the healthy behaviors to have in order to be healthy. When asked about the health benefits of physical activities, about 85% of them mentioned that it is helpful in controlling weight, 73% of them indicated that it prevents heart diseases, diabetes, and hypertension, 78% of the participants said it provides psychological well-being, and about 30% mentioned that it will help to protect from cancers, bone fractures, and strengthens one's memory.

With regard to the questions on sleep quality, 39.5% reported having sleeping problems during the last month. Among these, 32.6% had difficulty in falling asleep, about 40% felt tired upon waking up from sleep, while 20.6% reported having excessive sleep. About the harmful consequences of the excessive sunlight exposure, the majority were aware of the negative health effects such as skin cancer (74.3%), eye problems (57.4%), aging skin (67.2%), and sunburn (60.7%). However, only 22.6% of the respondents have used some methods to protect from sunlight. About 40% of the participants have reported skipping any one of the three meals in a day and among these, 44% of them skipped breakfast, 23.3% skipped lunch, while 19.4% of them skipped dinner.

TABLE 3. Health Perceptions and Daily Habits in Relation with Lifestyle Status of the Participants (n = 345)

	Total		Unhealthy lifestyle		Healthy lifestyle		
	N	%	n	%	n	%	*P*-Value
Body Mass Index							
Obese	14	5.2	10	71.4	4	28.6	.000*
Overweight	49	18.2	41	83.7	8	16.3	
Normal	185	68.8	74	40.0	111	60.0	
Underweight	21	7.8	17	81.0	4	19.0	
Self-Health Perception							
Healthy	230	68.7	116	50.4	114	49.6	.000*
Unhealthy	105	31.3	78	74.3	27	25.7	
Self-Body Image							
Ideal	172	50.0	87	50.6	85	49.4	.003*
Not Ideal	172	50.0	114	66.3	58	33.7	
Skip Any One of Three Meals in a Day							
Yes	204	59.8	130	63.7	74	36.3	.014*
No	137	40.2	69	50.4	68	49.6	
Having Enough Sleep Daily							
Yes	217	62.9	113	52.1	104	47.9	.001*
No	128	37.1	89	69.5	39	30.5	
Have Stress in a Daily Life							
Yes	203	59.9	124	62.1	79	38.9	.340
No	136	40.1	76	55.9	60	44.1	

TABLE 4. Distribution of Healthy Lifestyle Behaviors by Sex (n = 345)

	Total		Female		Male		
	N	%	n	%	n	%	*P*-Value
Body Mass Index							
Obese	14	5.2	3	21.4	11	78.6	.000*
Overweight	49	18.2	9	18.4	40	81.6	
Normal	185	68.8	96	51.9	89	48.1	
Underweight	21	7.8	16	76.2	5	23.8	
Smoking							
Yes	162	47.5	68	42.0	94	58.0	.008*
No	179	52.5	101	56.4	78	43.6	
Dietary Intake							
Yes	172	50.6	87	50.6	85	49.4	.828
No	168	49.4	83	49.4	85	50.6	
Physical Activities							
Yes	181	54.2	91	50.3	90	49.7	.819
No	153	45.8	75	49.0	78	51.0	
Sleeping Hours							
Yes	243	70.6	127	52.3	116	47.7	.071
No	101	29.4	42	41.6	59	58.4	
Sunlight Protection							
Yes	77	22.6	27	35.1	50	64.9	.003*
No	263	77.4	142	54.0	121	46.0	
Alcohol Intake							
Yes	131	38.6	59	45.0	72	55.0	.187
No	208	61.4	109	52.4	99	47.6	
Using a Seatbelt							
Yes	193	58.0	94	48.7	99	51.3	.815
No	140	42.0	70	50.0	70	50.0	
Have Had Sexual Experiences (n = 323)							
Yes	47	14.6	7	14.9	40	85.1	.000*
No	276	85.4	154	55.8	122	44.2	

*$P < .05$.

Distribution of the Individual Health Behaviors by Gender

There were significant differences between genders with regard to the BMI, smoking status, sexual experiences, and protection from the excessive sunlight (Table 4).

Male students were more likely to be obese and overweight than girls (78.6% vs 21.4, $P < .001$). Similarly, the high-risk behaviors such as smoking and having sexual relationships were significantly prevalent among boys compared to girls (58% vs

TABLE 5. Logistic Regression Analysis for Predicting the Factors Attributed to the Lifestyle Status of the Participants. Adjusting for Age and Sex (n = 309)

	B	SE	Wald	*P*-Value	Exp(B)	95% CI	
Self-perception on health (no/yes)	0.793	0.285	7.735	.005	2.210	1.264	3.863
Self-description on body image (not ideal/ideal)	0.685	0.248	7.638	.006	1.983	1.220	3.223
Having a sexual experience (no/yes)	−0.321	0.383	0.699	.403	0.726	0.342	1.539
Self-perception of having enough sleep (no/yes)	0.477	0.270	3.131	.077	1.611	0.950	2.733
Having stress in a daily life (no/yes)	−0.012	0.260	0.002	.962	0.988	0.594	1.642
Skips any one of the three meals (no/yes)	−0.319	0.257	1.537	.215	0.727	0.439	1.204
Gender (male/female)	0.336	0.259	1.683	.195	1.400	0.842	2.326
Age	0.086	0.102	0.709	.962	0.988	0.594	1.642
Constant	−1.783	2.044	0.761	.383	0.168		

42% and 85.1% vs 14.9%, $P < .001$, respectively). Interestingly, the boys also have a higher tendency to protect from excessive sunlight compare to the girls (64.9% vs 35.1%, $P < .001$). There were no significant gender differences between other behaviors such as alcohol intake, physical activity, sleeping hours, dietary intake, and usage of seatbelt while driving.

About 15% out of all participants has reported having sexual relationship previously, and there was a significant difference between age groups as the older students have a higher tendency to have sexual relationships than the younger ones ($P < .001$). A significant number of students who had sexual experience had never used a condom (75.7%, $P < .001$). An evident difference was detected between lifestyle status and sexual experience, where the students with unhealthy lifestyles have a higher tendency of having sexual experiences (17.6%) compared to the ones who have healthy lifestyles, although it was not statistically significant ($P > .05$). The participants' knowledge on the prevention of STIs has shown a significant difference in their sexual experience ($P < .01$). However, participants' knowledge regarding FP and its methods, knowledge about emergency contraception (EC), and types of EC did not affect their lifestyle behaviors. The results of the logistic regression to examine the predicting factors associated with lifestyle status of the participants adjusted for age and gender were shown in Table 5. It presented that the odds of having unhealthy lifestyles among the students who perceived their body "not ideal" and "not healthy" were 1.98 (95% CI: 1.220-3.223) and 2.21 (95% CI: 1.264-3.863) times higher than the students who perceived their body "ideal" and "healthy," respectively, which were statistically significant ($P = .006$ and .005).

DISCUSSION

The current study is the first of its kind conducted in Northern Cyprus, which examined the healthy lifestyle behaviors and associated factors among the first-year medical students from a university. The investigation of the lifestyle behaviors among medical students is essential to provide a foundation for the development of the evidence-based interventions or curriculums for helping them to develop and adopt healthy lifestyles. Subsequently, it will increase the willingness and attitude to promote healthy lifestyles to their patients in the future. In the present study, about 59% of students had "unhealthy lifestyles," which was scored based on the combination of eight subfactors of behaviors. A considerably higher proportion of male students has unhealthy lifestyles compared to girls; nevertheless, this difference was not statically significant. However, a study from Pakistan has found that girls tend to have healthier lifestyle habits and diet practices compared to boys, which was statistically significant.[40]

The prevalence of smoking was 47.5% among all, where smoking among boys was detected to be more prevalent (58%) compared to girls (42%). The statistical significance in gender was consistent with the study conducted among the Turkish medical students from Erciyes University, although the overall and gender-specific prevalence in our study were much higher compared to the Turkish medical students in other studies.[30,31,41] This might be due to the age composition of our sample as the majority (78%) were adolescents and youth, and the smoking prevalence was reported to be as high as 55% among Cypriot adolescents,[42] where they might be experiencing the transitional period in their life and most of their behavior was affected by their peers and friends. The sex difference and high prevalence of smoking were consistent with a study conducted among the medical students in Ethiopia,[43] however, was in contrast to a study conducted in Greek among health science students (37.6%).[14]

There were consistencies in our results with other studies in terms of alcohol intake (38.6%),[30,31,43] physical inactivity (45.8%),[14,30,44,45] inadequate sleeping hours (29.4%),[30] and not using a seat belt while driving (42%).[30,46] Among these, the prevalence of not using seat belt while driving was not significantly different between genders in our study, which was demonstrated a contrast with another study result (boys 55% vs girls 49%), and there was also a significant difference among the first-year medical students compared to the last year students.[30] The prevalence of physical inactivity was higher compared to most of the 21 European countries in a study conducted among Young Europeans; however, it was in line with several European countries such as Greece, Portugal, and Spain.[45]

In the current study, about half (49.4%) of the students did not have adequate dietary intake, and the trend was similar to both genders. This was consistent with a study, which reported that 55% of male students have consumed fast food every day/frequently.[30] Moreover, our study results demonstrated that about 60% of the participants have always skipped one of the three meals, and those who often skipped meals have a significantly higher tendency of having unhealthy lifestyles than those who did not. These findings were consistent with the study from Pakistan, and the main reason for medical students for skipping meals was "lack of time."[30,40]

One of the important subcategories in the composite lifestyle index was BMI of the students. Our study revealed that

students with a "not healthy" BMI were 31.2%, including obese, overweight, and underweight which were 5.2%, 18.2%, and 7.8%, respectively. Moreover, there was a significant difference between genders as more boys tend to be obese and overweight than girls, whereas more girls tend to be underweight compared to boys. The obesity and overweight prevalence among our study sample was slightly higher than several studies conducted among medical students[26,41,47,48]; however, it was much lower than the prevalence among the first-year students from studies conducted in Turkey and Australia.[30,49]

The significant difference in BMI between genders was seen in most of these studies, which was similar to ours. Primarily, this trend can be explained by the high prevalence of sedentary lifestyle, physical inactivity, poor eating habits, and lack of adequate sleep among medical students and, in general, girls tend to be more cautious about their appearances and make efforts to practice healthier behaviors,[49-51] which might be attributed to their low BMI compared to boys. This was supported by the significant positive correlation found in our study between the self-perception of "not ideal" body image and unhealthy lifestyle among the students. More male students perceived their body is "not ideal" than girls, though this difference is not statistically significant. In our study, interestingly, more males perceived themselves as "healthy" compared to girls and this can be one of the reasons for boys not to spend too much effort to be healthy.

A notable proportion of students who considered themselves "not healthy" actually were having unhealthy lifestyles and more among boys. This positive relationship was statistically significant and consistent with a study conducted by Nacar et al.[30] All these evidence indicate that self-perception of body image and knowledge of being healthy to play an important role in one's behaviors and practice of healthy lifestyles. Hence, educating medical students regarding the risky behaviors and healthy body image, encouraging them to translate their knowledge into daily practice should be the essential component of the interventions or counseling program for the students.

Another important finding of this present study was the examination of the participants' sexual practices and knowledge of the FP and practices of using contraception methods. As most of our participants constituted of adolescents and youth, it will be important to examine their sexual health knowledge and practices to prevent risky sexual behaviors in the future. The prevalence of students who had sexual experiences in our study was lower compared to the prevalence of university students in Turkey. However, a significantly higher prevalence of students with sexual experience did not use condoms, and the low level of knowledge regarding contraception methods and prevention methods of STIs should be given high attention among educators. Particularly, a comprehensive sexuality education on reproductive health and prevention of STIs should be provided for the first-year medical students, which should be the essential components of the first-year medical curriculum along with the healthy lifestyle education.

There are several limitations to the current study. First, as this is a cross-sectional study conducted among medical students from one university using a purposive sampling method, the results from this study cannot generate causal relationships between healthy lifestyle status and related factors. Furthermore, it is also difficult to generalize the results to represent the entire population of the island. However, as the university is one of the biggest universities in Northern Cyprus and the total population of the island is about 300,000,[52] we could refer to this study as the first attempt to fill the gap in this area. Second, the data were collected based on the self-report of the students, which might lead to recall bias and underreporting of some sensitive behaviors, particularly related to sexual practices. Third, recognizing the sex differences in muscle mass, which is the limit of comparison of BMI between genders, can be one of the limitations of the study. Apart from the above limitations, the study results not only provide appealing insights regarding the prevalence of healthy behaviors among the first-year medical students and associated factors but also provide evidence to improve medical students' general health by modifying curriculums and counseling programs in the future.

In conclusion, the study results demonstrated that the majority of the first-year medical students have had unhealthy lifestyles. Those include the high prevalence of smoking, alcohol intake, physical inactivity, insufficient sleep, inadequate eating habits, and unsafe sexual practices among these students. It also highlighted the significant sex differences in most of the risky habits, where boys were more prone to have unhealthy lifestyle due to these risky habits. Moreover, the results revealed that medical students have insufficient knowledge and lack of positive attitudes toward healthy behaviors. This could eventually adversely influence their health-promoting practices in the future and willingness to consult their patients regarding healthy living. Hence, it is vital to develop gender-specific healthy lifestyle counseling programs to be a part of the medical curriculum during the first year. This study results can provide evidence to the local stakeholders, educators, and policymakers to modify the current curriculum with proposed amendments. Furthermore, a comprehensive sexuality education, including FP should be one of the compulsory subjects for the students at this stage.

Ethics Committee Approval: The ethical approval was obtained from the Ethical Committee of the Near East University for the study protocol with a project number of 2016/39-324.

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The Relationships between the Pain Beliefs and Coping Strategies of Palliative Care Patients

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BACKGROUND/AIMS
This descriptive study aims to determine the relationships between the pain beliefs and coping strategies of palliative care patients.

MATERIAL and METHODS
This study was conducted in the Malatya Training and Research Hospital Palliative Care Clinic from March 10, 2019 to June 10, 2019. The sample consisted of 138 inpatients. The data were collected using a personal information form, the Pain Beliefs Questionnaire, the Pain Coping Questionnaire, and the Palliative Performance Scale. Statistical Package for the Social Sciences (SPSS) version 18.0 (IBM SPSS Corp.; Armonk, NY, USA) software was used to analyze the data. The required ethical approvals were obtained.

RESULTS
The patients' mean age was 59.01 ± 9.38. Of them, 65.1% were female, and 89.7% were married. Of the patients, 56.3% had completed primary school, and 75.3% were unemployed. Of the patients, 70.5% believed that pain is controlled by God. Their mean organic beliefs score was 3.04 ± 0.38, and their mean psychological beliefs score was 4.83 ± 1.00. Their mean scores for self-management, helplessness, conscious cognitive attempts, and medical remedies were 19.07 ± 5.18, 10.72 ± 3.00, 13.85 ± 4.05, and 11.54 ± 3.08, respectively. Their organic beliefs scores had a negative relationship with self-management scores ($P < .001$, $r = -392$) and conscious cognitive attempts scores ($P < .001$, $r = -.350$), and they had a positive weak relationship with helplessness scores ($P < .001$, $r = .380$).

CONCLUSION
The pain beliefs of patients in palliative care affect their ability to cope with pain. The planning and implementation of nursing pain management interventions should consider the relationships between the pain beliefs and pain coping strategies of patients.

Keywords: Palliative care, pain beliefs, coping with pain, nursing

INTRODUCTION

Palliative care is a multidisciplinary approach that starts with diagnosis and continues during and after treatment. Palliative care helps patients to cope with a variety of disease-related symptoms.[1] When the symptoms are brought under control, patients' adaptation to their community increases, their recovery period begins, and they become able to tolerate their treatments' side effects like vomiting and dizziness, etc.[2,3] Palliative care aims to provide patients with an active and quality life until their death.[2,3] Pain is a critical symptom that affects the course of diseases, and treating it is a priority issue.[2,4]

Inadequate pain management leads to serious complications and increases morbidity and mortality and the length of hospital stays.[5] It reduces patients' quality of life by affecting their conduct of daily activities.[4] Pain and its effects are significant causes of stress. Cognitive and behavioral responses to stress that are considered "coping with pain" affect the severity of pain, pain-related disabilities, and patient psychology.[6,7] Coping is defined as people's resistance to events or factors that cause stress and their cognitive, emotional, and behavioral responses to endure them. Coping

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strategies vary with a variety of factors such as age, gender, culture, and disease. They are unique to each individual.[6,8,9] Pain includes sensory, emotional, and behavioral factors. It is a multidimensional experience that has been explained using a variety of models, including the pathogenic and biopsychosocial models. The pathogenic model of pain focuses on whether pain is the result of a direct tissue trauma or a physiological destruction. The biopsychosocial model involves cognitive, emotional, and behavioral factors. These factors are reported to affect pain response indirectly by affecting patients' neurochemistry.[10,11]

Belief is a cognitive factor that is based on social psychology. It is seen as one of the main constituents of people's thought systems in the cognitive perspective. Pain beliefs involve organic and psychological beliefs. Organic beliefs are based on the perception that pain is caused by bodily injury or harm. People believe that an increase in the level of injury increases pain. This makes activity/exercise and a biomedical approach important for eliminating the problem causing the pain. Psychological beliefs are based on the perception that pain is affected by psychological factors (anxiety, depression, etc.). A variety of techniques such as relaxation and distraction can be used for pain management.[8,10,12] Studies of pain beliefs show that patients' treatments and coping strategies vary by their beliefs.[8,11]

It is important for nurses as members of multidisciplinary teams to detect the pain management problems of patients that related to their pain beliefs and to plan nursing pain management interventions that consider them.[8,9] No studies of the relationships between the pain beliefs and pain coping strategies of patients in palliative care were found in the literature. Determining the pain beliefs of patients may help in the selection of the best coping method, and thus an effective pain management method.[8–11] Therefore, our study aimed to evaluate the correlation between pain beliefs and coping strategies in palliative care patients. Other purposes of the research are to examine whether sociodemographic variables affect pain belief and coping with pain.

Main Points

- Studies of pain beliefs show that patients' treatments and coping strategies vary by their beliefs.
- The patients' self-management scores had a positive strong relationship with conscious cognitive attempts scores and a negative weak significant relationship with helplessness scores.
- The female patients had higher self-management, conscious cognitive attempts, helplessness, and medical remedies scores. The female patients had higher psychological beliefs scores, and the male patients had higher mean organic beliefs scores.
- The cancer patients had lower self-management scores than the cardiovascular disease patients.

MATERIALS and METHODS

The Study's Population and Sample

This descriptive study was conducted in the Malatya Training and Research Hospital Palliative Care Clinic from March 10, 2019 to June 10, 2019, the only hospital in the city of Malatya that admits patients to palliative care. A necessary sample size of 140 people was determined using G*Power software and an effect size of 2.25, a significance level (α) of 0.05, and 80% power. The sample consisted of 138 patients.

Inclusion Criteria

Patients who were 18 years old and above, conscious, had no communication difficulties or mental disorders, scored 40% or higher on the Palliative Performance Scale (PPS), and agreed to participate were included in the study. The minimum palliative performance score for patients was 40%. The criteria also included being conscious and having a normal or less than normal food intake, requiring major assistance for self-care, being unable to do most activities, having extensive disease, and being mainly in bed. Patients who scored below 40% on the PPS were excluded from the study because they would be tired due to their lack of functional capacity, and reliable data would not be obtained from them due to their unsteady levels of consciousness.[13]

Data Collection

The patients were informed about the study and told that its data would not be shared with third parties. The researchers collected the data in face-to-face interviews. The questionnaire and scale items were read, and the patients' responses were recorded by the researchers. Filling out the forms took roughly 30 minutes for each patient. The data were collected using a personal information form, the Pain Beliefs Questionnaire (PBQ), the Pain Coping Questionnaire (PCQ), and the PPS.

The personal information form. It was created by researchers after a review of the literature. It consists of 13 questions about the patients' sociodemographic characteristics (age, gender, marital status, educational level, working status, caregiver, and diagnosis) and pain-related information (site of pain, severity of pain, pain history, type of analgesic, and the patient's beliefs about who controls their pain).

The Pain Beliefs Questionnaire. The PBQ was developed by Edward et al.[14] to evaluate beliefs about the causes and treatment of pain. Berk[15] did the validity and reliability study of the questionnaire's Turkish version. The PBQ has 12 items that concern organic and psychological pain beliefs. The organic beliefs subtest concerns the organic causes of pain. The psychological beliefs subtest is about psychological factors that affect the experience of pain. There is no cutoff point for the scores. Higher subscale scores indicate more pain beliefs, and lower subscale scores indicate less pain beliefs. The highest possible scores on the organic and psychological beliefs subscales are 6, and the lowest possible scores are 1. Cronbach's α of the Turkish versions internal consistency coefficients was 0.71 for the organic beliefs subtest and 0.73 for the psychological beliefs subtest in its reliability study.[15]

The Pain Coping Questionnaire. The PCQ was developed by Kleinke[16] to determine pain-related patterns of affection and behavior. Hocaoğlu et al.[6] did the validity and reliability study of its Turkish version. The PCQ has these subscales: self-management, helplessness and conscious cognitive attempts, and medical remedies. It is a 4-point Likert-type scale (0 = never to 3 = often) with 29 items. There is no cutoff point for the scores. The highest possible scores on the subscales of self-

Table I. The Patients' Mean PBQ and PCQ Scores

Scales		Minimum	Maximum	Mean ± SD
Pain Coping Questionnaire	Self-management	1.00	34.00	19.07 ± 5.18
	Helplessness	2.00	22.00	10.72 ± 3.00
	Conscious Cognitive Attempts	3.00	20.00	13.85 ± 4.05
	Medical Remedies	3.00	26.00	11.54 ± 3.08
Pain Beliefs Questionnaire	Organic Beliefs	1.96	5.59	3.04 ± 0.38
	Psychological Beliefs	1.00	5.70	4.83 ± 1.00

management, helplessness and conscious cognitive attempts, and medical remedies are 36, 24, and 27, respectively. The lowest possible score on all the subscales is 0. The Cronbach's α of the Turkish versions internal consistency coefficient was 0.75 in the questionnaire's reliability study.[6]

The Palliative Performance Scale

The PPS was developed by Anderson et al.[13] to evaluate patients' ambulation, activity and evidence of disease, self-care, food intake, and consciousness levels. PPS levels range from 0 to 100% in 10% increments. They are determined by starting with ambulation in the leftmost column. After the most appropriate ambulation level is determined, other four columns are evaluated. Then, the overall best fit for patients is assigned as their PPS score. It should be noted that the left-hand columns are more determinant than the right-hand columns.

Ethical Considerations

Prior to the study, ethics committee approval and written permission were obtained from the İnönü University Noninvasive Clinical Research Ethics Committee (approval number: 2019/36-04) and the Malatya Training and Research Hospital. Written and verbal consent were obtained from the participants.

Data Analysis

The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 18.0 (IBM SPSS Corp.; Armonk, NY, USA) software and descriptive statistics (numbers, percentages, means, and standard deviations). The data were compared using the Mann–Whitney U test and the Kruskal–Wallis test. Spearman's correlation was used to determine the relationships between variables. The confidence interval was 95%, and the threshold for significance was <5%.

RESULTS

The patients' mean age was 59.01 ± 9.38. Of the patients, 65.1% were female, and 89.7% were married. Of them, 56.3% had completed primary school, and 75.3% were unemployed. Of the patients, 82.1% said that their caregivers were their family members. Of the patients, 63.5% were diagnosed with cancer, 24.5% were diagnosed with cardiovascular diseases, and 12.0% were diagnosed with neurological diseases. For the treatment of pain, 52.6% of patients used nonsteroidal anti-inflammatory drugs (NSAIDs), 20.3% used weak or strong opioids, and 27% used adjuvant drugs. Of the patients, 75.2% said that they had previously had pain complaints for other reasons. Of the patients, 57.3% had back-lower back pain, 26.9% had head-neck pain, and 15.8% had arm-shoulder pain. Of the patients, 40.4% had severe levels of pain, 30.2% had very severe levels of pain, and 29.4% had moderate levels of pain. Of the patients, 70.5% believed that pain is controlled by God and 14.6% believed that pain is controlled by doctors. Another 10.3% believed that they controlled their own pain, and only 4.6% believed that pain is controlled by nurses.

Table I shows the patients' mean total and subscale PBQ and PCQ scores.

The patients' self-management scores had a positive strong relationship with conscious cognitive attempts scores ($P < .001$, $r = .675$) and a negative relationship with helplessness scores ($P < .001$, $r = -.553$). The patients' helplessness scores had a negative relationship with their conscious cognitive attempts scores ($P < .001$, $r = -.199$) and a positive relationship with their medical remedies scores ($P < .001$, $r = .572$). A positive relationship was found between their conscious cognitive attempts scores and medical remedies scores ($P < .001$, $r = .302$). The patients' organic beliefs scores had a negative relationship with their self-management scores ($P < .001$, $r = -.392$) and conscious cognitive attempts scores ($P < .001$, $r = -.350$) and had a positive weak relationship with their helplessness scores ($P < .001$, $r = .380$). A positive weak relationship was found between the patients' psychological beliefs scores and self-management scores ($P < .05$, $r = .197$). No significant relationship was found between the patients' organic beliefs and psychological beliefs ($P > .05$, $r = .062$) (Table 2).

The female patients had higher self-management, conscious cognitive attempts, helplessness, and medical remedies scores ($P < .01$). The female patients had higher psychological beliefs scores, and the male patients had higher mean organic beliefs scores ($P < .05$). The patients' age, marital status, education levels, and income levels had no significant relationship with their organic and psychological pain beliefs scores and PCQ scores ($P > .05$). The patients whose pain management was supported by people they lived with had higher scores for psychological pain beliefs, self-management, conscious cognitive attempts, helplessness, and medical remedies ($P < .05$).

The cancer patients ($P < .01$) had lower self-management scores than the cardiovascular disease patients. The cancer patients ($P < .001$) had lower conscious cognitive attempts scores than the patients diagnosed with neurological diseases and higher medical remedies scores than the other groups ($P < .05$). No significant difference was found between patients' diagnoses and their organic and psychological beliefs ($P > .05$).

A significant difference was found between self-management ($P < .01$), helplessness ($P < .01$), and organic beliefs ($P < .05$) scores of the patients who used opioids to treat pain. A significant difference was found between the patients' helplessness ($P < .001$) and medical remedies ($P < .01$) scores and their pain history. No significant difference was found between patients'

Table 2. Correlations Between the Patients' PBQ and PCQ Scores

Scales	Subscales	1 r *P*	2 r *P*	3 r *P*	4 r *P*	5 r *P*	6 r *P*
Pain Coping Questionnaire	1. Self-management	–					
	2. Helplessness	–.553***	–				
	3. Conscious Cognitive Attempts	.675*** .000	–.199*** .000	–			
	4. Medical Remedies	.041 .705	.572*** .000	.302** .004	–		
Pain Beliefs Questionnaire	5. Organic Beliefs	–.392*** .000	.380*** .000	–.350*** .000	.093 .362	–	
	6. Psychological Beliefs	.197* .033	–.049 .651	.241 .084	.099 .743	.062 .481	–

n = 138.
*$P < .05$.
**$P < .01$.
***$P < .001$.

organic and psychological beliefs scores and their pain history ($P > .05$) (Table 3).

There was a significant difference between the pain location and the scores of for self-management and conscious cognitive attempts ($P < .001$). The patients who had head-neck pain had lower mean scores for self-management and conscious cognitive attempts. A significant difference was found between the severity of pain and the subscales of self-management ($P < .001$), helplessness ($P < .01$), and medical remedies ($P < .01$). The patients who had moderate levels of pain had higher mean scores for self-management. The patients who had very severe levels of pain had higher mean scores for medical remedies, and the patients who had intolerable levels of pain had higher mean scores for helplessness. A difference was found between the belief that patients control their own pain and organic beliefs scores ($P < .05$). A significant difference was only found in the medical remedies scores of patients who believed that pain is controlled by nurses ($P < .05$). There is a significant difference only in the helplessness scores of the patients who believe that pain control is in God ($P < .05$) (Table 3).

DISCUSSION

Only one study that examines pain belief and coping with pain together was found in the literature. For this reason, a limited number of resources are used in this discussion of the results.

The patients' organic beliefs mean score was 3.04 ± 0.38, and their mean psychological beliefs score was 4.83 ± 1.00. Studies of pain beliefs have reported that organic and psychological beliefs scores vary with different samples (old people, patients in algology clinics, students, etc.).[8,10,17,18]

In our study, scores for self-management, helplessness, conscious cognitive attempts, and medical remedies were 19.07 ± 5.18, 10.72 ± 3.00, 13.85 ± 4.05, and 11.54 ± 3.08, respectively. Few studies of coping with pain were found in the literature. These studies report different levels of mean subscale scores.[8,18] When the relationship of the PCQ subscales with each other is examined, the similarity in the results is quite remarkable.[8,18] The differences in the results were caused by the effect of variables such as age, gender, diagnosis, education level, site of pain, and severity of pain-on-pain beliefs and coping with pain.

A negative weak significant relationship was found between self-management scores and helplessness scores. Two studies conducted with different sample groups have similar results.[8,18] A negative relationship was found between helplessness scores and conscious cognitive attempts scores. Another study has similar results.[8] A positive strong relationship was found between self-management scores and conscious cognitive attempts scores. Madenci et al.[19] also found a significant relationship between self-management scores and conscious cognitive attempts scores. A positive weak significant relationship was found between the patients' helplessness scores and medical remedies scores. A positive weak significant relationship was found between the patients' conscious cognitive attempts scores and medical remedies scores. There are similar results in the literature.[8,18] Patients who feel helplessness in pain management may have difficulty in coping with pain by themselves and may fail in pain management, particularly in cognitive and behavioral strategies.[8,18] The results of the study are similar to those in the literature.

The patients' organic beliefs scores had a negative relationship with their self-management scores and conscious cognitive attempts scores and a positive weak relationship with their helplessness scores. Similarly, Babadağ et al.[8] found that higher organic beliefs scores lead to lower self-management and conscious cognitive attempts scores and higher helplessness scores. A positive weak relationship was also found between the patients' psychological beliefs scores and self-management scores.[8] A study conducted with students found that students who used the distraction method for pain management had significantly higher psychological beliefs scores.[10] Similarly, this study found a positive weak relationship between the patients' psychological beliefs scores and self-management scores. The correlation between psychological beliefs scores and self-management scores may be due to the fact that individuals who believe the origin of pain is related to psychological factors have stronger personal management. Higher organic beliefs scores cause difficulty in coping with pain and feelings of helplessness.[8,10]

Table 3. Comparison of the Patients' Pain-Related Features and PBQ and PCQ Scores

	Pain Coping Questionnaire				Pain Beliefs Questionnaire	
Scales	**Self-management**	**Helplessness**	**Conscious Cognitive Attempts**	**Medical Remedies**	**Organic Beliefs**	**Psychological Beliefs**
Subscales	Median (25-75) Percentile Mean ± SD	Median (25-75) Percentile Mean ± SD	Median (25-75) Percentile Mean ± SD	Median (25-75) Percentile Mean ± SD	Median (25-75) Percentile Mean ± SD	Median (25-75) Percentile Mean ± SD
Pain history	13.00 (12.00-18.00)	18.00 (12.00-21.00)	15.00 (12.00-17.00)	15.00 (10.00-20.00)	2.00 (1.00-4.00)	5.00 (9.00-16.00)
Yes	14.00 ± 2.50	16.00 ± 2.50	14.00 ± 2.65	11.00 ± 3.00	3.00 ± 1.00	4.00 ± 1.00
No	14.0 (10.00-16.00)	13.00 (10.00-16.00)	14.00 (10.00-15.75)	12.00 (7.00-14.00)	3.00 (2.00-3.50)	4.50 (2.00-4.50)
P/Z	13.77 ± 3.05	12.00 ± 3.00	12.00 ± 2.30	10.00 ± 4.55	4.00 ± 0.90	3.00 ± 0.80
	$P = .705/Z = 1.06$	$P < .001/Z = 2.03$	$P = .633/Z = 1.06$	$P < .01/Z = 1.03$	$P = .806/Z = 1.69$	$P = .302/Z = 1.06$
Type of analgesic	23.00 (12.00-25.00)	10.00 (8.00-17.00)	10.00 (8.00-17.00)	13.00 (8.00-19.00)	5.00 (2.09- 5.07)	4.50 (3.00-5.00)
Opioid	22.01 ± 5.90	11.99 ± 4.20	12.60 ± 4.55	12.00 ± 4.08	4.90 ± 0.43	3.70 ± 0.40
NSAID	19.00 (15.00-25.00)	11.00 (8.00-18.00)	11.00 (15.00-20.00)	12.00 (6.00-21.00)	2.00 (1.20-3.30)	5.20 (4.10-5.90)
Adjuvant	18.99 ± 4.55	12.10 ± 5.00	12.00 ± 3.80	11.10 ± 5.70	2.96 ± 0.19	2.44 ± 0.87
P/KW	18.00 (15.00-20.00)	12.00 (10.00-19.00)	11.00 (15.00-22.00)	23.00 (15.25-25.75)	2.70 (3.00-3.50)	4.00 (3.20-4.30)
	17.00 ± 6.06	13.00 ± 5.88	10.30 ± 5.09	10.34 ± 6.80	2.60 ± 0.25	3.96 ± 0.19
	$P < .001/$ KW = 20.603	$P < .001/$ KW = 19.102	$P = .210/$ KW = 59.500	$P = .314/$ KW = 5.700	$P < .001/$ KW = 3.034	$P = .510/$ Z = 1.106
Site of pain†	19.00 (14.00-25.00)	13.00 (10.00-17.00)	13.50 (10.00-16.00)	14.00 (10.00-16.00)	3.00 (2.09- 3.07)	5.00 (4.23-5.75)
Back-lower back	17.05 ± 5.73	12.76 ± 4.11	11.09 ± 3.55	12.89 ± 4.18	3.19 ± 0.43	4.90 ± 0.90
Head-neck	11.00 (8.00-18.00)	15.00 (12.00-18.00)	9.00 (5.00-11.00)	12.00 (7.00-15.00)	4.00 (3.20-4.30)	5.60 (4.50-5.95)
Arm-shoulder	12.67 ± 6.08	13.98 ± 3.85	8.11 ± 4.00	10.20 ± 4.05	3.96 ± 0.19	5.52 ± 1.09
Leg-knee	18.00 (15.00-23.75)	13.00 (10.00-16.00)	12.00 (10.00-14.00)	15.50 (12.00-16.75)	2.50 (5.97-4.00)	5.25 (4.40-5.60)
Other	16.05 ± 6.01	11.95 ± 3.94	11.07 ± 2.57	15.77 ± 4.05	2.85 ± 0.70	4.05 ± 1.09
P/KW	23.00 (15.25-25.75)	11.00 (9.25-16.00)	15.00 (10.25-16.00)	12.00 (10.00-15.75)	3.93 (3.01-4.10)	4.90 (4.06-6.00)
	21.33 ± 6.74	13.00 ± 5.18	13.92 ± 2.76	11.99 ± 3.10	3.05 ± 0.18	5.17 ± 0.77
	17.00 (11.50-21.00)	17.00 (14.00-17.00)	13.00 (9.00-14.00)	10.00 (10.50-16.00)	2.69 (3.01-4.00)	5.00 (3.77-5.00)
	15.36 ± 6.09	15.90 ± 4.03	11.88 ± 2.90	10.05 ± 3.07	2.97 ± 0.65	4.00 ± 0.99
	$P < .001/$ KW = 22.034	$P = .420/$ KW = 4.085	$P < .001/$ KW = 28.501	$P = .062/$ KW = 8.075	$P = .077/$ KW = 9.015	$P = .791/$ KW = 2.052
Severity of pain	21.00 (15.00-25.00)	10.00 (7.50-15.50)	12.00 (10.50-16.00)	10.06 (6.00-15.00)	3.01 (3.70-4.50)	4.50 (4.50-5.50)
Moderate	19.03 ± 5.21	11.70 ± 4.80	11.02 ± 2.86	9.00 ± 3.87	3.85 ± 0.59	4.86 ± 0.90
Severe	18.00 (12.00-25.00)	15.00 (12.00-16.00)	10.02 (8.00-14.00)	13.00 (9.00-17.00)	3.99 (3.00-4.25)	4.75 (4.50-6.00)
Very severe	16.05 ± 6.08	13.05 ± 3.00	12.03 ± 3.58	12.02 ± 3.53	2.95 ± 0.77	5.00 ± 1.28
Intolerable	16.00 (11.00-22.00)	13.00 (11.00-18.00)	12.00 (9.00-16.00)	16.00 (11.00-19.00)	3.04 (3.00-4.75)	5.00 (4.50-6.00)
P/KW	15.57 ± 5.71	12.92 ± 3.80	10.05 ± 3.27	15.77 ± 4.60	3.74 ± 0.61	5.00 ± 1.04
	13.50 (5.00-18.00)	16.00 (13.00-18.00)	11.00 (7.00-15.00)	12.00 (8.00-15.00)	3.85 (3.07-3.94)	4.75 (4.25-5.50)
	12.01 ± 9.04	14.00 ± 2.30	10.88 ± 5.02	10.08 ± 3.71	3.37 ± 0.90	4.00 ± 0.80
	$P = .001/$ KW = 14.020	$P = .001/$ KW = 14.360	$P = .458/$ KW = 2.97	$P = .006/$ KW = 14.135	$P = .314/$ KW = 5.020	$P = .298/$ KW = 4.992
Patients control their own pain*	19.00 (12.00-24.00)	14.00 (10.00-17.00)	14.00 (8.00-16.00)	12.00 (9.00-15.00)	3.10 (3.00-4.60)	4.25 (4.00-5.95)
	17.00 ± 5.50	12.90 ± 2.08	13.75 ± 4.62	11.00 ± 3.20	3.26 ± 0.71	5.12 ± 0.91
Yes	16.00 (13.00-25.00)	13.00 (11.00-16.00)	13.00 (8.00-14.00)	13.00 (11.00-16.00)	3.90 (3.10-4.70)	5.10 (4.50-5.70)
No	15.00 ± 5.05	11.45 ± 3.07	12.04 ± 3.99	12.90 ± 3.21	4.00 ± 0.95	5.01 ± 1.44
P/KW	$P = .681/Z = -1.012$	$P = .630/Z = 1.214$	$P = .370/Z = -0.984$	$P = .537/Z = 0.980$	$P = .031/Z = 2.714$	$P = .888/Z = 0.570$
Pain is controlled by nurses*	10.00 (4.00-25.00)	13.00 (12.00-18.00)	9.00 (4.25-16.00)	15.0 (10.00-19.00)	3.00 (2.80-4.90)	3.60 (3.50-5.00)
	14.00 ± 9.60	14.00 ± 3.00	10.40 ± 5.17	14.93 ± 3.70	3.06 ± 0.18	3.95 ± 1.01
Yes	19.00 (13.00-24.00)	13.20 (10.00-16.00)	10.00 (9.00-15.)	13.50 (10.00-16.00)	2.02 (3.00-4.61)	4.30 (4.00-5.25)
No	17.05 ± 5.62	12.11 ± 3.70	9.84 ± 3.40	11.26 ± 3.00	2.07 ± 0.62	4.70 ± 0.68
P/Z	$P = .520/Z = 1.128$	$P = .440/Z = -0.921$	$P = .750/Z = 0.772$	$P = .045/Z = -1.870$	$P = .197/Z = 1.880$	$P = .461/Z = 1.008$
Pain is controlled by doctors*	16.00 (10.00-24.00)	13.00 (10.00-17.00)	12.00 (7.00-15.00)	12.00 (9.00-17.00)	3.75 (3.50-4.65)	4.50 (4.00-5.00)
	16.03 ± 7.50	12.05 ± 3.20	10.21 ± 3.26	12.62 ± 3.10	3.73 ± 1.05	4.01 ± 0.95
Yes	17.00 (13.00-24.00)	12.90 (9.00-16.00)	11.00 (8.00-14.00)	13.00 (10.00-15.00)	3.02 (3.50-4.50)	4.75 (4.50-5.75)
No	16.99 ± 5.50	12.57 ± 2.30	10.30 ± 2.74	12.00 ± 3.90	3.22 ± 0.87	4.23 ± 0.76
P/Z	$P = .783/$ Z = 0.976	$P = .700/$ Z = −0.871	$P = .674/$ Z = 0.903	$P = .260/$ Z = −2.180	$P = .143/$ Z = −1.983	$P = .601/$ Z = 1.255
Pain is controlled by God*	17.00 (13.00-23.00)	13.00 (11.00-17.00)	11.00 (9.00-14.00)	12.50 (10.00-15.00)	2.70 (2.00-4.90)	4.75 (4.00-5.50)
	17.25 ± 5.92	13.80 ± 4.60	11.20 ± 4.00	11.50 ± 3.68	2.00 ± 0.13	4.60 ± 0.71
Yes	17.25 (10.00-24.00)	12.90 (7.00-15.50)	10.50 (7.50-13.50)	12.00 (9.50-15.50)	3.00 (2.50-4.50)	4.25 (4.00-5.50)
No	17.00 ± 6.15	11.59 ± 3.83	11.50 ± 3.60	10.90 ± 4.03	3.05 ± 0.90	3.75 ± 1.89
P/Z	$P = .480/$ Z = −0.530	$P = .027/$ Z = −1.024	$P = .301/$ Z = −0.995	$P = .923/$ Z = −0.325	$P = .480/$ Z = −1.273	$P = .702/$ Z = −1.906

*Mann–Whitney U test.
†Kruskal–Wallis test.

The management of pain symptoms, which are common in palliative care patients, significantly affects the quality of care.[20] Knowing the relationship between pain beliefs and coping with pain may provide substantial benefits in the treatment of pain. Nurses should be aware of individual differences concerning pain and should not consider every patient to be the same. Nurses have critical roles in determining a specific method for each patient in pain management.[8,21]

Beliefs about the nature and treatment of pain may change with multidisciplinary pain management programs based on cognitive-behavioral interventions, and health professionals do not generally take the psychological and cultural components of pain into consideration, but tend to focus on its physiological causes.[21,22] It is important for nurses as members of healthcare teams to detect the problems of patients related to their pain beliefs in pain management early and to plan nursing interventions that consider patients' pain beliefs. For instance, patients who have low psychological beliefs scores may not benefit from nonpharmacological cognitive-behavioral methods of pain control.[8,21]

The patients' age, marital status, education levels, and income levels had no significant relationships with their organic and psychological pain beliefs scores. The female patients and patients who defined their family members as their caregivers had higher mean psychological pain beliefs scores, but this difference was not statistically significant. Koçoğlu and Özdemir[23] found that age, education level, and marital status had no relationship with organic beliefs scores. Babadağ et al.[18] found that females had higher psychological beliefs scores. Higher psychological beliefs scores suggest that female patients use cognitive-behavioral methods more. The female patients had higher self-management, conscious cognitive attempts, helplessness, and medical remedies scores, and this difference was statistically significant. Another study found that female patients had higher helplessness and medical remedies scores than male patients.[8] The literature emphasizes that cultural expectations, social responsibilities, and social roles affect female patients' coping with pain.[24] Care support by family members has a positive effect on patients' psychology and eases coping with pain.[25] This is thought to be the cause of the higher psychological beliefs scores of the patients who defined their family members as their caregivers.

In our study, a significant difference was found between patients' pain history and their scores for helplessness and medical remedies. There are similar results in the literature.[8] Nurses who have a significant role in pain management can have a positive effect on coping with pain when they consider patients' pain histories while planning nursing interventions.

The patients who used opioids had higher organic beliefs scores than those who did not. A study conducted with patients in algology clinics reported similar results.[8] The patients who used opioids had higher self-management scores and lower helplessness scores. This is thought to be related to negative and inaccurate beliefs about opioids (fears of their side effects and drug addiction). By giving information about opioids, nurses can have a positive effect on patients' pain beliefs.

The cancer patients had lower self-management scores than the cardiovascular disease patients. This may be due to the fact that cancer causes emotional distress and negative thoughts. The cancer patients had lower conscious cognitive attempts scores than those diagnosed with neurological diseases and had higher medical remedies scores than all the other groups. These results may be due to the fact that patients with cancer consider nonpharmacological methods ineffective for pain management. Healthcare teams should determine the factors that reduce pain tolerance, increase suffering, worsen cancer pain, cause opioid addiction, and negatively affect the pain treatment of cancer patients.[25]

The patients who believed that they control their own pain had lower organic beliefs scores. A significant difference was only found in the helplessness scores of patients who believed that pain is controlled by God. Helmes and Goburdhun[26] studied patients' beliefs about the control of pain (internal factors, external factors, and luck). They found that more belief in internal factors reduces helplessness, and more belief in external factors and luck increases helplessness. A significant difference was found in the medical remedies scores of the patients who believed that pain is controlled by nurses.[26] This may be due to the fact that the patients considered nurses to be effective in pain treatment. No significant difference was found in the scale scores of patients who believed that pain is controlled by doctors. Several studies have found that patients who believe that pain is controlled by God feel more helplessness in coping with pain.[8,18] This study's results support the claim that individuals feel helpless against pain when they believe that pain is controlled by external factors.[18]

The cancer patients had lower self-management scores than the cardiovascular disease patients. The cancer patients had lower conscious cognitive attempts scores than those diagnosed with neurological diseases and higher medical remedies scores than all the other groups. This may be due to the fact that the cancer patients had very severe levels of pain, are at risk of depression, and thus have difficulty coping with pain. A significant difference was found between the patients' severity of pain and the subscales of self-management, helplessness, and medical remedies. It is emphasized in the literature that changes in the severity of pain affect coping with pain.[27] This indicates that diagnosis and severity of pain should be considered in the extensive evaluation of pain.

A significant difference was found between self-management and conscious cognitive attempts scores of the patients with head-neck pain, back-lower back pain, arm-shoulder pain, and leg-knee pain. The results of this study are similar to those in the literature.[8,18] This may be related to the fact that most of the patients in palliative care were cancer patients. Of patients, 50%–80% have been reported to have frequent head-neck pain in their final years and to be unable to cope with this pain by themselves.[28] The differences between these study results may be due to a variety of sociodemographic and cultural factors. The results of this study are important because they are based on considering sociodemographic and pain-related variables, particularly diagnosis and gender, in the selection of methods of pain management.

In conclusion, higher organic beliefs scores have a positive effect on self-management and conscious cognitive attempts and a negative effect on helplessness. Higher psychological beliefs scores positively affect self-management. The evaluation of the pain, which is one of the main symptoms in palliative care, is the cornerstone of pain management. Pain management involves a variety of difficulties, including lack of effective communication between patients and nurse; psychological, cultural, and social barriers to the diagnosis of pain; and the fact that pain is a multidirectional and subjective concept. Nurses should determine the effects of patients' thoughts, beliefs, and sociodemographic differences on their pain and train patients

to cope with their pain by establishing effective communication with them. The planning and implementation of nursing pain management interventions should consider the relationships between the pain beliefs and pain coping strategies of patients.

Limitations of the Research

Since there is only one palliative care clinic in Malatya province, the fact that the study was conducted with 140 patients was considered as a limitation for this study.

Ethics Committee Approval: Ethical committee approval was received from the İnönü University Noninvasive Clinical Research Ethics Committee (approval number: 56150952/050.04-316).

Informed Consent: Both written and verbal informed consents were obtained from all participants who participated in this study.

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Knowledge, Perception, and Implementation of Personal Protective Measures by Citizens during the COVID-19 Outbreak in Northern Cyprus: A Cross-Sectional Survey

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BACKGROUND/AIMS
Severe acute respiratory syndrome coronavirus 2 has generated over 57 million cases of coronavirus disease 2019 (COVID-19) worldwide and has led to the implementation of strict measures in all countries. The aim of this study was to investigate the knowledge, attitude, and implementation status of personal protective measures (PPMs) by Northern Cyprus citizens and their access to personal protective equipment (PPE) during the COVID-19 outbreak.

MATERIAL and METHODS
This was a cross-sectional study based on internet-based survey. A total of 406 participants were recruited between May 1, 2020 and May 4, 2020 via authors' networks to complete a questionnaire. Participants were asked to indicate how often they implemented five PPMs recommended by the World Health Organization, their daily frequency of hand hygiene events, COVID-19 knowledge, and the availability of PPE in their hometown.

RESULTS
The prevalence of five PPMs was 65.0-95.6%, with the highest being hand hygiene and the lowest being avoiding touching the eyes, nose, and mouth. Gloves (86.2%), surgical masks (52.2%), and cloth face masks (47.3%) were the most commonly used PPE in public areas. Majority of responders were aware of the incubation time (90.4%) and indirect route of viral transmission (89.7%), whereas the knowledge of droplet (72.2%) and aerosol transmission (43.6%) was lower. Women washed their hands more frequently than men ($P = .008$), and the 15-54 age group was statistically more knowledgeable about transmission routes compared with >55 age group ($P = .003$). Knowledge was gained mainly through the social media and TV.

CONCLUSION
Overall, citizens implemented protective measures effectively and were strictly coherent to government-induced curfew and self-isolation measurements with a high public awareness.

Keywords: COVID-19, personal protective equipment, personal protective measures, citizens, Northern Cyprus

INTRODUCTION

Originated from Wuhan, China, in the late 2019, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the etiological agent of the coronavirus disease 2019 (COVID-19), has emerged as a significant threat to public health and has been declared as a pandemic by the World Health Organization (WHO), with over 57.8 million cases and 1.3 million deaths occurred worldwide as of November 22, 2020.[1] While SARS-CoV-2 was initially observed in East Asia, Europe consequently became the center of the pandemic,[2] followed by the United States and Latin America and is currently adversely affecting multiple African countries.

With the rapid surge in the number of people infected with SARS-CoV-2, WHO emphasized the urgent need to coordinate international collaborative efforts to minimize the threat in all affected countries in order to prevent the rapid spread of COVID-19.[3] While the battle against COVID-19 is ongoing, multiple measures have been taken by governments

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in an effort to slow down and mitigate the viral transmission of the respiratory virus SARS-CoV-2 in the local population, such as closing down schools; banning public gatherings/events; stopping mass movements via land, sea, and airports; imposing partial/full curfew; implementation of the social distance rules; and compulsory use of face masks. When formulating a health policy, key front-line workers within multidisciplinary teams should be a part of the policy planning to ensure that these policies function effectively. Indeed, government health education messages represent a key source of information for citizens for promoting their self-protective practices against respiratory infectious diseases. These preventive messages generally emphasize improved hygiene, face-mask use, and social distancing measures, including avoiding crowds during epidemics.[4] Although the decision-making and application of such measures by governmental bodies are essential for the control of a pandemic, the level of awareness and adherence of citizens to control measures is also crucial for the successful application of the aforementioned measures.

In the absence of an effective vaccine, public implementation of personal protective measures (PPMs) is fundamental. WHO has recommended five main PPMs against COVID-19: hand hygiene; social distancing measures; avoiding touching the eyes, nose, and mouth; practice of respiratory hygiene; and self-isolation.[5] While government-imposed social distancing measures alone have been estimated to delay a peak of cases, the combination of this intervention with self-imposed prevention measures such as handwashing and mask-wearing has been shown to further delay a large epidemic and buy time for healthcare systems to prepare for an increasing COVID-19 burden.[6] In a case–control study investigating the effectiveness of PPMs against SARS-CoV-2 infection including mask-wearing, handwashing, and social distancing, the consistent use of protective measures was found to be independently associated with lower risk for SARS-CoV-2 infection in the general public.[7] Evidence from the literature indicates that frequent hand-washing would reduce viral transmission risk by 55%,[8] and epidemiological studies have suggested that handwashing is an effective measure against SARS transmission in health care and community settings.[9] In a separate meta-analysis, regular hand hygiene was detected to have a protective effect against the 2009 influenza pandemic and was recommended as an effective measure to limit the transmission of pandemics.[10] Indeed, recent studies indicate that wearing masks, hand hygiene, and social distancing not only contribute to the prevention of COVID-19 but also lead to the decline of other respiratory infectious diseases such as influenza, enterovirus, and all-cause pneumonia.[11] Mask-wearing and instant hand hygiene together have been proposed to slow down the exponential spread of SARS-CoV-2.[12] While considered an important factor for reducing viral transmission, the incorrect use of face masks has also been reported during the COVID-19 pandemic, and compliance rates have been shown to be low in men and persons with low household incomes.[13] Interestingly, a cross-sectional study revealed that mask wearing was associated with a reduction in face-touching behaviors, particularly touching the nose, mouth, and eyes.[14]

Main Points

- The level of awareness and adherence of citizens to control measures during the pandemic is crucial for the prevention of COVID-19.
- Majority of North Cyprus citizens were aware of the incubation time for COVID-19 (90.4%) and indirect route of viral transmission (89.7%), whereas the knowledge of droplet (72.2%) and aerosol transmission (43.6%) was lower.
- The prevalence of the application of PPMs among citizens was between 65 and 95.6%, highest being handwashing and lowest being avoiding touching the eyes, nose, and mouth.
- Gloves (86.2%), surgical masks (52.2%), and cloth face masks (47.3%) were the most commonly used personal protective equipment (PPE) in public areas. Availability of PPE remained high during the pandemic in the country.
- North Cyprus citizens effectively implemented protective measures and were strictly coherent to government-induced curfew and self-isolation measurements with a high public awareness.

Another recommendation by WHO suggests that citizens should follow advice given by their healthcare provider or their national and local public health authorities in order to obtain information from a reliable source. The level of public adherence to control measures is affected by their knowledge, attitudes, and practices toward COVID-19, and it directly impacts the trajectory of the outbreak in a country. This is particularly valid during outbreaks, which, due to their evolving nature and inherent scientific uncertainties, can be associated with considerable fear in the general public, especially if illness or death rates are high. This was a phenomenon observed during the SARS outbreak in 2003, where studies conducted suggest that the level of panic emotions in the population is directly associated with their knowledge and attitudes toward the infectious disease.[15]

The first case of COVID-19 in Northern Cyprus was reported on March 9, 2020.[16] Consequent to the identification of the first case, a wide range of measures have been implemented by the government in order to prevent the spread of the virus. All schools and nonessential workplaces were immediately shut down; country borders were closed to all incoming noncitizen travelers, which was reopened on July 1 with the condition of 10 days of quarantine. Within the COVID-19 restrictions, large gatherings were banned, a full curfew from 21:00 PM to 06:00 AM was temporarily enacted, and mandatory use of face masks in public areas was implemented. As of November 24, 2020, a total of 1,062 cases and five COVID-19-related deaths have been reported in the country.[17] In order to facilitate outbreak management of COVID-19 in Northern Cyprus, there is an urgent need to clarify the public awareness of COVID-19 and their status of the implementation of the protective measures, as well as their access to personal protective equipment (PPE) during the COVID-19 pandemic. The aim of this study is to investigate the knowledge, attitude, and practices of Cypriot citizens toward COVID-19 and to measure their coherence to PPMs during the public health crisis.

MATERIAL and METHODS

Ethical Approval

This project was approved by Near East University Institutional Review Board, Project No: YDU/2020/80-1113. Respondent's

anonymity and confidentiality were ensured. The submission of the answered survey was considered as a consent to participate in the study.

Participants and Data Collection

This was a cross-sectional study conducted through an internet-based survey between May 1 and May 4, 2020. Partial curfew from 06:00 to 21:00 in Northern Cyprus began on April 1, 2020 and ended on May 4, 2020, while the implementation of the mandatory mask use in public areas began on April 24, 2020. Therefore, the survey dates represent a reliable time period for data collection on self-isolation and coherence to COVID-19 measures. As of May 1, the total number of reported COVID-19 cases in Northern Cyprus was 108.[18] A total of 406 citizens were randomly included in this study. Participants were recruited via authors' networks with local citizens living in Northern Cyprus. A recruitment poster with a link to the questionnaire was posted to online pages through the local COVID-19-related media as well as Facebook, emails, and WhatsApp, which contained information on the background, objective, voluntary nature of participation, indications of how to fill in the questionnaire, and the declarations of anonymity and confidentiality of participants. Citizens who indicated that they were unable to adhere to curfew measures due to the essentiality of their jobs (eg, fire brigade and policemen) were excluded from the study.

Measurement

Survey: The survey consisted two sections and 26 questions. Section 1 contained eight questions on demographic data, followed by 14 questions regarding the participants' knowledge and attitudes toward PPMs and COVID-19 in section 2. The survey was created by the researchers, and a piloting was performed before the survey was distributed.

Assessment of Sociodemographic Characteristics: The first part of the questionnaire consisted of the assessment of sociodemographic attributes, in which participants responded to demographic variables including gender, age, education status, occupation, current district of residency, smoking (smoker/nonsmoker), chronic disease (present/nonpresent), and seasonal influenza vaccination history (vaccinated/nonvaccinated).

Assessment of Knowledge on COVID-19: Participants were asked to answer questions regarding the transmission routes of SARS-CoV-2 among choices, including droplet, aerosol, and indirect transmission (touching contaminated surfaces and touching eyes, mouth, and nose) routes or indicate if they did not know the transmission route of infection. Participants also responded to a question on the incubation period for SARS-CoV-2. Among the choices 1-2 days, 2-4 days, 2-14 days, 27 days, and "I do not know the incubation period" were present.

Assesment of WHO Recommended Personal Protective Control Measures: Participants were asked to indicate which of the personal protective control measures including hand hygiene; social distance; avoiding touching nose, mouth, and eyes; and use of face mask they implemented during the pandemic and the frequency of implementation for each measure. For each option, the scale was designed as always, sometimes, rarely, and never. Participants also responded to a question which assessed their coherence to the curfew imposed by the local government, outside of their working hours, with a scale of always, generally, rarely, and never.

The application of PPE by ordinary citizens was evaluated. Individuals were asked to indicate which PPE they used in public areas such as supermarkets, with choices including gloves, surgical masks, vented masks, cloth masks, wrap/scarf, face shield, goggles, and "I do not use any PPE." Participants were also assessed if they applied hand hygiene before and after the PPE use and if they adhered to social-distancing rules while wearing face masks.

Assessment of Hand Hygiene Events per Day: Questions were designed to evaluate the hand hygiene measures applied by citizens. Individuals were initially asked which products they use when they apply hand hygiene and selected from various options including water, soap and water, alcohol-based hand sanitizer, pure alcohol, cologne with at least 70% alcohol content, wet tissues, or "I do not use any products." The number of hand hygiene events per day was also evaluated. Participants reported the mean number hand hygiene events based on soap and water and alcohol-based hand sanitizers per day.

Assessment of The Availability of PPE During The Pandemic: As the use of PPE and application of hand sanitation can be affected by their availability in a local town or city, participants were asked to report their access to these products during the pandemic. Participants responded to questions for the availability of masks, gloves, and hand sanitizers with a scale of always, generally, rarely, and never for each product.

Assessment of The Attitude Toward Healthcare Facilities During The Pandemic: The citizens were asked if, during the pandemic, they felt any reservation from visiting hospitals or any healthcare facility where they responded as yes or no. Additionally, participants were asked if they would go for a COVID-19 test in a mobile test center in a hospital carpark without leaving their car for which they responded as yes or no.

Assessment on The Source of COVID-19-Related Information: In this survey, the use of reliable source of personal protective procedures and the source of COVID-19-related updates by participants were evaluated. Individuals were asked to choose among WHO, Turkish Republic of Northern Cyprus Ministry of Health, Turkish Republic of Northern Cyprus Medical Association, newspapers, TV, and social media for the most commonly used source of personal protective procedures. Citizens also indicated the most commonly used sources of COVID-19-related updates among scientific articles, TV, radio, internet sites, newspapers, brochures/flyers, social media, family/friends/relatives, and WhatsApp group.

Statistical Analysis

Statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 23 (IBM SPSS Corp.; Armonk, NY, USA). Knowledge and attitudes and practices of different individuals according to demographic characteristics were compared using independent samples t test or Chi-square test as appropriate. Binary logistic regression analysis using demographic variables as independent variables and knowledge or practices as the outcome variable were conducted to identify factors associated with attitudes and practices. *P* value of .05 or less was considered as significant.

TABLE I. Demographic Characteristics of Participants

Participant characteristics		Number of participants, n (%)
Gender	Male	191 (47)
	Female	215 (53)
Age group (years)	15-20	8 (2)
	21-34	151 (37.2)
	35-44	99 (24.4)
	45-54	38 (9.4)
	55-64	86 (21.2)
	65+	24 (5.9)
Residential area	Kyrenia	71 (17.5)
	Nicosia	210 (51.7)
	Famagusta	63 (15.5)
	Trikomo	16 (3.9)
	Morphou	20 (4.9)
	Lefka	26 (6.4)
Education	Primary school	9 (2.2)
	Secondary school	22 (5.4)
	High school	72 (17.7)
	Bachelor's degree	202 (49.8)
	Master's degree or above	101 (24.9)
Smoking	Smoker	116 (28.6)
	Nonsmoker	290 (71.4)
Chronic disease	Yes	68 (16.7)
	No	338 (83.3)
Seasonal influenza vaccination	Yes	26 (6.4)
	No	380 (93.6)

RESULTS

A total of 406 participants (53% females) completed the survey questionnaire. The demographic characteristics of participants are shown in Table I. Participants belonged to a broad distribution of age range, residential areas across the country, and educational backgrounds. A large majority of the responders had a Bachelor's degree (49.8%) or higher (24.9%), 71.4% were nonsmokers, and 83.3% did not have any chronic disease.

Before the assessment of the implementation of PPMs by citizens, participants were asked two questions regarding the transmission routes and incubation time of COVID-19 in order to measure their level of knowledge of the disease, which may also affect their inclination to properly apply protective measures and PPE use. A striking 89.7% of the individuals responded with indirect transmission route for the disease, whereas 72.2 and 43.6% were aware of droplet and aerosol transmission routes, respectively (Figure 1a). There were no statistical differences between men and women in terms of their knowledge of all the three disease transmission routes (P = .089). When the age groups and their knowledge on transmission routes were analyzed, a statistically significant association was found in the age group 15-34 and 34-54 compared with the 55 and above (P = .046). This suggests that younger citizens were more knowledgeable about disease transmission compared with the elderly. Regarding the incubation time for COVID-19, a vast majority (90.4%) were aware of the 2-14 days of incubation time (Figure 1b). There was no statistically significant association between gender or age groups in terms of knowledge of disease incubation time. Binary logistic regression analysis showed that education levels of individuals and COVID-19 incubation time knowledge were not significantly associated (P = .915), suggesting that individuals at all education levels were knowledgeable about COVID-19, and that this knowledge was gained through educatory channels during the pandemic. However, there was a statistically significant difference between education level and transmission routes of the disease (P = .000), in which individuals with a bachelor degree or above had better knowledge and had a higher frequency of correct answers (Table 2). There were no statistical differences between individuals from different cities in terms of their knowledge of the incubation time (P = .997) or the transmission routes of COVID-19 (P = .427).

Figure 2a shows the prevalence of the application of WHO recommended PPMs against COVID-19 by the citizens. Data suggest that participants always implemented hand hygiene and social distancing in public areas with a prevalence of 96.5 and 82.6%, respectively, during the pandemic. Alternatively, 72.6 and 65.8% of individuals always implemented the use of face masks and avoided touching the nose, mouth, and eyes, respectively. Among all PPMs, hand washing was statistically the most applied measure (P = .001). In terms of PPE use, the mostly used equipment was gloves (86.2%), followed by face masks (52.2% surgical masks and 47.3% cloth masks). Types of

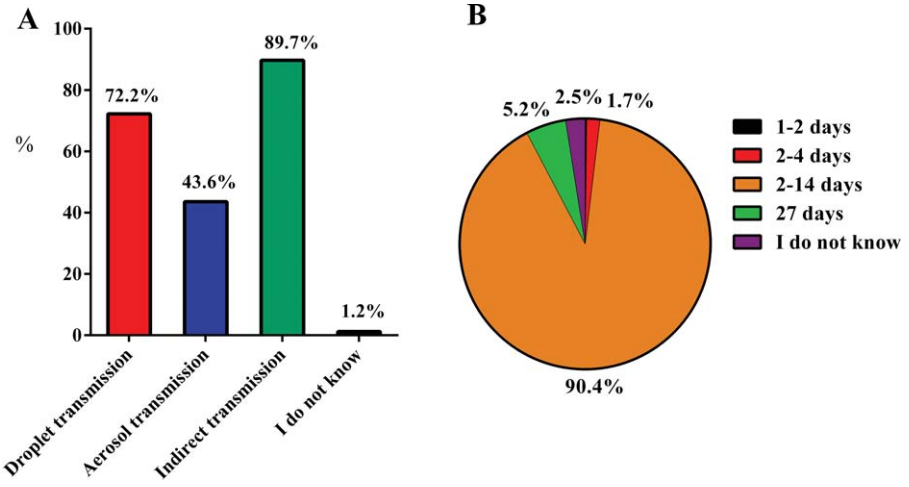

Figure 1. a,b. Participant knowledge on COVID-19 characteristics. (a) Participant knowledge on COVID-19 transmission routes (b) Participant knowledge on COVID-19 incubation time

TABLE 2. Association of Participant Education Level and Disease Knowledge/Adherence to PPMs

	Primary school	Secondary school	High school	Bachelor's degree	Master's degree or above	*P* value
Hand washing frequency						
0-6 times	3/9 (33.3%)	8/22 (36.4%)	16/72 (22.2%)	58/202 (28.7%)	16/101 (15.8%)	.085
>6 times	6/9 (66.7%)	14/22 (63.6%)	56/72 (77.8%)	144/202 (71.3%)	85/101 (84.2%)	
Antiseptic use frequency						
0-6 times	7/9 (77.8%)	15/22 (68.2%)	52/72 (72.2%)	159/202 (78.7%)	73/101 (72.3%)	.599
>6 times	2/9 (22.2%)	7/22 (31.8%)	20/72 (27.8%)	43/202 (21.3%)	28/101 (27.7%)	
Knowledge of transmission route						
Correct	0/9 (0%)	2/22 (9.1%)	12/72 (16.7%)	69/202 (34.2%)	51/101 (50.5%)	<.05
Incorrect	9/9 (100%)	20/22 (90.9%)	60/72 (83.3%)	133/202 (65.8%)	50/101 (49.5%)	
Knowledge of incubation time						
Correct	8/9 (88.9%)	19/22 (86.4%)	64/72 (88.9%)	183/202 (90.6%)	93/101 (92.1%)	.915
Incorrect	1/9 (11.1%)	3/22 (13.6%)	8/72 (11.1%)	19/202 (9.4%)	8/101 (7.9%)	
Use of face masks						
Yes	9/9 (100%)	22/22 (100%)	71/72 (98.6%)	198/202 (98.0%)	98/101 (97.0%)	.866
No	0/9 (0%)	0/22 (0%)	1/72 (1.4%)	4/202 (2.0%)	3/101 (3.0%)	

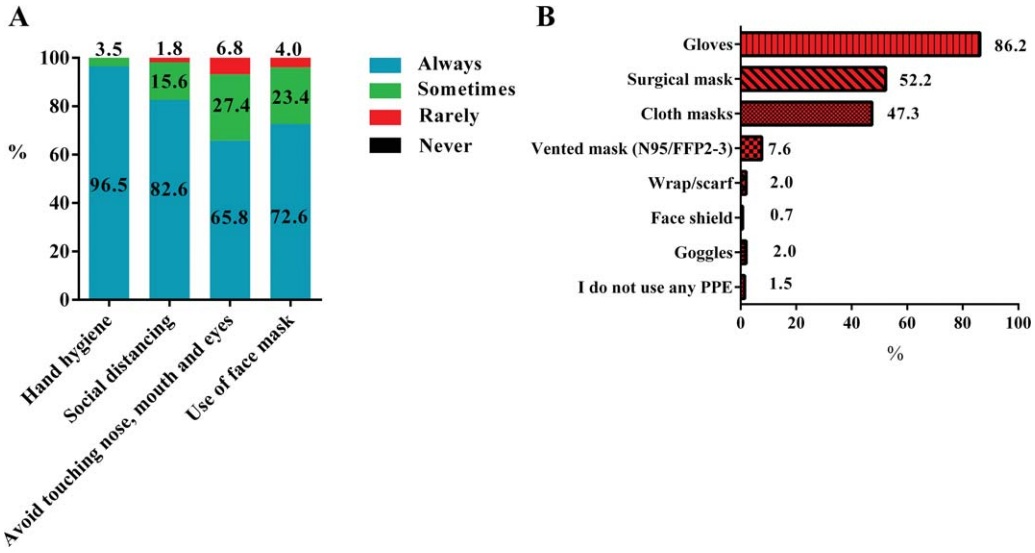

Figure 2. a,b. (a) Application frequency of personal protective measures recommended by WHO, (b) Use of personal protective equipment by participants

TABLE 3. Participant Coherence to Curfew Imposed by the Local Government

	Always, n (%)	Usually, n (%)	Rarely, n (%)	Never, n (%)
Coherence to curfew—self-isolation measures	323 (79.5)	79 (19.5)	2 (0.5)	2 (0.5)

PPE used by participants and their usage prevalence are shown in Figure 2b. When participants from different cities were evaluated in terms of the use of masks in public areas, the prevalence of citizens who applied all types of masks was found to be 94.4-100% in all cities with no statistical differences among them ($P = .084$). Similarly, no statistical association was found between education level and the use of masks ($P = .866$) (Table 2).

Of all the participants, adherence to hand hygiene before and after mask and glove use was 90.1 and 93.8%, respectively, indicated to practice 2-m social distancing while in public places using masks. Overall, citizens were coherent to curfew imposed by the local government (Table 3).

When participants were asked to indicate which hand hygiene products they used, majority indicated to use soap and water (95.6%), followed by hand sanitizer (81%) and cologne with at least 70% alcohol content (69%) (Figure 3a). Figure 3b and c shows the total number of hand hygiene events per day. A high proportion of citizens (47.3%) responded to wash their hands more than 10 times a day, while a high prevalence was observed for the application of hand sanitizer 1-3 times a day (37.9%) (Figure 3c). There was a statistically significant

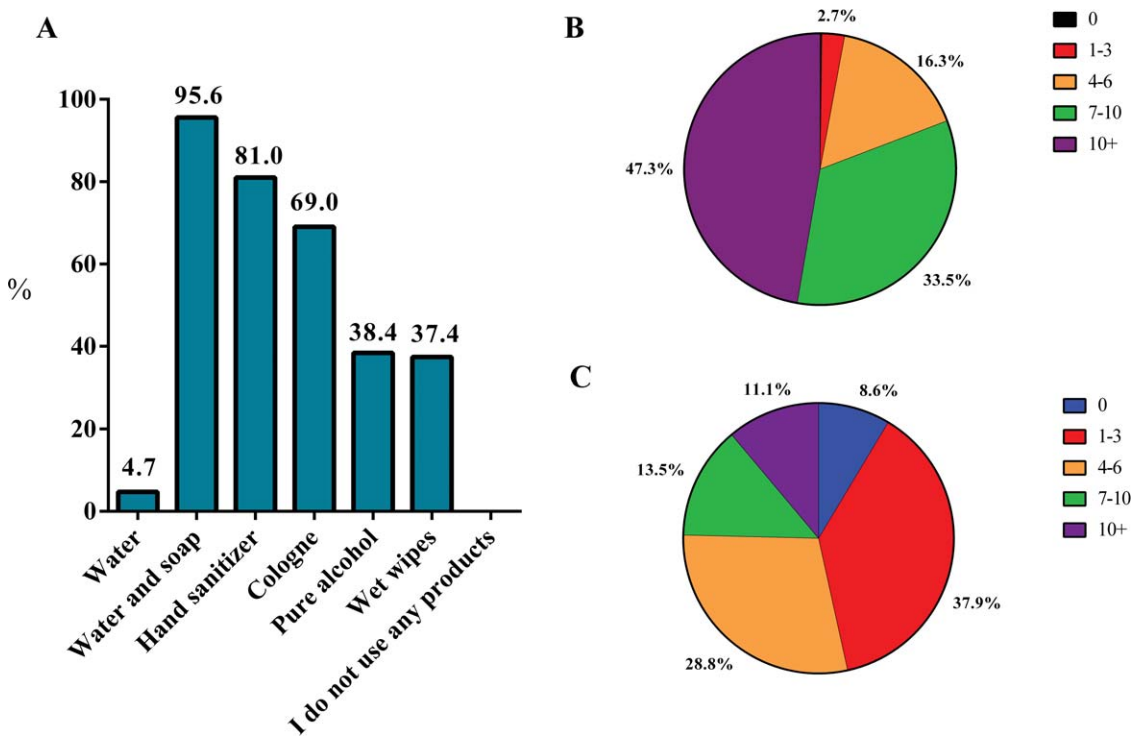

Figure 3. a-c. (a) The proportion of participants applying hand hygiene products, (b) Frequency of daily hand washing events, (c) Frequency of daily hand sanitation events

difference between age groups and hand washing frequency ($P = .046$), where individuals in age group 35-54 had a higher hand washing frequency (7 or more) compared with other groups. On the contrary, there was no statistically significant difference between age groups and frequency of hand sanitation application ($P = .159$). Interestingly, when the gender of the participants was analyzed, a statistically significant difference was observed in terms of hand-washing frequency, where women washed their hands (>6 times a day) more frequently than men ($P = 0.008$). There was no statistically significant association between gender and application of hand sanitizers ($P = .652$). In terms of demographics, our analysis showed that the distribution of individuals who had a hand washing frequency >6 times a day was 87.5% in Trikomo, 79.5% in Nicosia, 75.0% in Morphou, 70.4% in Kyrenia, 66.7% in Famagusta, and 65.4% in Lefka. Similarly, the distribution of antiseptic use frequency >6 times a day was 31.3% in Trikomo, 30.8% in Lefka, 28.2% in Kyrenia, 25.4% in Famagusta, 22.4% in Nicosia, and 20.0% in Morphou. There were no statistically significant differences between different cities in terms of hand hygiene events as shown in Table 4 (hand washing, $P = .153$; antiseptic use, $P = .820$).

When the local availability of PPE for the participants was assessed, masks, gloves, and hand sanitizer were found accessible to public use at a large extend. However, although less than 25%, some of the participants were rarely or never able to find these PPE products available at the pharmacies or supermarkets during the pandemic (Figure 4).

Majority of citizens (82%) indicated that during the pandemic, they felt reservation from visiting hospitals or healthcare facilities. Additionally, 84.2% of the participants responded that they would be comfortable with going for a COVID-19 test in a mobile test center in a hospital carpark without leaving their car. Binary logistic regression analysis showed that education levels of individuals and having a COVID-19 test in a mobile test center were not significantly associated ($P = .266$),

TABLE 4. Association of Demographics and Participant Hand Hygiene Events

	0-6 times	>6 times	*P* value
Hand washing frequency			
15-34	47/159 (29.6%)	112/159 (70.4%)	<.05
35-54	24/137 (17.5%)	113/137 (82.5%)	
>55	30/110 (23.7%)	80/110 (72.5%)	
Male	59/191 (30.9%)	132/191 (69.1%)	<.01
Female	42/215 (19.5%)	173/215 (80.5%)	
Kyrenia	21/71 (29.6%)	50/71 (70.4%)	
Nicosia	43/210 (20.5%)	167/210 (79.5%)	
Famagusta	21/63 (33.3%)	42/63 (66.7%)	.153
Trikomo	2/16 (12.5%)	14/16 (87.5%)	
Morphou	5/20 (25.0%)	15/20 (75.0%)	
Lefka	9/26 (34.6%)	17/26 (65.4%)	
Antiseptic use frequency			
15-34	114/159 (71.7%)	45/159 (28.3%)	
35-54	102/137 (74.5%)	35/137 (25.5%)	.159
>55	90/110 (81.8%)	20/110 (18.2%)	
Male	142/191 (74.3%)	49/191 (25.7%)	.652
Female	164/215 (76.3%)	51/215 (23.7%)	
Kyrenia	51/71 (71.8%)	20/71 (28.2%)	
Nicosia	163/210 (77.6%)	47/210 (22.4%)	
Famagusta	47/63 (74.6%)	16/63 (25.4%)	.820
Trikomo	11/16 (68.8%)	5/16 (31.3%)	
Morphou	16/20 (80.0%)	4/20 (20.0%)	
Lefka	18/26 (69.2%)	8/26 (30.8%)	

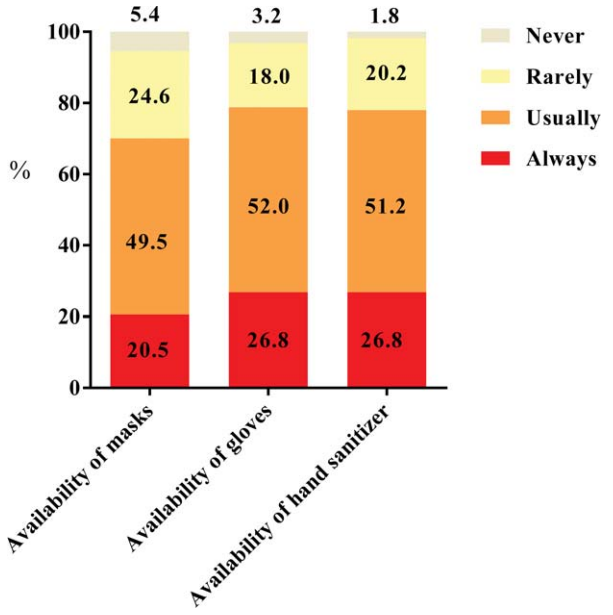

Figure 4. The prevalence of personal protective equipment availability

TABLE 5. The Source of COVID-19-Related Information and Personal Protective Measures

Source of personal protective procedures	**n (%)**
Social media	299 (73.6)
TV	224 (55.2)
T.R.N.C. Ministry of Health	195 (48.0)
World Health Organization	174 (42.9)
T.R.N.C Medical Association	102 (25.1)
Newspaper	21 (5.2)
Source of COVID-19 information	**n (%)**
Social media	290 (71.4)
TV	288 (70.9)
Internet sites	278 (68.5)
Scientific articles	83 (20.4)
Newspaper	40 (9.9)
Family/friends/relatives	40 (9.9)
WhatsApp group	23 (5.7)
Radio	16 (3.9)
Brochures/flyers	4 (1)

suggesting that individuals at all education levels were comfortable with having a COVID-19 test in a mobile test center.

Based on the responses, the mostly used source of COVID-19-related information was social media (71.4%) and TV (70.9%), while only a minority of citizens used newspapers, scientific articles, and brochures/flyers. The same pattern was also observed for information on personal protective procedures (social media 73.6% and TV 55.2%), followed by more reliable sources such as WHO, T.R.N.C. Ministry of Health, and T.R.N.C. Medical Association used at a lesser extend (Table 5).

DISCUSSION

In the course of a pandemic, the implementation of PPMs represents an important factor for the control of the outbreak and has been shown to have significant protective effects associated.[10] This study was designed to assess the knowledge, attitudes, and implementation status of PPMs by the citizens in Northern Cyprus between May 1 and May 4, 2020. The survey period covers an important time period amid COVID-19 pandemic in which all preventive measures enforced by the local government in Northern Cyprus were in place, and the curfew was still ongoing and, therefore, provides a timely assessment. Overall, 70-90% of the individuals surveyed were knowledgeable about the droplet and indirect transmission routes of disease transmission, whereas the citizens were aware of the more recently described aerosol route of transmission[19] at a lesser extent, approximately 44%. The survey responders also demonstrated a 90% knowledge of the incubation period for COVID-19, demonstrating a high comprehension of disease characteristics during the pandemic. In a different study conducted among in Cyprus, healthcare workers were found to have a satisfactory level of knowledge of the virus.[20] Interestingly, in our study, younger citizens were statistically more knowledgeable about the disease transmission routes compared with the elderly population above age 55. Recent surveys on public knowledge on COVID-19 in China, where the pandemic has emerged, demonstrated an overall 90% correct rate on a COVID-19 knowledge test, which included questions on main clinical symptoms, viral transmission, observation period, and age groups affected.[21] In a separate study, where the responders were asked question regarding the origin, common signs and symptoms, sources of infection of COVID-19, and awareness of any other pandemic viral infection, the knowledge level of individuals varied according to the profession.[22] Cross-sectional studies from various countries have showed that there are regional disparities in the attitude toward preventive measures and knowledge of COVID-19.[23-27]

WHO and its recommendation of five PPMs against COVID-19, namely, hand hygiene; social distancing measures; avoiding touching the eyes, nose, and mouth; use of face masks; and self-isolation, have been taken as a reference by all countries and were communicated to the citizens via local health authorities in each country. Of these measures, the prevalence of hand hygiene and social distancing was the highest and respiratory etiquette was high, whereas the prevalence of avoiding touching nose, mouth, and eyes was the lowest among Northern Cyprus citizens. Interestingly, our study results indicated that women statistically washed their hands more frequently than men. Compared with a recent a study conducted in Japan, with hand hygiene being the highest with 83.8% and the lowest being avoiding touching eyes, nose, and mouth with 59.8%, the prevalence of PPM application was overall higher in Northern Cyprus.[28] Similarly, in a population survey performed in the United Kingdom with the age group of 18+ individuals, the prevalence of respondents taking the aforementioned measures to protect themselves and others from COVID-19 was comparably much lower with face mask implementation being as low as 3% and hand washing being highest with 83%.[29] Alternatively, in a study conducted in Hong Kong, enhanced personal hygiene practices were adopted by more than 77% of citizens.[30] Medical students, on the other hand, have been shown to adopt social isolation strategies, regular hand washing, and enhanced personal hygiene measures at a rate of more than 80%.[31] To a surprising extend, Machida et al.[32] reported a significant improvement in the implementation of PPMs and social distancing measures in particular, during the

community transmission phase compared to the early phase of the COVID-19 outbreak.

The recommendation on the use of face masks by citizens in public areas has been controversial. In a guidance report dated January 29, 2020, the WHO recommendation was for only individuals with respiratory symptoms to wear a medical mask to avoid unnecessary cost, procurement burden, and false sense of security.[33] WHO additionally published interim guidance report on the rational use of PPE for COVID-19, which recommended the use of vented masks (respirators) only for frontline healthcare workers in order to optimize the PPE availability.[34] However, health authorities in parts of Asia encouraged all citizens to wear masks in public setting, and the Czech Republic applied mandatory use of face masks to prevent viral spread in the community.[35] The Centers for Disease Prevention and Control has also recommended the use of cloth face coverings or cloth masks in public settings with particular risk of community-based transmission.[36] In Northern Cyprus, the mandatory use of face masks was implemented by the local government on April 24, 2020. In the Cypriot community, the practice of surgical mask and cloths mask use was 47-52% and approximately 8% for vented masks, indicating a good adherence to government measures against COVID-19 with some room for improvement. In our study, there were no statistical associations between educational level or geographical regions and the use of face masks. In an online survey conducted in China where the pandemic began, 96.9% of the participants indicated that they use a mask when going to the hospital.[37] In Japan, the prevalence of wearing masks was 80.9%.[13] Indeed, government mandates for face mask use in community has been demonstrated to be associated with a decline in the daily COVID-19 growth rate in the United States.[38]

During the early phase of the pandemic, a major demand of face masks, gloves, and hygiene products arose mainly due to the panic caused by the outbreak, and it has led to the exhaustion of local hygiene products and PPE as well as a steep rise in prices in many countries.[39] A recent study has indicated a correlation between the spread of COVID-19 and the search for PPE and hand hygiene, which can, to a certain extent, show people's concerns, behaviors, and reactions to sanitary problems and protection recommendations.[40] In Northern Cyprus, the shortage of gloves, face masks, and hand sanitizers was reported by 21-30% of the citizen, who indicated they could never find certain PPE types available. In terms of the source of information used by people to gather knowledge about COVID-19, some studies suggested that social media and internet are among the most commonly used sources,[29,41] whereas people also had a tendency of acquiring information and advice from TV and local health authorities which they expressed as more reliable.[30] The Cypriot citizens' choice of COVID-19 information and advice on PPMs were similar to previous studies with TV, social media, and local health authorities such as Ministry of Health and Medical Association being represented on top of the list.

As the current study was based on an online survey, there are certain limitations. There can be differences among participants in terms of their understanding and interpretation of the questions. Furthermore, due to the collection of data at a single point in time with the survey, it is difficult to measure changes in the population over time, for instance, from the beginning of outbreak through the pandemic.

CONCLUSION

In conclusion, the knowledge of the disease characteristics, the practice of PPMs, and coherence to government-induced protective measures were high in Cyprus citizens. This is believed to have advantageous effects on the control of the outbreak in the country.

Ethics Committee Approval: Ethical committee approval was received from the Near East University (YDU/2020/80-1113).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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Nomogram of Fetal Cisterna Magna Width in the Second Trimester of Pregnancy

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BACKGROUND/AIMS
We aimed to determine the normal value interval for the Turkish population by measuring the cisterna magna width of fetuses in the 18-24th weeks of gestation and to determine the correlation of cisterna magna width with gestational week, maternal age, maternal body mass index, and fetal parameters.

MATERIAL and METHODS
This study included 1,236 healthy fetuses in the 18-24th gestational week of cases aged from 18 to 40 years. The cisterna magna width, biparietal diameter, femur length, and abdominal circumference of the fetuses were measured. Additionally, groups were divided according to the maternal age and body mass index.

RESULTS
The cisterna magna width of fetuses from 18 to 24 weeks of gestation was identified to vary from 3.84 ± 0.57 to 5.25 ± 0.83 mm. Additionally, the mean and standard deviation of cisterna magna width and fetal parameters were determined according to the gestational week, maternal age, and maternal body mass index. Later, the correlations of cisterna magna width with pregnancy week, maternal age, maternal body mass index, and fetal parameters were examined. Cisterna magna width was correlated with pregnancy week and fetal parameters ($P < .01$) but was not correlated with maternal age ($P > .01$). Additionally, cisterna magna width and fetal parameters were determined to show negative correlation with maternal body mass index ($P < .01$).

CONCLUSION
We believe our data related to the cisterna magna width obtained at the end of the study will be beneficial for the assessment of fetal development and identification of fetal anomalies.

Keywords: Cisterna magna, pregnancy, ultrasonography

INTRODUCTION

The central nervous system developed from neural plates forming by thickening of the ectoderm layer after the 5th week of pregnancy. The cisternae are larger cavities than the subarachnoid structures. The cisternae have more cerebrospinal fluid accumulation than other regions in the central nervous system. The main cisternae are the cisterna magna, pontine, interpeduncular, and chiasmatic. The cisterna magna is the largest of these, and the localization is the internal face of the cerebellum in the posterior fossa between the dorsal section of the medulla oblongata and the roof of the fourth ventricle.[1-4] There is a communication with the fourth ventricle through the foramen Magendie and Luschka.[4]

In the fetal period, assessment of the posterior fossa is important in terms of evaluating the nervous system.[1,4-7] Many different malformations such as the Arnold–Chiari malformation, Dandy–Walker syndrome, mega cisterna magna, arachnoid cyst, and vermis hypogenesis or hypoplasia may occur.[1-8] As the cerebellar vermis has not fully developed in the

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TABLE I. Mean and Standard Deviation (mm) of Cisterna Magna width and Fetal Parameters According to Week of Pregnancy

Gestational weeks	N	Cisterna magna width	BPD	FL	AC
18	112	3.84 ± 0.57	43.30 ± 4.81	27.98 ± 4.17	142.03 ± 18.28
19	117	4.06 ± 0.73	46.34 ± 3.76	32.28 ± 3.52	153.81 ± 13.27
20	118	4.45 ± 0.75	47.61 ± 3.18	33.61 ± 2.44	156.02 ± 10.14
21	436	4.70 ± 0.85	50.22 ± 2.93	35.64 ± 2.34	164.50 ± 10.36
22	241	4.96 ± 0.82	52.83 ± 2.75	37.77 ± 2.30	173.45 ± 10.44
23	104	5.00 ± 0.80	55.60 ± 2.97	40.43 ± 2.34	183.12 ± 10.73
24	108	5.25 ± 0.83	58.90 ± 3.91	43.87 ± 2.77	200.24 ± 33.21
Total	1236	4.66 ± 0.89	50.69 ± 5.24	35.97 ± 4.77	167.08 ± 20.83

$P < .05$: difference between weeks for all parameters (apart from cisterna magna width parameter between weeks 18-19, 22-23 and 23-24 and AC parameter between weeks 19-20).

second trimester, observation of this region in the early weeks may lead to mistaken assessments. As a result, full assessment of the cisterna magna and posterior fossa should not be performed before the 18th week of gestation.[2]

Normal cisterna magna width is stated to be between 2 and 10 mm.[1,2,9] In situations where the cisterna magna is smaller than 2 mm or is not observed, it may mean malformations like neural tube defects, and Arnold–Chiari 2 are observed.[2,8,10] In situations of mega cisterna magna where the cisterna magna width is larger than 10 mm, it is stated that structural and chromosomal anomalies like arachnoid cyst and Dandy–Walker malformations may be seen.[2,5,8,9,11,12] As a result, anterior–posterior length measurement of the fetal cisterna magna performed in the second trimester of pregnancy is an important parameter in terms of identifying abnormalities of the posterior fossa.[1]

There are radiologic studies performed related to the fetal cisterna magna morphometry during the pregnancy.[1-13] These studies have taken morphometric measurements like cisterna magna length, width, and anterior–posterior diameter, and developmentally assessed the cisterna magna and neighboring structures belonging to the nervous system.[1-13]

Different to other studies, we aimed to determine the normal value interval for the Turkish population by measuring the cisterna magna width of fetuses from 18 to 24 weeks of gestation and to determine the correlation of the cisterna magna width with gestational week, maternal age, maternal body mass index, and the fetal parameters of biparietal diameter (BPD), femur length (FL), and abdominal circumference (AC).

MATERIAL and METHODS

This study was completed retrospectively using screening files recorded in Radiology Clinic from January 1, 2017 to December 31, 2017. This study included 1,236 healthy fetuses from 18 to 24 weeks of gestation of pregnant cases aged from 18 to 40 years (mean: 28.70 ± 5.26). Pregnant cases with any chronic or systemic disease and fetuses with chromosome anomalies or developmental retardation were not included in the study. An informed oral consent was obtained from all participants. Permission to conduct this study was granted from the ethics committee of the Ankara Yıldırım Beyazıt University Faculty of Medicine (date: December 19, 2018, protocol no: 280).

Later, the cisterna magna width, BPD, FL, and AC parameters of the fetuses were recorded. Additionally, pregnant cases were divided into five groups according to the age, 20 years or younger (n: 60), 21-25 years (n: 327), 26-30 years (n: 409), 31-35 years (n: 304), and older than 35 years (n: 136), and body mass index, 20 or less (n: 475), 20-24.99 (n: 406), 25-29.99 (n: 234), 30-34.99 (n: 57), and 35 or higher (n: 10).

Statistical Analysis

Using the Statistical Package for the Social Sciences (SPSS) version 17.0 (SPSS Inc.; Chicago, IL, USA) statistical program, mean and standard deviation of parameters according to the gestational age and groups were determined. Statistical comparisons within and between the groups used the t test. The correlations between parameters and gestational age and groups were determined using the Pearson correlation test. For statistical analyses, the significance level was taken as $P < .05$. P values obtained are given in the results section and under the relevant tables.

RESULTS

In this study, the mean age of pregnant cases was 28.70 ± 5.26 (18-40) years. Later, cisterna magna width and fetal parameters had mean and standard deviations determined according to the gestational week, maternal age, and maternal body mass index groups (Tables 1-3). Comparison of cisterna magna width with fetal parameters (apart from cisterna magna width parameter between the weeks 18 and 19, 22 and 23, and 23 and 24, and AC parameter between weeks 19 and 20) according to the gestational week observed differences between the weeks ($P < .05$; Table 1). Comparison of maternal age with maternal body mass index (apart from BPD and FL parameters in groups 1 and 3) did not observe differences between the groups ($P > .05$; Tables 2 and 3). Additionally, the correlations between cisterna magna width and pregnancy week, fetal parameters, maternal age, and maternal body mass index were examined. Cisterna magna width was correlated with pregnancy week and fetal parameters ($P < .01$, Table 4 and Figure 1) but not correlated with maternal age ($P > .01$, Table 4 and Figure 2). Additionally, there were negative correlations determined between cisterna magna width and fetal parameters with maternal body mass index ($P < .01$, Table 4 and Figure 3).

DISCUSSION

In the fetal period, assessment of the posterior fossa is important in terms of evaluating the nervous system.[1,4-7] Because various malformations occur in this region, these malformations have variable prognosis. As a result, definite diagnosis and the determination of the localization of these malformations are

TABLE 2. Mean and Standard Deviation (mm) for Cisterna Magna Width and Fetal Parameters According to Maternal Age Groups

Maternal age	N	Cisterna magna width	BPD	FL	AC
Group 1 (≤20 years)	60	4.56±0.82	50.20±5.17	35.53±4.81	165.61±18.95
Group 2 (21-25 years)	327	4.68±0.86	50.60±5.42	35.81±4.66	166.93±19.95
Group 3 (26-30 years)	409	4.68±0.93	50.62±5.25	35.90±4.95	167.01±18.49
Group 4 (31-35 years)	304	4.67±0.85	50.79±5.19	36.06±4.84	167.28±24.33
Group 5 (>35 years)	136	4.65±0.89	51.02±5.03	36.41±4.40	167.83±16.11
Total	1236	4.66±0.89	50.69±5.24	35.97±4.77	167.08±20.83

P > .05: no difference between groups for all parameters.

TABLE 3. Mean and Standard Deviation (mm) for Cisterna Magna Width and Fetal Parameters According to Maternal Body Mass Index Groups

Maternal BMI	N	Cisterna magna width	BPD	FL	AC
Group 1 (< 20)	475	4.70±0.89	51.06±4.63	36.43±4.12	168.40±17.13
Group 2 (between 20-24,99)	460	4.68±0.90	50.84±5.46	36.14±5.55	166.87±19.00
Group 3 (between 25-29,99)	234	4.66±0.87	50.49±6.41	35.91±4.94	165.96±22.17
Group 4 (between 30-34,99)	57	4.60±0.91	49.82±5.46	35.21±5.24	165.45±28.92
Group 5 (≥35)	10	4.19±1.04	48.60±7.66	33.80±7.06	158.30±26.16
Total	1236	4.66±0.89	50.69±5.24	35.97±4.77	167.08±29.83

P > .05: no difference between groups for all parameters (apart from BPD and FL parameters in group 1 and group 3).

TABLE 4. Correlation between Cisterna Magna Width and Other Parameters

	Age	BMI	Week	BPD	FL	AC	Cisterna magna width
Age	1						
BMI	0.116**	1					
Week	0.014	−0.073*	1				
BPD	0.021	−0.079**	0.771**	1			
FL	0.033	−0.083**	0.814**	0.876**	1		
AC	0.018	−0.060	0.685**	0.805**	0.798**	1	
Cisterna magna width	0.003	−0.046	0.435**	0.484**	0.487**	0.416**	1

*$P < .05$.
**$P < .01$.

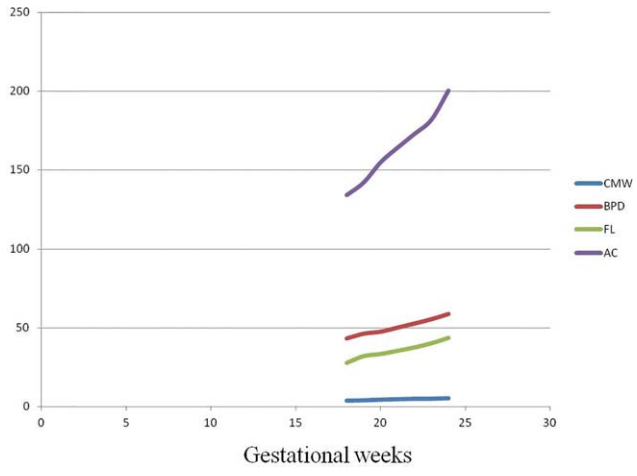

FIGURE 1. Correlation between cisterna magna width (CMW) and fetal parameters in gestational weeks

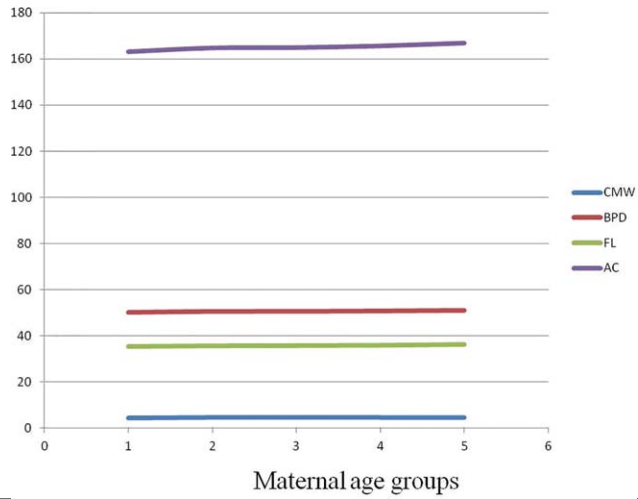

FIGURE 2. Correlation between cisterna magna width (CMW) and fetal parameters in maternal age groups

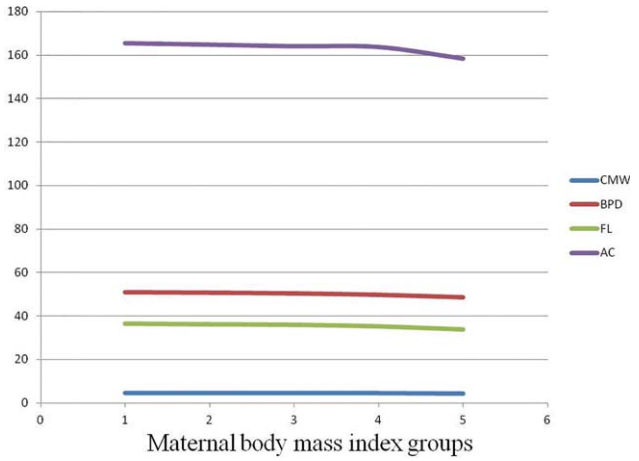

FIGURE 3. Correlation between cisterna magna width (CMW) and fetal parameters in maternal body mass index groups

necessary in terms of monitoring the development of the fetus.[1,4-8]

In our study, first, the mean and standard deviation according to the gestational week were determined for the cisterna magna width of 1,236 fetuses from the 18 to 24th week of gestation. As a result of the study, we identified the mean cisterna magna width was 4.66 ± 0.89 mm (varying from 3.84 ± 0.57 to 5.25 ± 0.83 mm) (Table 1). When we examine previous studies, Araujo Júnior et al.[1] in a study of 3,862 fetuses from 18 to 24 weeks stated the mean cisterna magna width was 4.29 ± 0.93 mm (varying from 2.60 to 7.00 mm). Arısoy and Yayla[2] studied 1,822 fetuses from 15 to 24 weeks of gestation and stated the mean cisterna magna width was 5.44 ± 1.28 mm (varying from 3.41 to 6.58 mm). Koktener et al.[7] stated the mean cisterna magna width was 3.84 ± 0.89 mm (varying from 2.88 to 5.90 mm) in a study of 194 fetuses from 16 to 24 weeks of gestation. A study of 160 fetuses from 16 to 38 weeks of gestation by Serhatlioglu et al.[8] determined the mean cisterna magna width was 4.8 ± 1.4 mm in the second trimester and 6.5 ± 1.4 mm in the third trimester. Tao et al.[9] in a study of 337 fetuses from 22 to 38 weeks of gestation stated the mean cisterna magna width was 8.01 ± 1.79 mm (varying from 5 to 14 mm). As in the results of other studies, in our study, we identified the cisterna magna width increased during the weeks of gestation. We interpret this result as showing that the cisterna magna width continues to develop through the gestational weeks and development continues after birth to complete in later periods. In our study, we observed some differences in cisterna magna width values we measured through the pregnancy weeks, compared to the cisterna magna width values obtained in other studies. However, when we compare our study data with other study results from the 18 to 24-week period, we did not determine a significant difference ($P > .05$). We interpreted the difference between cisterna magna width values in the studies as due to different gestational weeks, populations and case numbers, cases not focused on defined weeks, due to the person measuring, or device used for measurements.

Additionally, we determined the mean and standard deviation of cisterna magna width according to the maternal age and maternal body mass index. We did not encounter this parameter in other studies related to the cisterna magna width. The results of the study determined that the cisterna magna width increased until the age of 30 and decreased after the age of 30 (Table 2 and Figure 2), and that as the body mass index increased, the cisterna magna width decreased (Table 3 and Figure 3). Additionally, comparing the cisterna magna width between maternal age and maternal body mass index groups, we did not identify a statistical difference ($P > .05$, Tables 2 and 3). We interpreted this result as showing that the cisterna magna development is positively affected until maternal age 30 and is negatively affected after the age of 30, while maternal body mass index negatively affected the fetal cisterna magna development.

Later in our study, we determined the mean and standard deviation of fetal parameters like BPD, FL, and AC according to the gestational week, maternal age, and maternal body mass index (Tables 1-3). Fetal parameters increased during the gestational weeks, and comparing the weeks, we determined differences between the weeks (apart from the AC parameter for 19th and 20th weeks) ($P < .05$, Table 1 and Figure 1). We identified a very low amount of increase in the maternal age groups, with no difference when groups were compared ($P > .05$, Table 2 and Figure 2). For maternal body mass index groups, there was a reduction in fetal parameters, but we observed no significant difference when groups were compared (apart from BPD and FL parameters between groups 1 and 3) ($P > .05$, Table 3 and Figure 3). We interpret the data obtained as a result of our study as that pregnancy week and maternal age positively affect fetal parameters, while maternal body mass index negatively affects them.

When we examine previous studies, the correlation between cisterna magna width and BPD and HC was examined.[2,7] Different to other studies, our study added FL and AC to BPD and examined the correlation with cisterna magna width. Other study results stated there were correlations between cisterna magna width and BPD and HC.[2,7,8] We observed a positive correlation between cisterna magna width and BPD, FL, and AC in the results of our study (Table 4). Arısoy and Yayla[2] stated the BPD and HC were better correlated with cisterna magna width than gestational week. Koktener et al.[7] stated that BPD and gestational week were correlated with cisterna magna width to the same degree. In our study, we determined that BPD and FL were better correlated with cisterna magna width compared to gestational week and AC. We interpret this result as showing that fetal parameters and cisterna magna width increase in correlated fashion during the fetal development process.

Cisterna magna width shows a linear increase from the 16 to 24th weeks of pregnancy. This increase is closely associated with BPD, HC, AC, and FL. Assessment of the cisterna magna width in the fetal development period is important in terms of early diagnosis of anomalies and defects in the posterior fossa and neighboring organs. When evaluating the cisterna magna width, the gestational week should be noted, and in situations with excessive values related to the cisterna magna width obtained, systemic examination should be performed to assess fetal development. Additionally, cisterna magna length of 10 mm is used as a standard marker of posterior fossa fetal anomalies.[3,5,12] If the cisterna magna is small or absent, it

indicates that malformations such as spina bifida and Arnold Chiari 2 may be observed in the fetus.[2,10] In situations where the cisterna magna is wide (≥10 mm), it indicates that anomalies such as trisomy 18, Dandy–Walker syndrome, cyst in the fourth ventricle, lack of cerebellar vermis, and hydrocephalus may be observed.[2,5,7] As a result, it is necessary to routinely examine the posterior fossa and cerebellum structure in terms of fetal development.

There are some limiting aspects to our study; our study is a retrospective study of 1,236 fetuses. Additionally, as our study involved fetuses with normal development, no comparison was made in relation to fetuses with chromosomal anomalies and development retardation.

The results of studies emphasize that cisterna magna width is important in terms of assessing the posterior fossa, cerebellum, nervous system, and fetal anomalies.[1-13] In conclusion, we believe cisterna magna width is an important parameter that should be examined with routine measurements in terms of assessing fetal development. Additionally, we think multicenter studies are required to assess more fetuses and to compare ethnic groups and normal fetuses with anomalous fetuses to provide more reliable and accurate results.

Ethics Committee Approval: Ethical committee approval was received from the Ankara Yıldırım Beyazıt University Faculty of Medicine (date: December 19, 2018, protocol no: 280).

Informed Consent: Verbal informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - R.D., A.F.Y.; Design - R.D.; Supervision - K.D., M.G.; Resources - R.D., A.F.Y.; Materials - A.I.; Data Collection and/or Processing - A.I., M.G.; Analysis and/or Interpretation - R.D., K.D.; Literature Search - K.D.; Writing Manuscript - R.D., A.F.Y.; Critical Review - A.I., M.G.

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The Knowledge of Pain Management among Nursing Students

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BACKGROUND/AIMS
The aim of this study was to investigate the pain management knowledge of nursing students.

MATERIAL and METHODS
The sample of this study that was undertaken in descriptive design consisted of nursing department students of whom language of education was Turkish and English. To collect data, the study used a data collection form that was developed by the researchers between January and February 2018. In the evaluation of data, mean value, standard deviation, numbers, frequency analysis, Kolmogorov–Smirnov test, Levene test, Parametric hypothesis tests, t test, variance analysis, and Tukey test were used.

RESULTS
The sample consisted of 728 nursing students who voluntarily agreed to participate in the study. Of the participants, 66.76% were female, 32.14% were in the age-group of 22-23, and 72.80% education language was Turkish. The study found a statistically significant difference between the scores of their general knowledge relating to pain, pharmacological, and nonpharmacological methods. The students need to receive the most knowledge in the field of the pharmacological management of pain.

CONCLUSION
The study results show, based on the overall score averages the students achieved from statements regarding pain management, that they have medium level of knowledge. The study suggests that training programs should be designed and sustained to address the students' knowledge gap in respect of pain management and enhance their educational level.

Keywords: Pain, pain management, nursing, students

INTRODUCTION

Pain is a distressing and subjective experience of sensual and emotional nature, which results from a certain area in the body and is related to real or potential tissue damage.[1,2] Pain negatively affects one's daily life activities, sleep cycle, working capacity, social life, and life quality.[3,4] Pain level and control can vary depending on various aspects such as psychological state, fatigue, culture, and religious belief.[5] Nowadays, pharmacological methods are generally used in controlling pain, which are preferred due to their easy implementation and rapid effects.[6] Besides pharmacological methods, nonpharmacological methods such as massage, cold and heat applications, meditation, imagery, music therapy, aroma therapy, and acupuncture are also used to control pain.[7,8]

The aim of pain control is to minimize the discomfort of the patient, eliminate the pain, protect the suffering person from adverse effects, and enhance the life quality. In case where the pain is not effectively treated, it would persist and have both physical and psychological impacts on the affected individuals.[9,10]

Pain can be taken under control through a multidisciplinary team work.[7,11] In their professional capacity as part of a healthcare team, nurses do play a pivotal role in relieving pain and improving the comfort of patients.[12] The approach of nursing staff in pain management is of essential importance in eliminating pain or reducing it to a minimum level.[13] In all the phases of pain beginning with diagnosis, nurses are one of the most important members in a healthcare team that make the greatest effort with respect to pain elimination. That nurses should properly assess pain in order to eliminate it as a matter of great priority in

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terms of an effective pain management.[14,15] It is of great importance that nursing students have, as prospective nurses, due knowledge about pharmacological and nonpharmacological interventions used in pain management.

In the study investigating the student nurses' knowledge level, cultural awareness, and competence regarding pain management, Dirimeşe et al.[16] report that they have medium level of knowledge in pain management, and their cultural awareness and competence in this respect are also at a medium level. In a study that examined the nursing students' attitudes to pain management, Fang et al.[17] conclude that the students with a higher level of educational qualification have a higher level of knowledge of pain management compared with those with a lower educational level.

Plaisance and Logan[18] demonstrated that nursing students had insufficient (64%) information about pain management and suggested to improve education curriculum about pain management. Similarly, Al-Khaweldeh et al.[19] revealed that nursing students had insufficient information about pain management and insufficient attitudes (34.1%). Also, the other research which was conducted by Karaman et al.[20] revealed that nursing students scored low in pain knowledge scores (40.64%). It was thought that it might be beneficial to provide more education in baccalaureate about pain management to improve patients' life quality and to accelerate a healing process.

To educate and train student nurses into qualified nursing staff for the future, their knowledge level should be defined, and the deficiencies in this respect should be overcome. Defining the knowledge level of student nurses in pain management will provide a guiding framework for the planning regarding the required trainings. There was not found any study in Turkish Republic of Northern Cyprus (TRNC), which is similar to present study. This study aimed to investigate the pain management knowledge of nursing students of different nationalities in the nursing department of a university.

Research Questions

The study has addressed the following specific research questions:

1. What is the current knowledge level regarding pain management among baccalaureate nursing students in TRNC?
2. Are there any significant differences in knowledge regarding with pain management and personal information properties among baccalaureate nursing students?

Main Points

- It is vital to assess the students' knowledge levels regarding pain management that are attributable to their education processes.
- Male students' general knowledge regarding pain management and knowledge of non-pharmacological methods was significantly lower than that of female students.
- There is no significant differences between the scores of students based on the language in which they received their education (Turkish/English).

MATERIAL and METHODS

Design and Sample

The study was performed in descriptive design. The population of the study was composed of 1,095 students who studied in the nursing department attending lectures in Turkish and English in a University located in Nicosia in the TRNC. The sample, on the other hand, comprised 728 students who agreed to participate in the study on voluntary basis. Thus, the inclusion rate was 66.48%.

The study was included all students of the nursing department in order to revealing the level of effect of pain management knowledge. Both Turkish and English department of nursing curriculum include 2 hours "pain and management" topics in the course of principles of nursing, 3 hours "surgical pain" topics in the course of surgical nursing, and 1 hour "birth pain" topics in the course of gynecology and obstetrics. Additionally, the course of Internal Medicine Nursing has included information on pain management in some topics.

Instruments

Personal information form and pain knowledge form were used, which were based on previous models and developed by the researchers to collect data.[3,5,14,15,21–25]

a. *Personal information form*: This form that includes nine questions was used to record the socio-demographic form regarding the participating students' information such as age, gender, ethnicity, the year of study, as well as information on trainings that students have received about pain management.

b. *Pain knowledge form*: This form was designed by the researchers based on a review of models available in the relevant literature. It is a form with 30 statements regarding pain management, which include general knowledge on pain and also the pain knowledge form consists of three subdimensions. The participants had to respond in options categorized as "true, false, and do not know." The first group of 10 statements in the form addresses general knowledge on pain, the second group of 10 statements in the form includes knowledge about pharmacological methods, and the third group of 10 statements in the form includes knowledge about nonpharmacological methods that are used in pain management.

For the evaluation of the responses, every statement indicated as "true" was scored with one (1), and statements indicated as "false" and "do not know" with zero (0). The level of general knowledge on pain management was evaluated on a scale varying between 0 and 30 scores; the total scores achieved showed whether the participant had higher or lower level of knowledge.

The form does not include cut point. Therefore, evaluation of the form was determined according to total score (30), which was accepted as (0-10) low, (10-20) middle, and (20-30) high.

Validity of the Form

The personal information form and pain knowledge form were designed in the first stage in a Likert-scale questionnaire with 50 questions with options "true, false, and do not know" as Turkish language. Then, the scales were translated to the

English language by the translator and presented to four surgical nursing professors and one psychological professor specialized in the subject of the study reviewed and confirmed the content of the questionnaire, and a language specialist approved the clarity in terms of language. Based on the experts' opinions, the repeated, conflicting, and meaningless questions were excluded from the form. Then, the forms were amended in line with their views. The statements were categorized under three headings as general knowledge on pain, knowledge on pharmacological methods, and that on nonpharmacological methods, and as such the form included 30 statements in total. In the present study, the statement in the pain form was classified as true, false, and do not know which were included in the pain form. The form was then reviewed once more by the specialists, after which it was revised and adapted at some points and then finalized and adopted. Both forms were administered in a pilot questionnaire to examine their comprehensibility.

It was taken only expert opinions in order to apply the form. There was not to be done any analysis, because the form which was used in the study was not the scale.

Pilot Study

A pilot study was performed with 75 students, whom consist of 55 Turkish and 20 English nursing students for clarity on December 25-29, 2017. After the pilot study, no revision was necessary, and the nursing students who participated in the pilot study were included in the main sample.

Procedure

The data collection instruments were administered between January and February 2018. The aim of the study was explained to the students who had agreed to participate in the study, particularly with information on the principle of voluntary participation in the study. The questionnaire form was distributed in the classroom environment, where the participants completed the form in about 15-20 minutes.

Data Analysis

In statistical analysis of the forms, the Statistical Package for the Social Sciences (SPSS) version 24.0 (IBM SPSS Corp.; Armonk, NY, USA) was used. Besides, frequency analysis, Kolmogorov–Smirnov test, Levene test, parametric hypothesis test, t test, variance analysis, and Tukey test were used to evaluate the study data.

Ethical Consideration

An ethical approval from the Ethical Review Board of the Near East University's Scientific Research Ethics Evaluation Board (approval date: December 21, 2017; approval number: YDU/ 2017/ 53-504), and an institutional permission from the administration of the Faculty of Nursing were obtained. In addition, a written informed consent was obtained from all participants.

RESULTS

Of the participating students, 66.76% were female, 32.14% in the age group of 22-23, 72.80% education language was Turkish, and 27.34% continued their studies in the first year.

The study found, on the basis of participating students' knowledge on pain broken down by gender, a statistically significant difference between the scores of their knowledge on nonpharmacological methods and that on overall pain management ($P < .05$). The general knowledge of male students on pain, and also their knowledge on nonpharmacological methods and that on pain management were found to be significantly lower than the overall knowledge of female students. However, they had a similar level of knowledge on pharmacological methods. The general knowledge of pain of the students in the age group of 18-19, and also their knowledge on pharmacological and nonpharmacological methods were found to be significantly lower than the knowledge of the students in the age group of 22-23 and also than that of the students over 24 years of age. The study further demonstrated that the students in the first year of their studies had a lower level of overall knowledge on pain management than those in the third- and fourth-year students (Table 1).

In the present study, reviewing the distribution of the responses to the statements regarding pharmacological and nonpharmacological methods used in pain management, we see that the statement "Pain has a negative effect on one's life quality (T)" has received the most responses indicated as true, and the statement "Visual comparison scale should be used in every patient (F)" was indicated as "false" by most of the students. As for the pharmacological methods used in pain management, it was the statement "Drugs should be used in effective dosages in pharmacological applications (T)" that received the most "true" responses, and the statement "Short acting opioids should be used in patients with dull pain (F)" was indicated as false by most of the students. As for the nonpharmacological methods, on the other hand, the statement that received the most "true" responses was the one "Nurses should eliminate the factors that increase pain (T)," and the one which was indicated as false by most of the students was "Acupuncture treatment should only be used to treat headaches and pains at the abdominal area (F)" (Table 2).

The average score the participating students achieved in the statements concerning their general knowledge on pain was 6.71 ± 2.01, that in pharmacological methods 5.22 ± 2.04 and the one in nonpharmacological methods 6.01 ± 2.63, and their overall average score regarding their knowledge on pain was 7.95 ± 5.53. The lowest and the highest scores, which the students achieved, were 0 and 28, respectively (Table 3).

The results show that 63.74% of the students had already received training on pain in general, of whom 74.57% expressed receiving this training at school, and 72.63% said that they were satisfied with the training they received.

What is more, results also demonstrated that the students who had training about pain were scored higher than students who had not any training about pain. There were not any statistically significant difference between place which students received training about pain and total pain of knowledge ($P > .05$). Although students who were receive training about pain at school scored more higher than others, it was not statistically significant. Additionally, students, who were found sufficient in the education about pain, were found that statistically significant differences between knowledge about pain, knowledge about pharmacological methods in pain management, and total score of pain knowledge ($P < .05$). Students who were found sufficient in the education about pain were scored more higher than students who were not found sufficient in the

TABLE 1. Relationship of Personal Information of Students with Pain Management (n = 728)

Variables			Knowledge on pain management													
			General knowledge on pain				Knowledge on pharmacological methods				Knowledge on nonpharmacological methods				Total			
Personal information		N (%)	M	SD	t/F	*P* value	M	SD	t/F	*P* value	M	SD	t/F	*P* value	M	SD	t/F	*P* value
Gender	Female	486 (66.76)	6.91	1.90	t = −3.675	.000*	5.30	1.97	t = −1.282	.200	6.15	2.63	t = −2.061	.040*	18.35	5.31	t = −2.782	.006*
	Male	242 (33.24)	6.33	2.16			5.09	2.16			5.72	2.60			17.14	5.88		
Age	18-19	73 (10.03)	6.07	2.02	F = 4.114	.007*	4.40	2.07	F = 9.282	.000*	5.01	2.51	F = 14.873	.000*	15.48	5.68	F = 13.055	.000*
	20-21	231 (31.73)	6.60	2.08			4.93	2.02			5.35	2.76			16.88	5.62		
	22-23	234 (32.14)	6.69	1.87			5.60	2.02			6.48	2.52			18.91	5.20		
	24 and ↑	190 (26.10)	6.81	2.02			5.22	2.03			6.60	2.35			19.03	5.24		
Education language	Turkish	530 (72.80)	6.69	1.98	t = −.522	.602	5.22	2.01	t = −.157	.875	6.00	2.01	t = −.84	.933	17.91	5.46	t = −.287	.774
	English	198 (27.20)	6.78	2.07			5.24	2.10			6.02	2.10			18.04	5.73		
Years of study	First year	199 (27.34)	6.10	2.19	F = 13.104	.000*	4.46	2.07	F = 23.007	.000*	4.92	2.75	F = 30.180	.000*	15.48	5.87	F = 33.180	.000*
	Second year	196 (26.92)	6.61	2.09			4.94	2.03			5.54	2.63			17.10	5.53		
	Third year	190 (26.10)	7.30	1.61			5.93	1.88			6.98	2.23			20.21	4.43		
	Fourth year	143 (19.64)	6.94	1.84			5.74	1.73			6.87	2.16			19.54	4.61		

M: mean; SD: standard deviation.
*Statistical significance set at values $P < .05$.

education about pain in knowledge about pain, knowledge about pharmacological methods in pain management, and total score of pain knowledge (Table 4).

The study found statistically significant, positive, and strong correlations between the students' knowledge scores regarding general knowledge on pain and that on pharmacological and nonpharmacological methods ($P < .05$), meaning that higher scores in any of these knowledge fields referred to higher scores in others as well (Table 5).

DISCUSSION

The present study discusses the findings concerning the nursing students' knowledge on pain management in line with the findings observed in previous research.

In this study, there are 66.76% female and 33.24% male students. Results demonstrated that, male students' general knowledge of pain in pain management and knowledge of nonpharmacological methods were found to be significantly lower than female students.

The study did not demonstrate any significant differences between the students education language (Turkish/English) and also results demonstrated that their knowledge level was similar. Therefore, the results demonstrated that their department curriculum is similar.

Furthermore, results demonstrated that there is a significant difference between students' ages. Students who are between 18 and 19 scored lower in pain knowledge in totally compared to students who are between 22-23 ages and 24 and above. This result might be because the most of students who are between 18 and 19 ages was studying at first class. Additionally, there was a difference between first, second, third, and fourth class of students in their general knowledge scores. It was not surprising situation that students who were studying at first class scored lower in knowledge level compared to students who were studying at third and fourth class.

Nowadays, despite significant developments in the field of education, it is generally observed that healthcare providers have poor knowledge and attitudes toward pain management. The literature has reported that medical and nursing students lack satisfactory knowledge of pain management, and that this lack has a negative effect on their knowledge and skills regarding pain management when working in healthcare settings after graduation.[3,22,23] It is therefore indispensable to investigate the students' knowledge levels of pain management in educational processes and overcome their lack of knowledge to enhance their knowledge and attitudes toward pain management in their professional life.

The accurate assessment of pain is the basis of effective pain management. Nurses who have important responsibilities in the evaluation of pain should have sufficient knowledge to evaluate their patients effectively. Students received the highest score from the subdimension, where general pain information was expressed. Therefore, this result demonstrated that students have moderate pain knowledge about pain.

The use of pharmacological management is common in pain control nowadays. This method provides to control pain with

TABLE 2. The Responses of Students to the Items Relating to General Knowledge on Pain, Pharmacological and Nonpharmacological Methods on Pain Management (n = 728)

	True		False		Do not know	
Knowledge on pain management	**N**	**%**	**N**	**%**	**N**	**%**
General knowledge on pain						
Pain is an indicator of an illness (T)	**593**	**81.46**	100	13.74	35	4.81
Pain should be accepted as the fifth vital sign (T)	**396**	**54.40**	125	17.17	207	28.43
Pain is a measurable indicator (T)	**525**	**72.12**	141	19.37	62	8.52
Treatable pain is not a serious pain (F)	263	36.13	**385**	**52.88**	80	10.99
Pain has a negative effect on one's life quality (T)	**600**	**82.42**	67	9.20	61	8.38
The first stage in pain management is pain assessment (T)	**573**	**78.71**	63	8.65	92	12.64
It is the person herself/himself who can correctly assess the pain (T)	**580**	**79.67**	85	11.68	63	8.65
During assessment, a person's self-report of pain has to be taken seriously (T)	**544**	**74.73**	97	13.32	87	11.95
As pain provides clues in diagnosis and treatment of diseases. it should be accepted as a vital sign (T)	**505**	**69.37**	105	14.42	118	16.21
Visual comparison scale should be used in every patient (F)	376	51.65	**187**	**25.69**	165	22.66
Knowledge on pharmacological methods						
Drugs should be used in effective dosages in pharmacological applications (T)	**585**	**80.36**	75	10.30	68	9.34
In pain treatment only pharmacological methods should be used (F)	228	31.32	**379**	**52.06**	121	16.62
Analgesics should only be administered through the oral way (F)	199	27.34	**334**	**45.88**	195	26.79
Analgesics should be administered to the patients who have pain where necessary (T)	**486**	**66.76**	94	12.91	148	20.33
Short acting opioids should be used in patients with dull pain (F)	375	51.51	**136**	**18.68**	217	29.81
Patients should be informed about probable adverse effects of the analgesics used in pain management (T)	**541**	**74.31**	87	11.95	100	13.74
Proper dosage should be administered to patients who have pain on a continual manner (T)	**357**	**49.04**	258	35.44	112	15.38
Pain treatment in surgical patients should start with strong pain-killers (F)	350	48.08	**155**	**21.29**	223	30.63
The dosage should be tailored in line with the needs of patients (T)	**501**	**68.82**	113	15.52	114	15.66
If PCA is to be applied, patients should be informed about the device, alarm system and usage of buttons (T)	**529**	**72.66**	78	10.71	121	16.62
Knowledge on nonpharmacological methods						
Nurses can apply nonpharmacological methods proper for the characteristics and general condition of a patient (T)	**519**	**71.29**	93	12.77	116	15.93
Nurses should do planning for the reasons that cause an increase in pain (T)	**529**	**72.66**	101	13.87	98	13.46
Nurses should eliminate the factors that increase pain (T)	**540**	**74.18**	91	12.50	97	13.32
In case of pain the position should be frequently changed (T)	**409**	**56.18**	149	20.47	170	23.35
In using music in pain management, it is important to choose the type of music the patient treated likes and prefers (T)	**505**	**69.37**	88	12.09	135	18.54
Techniques like vibration, meditation, aromatherapy and acupuncture are nonpharmacological methods (T)	**437**	**60.03**	96	13.19	195	26.79
Aromatherapy relieves pain by distracting the patient or reducing the pain sensation (T)	**449**	**61.68**	82	11.26	197	27.06
Therapeutic touches reduce the pain by relaxing the patient (T)	**472**	**64.84**	91	12.50	165	22.66
Acupuncture treatment should only be used to treat headaches and pains in abdominal area (F)	315	43.27	**145**	**19.92**	268	36.81
Vibration is a method that can be used in acute and chronic muscle spasm pains, phantom pains and malign pains (T)	**368**	**50.55**	80	10.99	280	38.46

The number and percentage of correct answers are indicated in bold-type.

TABLE 3. Knowledge Scores of Students Relating to Pain Management (n = 728)

Knowledge on pain management (score range)	**N**	**M**	**SD**	**Min**	**Max**
General knowledge on pain (0-10)	728	6.71	2.01	0	10
Knowledge on pharmacological methods (0-10)	728	5.22	2.04	0	10
Knowledge on nonpharmacological methods (0-10)	728	6.01	2.63	0	10
Total scores (0-30)	728	17.95	5.53	0	28

M: mean; SD: standard deviation.

pills. Pills are preferred by most of the people, because they have quick effect and used easily.[7] This study demonstrated that students had moderate knowledge level in pain management about pharmacological applies and lowest knowledge in pain management. Dirimeşe et al.[16] revealed that nursing students preferred mostly pharmacological methods considering patients' complaints, but they had a low level of knowledge about pharmacological methods. Furthermore, previous

TABLE 4. Relationship of Pain Training Information of Students with Pain Management (n = 728)

		General knowledge on pain				Knowledge on pharmacological methods				Knowledge on nonpharmacological methods				Total			
Pain training information	**N (%)**	**M**	**SD**	**t/F**	***P* value**	**M**	**SD**	**t/F**	***P***	**M**	**SD**	**t/F**	***P* value**	**M**	**SD**	**t/F**	***P* value**
Information about pain training																	
Received training	464 (63.74)	6.91	1.91	3.470	.001*	5.48	1.96	4.453	.000*	6.31	2.49	4.178	.000*	18.69	5.21	4.178	.000*
Not received training	264 (36.26)	6.38	2.12			4.79	2.08			5.47	2.78			16.63	5.82		
Training place																	
School	346 (74.57)	6.98	1.94	1.158	.315	5.59	2.00	2.887	.057	6.44	2.51	1.756	0.174	19.01	5.37	2.684	.069
Seminar	79 (17.03)	6.62	1.79			5.01	1.71			5.94	2.21			17.57	4.23		
Course	39 (8.41)	6.85	1.87			5.38	2.07			5.95	2.72			18.18	5.38		
Sufficient training																	
Sufficient training for students	337 (72.63)	7.04	1.82	2.364	.018*	5.60	1.87	2.325	.021*	6.42	2.40	1.527	0.127	19.06	4.87	2.476	.014*
Insufficient training for students	127 (27.37)	6.57	2.11			5.13	2.16			6.02	2.68			17.72	5.94		

M: mean; SD: standard deviation.
*Statistical significance set at values $P < .05$.

TABLE 5. Correlations Between the Students' Knowledge Scores Related to Pain Management (n = 728)

Knowledge on pain management		**General knowledge on pain**	**Knowledge on pharmacological methods**	**Knowledge on nonpharmacological methods**	**Total scores**
General knowledge on pain	r	1			
	P	.000*			
Knowledge on pharmacological methods	r	0.474	1		
	P	.000*			
Knowledge on nonpharmacological methods	r	0.496	0.586	1	
	P	.000*	.000*		
Total scores	r	0.776	0.818	0.874	1
	P	.000*	.000*	.000*	

*Statistical significance set at values $P < .001$.

research demonstrated that students were mostly insufficient in pharmacological methods in pain management.[19] The present results are similar to previous research.

Nonpharmocological methods, which were using in pain management, can be provided to control the pain without medicine. Nonpharmacological methods could apply alone or by pharmacological methods. This method also has advantages such as low cost, applied easily, and does not have any side effects.[6] In the present study, results demonstrated that there is a moderate level of knowledge about nonpharmacological methods and also there is not high level of differences compared to knowledge of pharmacological methods. Previous research demonstrated that there was a moderate level of knowledge about nonpharmacological methods (n = 244).[7]

Furthermore, the present study demonstrated that there was a moderate level of pain management knowledge and pharmacological and nonpharmacological knowledge level methods slightly higher.

The present study demonstrated that 63.74% students received training about pain and 36.26% students did not receive training about pain. Research demonstrated that students who received pain management training scored more higher in a total score of pain knowledge compared to students who did not receive training. Previous research, which was conducted by Al-Khaweldeh et al.,[19] investigated the pain management training on students (n = 240), and the results demonstrated that students who received training scored more higher in the pain information level compared to students who did not receive any training. Constantly, Chiang et al.[26] revealed that nursing students scored more higher in pain information and their skills after receiving the pain training. Results are similar to previous research.

This study also revealed the place that students receive pain training. 74.56% of students received training at school. The previous study that was conducted by Ozer et al.[27] at nursing students demonstrated that 70.7% of students received training about pain so this result is similar to present study. Moreover, nursing students who received training about pain except school and scored a low level of pain knowledge might be because of the insufficient training, insufficient training program, or lack of training intervals.

Additionally, the study demonstrated that there was a statistically significant correlation between pain management scores, and these correlations are both positive and strong. Therefore, there is a positive correlation between knowledge about pain and general, pharmacological, and nonpharmacological pain. There were not any similar results in previous research.

Previous research demonstrated that insufficient of practice about pain management and insufficient education about pain management might be the reason for lower level of pain knowledge.[28,29]

Furthermore, results demonstrated that nursing students who received pain management training were scored more higher in the knowledge level. In conclusion, it is thought that it might be beneficial to increase students' knowledge about pain management by putting to curriculum pain management topics.

In conclusion, based on the rate of the correct answers given by the students to the statements regarding pain management, the study found that they had a medium level of knowledge, which, however, increased in higher semesters. The study further showed that the students gave the most correct answers to the statements in the group general pain knowledge, and that their level of knowledge in this group was slightly higher than their knowledge on pharmacological and nonpharmacological techniques.

The present study also includes some limitations. First, most of students might have negative attitudes about survey form and these attitudes might affect their answers. Second, there were 1,095 students in total but some of them rejected to participate in the study. Therefore, the study consisted of 728 students. Third, the study was conducted only at a University, Department of Nursing Students so results were not generalized in TRNC.

Based on these results, the study recommends, besides ensuring the participation of students in teamwork in clinical and professional settings, overcoming students' deficiency in knowledge on pain management by including study courses of pain management in the curricula of nursing education and providing trainings with richer content of knowledge.

Ethics Committee Approval: Ethical committee approval was received from the Near East University's Scientific Research Ethics Evaluation Board (approval date: December 21, 2017; approval number: YDU/2017/53-504).

Informed Consent: Informed consent was obtained from the nursing students who participated in this study.

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Original Article

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Predictors of Reoperation Requirement on Iatrogenic Chylothorax after Thoracic Surgery

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BACKGROUND/AIMS
We reviewed our experience with iatrogenic chylothorax after general thoracic surgical procedures to identify factors that predict the need for reoperation and to evaluate the success of management.

MATERIAL and METHODS
Between January 2010 and July 2018, 3,640 general thoracic surgical procedures were performed at our institution, and iatrogenic chylothorax developed in 19 patients. The medical records of these 19 patients were reviewed for age, sex, preoperative history, operative and pathologic findings, amount of daily chest tube (CT) output, and method of management of the chylothorax. We compared the differences in triglyceride value, triglyceride/cholesterol rate, the CT output for the daily before reoperation, and the first 24 hours and 5 post-operative days between the conservatively cured group and reoperation group.

RESULTS
Pulmonary operations were performed in 14 patients, mediastinal operations were performed in four, and esophageal operation was performed in one. All patients were initially treated by complete cessation of oral intake and total parenteral nutrition, talc pleurodesis, and somatostatin. This treatment was successful for 12 patients. The remaining seven patients (36.8%) required reoperation to control the chylothorax. There were significant differences between the conservatively cured group and reoperation group for CT output for the first 24 hours and 5 days and triglyceride/cholesterol rate.

CONCLUSION
The CT output greater than 950 mL day^{-1} for the first day or 1,000 mL day^{-1} for the first 5 days and the development of a chylothorax after an esophageal operation are significant factors that predicted the need for reoperation.

Keywords: Iatrogenic chylothorax, management, reoperation

INTRODUCTION

Chylothorax can result from benign or malignant occlusion of the thoracic duct resulting in collateral formation or disruption of the main thoracic duct with subsequent leakage of lymph into the pleural space.[1] Iatrogenic chylothorax is a rare but well-known complication in thoracic surgery. Iatrogenic chylothorax ranges from 0.5 to 10.5% after esophagectomy[2-4] and from 1.4 to 2.3% after lung resection.[5,6] At an early stage, chylothorax can lead to severe cardiorespiratory and volemic complications. In the case of chronicization, malnutrition and immunologic complications can occur, responsible for a mortality rate of up to 50%. Optimal management of chylothorax can decrease mortality.[7] Optimal management remains a subject of debate. Some authors advocate conservative treatment, while others propose early surgery. We reviewed our experience with iatrogenic chylothorax after general thoracic surgical procedures to identify factors that predict the need for reoperation and to evaluate the success of management.

MATERIAL and METHODS

Between January 2010 and July 2018, 3,640 general thoracic surgical procedures were performed at our institution, and iatrogenic chylothorax developed in 19 patients (0.52%); these patients constituted the subjects in this study. Ethics committee approval was received for this study from the local ethics committee of the University of Health Sciences, Konya

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City Hospital (224/ 04.01.2019). A written informed consent was obtained from patients who participated in this study. The diagnosis was established by a triglyceride content of 110 mg dL^{-1} or greater in the pleural fluid in all patients. The medical records of these 19 patients were reviewed for age, sex, preoperative history, operative and pathologic findings, amount of daily chest tube (CT) output, and method of management of the chylothorax. Follow-up data were obtained from the patients' most recent clinic visits and telephone interviews.

There were 12 male and seven female patients, with a median age of 56 years (range 4-82). Significant medical conditions were present before initial thoracotomy in nine patients (47.3%) and included hypertension in five, chronic obstructive pulmonary disease in three, diabetes mellitus in two, and lymphoma, breast cancer, and atrial fibrillation in one each. The initial operations were performed for lung cancer in 11 patients, mediastinal mass in four, empyema in two, and esophageal cancer, pulmonary metastases, and palmar hyperhydrosis in one each.

Observation

We initially treated conservatively with complete oral intake cessation and total parenteral nutrition (TPN). If CT output did not decrease significantly in about 3 days, we performed talc pleurodesis (Steriltalc 4 g; Biotema, İstanbul, Turkey) into the thoracic cavity through a CT. Patients received somatostatin (5 µg kg^{-1} h^{-1}) (Somatosan 3 mg; CuraMED Pharma GmbH, Wasserberg, Germany) for 7 days. Successful management was defined as resolution of cloudy CT output, volume of less than 150 mL day^{-1}, and sustained removal of the CT. If chylothorax was not cured in about 10 days, the conservative strategy was considered unsuccessful and surgical intervention was indicated.

Surgical Intervention

Patients were given olive oil until 6 hours before the operation to facilitate visualization of the leak in the operating room. The origin of the white chylous fluid was easily identified intraoperatively in three patients. Patients were undergoing thoracic duct ligation through reoperative thoracotomy or thoracoscopy. The area of the thoracic duct was explored to identify sites of leak. When leakage was detected from the ductus thoracicus, sture ligation was applied to the leakage site and lower part. Supradiaphragmatic sutures were performed when the area of the leak could not be identified. Fibrin glue was applied to the posterior mediastinum in all patients. A partial parietal pleurectomy or mechanical pleurodesis was performed in all patients.

We compared the differences in triglyceride value, triglyceride/cholesterol rate, the CT output for the daily before reoperation, and the first 24 hours and 5 post-operative days between the conservatively cured group and reoperation group using an independent *t* test. All the statistical comparisons were made using the Statistical Package for Social Science version 16 (SPSS Inc.; Chicago, IL, USA).

RESULTS

Pulmonary operations were performed in 14 patients, mediastinal operations were performed in four, and esophageal operations were performed in one (Table 1). All chylothoraces developed on the ipsilateral side. All patients had thoracostomy tubes after their initial operation. Chylothorax was diagnosed a median of 3 days after operation (range 2-5 days). The chylothorax was on the right side in 13 patients and on the left side in six. The mean triglyceride content of the drainage was 530 mg dL^{-1} (range 121-1,465 mg dL^{-1}), and the mean cholesterol content of the fluid was 56 mg dL^{-1} (range 23-87 mg dL^{-1}). All patients were initially treated by complete cessation of oral intake and TPN, talc pleurodesis, and somatostatin. This treatment was successful for 12 patients. These patients resumed a normal diet with a median of 10 days after the diagnosis of chylothorax was made (range 7-12 days). The remaining seven patients (36.8%) required reoperation to control the chylothorax.

TABLE 1. Cause of Iatrogenic Chylothorax

Operation	No.
Pulmonary resection	
Bilobectomy	2
Lobectomy	6
Segmentectomy	2
Wedge resection	1
Mediastinal mass resection	4
Empyema	2
Esophagectomy	1
Sympathectomy	1

Reoperation was undertaken with a median of 14 days after operation (range 12-18 days). Chylothorax developed on the right side in five patients and on the left side in two patients. The reoperation was performed on the chylothorax side in five patients and on the contralateral side in two. The approach for the reoperation was performed through the initial thoracotomy in five patients and by video-assisted thoracic surgery in two. We used the contralateral side in two patients reoperated with Video-assisted thoracic surgery (VATS). Because the adhesions are less, the ductus thoracicus is easier to find. The injury to the thoracic duct was identified at reoperation in three of the seven patients (42.8%). The site of ligation was the supradiaphragm in four patients and immediately below the fistula

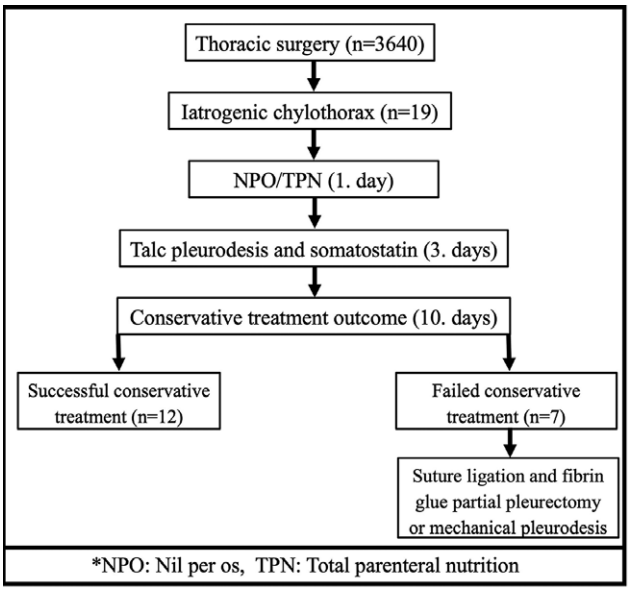

Figure 1. Outcomes of treatment for iatrogenic chylothorax

TABLE 2. Clinical Findings by the Type of Therapy

Variable	Conservatively cured group (n = 12)	Reoperation group (n = 7)	*P* value
Triglyceride, g dL^{-1}	410.7 ± 89.9	735.7 ± 151.9	.065
Triglyceride/ choles-terol rate	5.9 ± 0.9	16.6 ± 2.1	.001
CT output, mL/first 24 hours	521.6 ± 51	950 ± 127.2	.014
CT output, mL/first 5 days	461.5 ± 27.8	1004 ± 141.7	.008
CT output, mL $days^{-1}$ (Before reoperation)	545.5 ± 69.8	772.4 ± 102.1	.076

CT = chest tube

in three. Fibrin glue was applied to the posterior mediastinum in all patients. A partial parietal pleurectomy was performed in five patients, and the mechanical pleurodesis was performed in two patients. Reoperation was successful in all patients (Figure 1).

There was no death among the 19 patients. Complications occurred in six patients (31.5%): atrial fibrillation in three, prolonged air leak in two, and wound infection in one. There were significant differences between the conservatively cured group and reoperation group for CT output for the first 24 hours and 5 days and triglyceride/cholesterol rate. However, no significant differences in daily CT output and triglyceride values were observed among two groups (Table 2).

DISCUSSION

Iatrogenic chylothorax is an uncommon but well-known complication in thoracic surgery. In our review, we found only 19 patients with chylothorax out of 3,640 who underwent a general thoracic surgical procedure at our institution. Although chylothorax has been reported after almost every type of thoracic operation, certain patients may be predisposed toward post-operative chylothorax. Esophageal surgery is probably the most common iatrogenic cause of chylothorax with incidence reported from 0.2 to 10.5% of operations.[4] Most injuries to the thoracic duct occur near the aortic and azygos arches, where the relations between the esophagus and the thoracic duct are closest.[8] Pulmonary resection for lung cancer with systematic mediastinal lymph node dissection may lead to a higher incidence of post-operative chylothorax than is seen with other general thoracic surgical procedures, except for esophageal resection with mediastinal lymphadenectomy.[3] Shimizu et al.[9] reported that 27 patients (2.4%) had iatrogenic chylothorax after pulmonary resection with systematic mediastinal lymph node dissection for lung cancer in their division. Among our patients, the overall incidence of iatrogenic chylothorax was 0.52%; after esophagectomy, it was 10%, and after pulmonary resection, it was 0.31%. Our incidence was consistent with the literature.

Octreotide along with TPN and bowel rest is effective in reducing volume of drainage in cases of chylothorax caused by injury to thoracic duct or its branches. There is an increasing amount of evidence in the literature concerning the usefulness of octreotide, a somatostatin analog, for the conservative treatment of chylothorax.[10,11] A retrospective study by Fujita and Daiko[12] of 521 esophagectomy patients, including 15 who underwent conservative therapy with octreotide vs. five without octreotide, showed significantly improved resolution (86% vs. 20%). Bryant et al.[5] conducted a retrospective study with the largest number of patients to date (n = 41) with chylothorax following pulmonary resections and lymphadenectomy. Success rate of the treatment with octreotide was 90%. Ismail et al.[13] reported in meta-analysis that the general consensus is for conservative management with octreotide to be instituted for 1 week before consideration of surgery. In our study, we started the somatostatin treatment on the third day of chylothorax and continued for 7 days. Success rate of our treatment with somatostatin was 63.1%.

The criteria for surgical intervention described by Selle et al.[14] are most frequently used in clinical practice. Selle et al.[14] recommend reoperation to ligate the thoracic duct when chylous leakage persists for at least 5 days at the rate of 1,500 mL day^{-1} or more in adults and when the drainage of chyle does not decrease within 2 weeks or the patient's nutrition or metabolic status becomes measurably more impaired during the same period. Merrigan et al.[15] suggest that operative intervention should be undertaken if CT output in 24 hours is 1 L or more for 5 consecutive days. Lagarde et al.[16] proposed if drainage is 2 L or more after the first 2 days of optimal conservative therapy, reoperation is indicated. We found that CT output greater than 950 mL day^{-1} for the first day or 1,000 mL day^{-1} for the first 5 days and the development of a chylothorax after an esophageal operation were significant factors that predicted the need for reoperation.

For thoracic duct wounds after the chylothorax, two surgical strategies predominate: direct wound ligature or en masse supradiaphragmatic ligature. Laceration of the thoracic duct can be difficult to identify. Due to the problems encountered with localizing wounds of the thoracic duct, techniques have been developed to ligature the duct upstream, at its entry into the thorax. The method of choice is en masse ligature above the diaphragmatic hiatus among the aorta, the vertebral bodies, and the pericardium.[17] This allows ligature not only of the duct, which may be injured in the process, but also of the neighboring lymphatic tissues.[8] In our study, the injury to the thoracic duct was identified at reoperation in three of the seven patients (42.8%). The site of ligation was the supradiaphragm in four patients and immediately below the fistula in three. When the reoperation is performed, pleurodesis or pleurectomy should also be performed at the same time as thoracic duct ligation. Fibrin glue application and partial parietal pleurectomy or mechanical pleurodesis were performed in all patients. The mechanical pleurodesis was performed on the contralateral side of the chylothorax by video-assisted thoracic surgery in two patients. Reoperation was successful in all patients.

In conclusion, when patients present with an iatrogenic chylothorax, we recommend an aggressive conservative management (CT drenage, nil per os/TPN, talc pleurodesis, and somatostatin). We found that CT output greater than 950 mL day^{-1} for the first day or 1,000 mL day^{-1} for the first 5 days and

the development of a chylothorax after an esophageal operation were significant factors that predicted the need for reoperation.

Ethics Committee Approval: Ethical committee approval was received from the The University of Health Sciences, Konya City Hospital (224/04.01.2019)

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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CYPRUS JOURNAL OF MEDICAL SCIENCES

Original Article

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Hepatitis B Vaccination Coverage among Health Workers in a University Hospital in Northern Cyprus*

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BACKGROUND/AIMS
This study aimed to evaluate the hepatitis B vaccination coverage rates among health care workers (HCWs) in a university hospital in Northern Cyprus.

MATERIAL and METHODS
Our sample consists of 486 HCWs. The study was performed retrospectively on a group of 486 HCWs, whose blood serum samples were evaluated in the microbiology laboratory of the hospital. Laboratory tests were conducted for identification of HBsAg and anti-HBs. Those who were HBsAg positive were excluded. All the data of the participants were obtained from the hospital system, and the data were analyzed using the Statistical Package for the Social Sciences 15.0 software package (SPSS Inc., Chicago, IL, USA).

RESULTS
Four of the 486 HCWs were HBsAg positive and excluded from the study. From the 482 HCWs in the study group, 113 (23.4%) of whom were male, and 369 (76.6%) of whom were female, altogether had an average age of 36.11 ± 11.25 (20-71 years). Among them, 270 (56%) were nurses, 93 (19.3%) were technicians, 77 (16%) were cleaning personnel, and 42 (8.7%) were doctors. It was found that 375 (77.8%) HCWs were anti-HBs positive and 107 (22.2%) were negative in the current study. Statistically, physicians, nurses, and technicians were found to be immune to hepatitis B virus significantly compared to other hospital workers ($P < .05$; $P < .0001$).

CONCLUSION
The current vaccination coverage among HCWs at university hospital is as high as in developed countries. Despite a high level of acceptance, nearly one-fifth of the HCW's remains vulnerable to the infection. Efforts to target the unvaccinated staff should be encouraged.

Keywords: Vaccine, hepatitis B, health care workers, prevention

INTRODUCTION

Hepatitis B virus (HBV) infection is one of the significant health problems, with an estimated 260 million chronically infected people. The infection accounts for 887,000 deaths annually due to its complications like hepatocellular carcinoma and cirrhosis.[1] Health care workers (HCWs) are one of the special populations who have particular risks for both acquiring and transmitting HBV infection to patients.[2] It is reported that HCWs have an up to the fourfold incidence of this infection in the general population.[3] Direct contact with infectious material, such as infected blood and body fluid, is the leading risk factor to acquire HBV infection for HCWs. Highly infectious HBV can also be transmitted in the absence of visible blood and remains on environmental surfaces for at least seven days.[4-6] Thus, the infections can occur with no history of apparent exposure. Although most of the HBV infections are attributed to percutaneous exposure, the potential HBV transmission through contact with surfaces has been demonstrated in investigations of outbreaks among patients and staff of hemodialysis units.[7,8]

This study was presented as a poster at 3rd Annual Congress of Southeast Anatolia (GAEK) on May 2019.

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TABLE I. The Distribution of HCWs Anti-HBs Results

HCWs Anti-Hbs	Negative (<10), n (%)	Positive (>10), n (%)	Total, n (%)
Doctor	7 (16.7)	35 (83.3)	42 (100)
Nurse	37 (13.7)	233 (86.3)	270 (100)
Technician	24 (25.8)	69 (74.2)	93 (100)
Cleaning personnel	39 (50.6)	38 (49.4)	77 (100)
Total	107 (22.2)	375 (77.8)	482 (100)

A safe and effective HBV vaccine has been available since 1981 and is the crucial strategy to prevent HBV infections.[9] Although the vaccine is recommended for HCWs by the WHO, vaccination coverage remains low.[10]

In Northern Cyprus, there are no data available on the vaccination status of HCWs. We, therefore, aimed to estimate the prevalence of hepatitis B vaccination among HCWs at a university hospital in Northern Cyprus.

MATERIAL and METHODS

The study was performed retrospectively on a group of 486 HCWs, whose blood serum samples were evaluated in the microbiology laboratory of the hospital. HBsAg and anti-HBs tests were performed on the samples using the chemiluminescence enzyme immunoassay method (Architect i2000 SR, Abbott, A.B.D.). HBsAg positive staffs were excluded from the study group. The study was conducted by the recommendations of the manufacturer, and >10 IU mL^{-1} was accepted as a positive result.

All the demographic data of the participants and laboratory results were obtained from the hospital system, and the data were analyzed using the SPSS 15 statistical software (IBM SPSS Corp.; Armonk, NY, USA). Through applying Pearson's chi-squared test and Fisher's exact test, $P < .05$ was accepted as significant. Ethical committee approval was not obtained since the study involved only retrospective data.

RESULTS

Four of the 486 HCWs were HBsAg positive and excluded from the study. From the 482 hospitals HCWs in the study group, 113 (23.4%) of whom were male and 369 (76.6%) of whom were female, altogether had an average age of 36.11 ± 11.25 (20-71 years). Among them, 270 (56%) were nurses, 93 (19.3%) were technicians, 77 (16%) were cleaning personnel, and 42 (8.7%) were doctors. It was found that 375 (77.8%) HCWs were anti-HBs positive, and 107 (22.2%) were negative in the current study.

While 73.5% of the male HCWs (n = 83) and 79.1% (n = 292) of the female HCWs were positive for anti-HBs, the relationship between gender and anti-HBs positivity was not statistically significant ($P = .204$). 86.3% (n = 233) of the nurses, 83.3% (n = 35) of the doctors, 74.2% (n = 69) of the technicians, and 49.4% (n = 38) of the cleaning personnel were found to be positive for anti-HBs (Table I). Statistically, physicians, nurses, and technicians were found to be immune to hepatitis B virus significantly compared to other hospital workers ($P < .0001$). From among the 375 HCWs who had a positive value for anti-HBs, 24% (n = 90) had an anti-HBs value between 10 and 100, while 76% (n = 285) were identified to have a value of >100.

Main Points

- HCWs are at particular risk for both acquiring and transmitting HBV infections.
- Continuous educational programs and initial serological testing of newly recruited staff for HBV can increase vaccine uptake among HCWs.
- Despite the high vaccination coverage among HCWs in Northern Cyprus, attention has to be given to nearly one fifth of them who are still susceptible to HBV infections.

DISCUSSION

Hepatitis B vaccine is reported to be one of the safest and effective vaccines according to the international literature.[11] The Advisory Committee on Immunization Practices has been recommending hepatitis B vaccine for HCW since 1982.[10] The incidence of acute HBV infection among HCWs has declined, but the risks for exposure persist. Although the vaccine has been recommended for more than two decades, the coverage rate has remained below the average goal of 90%.[12] Suboptimal hepatitis B vaccine coverage is reported to be due to concerns about side effects, lack of availability, and knowledge gaps about the risks of the infection.[10] These barriers to vaccination suggest that additional education about the safety and benefits of the hepatitis B vaccine may increase acceptance. The WHO has reported that the vaccination coverage among HCWs is 18-39% in low- and middle-income countries and 67-79% in high-income countries.[13,14] Some studies showed even lower levels of vaccination coverage. The prevalence of vaccination for HBV among HCWs in Georgia was 12% similar to that for other developing countries such as Uganda 5%, Kenya 13%, and Egypt 16%.[15] These rates are ranging between 50% and 90% in Europe.[9]

According to WHO, vaccine coverage among HCW in the United States is 75 and 77% in Australia and New Zealand.[16,17] Our study was in the same line with developed countries with a coverage level of 77.1%. Nurses have the highest level of 85.9% when compared to other HCWs. Based on previous investigations, raising awareness is the crucial point to vaccination compliance. It is also known that health care personnel viewing their susceptibility to HBV infection as high are more likely to be vaccinated.[18,19] This can be possible with proper education programs.

In conclusion, Cyprus is classified as low-intermediate hepatitis B endemic country with a prevalence of 2-4.9% by the CDC.[20] In a comprehensive study, which is reported from Northern Cyprus, the rate of hepatitis B in the population was 1.5%.[21] Northern Cyprus has implemented universal hepatitis B vaccination to all infants since 1999. However, nationwide vaccination program for high-risk groups including HCWs has not been in place. Comparing with the global picture, our vaccination coverage rate is as high as in developed countries. This is a result of continuous educational programs and initial serological testing of newly recruited staff by an infectious disease control team. Despite these efforts, particular attention has to

be given to nearly one-fifth of HCWs who are still susceptible to HBV infection.

Ethics Committee Approval: Ethical committee approval was not obtained since the study involved only retrospective data.

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Original Article

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Comparative Antibacterial Capabilities of *Origanum Onites Oil* and Diode Laser against *Enterecoccus faecalis* Contaminated Primary Root Canals

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BACKGROUND/AIMS
Enterecoccus faecalis is the most dominant and most isolated resistant species from infected/failed permanent teeth undergoing root canal therapy or painful primary teeth with periapical radiolucency. The main purpose of the present research was to compare the antimicrobial effectiveness of essential oil of Origanum onites and diode laser irradiation against *E. faecalis* removal from primary root canals.

MATERIAL and METHODS
A total of 60 retained human primary incisors were selected randomly and divided into six experimental groups as follows: Group I: negative control; Group 2: positive control; Group 3: sodium hypochlorite (NaOCl); Group 4: diode laser; Group 5: Origanum onites (OO) oil; Group 6: diode laser + OO oil. The gas chromatography–mass spectrometry (GC–MS) and GC analyses of *OO oil* were carried out with an Agilent 5977B GC-MSD and Agilent 7890B GC systems, respectively. A 2-W diode laser was used in a continuous action mode with a wavelength of 980 nm for 20 seconds. NaOCl and OO oil were applied continuously for 5 minutes to each root canal. Multiple comparisons and the significances between experimental groups were statistically analyzed using Tukey's multiple comparisons test. The level of significance was accepted at .05 for the entire statistical analysis ($P = .05$).

RESULTS
The major reductions were observed in the groups of NaOCl (98.3%) and diode laser + Origanum onites oil combination (92.5%).

CONCLUSION
Combined therapy of diode laser irradiation following Origanum onites oil application in primary root canal disinfection may be used as an ideal effective chemo-mechanical alternative to NaOCl irrigation.

Keywords: Origanum onites oil, *E. faecalis*, diode laser, antibacterial

INTRODUCTION

The pulpectomy procedure seems to be complicated in primary teeth due to the existence of ramifications, microcanals, and root resorption areas that do not allow sufficient bacterial elimination from the root canal system with mechanical instrumentation and irrigation.[1,2]

Various bacterial species colonize root canals, but *Enterecoccus faecalis* is the most dominant and most isolated resistant species from infected/failed permanent teeth undergoing root canal therapy or painful primary teeth with periapical radiolucency.[3-6] The main properties of *E. faecalis* contribute toward its capacity to adapt to severe environmental

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conditions, as evidenced by its penetration into dentinal tubules, resistance to extreme alkaline pH values, exhibition of virulence factors, and biofilm formation.[7-11]

Currently, sodium hypochlorite (NaOCl) is still the most used irrigant. However, there are major adverse effects including that it is toxic, functions as an irritant when it reaches the apex because of the physiologic resorption of primary roots, and has harmful effects on dentin elasticity and flexural strength. In addition, it is unsuccessful for smear layer removal with limited dentinal tubule penetration to a depth of 100 μm.[12,13]

Over the last decade, various alternative irrigative methods consisting of lasers/laser-activated irrigation and ultrasonic/sonic irrigation systems have been developed and popularized to increase the effectiveness of root canal disinfection and *E. faecalis* elimination.[14-16]

Besides laser technology, the usage of plant-derived/natural/herbal extracts has increased as new efficient therapies against growing antibacterial resistance and oral bacteria. Various natural extracts or their complexes have been investigated, and it has been shown that herbs can manage oral infections to improve oral health.[17] Oregano is one of these herbs and is a term which describes different subspecies. The genus Origanum is rich in phenolic compounds with their powerful antibacterial and antifungal capabilities.[25] Generally, the main components of Oregano essential oils are composed of the monoterpenic phenols carvacrol and thymol. These main components are biosynthesized from γ-terpinene through p-cymene.[26,27] Oregano essential oils have been reported that exhibit anticarcinogenic, antioxidant, antifungal, antibacterial, antioxidant, analgesic and antispasmodic properties under different growth conditions.[28]

There are limited research investigating some herbal drugs as an intracanal medicament in primary root canals.[22-24] Various studies have discussed the antibacterial activities and cytotoxicity of Origanum species, particularly, its essential oil on oral microorganisms.[18-21] However, no research has focused on the antibacterial efficiency of specific Origanum onites oil (OO oil) as a root canal irrigant in primary teeth.

In the light of current clinical problems (such as complex morphology of primary teeth, toxic and irritant effects of NaOCl), the main objective of the present research was to compare the antimicrobial effectiveness of essential oil of *Origanum onites* and diode laser irradiation in primary root canals and to suggest a more conservative clinical alternative to NaOCl irrigation against *E. faecalis* removal from primary root canals.

Main Points

- Combined therapy of diode laser irradiation following OO oil application in primary root canal disinfection should be recommended as an ideal effective chemo-mechanical alternative to NaOCl irrigation.
- A small difference between the *E. faecalis* reduction percentages of NaOCl (98.3%) and diode laser–Origanum onites oil combination (92.5%) groups was observed.
- Further in vivo investigations with larger sample sizes are required to provide a clinically valuable antibacterial treatment with minimal chair-time as an important point of children s treatment.

MATERIAL and METHODS

The present experimental study was evaluated and approved by the Institutional Review Board of Near East University (NEU / 2018 / 58-609). The commercial essential oil of Origanum onites was acquired from TûRER Inc.

The commercial essential oil of *Origanum onites* was acquired from TÜRER Inc.

Gas Chromatography (GC) and Gas Chromatography–Mass Spectrometry (GC–MS) Analysis

GC–MS Analysis: The GC–MS analysis was carried out with an Agilent 5977B GC-MSD system. Innowax FSC column (60 m × 0.25 mm, 0.25 μm film thickness) was used with helium as the carrier gas (0.8 mL min^{-1}). GC oven temperature was kept at 60°C for 10 minutes and programed to 220°C at a rate of 4°C min^{-1}, and kept constant at 220°C for 10 minutes and then programed to 240°C at a rate of 1°C min^{-1}. The split ratio was adjusted to 40:1. The injector temperature was set at 250°C. Mass spectra were recorded at 70 eV. Mass range was from *m/z* 35 to 450. The sample was dissolved in 10% *n*-hexane, and 1 μL was injected.

GC Analysis: The GC analysis was carried out using an Agilent 7890B GC system. The flame ionization detector (FID) detector temperature was 300°C. To obtain the same elution order with GC-MS, simultaneous auto-injection was done on a triplicate of the same column applying the same operational conditions. Relative percentage amounts of the separated compounds were calculated from FID chromatograms.

Identification of Compounds: Identification of the essential oil components was carried out by comparison of their relative retention times with those of authentic samples or by comparison of their linear retention index (LRI) to series of *n*-alkanes. Computer matching against commercial databases (Wiley GC/MS Library, NIST Chemistry Volatile oil constituents of *Origanum* species WebBook)[29,30] and in-house "Başer Library of Essential Oil Constituents" built up by genuine compounds and components of known oils, as well as MS literature data were used for the identification.[31,32]

Antimicrobial Susceptibility of Origanum Onites: *E. faecalis* was incubated at 37°C for 48 hours in blood agar (LAB028, LAB M Limited, Lancashire, United Kingdom). The microdilution method was used for the antimicrobial susceptibility test. Extracts were prepared at the following concentrations: 500, 250, 125, 62.5, 32, 16, 8, 4, 2, 1, 0.5, 0.25, 0.125, 0.06, and 0.03 μg mL^{-1}. The bacterial and *E. faecalis* suspensions were adjusted to 0.5 McFarland standard turbidity. In this method, dimethyl sulfoxide (DMSO) (Sigma-Aldrich, Saint Louis, USA) and water were used as control groups. To each of the dilutions, 100-μL of broth cultures and 100-μL of standard microorganisms were added. The microplates were incubated at 37°C for 48 hours. The turbidity reading was performed by a spectrophotometer.

Preparation of Teeth: A total of 60 retained human primary incisors without physiological or pathological resorption on more than one-third of the apical root were used. First, all superficial debris, tissue tags and calculus were removed, and all

samples were stored in normal saline solution (VACOLITER, Baxter, Turkey). Then, the crowns of the primary teeth were sectioned from the cement enamel junction and, for standardization, the length of the root canals was set at 8 mm. Later, the pulp tissues were extirpated from the root canals, and canals with an apical size of F3 were prepared using rotary instruments (x-smart, DENTSPLY, York, ABD). During the preparing and shaping procedure, 5.25% sodium hypochlorite (NaOCl, Chlorax, Cerkamed, Wola, Poland) in sterile saline was used as an irrigant agent. At the end of the preparation process, the smear layer was removed using 17% Ethylenediaminetetraacetic acid (EDTA) (Endo-Solution, Cerkamed, Wola, Poland), and all samples were irrigated again with sterile saline. Before the experiments, all prepared samples were autoclaved at 121°C for 30 minutes.

***E. faecalis* Contamination of Root Canals:** A 30-µL suspension of pure cultured *E. faecalis* Muller Hinton Broth (LAB114, LAB M Limited, Lancashire, United Kingdom) was used to contaminate each root canal with a sterile insulin syringe. After completing *E. faecalis* contamination, all samples (except negative control group) were incubated *at* 37°C for 48 hours. Following this incubation period, the samples were treated according to the experimental design.

Determination of Experimental Groups: The samples were selected randomly and divided into six equal experimental groups (n = 10) as follows:

Group 1: negative control (no contamination with *E. faecalis*, only normal saline);

Group 2: positive control (ATCC 29212 *E. faecalis* contamination, only normal saline);

Group 3: 5 mL 2.5% NaOCl;

Group 4: diode laser;

Group 5: 5 mL Origanum onites oil; and

Group 6: diode laser + 5 mL Origanum onites oil (overnight).

NaOCl and OO Oil Were Applied Continuously for 5 Minutes to Each Root Canal

Diode Laser Irradiation: Diode laser irradiation was performed using a diode laser (MEDENCY, Primo, Vicenza, Italy). A 2-W diode laser was used in a continuous action mode with a wavelength of 980 nm using a 200 µm diameter optical fiber for 20 seconds. Laser irradiation was initiated at the coronal portion of each root canal with helicoidal optical fiber movements down to 1-mm short of the apical area.

Intracanal bacterial samples were taken before and after canal disinfection to determine the CFU count.

Statistical Analysis

Multiple comparisons and the significances between mean values of the experimental groups were statistically analyzed using *Tukey's multiple comparisons test*. The percentages of reduction in colony counts (%RCC) were evaluated using the following equation:

CFUS (before treatment) – CFUS (after treatment) × 100 = %RCC

CFUS (before treatment)

Table 1. Essential Oil Composition of *Origanum* Onites (Türer Inc.)

LRI	Compound name	Relative percentage amounts (%) A
1020	α-Pinene	0.4
1024	α-Thujene	1.1
1072	Camphene	0.3
1119	β-Terpinene	0.1
1172	Myrcene	0.6
1177	α-Phellandrene	0.2
1191	α-Terpinene	1.3
1213	Limonene	0.2
1222	β-Phellandrene	0.2
1260	γ-Terpinene	6.9
1287	*p*-Cymene	4.1
1298	Terpinolene	0.1
1457	1-Octen-3-ol	0.1
1478	*trans*-Sabinene hydrate	0.4
1555	Linalool	1.4
1564	*cis*-Sabinene hydrate	0.2
1569	Linalyl acetate	0.1
1624	Terpinene-4-ol	0.7
1628	β-Caryophyllene	0.5
1638	Aromadendrene	0.1
1717	α-Terpineol	0.2
1728	Borneol	0.4
1748	β-Bisabolene	1.1
1770	Carvone	tr
1786	δ-Cadinene	tr
1793	γ-Cadinene	0.1
1899	Carvacryl acetate	0.1
2033	Caryophyllene oxide	0.1
2159	Spathunelol	0.1
2205	T2Cadinol	0.2
2210	Thymol	0.2
2243	Carvacrol	78.4
	Total	100.0

A: essential oil of Origanum onites (TÜRER, Inc.); LRI: linear retention indices calculated against n-alkanes; %: calculated from FID data; tr: trace (<0.1%).
Abbreviations: LRI, linear retention indices; FID, flame ionization detector; tr, trace.

RESULTS

The analysis results of commercial *Origanum onites* essential oil composition are given in Table 1. The totally analyzed essential oil was represented with 32 components. The major compounds were determined as carvacrol (78.4%), g-terpinene (6.9%), and *p*-cymene (4.1%), respectively.

According to the study results, bacterial growth was observed both before and after treatment in all 10 samples of the positive control group, whereas no bacterial growth was observed in the negative control group. Briefly, all samples treated with the diode laser and *Origanum onites oil* were positive for bacterial growth both before and after treatment. However, for the sodium hypochlorite (NaOCl) group, no bacterial growth was observed after treatment. After the 48 hours cultivation period, a significant decrease was detected for the combined diode laser and *Origanum onites oil* group.

The percentages of reduction in *E. faecalis* colony counts after irrigation procedures are shown in Table 2. The major reductions were observed in the groups of NaOCl and diode laser-*OO oil* combination. Moreover, the small difference between

Table 2. *E. faecalis* Reduction in Colony Counts of Each Group

Groups	RCC (%)	CFU mL^{-1} (±SD)
Positive control	0	3.04×10^5 ($\pm 6.7 \times 10^3$)
NaOCl	98.3	5.1×10^3 ($\pm 2.7 \times 10^3$)
Diode laser	32	2×10^5 ($\pm 4.5 \times 10^3$)
Origanum onites oil	25.5	2.26×10^5 ($\pm 1.5 \times 10^4$)
Diode laser + *Origanum onites* oil	92.5	2.2×10^4 ($\pm 6 \times 10^3$)

Bacterial base line count was 3×10^5 CFU mL^{-1}, and no bacterial growth was observed in negative control.
Abbreviations: NaOCl, sodium hypochlorite; RCC, reduction in colony counts.

the *E. faecalis* reduction percentages of NaOCl (98.3%) and diode laser–*Origanum onites oil* combination (92.5%) groups was found to be statistically significant. A greater reduction was observed in NaOCl in comparison to the diode laser–*Origanum onites oil* combination ($P = .0317$). Although *Origanum onites oil* RCC was about 25.5% without diode laser irradiation, when *Origanum onites oil* irrigation was combined with diode laser irradiation, the RCC was detected to be about 92.5%. This difference between groups was found to be significant ($P < .0001$). The same trend was detected between diode laser irradiation alone and diode laser–*Origanum onites oil* combination ($P < .0001$). The statistical comparisons between all groups are presented in Table 3.

DISCUSSION

E. faecalis is isolated with greater frequency from permanent root canals but clinically, it is copiously present in primary root canals.[33] In endodontic treatments, because of the bactericidal effects of lasers, various kinds of lasers, such as Er:YAG, Nd:YAG, and diode lasers, have been developed and used to provide infection control. In the present study, the diode laser was preferred because it has a good bactericidal effect and does not cause an unacceptable temperature rise in periodontal/external root tissues.[34-36] Also, the deep penetration capability of diode lasers into the dentinal tubules has been shown to be satisfactory under in vivo conditions.[37] For this reason, the diode laser irradiation was performed with a newly designed endodontic tip that was set to operate in the continuous mode for a regular effect at a power output of 2 W. According to Dai et al.'s[38] study, 2 W power was used to remove the smear layer on primary teeth while avoiding dentinal melting. However, diode laser irradiation alone with 2 W power output did not effectively reduce the *E. faecalis* bacterial count (32%). This ineffectiveness of the diode laser might be explained by biostimulatory effects of laser. The minimal exposure to laser irradiation in the present study may have helped to increase the physiological activities of *E. faecalis* for proliferation instead of reduction.[39] Also, the wavelength could be another reason that explains inadequate efficiency of diode laser. The wavelength of 980 nm in diode lasers has a powerful water absorption capacity, so superficial dentin layers benefit from the majority of antimicrobial effects in comparison to deeper tubule layers.[40] Hence, the disinfection capacity of diode laser is decreased against resistant bacteria like *E. faecalis*, which can penetrate deeper dentinal tubules. Another reason for the lower percentage of bacterial reduction with diode laser irradiation could be justified by the findings of Borges et al.'s[41] study. They reported that gram-positive bacteria such as *E. faecalis* need to be irradiated with additional-repeated modes for disruption of the bacterial cell wall. Although no effective bacterial reduction was determined and no attempts were made to find out main interaction between diode laser and *E. faecalis*, the main bactericidal mechanism of diode laser irradiation was based upon the photothermal effect, which stimulates the bacterial cell death by creating localized heating sides around the bacterial microenvironment.[42]

Essential oils that are rich in phenolic compounds in particular have the capabilities to change the permeability of cell membrane via diffusion into the phospholipids layer of the bacterial cell wall, thus affecting protein synthesis leading to cytoplasmic changes and blocking cellular functions.[43,44]

According to our results, the bactericidal effect of *Origanum onites oil* without diode laser irradiation as an intracanal irrigant agent on *E. faecalis* was inadequate (25.5%). This situation may be explained with more than one action of mechanism. First, *Origanum onites oil* is highly vaporizable, so it may have lost its antibacterial effectiveness during incubation. Second, the primary tooth microstructure may complicate the

Table 3. The Statistical Comparisons between All Experimental Groups. The Major Reductions Were Observed in the Groups of NaOCl and Diode Laser-Origanum Onites Oil Combination

Tukey's multiple comparisons test	Mean diff.	95% CI of diff.	Significant	Summary	*P* value
Positive vs. negative control	3.042	2.877 to 3.207	Yes	$P < .0001$	<.0001
Positive vs. NaOCl	2.991	2.826 to 3.156	Yes	$P < .0001$	<.0001
Positive vs. diode laser	0.9744	0.8093 to 1.139	Yes	$P < .0001$	<.0001
Positive vs. Origanum onites	0.7784	0.6133 to 0.9435	Yes	$P < .0001$	<.0001
Positive vs. laser-Origanum onites	2.816	2.651 to 2.981	Yes	$P < .0001$	<.0001
Negative vs. NaOCl	−0.051	−0.2161 to 0.1141	No	not significant	.9415
Negative vs. diode laser	−2.068	−2.233 to −1.903	Yes	$P < .0001$	<.0001
Negative vs. Origanum onites	−2.264	−2.429 to −2.099	Yes	$P < .0001$	<.0001
Negative vs. diode laser-Origanum onites	−0.226	−0.3911 to −0.06095	Yes	$P < .005$	.0022
NaOCl vs. diode laser	−2.017	−2.182 to −1.852	Yes	$P < .0001$	<.0001
NaOCl vs. Origanum onites	−2.213	−2.378 to −2.048	Yes	$P < .0001$	<.0001
NaOCl vs. diode laser-Origanum onites	−0.175	−0.3401 to −0.009947	Yes	$P < .05$	.0317
Diode laser vs. Origanum onites	−0.196	−0.3611 to −0.03095	Yes	$P < .05$	.0112
Diode laser vs. diode laser-Origanum onites	1.842	1.677 to 2.007	Yes	$P < .0001$	<.0001
Origanum onites vs. diode laser-Origanum onites	2.038	1.873 to 2.203	Yes	$P < .0001$	<.0001

Abbreviation: NaOCl: sodium hypochlorite.

penetration of *Origanum onites oil*, which is viscous and may be unable to penetrate dentinal tubules, especially in the case of smear layer. In agreement with Man et al.'s[45] study, the lower antibacterial effect of *OO oil* on *E. faecalis* may be related to oil's aqueous form which leads to a decrease in its antibacterial activity. Resultantly, DMSO was preferred to decrease the hydrophobic viscous structure of essential oil and also to reduce its side effects in the present study. While DMSO decreases the side effects and viscous structure of *OO oil*, it reduces the purity of essential oils. Therefore, in the present study, the *OO oil* was not used in its pure form, so that *OO oil* alone was detected ineffective against to *E. faecalis*. Another important factor that affects the antibacterial activity is the thymol and carvacrol content of *OO oil*. Higher amounts of thymol exhibit stronger antibacterial activity.[46] In a previous study by Başer, carvacrol was identified as the main component responsible for the biological activities of origanum species including *Origanum onites*.[47] According to GC/MS analysis in the present study, carvacrol (78.4%), γ-terpinene (6.9%), and *p*-cymene (4.1%) were detected as the major components of *OO* oil. Therefore, the *E. faecalis* reduction capacity of *Origanum onites oil* in this study may be explained by its high carvacrol component. In contrast to Ok et al.'s[20,21] studies, the reason for the differences with these studies may be caused by the lower percentage of thymol component (0.2%) in *OO oil* used our study and also the application area of the oregano essential oils. In Ok et al.'s[20,21] studies, oreganum extract solutions were found nontoxic and more effective against to *E. faecalis* than our results. Also thymol component was ranged between 1% and 1.25%, and mature/permanent teeth were used in those studies.

Parallel to our results, the effectiveness of NaOCl was shown by Oliveira et al.,[48] who found that, as an endodontic irrigant, only NaOCl had the capacity to kill the entire bacterial population. Of the considered treatments, we similarly observed that 2.5% NaOCl was the most effective endodontic irrigant for *E. faecalis* removal from primary root canals. However, this effective disinfection of 2.5% NaOCl probably arose due to the larger instrumental size of the primary root canals. In agreement with Kumar et al.'s[49] study, this larger preparation size of the root canals enables the dentinal tubules to be opened and removes the intratubular bacteria by allowing more effective penetration of NaOCl.

In the current study, the antibacterial efficacy of diode laser + OO oil combination could be clarified by Al Shahrani et al.'s[50] study, which claimed that the photonic energy of laser may activate and enhance irrigant agents by providing greater accessibility to unreachable parts of dentinal tubules.[50] Furthermore, the increasing antibacterial effect of *OO oil* in the long-term (overnight) may be explained by the increased smear layer dissolution and dentinal tubule penetration of *OO oil*. In other words, diode laser may act as a synergistic factor when combined with *OO oil*, and thus diode laser may increase the antibacterial effect of *OO oil*.

Furthermore, in vivo experiments with larger sample size need to be tested for a better understanding of the main antibacterial mechanism of diode laser irradiation and *Origanum onites oil*.

Within the limitations of this study, we can conclude that the combined therapy of diode laser irradiation following *OO oil* application in primary root canal disinfection may be used as an ideal effective chemo-mechanical alternative to NaOCl irrigation, especially in larger apical sized primary teeth with physiological resorption. Also, antibiotic resistance due to long-term medicinal usage may be prevented using this method. Prior to using irrigant agents including herbal drugs or laser, the viscosity of an essential oil, complex morphological root-canal structure of primary teeth, smear layer, deep penetration to dentinal tubules, timing properties, and biocompatibility must be taken into consideration and the ideal agent must be selected. Further studies are required to provide a clinically valuable antibacterial treatment choice with minimal chair-time as an important point of children's treatment.

Ethics Committee Approval: Ethical committee approval was received from the Near East University (NEU / 2018 / 58-609).

Informed Consent: Written informed consent was obtained from patients before they participated in the study.

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Original Article

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Online Medicine Tracking System of Pharmacies in North Cyprus

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BACKGROUND/AIMS
The main purpose of this study is to design an online mobile application to reach the nearest pharmacy in the fastest and most accurate way. It is vital in emergency situations. This application provides pharmacist locations, address, and contact numbers to users. In addition, it provides daily lists of pharmacies on duty. Thus, this study and the developed software will give us clues to contribute online medicine approach. Furthermore, this work is unique in this field; no such comprehensive study has been done before on online medicine tracking system.

MATERIAL and METHODS
The software was created using the android operating system on Massachusetts Institute of Technology App Inventor platform. Database was created with program codes, and necessary information was stored in the database. Finally, database is integrated into the interface.

RESULTS
The PHARNC was developed to provide a quick access to pharmacies. Nicosia, Famagusta, Kyrenia, Morpheus, and Iskele/Karpasia were selected as pilot regions. These districts vary in population and number of pharmacies. Nicosia is the district with the highest density in population and number pharmacies. As a result, there are 10 pharmacies per 10,000 people in Nicosia, while there is one pharmacy per 10,000 people in the Iskele/Karpasia.

CONCLUSION
This study showed that Nicosia has now reached the saturation point in the number of pharmacies. The necessary measures should be taken and a solution should be found for the accumulation of pharmacy in Nicosia because the number of pharmacies is higher than the population needs. Whereas, this situation is negative in Famagusta, Kyrenia, and Morpheus; there is a great risk for these districts in the upcoming years.

Keywords: Android, mobile application, online tracking system

INTRODUCTION

Pharmacies are important for health sector. This sector, which allows patients to access medicines quickly, is growing rapidly in recent years. The demand for pharmacies in direct proportion to the increase in population in North Cyprus has also increased. Government's state planning pharmacy department obtained from the work of Cyprus Turkish Pharmacies Association indicated that the distribution of pharmacies in North Cyprus is not ideal with respect to population to pharmacy number ratio.[1]

Pharmacists have competence for medicine, and patients reach to medicine from them. There are a total of 268 pharmacies in North Cyprus, according to the May 2019 records of the Cyprus Turkish Pharmacists' Association.[1] Of these, 105 pharmacies are in the Nicosia, 56 in the Kyrenia, 57 in the Famagusta, seven in the Iskele, 23 in the Morpheus, six in the Upper Mesaoria, nine in the Lower Mesaoria, and five in the Karpasia.

The area of North Cyprus is small (3,355 km^2), and it has low population density (286,257) according to the 2011 estimate.[2] So, the 268 pharmacies are very high for North Cyprus. Therefore, there is one pharmacy per 12 km^2.

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In 2019, a study was performed about the online pharmacy system in India. The aim of the study was to take the order via internet and deliver the drug to the customer. The development of online pharmacies has led to regulatory and monitoring actions at federal and state levels. The online sale of medicines is potentially dangerous in international systems and requires international regulations. Therefore, they worked on local system.[3]

In another study conducted in 2018, it was stated that some individuals or institutions that were ordered online were fraudulent, and it was argued that measures should be taken to reduce this risk.[4] Previous studies on the similar subject have generally focused on this security problem. This risk was taken into consideration in this study. Individuals or organization who received admin approval will be able to register for the PHARNC. This is how the system was designed. Those who wish to register on this application to receive online orders will be able to register by submitting official documents certifying that they are real pharmacists.

The PHARNC is a database designed to supply information both for people and pharmacists of the country. The distribution of pharmacies in North Cyprus is not well organized according to the population of the regions. So, patients have difficulties finding address and direction to the nearest pharmacy. This database provides easy and quick access to pharmacies. The PHARNC provides address and contact information of pharmacies via online, and people can make online contact via internet with pharmacies. Therefore, this system provides an instant communication. Another importance of PHARNC is that people can order drugs online with this system. The PHARNC database is designed to provide all contact information online in case of emergency situations. Day by day list of pharmacies on duty to be given, it is vital for emergency situations at nights. Furthermore, PHARNC provides services both in Turkish and English languages because the official language of North Cyprus is Turkish. Since there are too many foreign settlements, it is necessary to provide English language service.

The main purpose of this study is to design an online mobile application for people to reach the nearest pharmacy in the fastest and most accurate way. Quick reach to the pharmacy in emergency situations is vital. This application presents the pharmacist locations, address, and contact numbers to users. Also, it provides daily lists of pharmacies on duty. Another purposes of this study are to (1) develop and create a software program for online medicine tracking system and (2) design an application to reach the required medicine as soon as possible. Thus, this study and the developed software will give us clues to contribute online medicine approach. There is no such similar application in North Cyprus. Furthermore, this work is unique in this field; no such comprehensive study has been done before on online medicine tracking system. So, this is the first application-based study associated with pharmacies in North Cyprus.

Main Points

- The PHARNC is a database designed to supply information both for people and pharmacists of the country.
- Quick reach to the pharmacy in emergency situations is vital.
- This application provides pharmacist locations, address, and contact numbers to users.
- The android platform reaches more people around the world.

MATERIAL and METHODS

Computer

A computer was used to create the necessary database for this study. The operating system used in the computer was 32-bit Windows 10 Pro with an X64-based Intel (R) Core (TM) i5 processor, 2.53 GHz central processing unit, 3.00GB of random access memory, and 444GB of storage capacity.

Android Operating System

The software was created in accordance with the android operating system. Android is the operating system based on Linux for mobile devices. It is developed by Google and Open Handset Alliance. Although the system is open source, a small but very important part of the code is closed by Google. Because it is an open source, the system is quickly to develop, and to reach more people.[5]

An android-based software was developed in this study because android is the more common operating system worldwide. The android platform reaches more people around the world. Kantar WorldPanel has published the latest market research for mobile operating systems on 2016. According to the report, android usage rates in some countries around the world are as follows: United States 65.5%, Great Britain 57.3%, France 75.5%, Germany 79.2%, China 81.4%, and Japan 61%.[6] Unfortunately, there are no data from North Cyprus. This information shows us that we will reach wider masses with the android operating system.

MIT App Inventor

App inventor (MIT App Inventor; MIT Computer Science and Artificial Intelligence Laboratory, MA, United States) is an open-source web application supported by Google and maintained by Massachusetts Institute of Technology (MIT) in the United States. In this study, the application was developed using the MIT App Inventor online programing platform.[7]

It consists of two parts: design and block. First, the application interface was designed in the design part. When creating this interface, the consideration is based on designing a clear and understandable interface for the user to learn the application easily. In other words, the view of the application was created in this section. Subsequently, application's programing part was created in the block section. Block section is the brain of the software. So, database was created with program codes, and necessary information was stored in the database. Finally, the created database is integrated into the interface, and the application is completed and ready for present to the public.

Database of Application

The database is the domain in which information related to each other is stored. Nowadays, databases are used in banking, automotive industry, and health information systems, for example, a wide range of computer systems are used to create the infrastructure.[8]

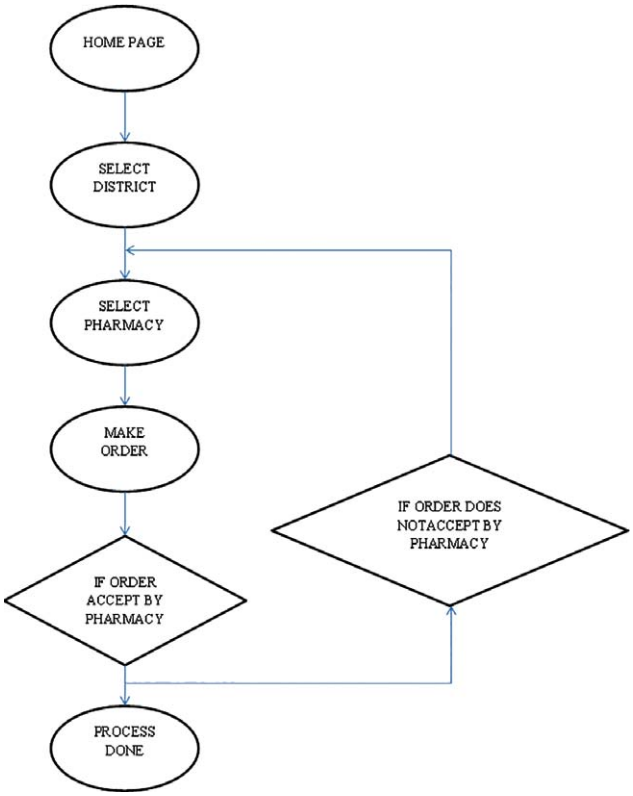

Figure 1. Flowchart of study

Figure 2. Available districts on application

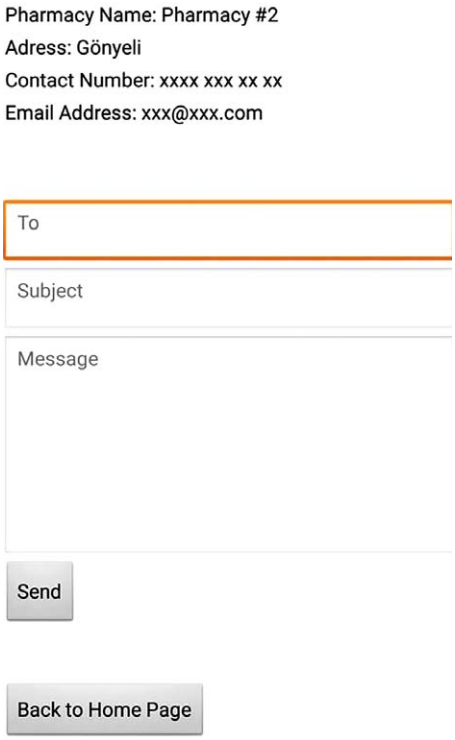

Figure 3. The main part of the application is shown as a pilot

In this study, a separate section has been created for each pharmacy in the database. Thus, it supports to keep the address and contact information of pharmacies in the database, and it was designed to communicate instantly on online orders.

The ethics committee approval, and informed consent and consent from are not required for this study. Also, this study has been written in accordance with the declaration of Helsinki.

RESULTS

The PHARNC is an android-based software. This software was developed to provide easy and quick access to pharmacies in North Cyprus. Thus, patients will be able to reach the pharmacies as soon as possible in case of emergency. This software consists of four main parts. The first part is the home page. When users log-in to the application, they first encounter the home page. On this page, there is an entry button that allows the user to log-in to the application. Also, application name and logo be on this page. After the users clicking the entry button, the application is designed to switch to the second part (Figure I).

The second section has six toggle buttons. These buttons represent six districts in North Cyprus. These districts are Nicosia, Kyrenia, Famagusta, Iskele, Morphou, and Karpasia (Figure 2). The purpose of this second section is to find a pharmacy in a district close to where the people live or current location. After clicking on any district button, then user sees the list of pharmacies registered in that district in the application. In the third section, the user accesses the pharmacy lists in the district where they are located. Thus, they can get the contact information and address of the nearest pharmacy. In the last part of the application, the user gets the name, address, and contact numbers of the pharmacy (Figure 3). Users can send instant online

TABLE I. Population and Pharmacy Distributions in North Cyprus

Cities	Number of population in 2006	Number of population in 2011	Population growth rate between 2006 and 2011	Number of pharmacy	Number of pharmacy per 10,000 person
Nicosia	84,776	94,824	11.85	105	10
Famagusta	63,603	69,741	9.65	57	8
Kyrenia	57,902	69,163	19.45	56	8
Iskele/Karpasia	21,099	22,492	6.60	12	5
Morpheus	29,264	30,037	2.64	23	7.6
Total	256,644	286,257	11.54	268	9

messages through the application to pharmacy. Thus, they can make online order via internet. The pharmacy will reply to the user how long the order will be ready. So, the patients will not have to wait in the pharmacy for their order.

Nicosia, Famagusta, Kyrenia, Morpheus, and Iskele/Karpasia were selected as pilot regions. These districts vary in population and number of pharmacies. Nicosia is the district with the highest density in population and number of pharmacies. As a result, there are 10 pharmacies per 10,000 people in Nicosia (Table 1). The statistical analysis of this study did not use any software program. The number of pharmacies in Nicosia is excessive compared to the population. This creates certain problems. The most important problem is the inaccurate distribution of the number of patients coming to pharmacies, namely, some pharmacies work less while some pharmacies work excessively. Thus, economic problems may occur in this sector. Because of this study, people who will use this application will be able to reach the nearest pharmacies in their location easily and quickly. Another positive aspect of this study is that the newly opened pharmacies can be discovered early by the public. In addition, this study aimed to provide an equal customers' distribution to each pharmacy in the same district. It provides two important advantages. First, it will provide customers earnings at a certain rate to pharmacies. Second, patients will be able to order medications over the internet and have early reach to these medications. Thus, the elimination or reduction of queues' in the pharmacies is aimed.

However, there is one pharmacy per 10,000 people in the Iskele/Karpasia. There are only 12 pharmacies in these regions (Table 1). The most important problem in this region is distance. Some villages in the region do not have a pharmacy. Especially, pharmacies are located near the center. Therefore, patients in some villages have to go long distances to access the pharmacies. This is a life-threatening in emergency situations. Here, the importance of the application is obvious. In practice, people can make an online order and may spend the time required time for order preparation on the road. Thus, the patients waste less time.

In the remaining districts of North Cyprus, the distribution of pharmacies is almost identical. In Famagusta and Kyrenia, there are eight pharmacies per 10,000 people, while in Morphou, 7.6 pharmacies per 10,000 people (Table 1). Finally, there are nine pharmacies per 10,000 people throughout the country.

DISCUSSION

The lack of medicines creates major challenges for medical care. Liang and Mackey created a website for the storage of all online pharmacies to the database in 2012. Also, their study provided access to online pharmacies to sell vaccine. Especially, a great importance has been attached for cancer and anesthetics medicine.[9]

This study is unique. Similar study has not been done before. It gives chance to online access to pharmacies in North Cyprus. Therefore, patients can reach pharmacies' contact information via online mobile application. This application provides pharmacies' address and online medicine orders.

The MIT App Inventor was used for the creation of this software. It is a computer programing platform based on android. This application works on all computer, smartphones, and other electronic devices with an android operating system. The android is the world's most widely used operating system. So, it will support to reach wider masses.

In concluding, this study showed that Nicosia has now reached the saturation point of the number of pharmacies. The necessary measures should be taken and a solution should be found for the accumulation of pharmacy in Nicosia because the number of pharmacies is higher than the population needs. Whereas, this situation is negative in Famagusta, Kyrenia, and Morpheus, but there is a great risk for these districts in the coming years. The most important factor of this risk is that more local students are interested studying in the pharmacy department at universities. This shows that more pharmacists will graduate from universities in the future, and more pharmacies will be opened in market. However, there is an opposite ratio in the Iskele and Karpasia districts. There are a total of 12 pharmacies in these districts: seven in the Iskele and five in the Karpasia. There are five pharmacies per 10,000 people in these districts. This rate is the lowest rate across the island. In particular, encouraging new pharmacists to the Iskele and Karpasia districts in order to prevent the accumulation in other districts may provide a small solution to this problem. Although this is not in the long term, it may to provide a solution in the short term.

Furthermore, the number of people per pharmacy in Europe varies by country. According to the 2004 data, the lower limit in Europe is Greece. There are 1,162 people per pharmacy in Greece. The upper limit is Denmark, there are 16,502 people per pharmacy. In addition, the situation in other major European countries is as follows: France 2,579, Germany 3,800, and the United Kingdom 4,867. Moreover, Turkey Statistical Institute reported that there should be a pharmacy to each 3,500 people. Accordingly, when the population and the number of pharmacies in the districts of North Cyprus were examined, some conclusions were reached. In result of this examine, there was an excess of pharmacy in each district. According to the population, there should be a maximum of 27 pharmacies in Nicosia, 20 in the Famagusta, 20 in the Kyrenia, seven in the

Iskele, and nine in the Morpheus. However, the number of pharmacies in each district is excessive. According to the current situation, there are 78 excess pharmacies in Nicosia. There are 37 pharmacies in the Famagusta, 36 in the Kyrenia, five in the Iskele/Karpasia, and 20 surplus in the Morpheus (Table 1). Worse is increasing the excess of this pharmacy every day. Furthermore, the intensity of the pharmacy in the coming years predicts that it can lead to economic difficulties for pharmacists.

In the future, it is aimed to develop a comprehensive software that will include all pharmacies in North Cyprus.

This study has been written in accordance with the declaration of Helsinki. Also, conflict of interest and financial disclosure statement are not required for this study.

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Informed Consent: N/A

Peer-review: Externally peer-reviewed.

Conflict of Interest: The author has no conflicts of interest to declare.

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Original Article

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The Relationship between Internet Usage and Perception Self Efficacy and Social Support of Mothers

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BACKGROUND/AIMS
This study was examined the relationship between the internet usage about child health, social support, and self-efficacy perceptions of mothers.

MATERIAL and METHODS
A descriptive study design was used. The study was conducted in pediatric out-patient clinics of two university hospitals. Totally 484 mothers who had 1-3 year-old children were included in the study.

RESULTS
This study was examined the relationship between the internet usage, social support, and self-efficacy perceptions of parents who have 1-3 year-old children according to their sociodemographic characteristics. It is shown that mothers use internet in order to seek information related to their children's health issues. The internet usage is independent of the age of the mother, whereas it is related to the educational levels of the mother and the ages of children. The subjects that are searched by mothers vary according to the ages of their children. The self-efficacy of the mothers is not influenced by the ages of mothers, whereas it is correlated with the educational levels of mothers, ages of the children, and the internet usage. Social support perception is not related to sociodemographic characteristics. However, it is negatively correlated with the internet usage. On the other hand, there is a positive correlation between the social support perception and self-efficacy.

CONCLUSION
The results are important in order to determine the support requirements of parents and strengthen them. The results can direct nurses and the other health professionals while defining and planning what kind of support should be given to parents.

Keywords: Internet usage, mothers, social support, self-efficacy

INTRODUCTION

According to the International Telecommunication Union, 51.2% of the global population use internet by the end of 2018. When four out of five people use internet in developed countries, internet uptake remains relatively low and four out of five individuals (80%) are not yet using the Internet in the world's least-developed countries. The internet usage rate of individuals is approximately 65% in Turkey and 81% in Cyprus.[I]

Internet is an efficient, popular, and cost effective tool for parents.[2] Internet usage provides opportunity to parents to access the information no matter how, when, and where they are.[3] Increasing number of parents use internet for health-related matters[4] and the internet usage rate among parents is almost 66.0% in Turkey.[I] Studies show that parents seek information and social support on the internet. However, there is a limited information related to the subjects and issues that are searched by parents on internet.[4-7] Majority of the studies are about the parenthood transition on internet usage by parents.[3,8-10] There are limited numbers of studies about the internet usage of parents on their children's health condition.[II] While transition to parenthood is an important period, first few years after transition to parenthood are also important in terms of information and social support requirements. In the first few years, physiological, psychological, social, and emotional development of children is very fast. In this period, particularly mothers need information and support. However, there is an inadequate research on this issue.[3,9,10]

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Parents' behaviors for their children are important, because their behaviors influence the health status of the children.[12] Parenting efficacy relates to the parents' competence and confidence in handling problems related to child rearing.[13] Parent self-efficacy is defined as the ability to fulfill and organize the parental tasks. Parental self-efficacy is related to the self-competence and strength of the person.[14] It is possible that parents seek information because of their need to strengthen their knowledge and thus their self-efficacy. On the other hand, it is possible that parents use internet since they need both knowledge need and social support.[4,5] According to the literature review of Plantin and Danabeck,[5] it was concluded that parents use internet more compared to their communication with their families, friends, and acquaintances.

There are a few studies in which the internet usage, social support perception, and self-efficacy of parents in terms of the health issues of their children are examined separately.[8,11,15] Recent reviews emphasize that there should be studies, which determine the information and support requirements of parents and define the internet usage characteristics of parents in the different stages of parenthood.[4,16] Therefore, this study was aimed to examine the relationship between the internet usage about child health, social support, and self-efficacy perceptions of mothers who have 1-3 year-old children according to their sociodemographic characteristics.

MATERIAL and METHODS

A descriptive study design was used. The study was conducted in pediatric out-patient clinics of two university hospitals, in İzmir, Turkey. Totally 484 mothers who had 1-3 year-old children were included in the study. The study was included children who did not have chronic disease.

The data of the study were collected by using a sociodemographic characteristics form, internet usage questionnaire, Multidimensional Scale of Perceived Social Support, and Self-Efficacy for Parenting Tasks Index-Toddler Scale.[17] Sociodemographic form is composed of 11 questions, which are related to the demographic characteristics such as age and education status of mothers and the age of the children. Internet usage questionnaire is composed of 25 questions related to the internet usage of mothers in the last 12 months about child care. Multidimensional Scale of Perceived Social Support is composed of 12 questions, and it contains family, private, and friend subscales. The Chronbach's α of the scale is 0.50. The scale contains three groups, which are separately composed of four items. These are family (3, 4, 8, and 11 items), friends (6, 7, 9, and 12 items), and private individuals (1, 2, 5, and 10 items). The lowest score which can be obtained from the entire scale is 12, and the highest score can be 84. Higher scores reflect the high social support perceptions. Self-Efficacy for Parenting Tasks Index-Toddler Scale is composed of 53 items and seven subscales. It examines the communication between parents and their children when they are between the infancy and childhood period (1-3 year old). The total scores that can be obtained from the scale can vary between 53 and 265. Higher scores reflect the strong self-efficacy. There are seven subscales such as emotional competence (seven items), reactivity (eight items), protection (seven items), discipline (Article 9), Games (seven items), teaching (seven items), and daily works-maintenance-configuration (eight items). The Chronbach's α of the scale is 0.91.[18]

Main Points

- The mothers use internet in order to seek information related to their children's health issues.
- The internet usage is independent of the age of the mother, whereas it is related to the educational levels of the mother and the ages of children.
- The self-efficacy of the mothers is correlated with the educational levels, the internet usage, and ages of the children.
- Social support perception is negatively correlated with the internet usage.

The research questions of this study are as follows:

- Is there a relationship between mothers' perception of social support and internet use?
- Is there a relationship between mothers' internet use and self-efficacy perception?

The data were acquired by the researcher in face-to-face interviews, explaining the aim of the research to the parents who were part of the research sampling in the clinics where the research was carried out. Consent was obtained from the parents who agreed to take part in the research. The necessary permission and the approval of the ethics committee (B.30.2.SFÜ.00.50.500/386) were obtained from Sivas Cumhuriyet University in order to conduct the study.

SPSS (Statistical Package for the Social Sciences) for Windows v.16 (SPSS Inc.; Chicago, IL, USA) statistical program was used to analyze the data of the study. Percentage, mean, t test, Kruskall–Wallis Variance Analysis (KW), chi-square, and correlation analyses were used. The significance was accepted, when *P* value was lower than .05.

Limitation of the Study

The generalizability of the results is limited, because this study was done with a limited number of parents who have 1-3 year-old children. These research results can be generalized to parents included in sampling.

RESULTS

The mean age of children is 1.93 ± 0.83 (1-3), 61.2% of the children are female, and 38.8% of them are male. The mean age of the mothers is 31.39 + 4.18 (25-43), 49.8% of them graduated from university, 51.9% of them are not working, 79.0% of them have one child, and 91.0% of them are using internet every day. The mean duration of the internet usage is 2.15 ± 0.85 hours (Table 1).

There is no correlation between the age of mothers and the duration of the internet usage, but a negative correlation was found with the child's age. However, the study was detected a significant difference between the educational status of mothers and the duration of the internet usage (Table 2).

According to the results, mothers seek information on internet about child development (32.6%), breastfeeding (14.7%),

Table I. Sociodemographic Characteristics

Variables	n (%)	M ± SD
	Child age	
One year	184 (38.0)	1.93 ± 0.83 (1-3 years)
Two years	146 (30.2)	
Three years	154 (31.8)	
	Child gender	
Female	296 (61.2)	
Male	188 (38.8)	
	Child number	
One	382 (79.0)	
Two	87 (18.0)	
Three	15 (3.0)	
	Mother age	
25-29 year	200 (41.3)	31.39 ± 4.18 (25-43 years)
30-34 year	177 (36.6)	
35-39 year	75 (15.5)	
40-45 year	32 (6.6)	
	Education	
Primary school	132 (27.3)	
High school	111 (22.9)	
University	241 (49.8)	
Work status		
Employed	233 (48.1)	
Unemployed	251 (51.9)	
	Internet usage frequency	
Every day	440 (91.0)	
Several day in a week	44 (9.0)	
	Internet usage duration	
One hour	106 (21.9)	2.15 ± 0.85
Two hours	238 (49.2)	
Three hours	100 (20.7)	
Four hours	40 (8.2)	

weaning (12.0%), toilet training (12.0%), and sleeping (11.0%) (Table 3). There is a significant difference between the subjects that are searched by mothers according to the mean age of children ($P < .005$). Mothers seek information about the child development for each age group. Mothers who have 1-year-old children mostly seek information about breastfeeding, supplementary food, and vaccination; mothers who have 2-year-old children mostly seek information about weaning, toilet training, and safety. Besides, mothers who have 3-year-old children mostly seek information about sleeping, toilet training, discipline, and safety.

There is no significant relationship between the social support perceptions of mothers, the mean age of children, and the mean age of mothers, whereas there is a negative and mild relationship with the duration of the internet usage. There is no significant relationship between the self-efficacy of mothers and the mean age of mothers, whereas there is a positive and

TABLE 2. The Relationship between the Duration of the Internet Usage and Some Demographic Variables

Variables	N	R	*P*
Mean age of the mothers	484	0.00	.978
Mean age of the children	484	−0.15	**.001**
Education	**N**	**KW**	
Primary school	132	235.11	**14.15.001**
High school	111	207.73	
University	241	262.56	

TABLE 3. Issues That Are Searched by Mothers

Issues	n (%)
Child development	158 (32.6)
Breastfeeding	71 (14.7)
Weaning	58 (12.0)
Toilet training	58 (12.0)
Sleeping	53 (11.0)
Supplementary food	30 (6.2)
Safety	30 (6.2)
Vaccination	15 (3.1)
Discipline	11 (2.3)

moderate relationship with the mean age of children and negative and mild relationship with the duration of the internet usage. There was not detected a significant relationship between the education status of the mother and the social support perceptions of mothers. On the other hand, there is a significant relationship with the self-efficacy perceptions of mothers (Table 4). There is a positive and significant relationship between the self-efficacy perceptions and the social support perceptions of mothers (Table 5).

DISCUSSION

This study was conducted in order to determine the relationship between the social support and self-efficacy perceptions of mothers with small children with the internet usage and sociodemographic variables.

All of the mothers use internet, and all of them seek information on internet mostly related to the health of their children. Almost all of them use internet every day and for almost 2 hours. The internet usage rate is higher than the overall rate of the country, and the daily internet usage rate is similar to the overall rate throughout the country. In Turkey, the regular internet usage rate is almost 94.0%.[1] This result is similar to the results of recent studies. Skranes et al.[11] examined the internet usage habits of mothers in case their children are sick, and they showed that almost all mothers seek information on internet. This is due to the easy accessibility to internet and various data can be learnt via internet.

According to the results of this study, the duration of the internet usage is not related to the mean age of mothers. However, as the educational status of the mother increases, the duration of the internet usage decreases. The majority of the studies on the parenthood examine the first years of mothers, and it is detected that mothers need information and seek information on internet. Skranes et al.[11] conducted a study in which they examined the internet usage of parents when their children got sick. According to their study, they showed that mothers with small children believed that they had more lack of knowledge compared to others. There is a negative correlation between the education statuses of mothers and the duration of the internet usage. It is possible that more educated mothers can find the correct keywords and reach the information in a shorter time compared to less educated mothers. The research results support the results of the literature.[11,19,20]

According to these results, as the ages of mothers increase, the duration of the internet usage decreases. Meanwhile, mothers still need information related to the health issues of their

TABLE 4. The Relationship between the Social Support and Self-Efficacy with Some Variables

		Social support		Self-efficacy	
	n	**r or M**	***P***	**r or M**	***P***
		Variables			
Mean age of mothers	484	0.03	.413	0.07	.081
Mean age of children	484	0.03	.389	**0.40**	**.000**
Duration of the internet usage	484	**–0.24**	**.000**	**–0.16**	**.000**
		Education			
Primary school	132	240.80		193.71	**39.00.000**
High school	111	260.13	2.43.297	240.19	
University	241	235.32		305.54	

children. As the ages of the children increase, the issues that are searched by mothers on internet change. Mothers with 1-year-old children seek information about the breastfeeding, mothers with 2-year-old children try to find information about the toilet training, and mothers with 3-year-old children try to learn about the sleeping and toilet training. The child development is the mostly searched topic on internet, because each age period of children requires different developmental characteristics. Nurses and the other health professionals can be involved in the internet services in order to ensure that parents reach the correct information about the health issues. Devolin et al.[16] conducted a study, in which they examined the requirements of parents who had younger than 6 year-old children. They found that parents needed information mostly about breastfeeding, vehicle safety, child development, and sleeping. However, the study is the first one which shows the subjects searched by mothers and indicates the relationship between these subjects and the ages of children. It is well known that mothers still need information. Therefore, these results are important to direct nurses and the other health professionals to be involved in the internet health services in order to ensure parents to reach the correct information. In this study, mothers were not asked about the web sites from where they searched information. The study does not know whether mothers use formal websites of health professionals or governmental web sites. On the other hand, there are known that parents still need information and the subjects that they seek on internet vary as their children grow up. Nurses and the other health professionals can direct parents in this regard.

The self-efficacy of the mother is not affected by mother's age, whereas it is influenced by the child's age. The self-efficacy scores of mothers who have older children and higher educational levels are higher compared to others. Similarly, there are studies which show that the age of the mother does not affect the self-efficacy of parents,[11] while there are some other studies which indicate that the age of the mother is a strong predictor for the self-efficacy of the mother.[21] Mothers have less knowledge in the first years of the parenthood. The efficacy level increases as one gains knowledge and experience about something. Self-efficacy refers to an individual's evaluation of his/her ability to successfully complete a task in a given situation. Self-efficacy has been found to be an important component of performing or learning diverse human behaviors, desirable or undesirable.[22] Consequently, parenthood should be accepted as a new life style and self-efficacy levels increase as time passes. It has been found that parenthood self-efficacy is a mediator for parents with older children and higher education levels, and it affects the health parental behaviors.[18] Salonen et al.[23] examined the effects of internet based education on the self-efficacy levels of parents, and they observed increased self-efficacy levels both in intervention and control groups. The lack of difference between two groups can be due to the increased self-efficacy experiences of parents related to the ages of children. This can be related to the increase in the mother's adaptation to parenthood or increased knowledge of parenthood. According to the study results, the self-efficacy perceptions of mothers with healthy children increase as the children grow depending on the increased knowledge and experience. Besides, there is also detected that the duration of the internet usage of them decreases as the self-efficacy levels of mothers increase. The self-efficacy of parents with sick children was examined in one of the studies, and it was shown that the self-efficacy levels increased as parents reached the correct information. Nieuwboer et al.[24] conducted a meta-analysis study and showed that the internet support was very important for parents. It was shown that planned support web sites increased the self-efficacy of parents. The study is not an interventional study, but it was shown that parents try to find information on internet and thus this positively affects their self-efficacy levels and perceptions.

TABLE 5. The Social Support and Self-Efficacy Perception of Mothers

Variables	**n**	**r**	***P***
Social support self-efficacy	484	.18	.000

In the study, the social support perception of the mother is not related to the education status of the mother and the age of the children. However, it is negatively correlated with the internet usage. As the social support increases, the duration of the internet use decreases. This result supports the studies, which show that mothers seek social support on the internet. Even though there are studies which indicate that there is no relationship between the social support perception and internet usage, some other studies show that parents seek and provide social support on the internet and they also provide the information in the internet.[4-6] Parents share their knowledge and experiences with others, and they give suggestions to less experienced parents via internet. Therefore, social support and the internet usage are related to each other. Some studies show that mothers interact with other parents on the internet more than interacting with their own family and friends. This study contains the social support perception scale and family, friend, and private person subscales. It can be concluded that as the scores obtained from these scales increase, the social support perception positively increases. As the support from the family, friend, or private person increases, the social support requirement decreases.

These results are contradictory to results of some studies.[9,25] These different results can be due to the cultural features of societies or because of the experiences of mothers related to the first 12 months of the parenthood. The family and relative interactions are important in social support in Turkish society. Devolin et al.[16] found that family and friends were among individuals who support parents. Social sources are important for parents in order to successfully adapt to the parenthood. Face to face interactions with the family, friends, and other members of the society are important support sources for parents.[26]

There is a positive and significant relationship between the social support perceptions and self-efficacy of mothers. The self-efficacy of parents has a mediator role between the motherhood experience and the social support. Studies, which are related to the first years of the parenthood, show that social support positively affects the self-efficacy of parents.[3] The study results support the literature, and meanwhile, the study is the first one which indicates the relationship between the social support and the self-efficacy of parents in the next years of the parenthood. This study results can be used to strengthen the self-efficacy of parents in later years of parenthood by increasing the effects of social support.

In conclusion, this study was examined the relationship between the internet usage, social support, and self-efficacy perceptions of parents who have 1-3 year-old children according to their sociodemographic characteristics. It is shown that mothers use internet in order to seek information related to their children's health issues. The internet usage is independent of the age of the mother, whereas it is related to the educational levels of the mother and the ages of children. The subjects that are searched by mothers vary according to the ages of their children. The self-efficacy of the mothers is not influenced by the ages of mothers, whereas it is correlated with the educational levels of mothers, ages of the children, and the internet usage. Social support perception is not related to sociodemographic characteristics. However, it is negatively correlated with the internet usage. On the other hand, there is a positive correlation between the social support perception and self-efficacy. The study results are important in order to determine the support requirements of parents and strengthen them. In this regard, the results can direct nurses and the other health professionals while defining and planning what kind of support should be given to parents.

Results of studies in which fathers are not involved can be even more beneficial. In further studies, the websites which are used by mothers can be examined. This study was examined the internet usage of mothers whose children are 1-3 year-old in the last 12 months. It is also possible to examine the association between the internet usage and the knowledge and support requirements of parents in later childhood periods. The relationship between the internet usage and the social support perception is examined in the study. Furthermore, effects of social media on this relationship can further be examined.

Ethics Committee Approval: Ethics committee approval was received for this study from Sivas Cumhuriyet University (approval date: May 7, 2016, approval number: B.30.2.SCÜ.00.50.500/386).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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The Difficulties for Sexual Minority Individuals: A Qualitative Study

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BACKGROUND/AIMS
Sexual health is one of the bases of physical, social and emotional health of individuals, couples, families and, therefore, societies.

MATERIAL and METHODS
This was a qualitative study which employed a in-depth interview 25 (Lezbiyen Gey Biseksüel Transgender) individuals in Turkey. Criterion sampling, one of the techniques of purposive sampling, was used as a qualitative sampling technique in the research. All participants were 18 years of age or older defined themselves as (Lezbiyen Gey Biseksüel Transgender) individuals, agreed to participate in the study, and completed all of the interview to set up the sampling. Participants were asked six open-ended questions. The interviews were, voice-recorded by the researcher. The technique of content analysis was used in data analysis. In this analysis, it was aimed to organize and interpret the qualitative data by means of specific categories and concepts. All information received from individuals were kept confidential to used as scientific data only. Before starting the study, written approval was obtained from the Scientific Ethics Committee and written consent from the participants.

RESULTS
As a result of the content analysis, nine major themes emerged: In this study, it has been determined that (Lezbiyen Gey Biseksüel Transgender) individuals have problems related to their sexual orientation or identity, they cannot express their wishes, feelings and thoughts easily, they have no freedom of life and they have to hide their sexual orientation or identity.

CONCLUSION
Challenges faced by (Lezbiyen Gey Biseksüel Transgender) people are associated with social norms, prejudice and discrimination. Nurses have a responsibility to serve as a change agent in the fight against discrimination and prejudice in society.

Keywords: Lesbian, gay, bisexual, transgender, sexual minority

INTRODUCTION

The United Nations Universal Declaration of Human Rights states that all people are born free and equal with regard to dignity and rights. Lesbian, Gay, Bisexual and Transgender (LGBT) individuals constitute a population which society has not heard and tries hard to avoid hearing. Sexual health is the basis of the physical, social and emotional health of individuals, couples, families and, therefore, societies. Respect for individuals' sexual rights and protection of these rights play a key role in offering people access to sexual healthcare without discrimination and violence and maintaining their well-being.[1] Although sexual orientation is no more seen as a disease according to the Diagnostic and Statistical Manual, there may be individuals in society who still see it as a disease.[2] This can cause individuals with non-normative sexual orientations to experience a range of physical, social and mental problems.[3]

The process of conflict with the rules and expectations which Turkish society has set up regarding them has forced LGBT people either to conform or to go against expectations.[4] As a result of this, widespread social exclusion, both in Turkish society and in the family, is reported. Many LGBT individuals see leaving the town where they were born and grew up where their families continue to live as a solution to the problems they experience.[5] They can also be the victims

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of hate killings. The Shadow Report on Human Rights Infringements of the LGBT Community in Turkey showed that Turkey was second in the world in terms of hate killings.[6]

This process of marginalization causes people to experience feelings of anger and aggressiveness toward themselves and others, as well as helplessness, regret, and guilt. Internalized homophobia accompanying these feelings prepares the way for the serious health problems of alcohol and substance abuse, suicide, anxiety disorders and depression.[7-9] LGBT individuals in Turkey have an approximately 2.5 times higher risk of suicide than heterosexual individuals, a 1.5 times higher risk of alcohol and substance abuse, and experience 1.5 times as much anxiety and depression.[10-12] In a report by the Healthy People 2020 and Medical Institute regarding LGBT individuals, the most important ways that LGBT are marginalized in terms of general health were homelessness, lesbian women making less use of cancer prevention services, a high proportion of lesbian or bisexual women being overweight or obese, and a higher risk of HIV and other sexually transmitted diseases in homosexual men who have sex with men.[7,8] Research has shown that very few LGBT people can receive health care due to their dissatisfaction with the health care system.[13] LGBT people can hide their sexuality from caregivers to retain their privacy or to prevent homophobic reactions.[14] The feedback on their orientation is often homophobic and far removed from the necessary attitude of respect.[15] Many studies have shown that homophobia is widespread among health workers.[10,16,17] Some researchers have shown that health professionals do not work willingly with LGBT individuals, and feel helpless in this regard,[18] and inadequate in terms of knowledge and equipment.[12]

Healthcare personnel need professional development to overcome these barriers. The right to receive health care is one of the inalienable rights of all individuals, and healthcare professionals must give all individuals equal care without prejudice. The social exclusion of LGBT people or preventing them from receiving care because of their different sexual orientation is unacceptable. When healthcare professionals have positive attitudes toward LGBT people, these individuals will have the opportunity to express all the difficulties they face including those concerning their sexuality. The aim of this study was to determine the difficulties accessing appropriate healthcare experienced by individuals with non-normative sexual orientations.

MATERIAL and METHODS

This research was a descriptive investigation based on qualitative methods, namely in-depth interviews. In this qualitative research, we collected in-depth and multidimensional information on LGBT people's experiences of life.

Main Points

- It had been determined that (Lesbian Gay Bisexual Transgender) individuals have problems related to their sexual orientation or identity in Turkey.
- It had been determined that (Lesbian Gay Bisexual Transgender) individuals have to hide their sexual orientation or identity in Turkey.
- Vulnerable groups such as LGBT individuals are faced with many visible/invisible obstacles in access to health services.

Setting and Participants

Research data collection was conducted between March and July 2016 via face-to-face in-depth interviews. In order to reach LGBT people, key persons were consulted and the cafés in Izmir known to be frequented by LGBT people were identified. Conversations were held with LGBT individuals in these cafés and after the aim of the research had been explained, appointments were made for formal interviews with those who agreed to take part. These interviews took place in a private room in the one University Faculty of Nursing in Turkey. The sample selection approach in our study required that the data collection process continued until the concepts and processes that could answer the research question began to repeat themselves (saturation point).[19] The researchers concluded that they had gathered an adequate number of data sources when emerging concepts and processes started to repeat themselves and, at this stage, the sample consisted of 25 individuals who agreed to participate in the study.

Criterion sampling, one of the techniques of purposive sampling, was used as a qualitative sampling technique in the research. The basic criteria in sampling were determined as being 18 years of age or older, identifying as either lesbian, gay, bisexual and/or transgender agreeing to participate in the study, and taking part in the whole interview.

Instruments and Data Collection

First of all, we asked our participants to fill out the form entitled "A questionnaire on the descriptive characteristics of the LGBT participants." This instrument consisted of questions on participants' sociodemographic characteristics. The data were collected by in-depth interviews, using a semistructured interview form. The questions were elaborated according to the course of the interviews. The open-ended interview questions were organized under six headings:

1. How do you define your sexual identity?
2. What meaning does sexuality have for you and society?
3. How does your sexual identity affect your daily life? Please describe the positive and negative effects.
4. Do you think your sexual orientation affects your sexual experience? Please explain with an example.
5. How would you describe the attitudes of society to individuals with a different sexual orientation?
6. What do you think of the health services which are offered to you? How do health personnel approach you? Please explain.

A pilot application was conducted with five of the participants in order to assess the usability of the Individual In-depth Interview Form. Additionally, the researchers also consulted four experts about the process. Necessary adjustments were made to the form based on the results of this pilot study. Also, written consent was obtained from the LGBT people who were willing to participate in the study. A semistructured interview form was used in the in-depth interviews. During the interviews the participant and the researcher (one researcher) sat facing or next to each other, and the researcher recorded the interviews

using a voice recorder. The researcher also took notes on the participants' body language and changes in individual gestures while talking during the interviews. All data were kept confidential for scientific purposes. Each interview session lasted approximately 50-60 minutes. After the end of each session, the interview notes were organized by the researchers.

Ethical Considerations

Before starting the study, written approval was obtained from the Scientific Ethics Committee of Ege University (approval dated December 22, 2015, issue: 1803/792) and from the institution where the data was to be collected. We obtained written consent from all of the participants.

Data Analysis

We carried out quantity and percentage distributions according to the descriptive characteristics of the participants. All the voice recordings were listened to and transcribed into a word document by the researchers, and saved. The rough draft of the transferred data consisted of 63 pages. In the data analysis, the technique of content analysis was used.[20,21] In the analysis, the qualitative data were loaded on to the computer, and the NVivo 10 program was utilized for computer-aided qualitative data analysis. Coding was performed according to the concepts extracted from the qualitative data. The qualitative data in the documents were read carefully, and key concepts were coded. Later on, categories were generated from these codes according to the similarities and differences between them. The qualitative data were coded on the basis of the concepts and categories with the help of the NVivo 10 program. In this analysis, we aimed to organize and interpret the qualitative data by means of specific categories and concepts. The coding of the qualitative data in the documents was performed according to the open coding technique.[20,21] In the analysis, a total of nine major themes emerged as a result of the data analysis. The qualitative data in each category were read carefully, short notes were taken, and then key concepts were generated. The qualitative data were organized according to the list of key codes under the nine basic categories they belonged to. The data were interpreted within the framework of the nine basic categories. As a result of the content analysis, six major themes emerged. They are summarized below.

RESULTS

Descriptive Characteristics of the Participants

Of the participants, 96% were single, 48% were university graduates, 86.7% were unemployed, 68% lived in urban areas and their mean age was 25.3 ± 7.5.

Theme 1. Meaning of Sexuality for Society and for the Individual

The participants in our study defined sexuality as satisfaction felt by two individuals who love each other while a few of them defined sexuality as meeting needs without sentimentality and as the sine qua non of being human. Nearly all of the participants stated that sexuality was considered by Turkish society as a taboo subject that was forbidden or sinful to talk about. They added they lived in a society with prejudices and a lack of positive attitudes toward LGBT people. Regarding society's perception of sexuality, on participants observed that,

> *Our society seems to be closed against sexuality, but they do have a fantasy and passion that they cannot express at all. They cannot have sexual experiences freely and easily, so they do these things in secret, behind closed doors. We, as a society, are hungry for sex no matter you are single or married, young or old* (19 years old, single, sex worker-GS).

Theme 2. Sexual Identity

Acceptance of Sexual Identity and Self-Love: The participants expressed satisfaction with their non-normative sexual identities, and emphasized that, in spite of this difference, they were first of all people. For example, one participant said that

> *I do not feel upset at all just because I am homosexual. I feel happy because I am satisfied with my life because I am "gay"* (26 years old, single, worker-DE).

Another participant explicitly contested the way mainstream Turkish society views sexual minorities, saying that

> *I am gay, not an animal or monster. I love, suffer, cry, or feel sad, too. I mean I am just like you. But I am not like you on this one thing. I do not hurt anyone just because I like my own gender* (21-year-old, single, student-YS).

Challenges Regarding Sexual Identity: The participants stated that they experienced sexually transmitted diseases in the past but they were treated. Almost half of them said they were worried and anxious about catching a sexually transmitted disease. They explained that such a situation would be a serious problem with psychological, social and physical effects. The vast majority of the participants stated that they preferred safe sex, protection and routine health screenings to avoid sexually transmitted diseases.

The participants complained that they could not express their desires, feelings and thoughts freely, they did not have a free life, and they avoided problems with society by keeping things confidential and only communicating with individuals like themselves. Another problem faced by the participants was that they were exposed to abuse and rape, and they could not find jobs, so they had to work as sex workers. In addition to the diseases, one of the participants said,

> *The greatest problem I encountered was not being able to introduce a long-term girlfriend to society* (22 years old, single, student-BT).

Suppression of Sexual Identity: The participants stated that they hide their sexual identities from their families, friends and society. They explained that they had to hide their sexual identities to find social acceptance and avoid isolation, stigma and humiliation. Regarding suppression of sexual identity, one participants said,

> *I have to pay attention to how I speak. I catch people's attention immediately when I talk in a feminine way. I cannot freely declare that I am gay. I cannot reveal the truth because I am worried about what my friends would think of me or that they would unfriend me on Facebook. This is because society thinks I am diseased. They are worried that I can make them gay, too* (29 years old, single, unemployed-ET).

Facing Social Stigma for Sexual Identity: The LGBT people in our study stated that, since they were children, society

teased them, excluded them, nicknamed them by using offensive words, gossiped about them, and abused them verbally. They also added that their friends did not include them in games during their childhood years, their friends at school displayed humiliating attitudes and behaviors, they had trouble getting a job, and they were disturbed, harassed or fired in their work environments. One of the participants said he was exposed to violence by family when they learnt the situation, he led a prisoner's life at home without anything to eat or drink, and his family took him so-called sorcerers or amulet makers. Regarding facing social stigma, one of the participants said,

> *I encounter behaviors that put me in a difficult situation such as verbal abuse, taunting, threats and so on. So, be careful! They may stigmatize you just because you are talking to me* (24 years old, single, healthcare personnel-FŞ).

Theme 3. Level of Satisfaction with Sexual Experiences

The participants stated that they were satisfied with their sexual lives, sexuality was the most precious gift that could be given to a person, they considered sexuality as the strongest bond between two individuals, and they enjoyed their sexual lives to repletion. Regarding their levels satisfaction with their sexual lives, one participants said,

> *I am pretty happy because live my life in the way I like* (25 years old, single, worker-EA).

Theme 4. Criticizing and Feeling Rage Toward Society

The vast majority of the participants made criticisms of society in several aspects. These criticisms include honor killing of women, LGBT people seen as monsters, society being homophobic, hypocritical ways of experiencing sexuality, sexuality seen as a taboo to talk about, and oppression and intolerance of society.

> *They tend to perceive and understand sexuality with religious taboos and repressed emotions. They see it as a shameful act and sin* (25 years old, single, security guard-NÇ).

Theme 5. Dislike and Distrust of People

The participants stated that they did not like or trust other people and so they kept away from them. However, they said they trusted individuals like themselves, they did not trust healthcare providers and, therefore, they would not receive counseling. Only one of the participants stated that only female healthcare providers were less biased. Regarding dislike and distrust of people, one of the participants said,

> *I have not had an affair for months because I do not trust people and I have a sentimental attitude* (22 years old, single, student-AU).

Theme 6. Willingness to Receive Counseling from Health Professionals

The participants indicated that they wanted to get help from experts such as doctors or nurses when they experienced health problems. Only one participant stated that he did not want to receive counseling service from a homophobic doctor or nurse. More than half of the participants said they did not need to receive counseling service because they met this need for obtaining information and counseling by searching on the Internet, reading, attending seminars and asking people like themselves for their advice. About receiving information from another person who was informed about a specific subject, one of the participants said,

> *I absolutely prefer to be counseled by a healthcare professional who is informed about LGBT. And I think this is certainly what needs to be done* (20 years old, single, student-HG).

DISCUSSION

This study has been content analysis, six major themes emerged. Themes are below. "Meaning of Sexuality for Society and for the Individual," "Acceptance of Sexual Identity and Self-love," "Level of Satisfaction with Sexual Experiences," "Challenges Regarding Sexual Identity," "Suppression of Sexual Identity," "Facing Social Stigma for Sexual Identity," "Criticizing and Feeling Rage toward Society," "Dislike and Distrust of People," and "Willingness to Receive Consulting from Health Professionals."

The participants in our study defined sexuality as satisfaction felt by two individuals who love each other while a few of them defined sexuality as meeting needs without sentimentality and as the sine qua non of being human.

The participants stated that they were satisfied with their sexual lives, sexuality was the most precious gift that could be given to a person, they considered sexuality as the strongest bond between two individuals, and they enjoyed their sexual lives to repletion. Expression of sexuality is extremely important for people throughout their lives. Sexuality is one of the basic human needs that starts with birth and lasts until death. In fact, research showed that sexuality is a basic need.[22,23]

The participants stated that sexuality was considered by society as a taboo subject that was forbidden or sinful to talk about. They added they lived in a society with prejudices and society did not have positive attitude toward individuals with different sexual orientations. In studies conducted in Turkey by Yılmaz and Özaltın[23] and Yılmaz,[22] sexuality was found to be a subject that could not be discussed, as a closed box and as a taboo.

Islam is the main religion in Turkey. Islam, like other monotheistic religions, regards homosexuality as a sin and forbids it. In Turkey, a country where Muslims are the majority, many LGBT people are faced with isolation from society, offenses, jokes, swearing and mobbing in the workplace.[5] This result is consistent with the literature.

The participants stated that they accepted the situation of having a different sexual identity, they were satisfied with their sexual orientation, they liked who they are as themselves, and they expressed themselves better this way. On the other hand, one out of every four participants in the study said that they could not accept the situation of having a different sexual identity, they could not deal with the situation or face themselves, and they got upset because of this situation.

Evidence showed that some lesbian and gay individuals pretended to be heterosexual in order to avoid discrimination and many transsexual individuals hid their sexual past so as to find social acceptance.[24] The majority of the participants in our study accepted the situation of having a different sexual

orientation. This might be attributed to İzmir's perception as "the most modern/liberal" city in Turkey in terms of atmosphere[25] and to the positive attitude of community here. In this sense, the findings in our study are in line with the literature. Finding social acceptance without prejudice in the place where they live is one of the most natural human rights for individuals with different sexual orientations like any other individual.

The participants in our study stated that they could not freely express their wishes, feelings and thoughts, and they had to hide their sexual orientations. What is more, they indicated that they did not have problems only when they communicated with people like themselves in society. Also, they were exposed to abuse and rape, and they could not find jobs, so they had to work as sex workers. Nearly half of the participants said they did not like or trust other people and so they kept away from them. This might be due to general problems experienced by LGBT people or their failure to find social acceptance. Brennan et al.[26] reported increased stress levels among LGBT people associated with hiding their sexual identity. LGBT people can be exposed verbal attacks in public, discrimination, physical abuse, expulsion from their homes, exclusion from their friend circles, dismissal from work and interpersonal violence in direct relation to their sexual orientations.[3] LGBT people also experience internalized homophobia related to their sexual orientations.[27] Research showed that 17.6% of heterosexual students faced a sexual assault whereas this ratio was 30.6% for lesbian students.[28] According to Ybarra et al.'s,[29] 82% of LGBT youth were verbally mocked because of their sexual identity while 38% were physically abused at school. In this sense, our results are consistent with literature results. Individuals need to be accepted by others. Being accepted by others makes it easier for individuals to accept themselves. Chamberlain and Haaga[30] suggested that those individuals that unconditionally accepted who they are had lower levels of depression and anxiety, and they were happier and they had higher levels of overall wellbeing. In light of this, those individuals who avoid opening up for fear of oppression and discrimination and rejection by others could have poor mental health. Accordingly, these people can be expected to exhibit a negative outlook in terms of psychological health.

The participants stated that they hide their sexual identities from their families, friends and society. Apart from other cultural and ideological values, the individual's family and friends have negative prejudices and stereotypes against LGBT people. In some cases, these prejudices and stereotypes can be internalized by the individual. This situation causes the individual to experience a variety of internal conflicts during recognition and acceptance stages of sexual orientation. These internal conflicts then hinder the development of the individual's identity. Even if the individual accepts his or her identity, he or she may have problems in the process of opening up to others.[31] Brennan et al.[26] found that LGBT people aged 70 years or older hide their sexual identities from family and community. Evidence showed that health needs of older LGBT people were still ignored and they were subjected to discriminatory practices.[31] About three-fourths of the LGBT people in our study stated that, since they were children, society teased them, excluded them, nicknamed them by using offensive words, gossiped about them, and abused them verbally. They also added that they were exposed to discrimination in the street, at school, at work and at home since their childhood years. Research showed that individuals with different sexual orientations are exposed to discrimination and stigma. The same study conducted with a group of LGBT people in a rural area in the United States, Whitehead et al.[3] found that those individuals faced three types of stigma: Internalized Stigma, Enacted Stigma and Anticipated Stigma. Evidence showed that four of every five LGBT people suffered verbal abuse at school because of their sexual identity and 38% were exposed to physical abuse.[29] While a certain tolerance for nonheterosexual sexual orientation in some societies, it is perceived as low in prestige and unhealthy in some other societies. This prejudiced attitudes and discriminatory behaviors are still a major issue for some communities today.[5] Out results are in line with the literature in this regard.

The participants stated that they experienced sexually transmitted diseases in the past while almost half of them said they were worried and anxious about catching a sexually transmitted disease. They explained that such a situation would be a serious and frightening problem with psychological, social and physical effects. Research showed that homosexual individuals had a high risk of catching sexually transmitted diseases.[10] Throughout their lives LGBT people are faced with social, emotional and psychological difficulties in addition to the physical effects of HIV/AIDS. These individuals are faced with situations that prevent them from maintaining and developing their wellbeing and seeking healthcare.[7]

The participants made criticisms of society in several aspects. These criticisms were usually about society being homophobic, oppressive and intolerant. The meaning attached to sexuality in adolescence is characterized by heterosexist norms in society. Heterosexism leads to glorification of heterosexual relationships and stigma and vilification of same-sex relationships.[32] Feeling alienated from their families because of their different sexual orientations, LGBT people turn to trust their friends' support rather than their family members' support.[33] Research showed that nurses' support is particularly critical for those LGBT people who were alienated from their families and did not have partners.[34]

The participants wanted to get help from doctors or nurses when they had sexual problems. However, more than half of the participants did not need to receive counseling service because they met this need for obtaining information and counseling by searching on the Internet, reading, attending seminars and asking people like themselves for their advice. Although access to healthcare services is recognized as a human right, particularly vulnerable groups such as LGBT individuals are faced with many visible/invisible obstacles in access to these services. Seeing homosexuality as a disease seems to be a thing in the past, the issue of homophobic attitude of healthcare professionals is yet to be resolved. This perspective prevents health service to be given in a fair and impartial manner and leads to problems in both medical and social aspects.

In a study conducted in the San Francisco Bay Area showed that 80% of nurses did not receive training on LGBT.[10] Education about LGBT should start in school curricula, but preparations for it are not adequate yet.[35] Healthcare personnel providing care to different/vulnerable groups should be free of

prejudices, sufficient and competent. Alpert et al.[36] found that a group of mostly white cisgender women was concerned with doctors' assumptions and negative attitudes after the women disclosed their sexual orientations. Nurses and doctors should have sufficient knowledge and ability in giving care and counseling for LGBT people. Research showed that information about LGBT individuals in nursing education was insufficient,[10,35] necessary education should be launched at school,[33] and nurses have difficulty in giving care to these individuals.[10]

Ethics Committee Approval: Ethical committee approval was received from the Ege University (approval dated December 22, 2015, issue: 1803/792).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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CYPRUS JOURNAL OF MEDICAL SCIENCES

Original Article

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Investigation of Anomalous Origin of Coronary Arteries in 8,366 Adult Patients Who Had Coronary Angiography: A Single Center Study

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BACKGROUND/AIMS
Congenital coronary anomalies usually do not cause clinical problems; however, some of them might be presented with serious clinical pictures such as sudden death. We investigated the prevalence and characteristics of anomalous origin of coronary artery (AOCA) in patients who had coronary angiography.

MATERIAL and METHODS
The coronary angiography reports of 8,366 patients at our center between January 2013 and October 2018 were reviewed. Angiography images of patients who were reported to have AOCA were reevaluated.

RESULTS
Fifteen of 8,366 (0.18%) patients were found to have AOCA. The most commonly detected anomaly was anomalous origin of the circumflex artery (CX) originating from right coronary artery (RCA) or right sinus of Valsalva (RSV) in seven patients (prevalence 0.08% or 46.6% of all AOCA). Five patients showed a single coronary artery (prevalence 0.05% or 33.3% of all AOCA), which was arising from the RSV in three of them and from left sinus of Valsalva (LSV) in the rest of two. In two patients (0.02% or 13.3% of all AOCA), the left main coronary artery (LMCA) was originating from the RSV through separate ostium from the RCA. LMCA from the pulmonary artery was seen in one patient (0.01% or 6.6% of all AOCA). Four patients were found to have coronary artery disease (26.6% of all AOCA) and two of them presented with acute coronary syndrome.

CONCLUSION
The prevalence of AOCA was found at 0.18% in the present study. The most commonly seen anomaly was the origin of CX artery from RCA or RSV.

Keywords: Coronary angiography, coronary artery anomaly, anomalous origin of coronary artery

INTRODUCTION

Coronary artery anomalies that consist of anomalous origin of a coronary arteries (AOCAs), myocardial bridge, and coronary fistula are commonly seen congenital cardiovascular anomalies.[1] Many of the coronary artery anomalies are detected incidentally during coronary angiography, computed tomography, or autopsy at an incidence ranging between 0.17% and 2.2% in autopsy and also between 0.6 and 1.3% in patients who had coronary angiography. The incidence rate of one or more AOCA has been found at percentages ranging from 0.27% to 1.66% in patients undergoing coronary angiography and at 0.6% in autopsy series. Most of the congenital coronary anomalies usually do not cause clinical problems; however, some of them might be presented with serious clinical pictures such as sudden cardiac death, congestive heart failure, arrhythmia, myocardial infarction, and syncope. AOCA has been detected in almost one-third of sudden cardiac deaths among young adults and athletes.[2,3] Furthermore, awareness of these anomalies is crucial as they could lead to complications during a coronary interventional procedure or a cardiac surgery.

The aim of our study was to investigate the prevalence and characteristics of AOCA in patients who had coronary angiography in our center.

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Table I. Characteristics and Prevalence of Anomalous Origin of Coronary Arteries (n = 15) in the Patient Population (n = 8,366)

Origin of Coronary Artery	n	Prevalence, %	Prevalence Among all Patients, %
CX from RCA	4	26.6	0.04
CX from RSV	3	20	0.03
Single CA	5	33.3	0.05
RCA from LMCA	1	6.6	0.01
RCA from distal CX	1	6.6	0.01
LMCA from RCA	3	20	0.03
LMCA from RSV	2	13.3	0.02
LMCA from PA (ALCAPA)	1	6.6	0.01

CX: circumflex artery, RCA: right coronary artery, RSV: right sinus of Valsalva, CA: coronary artery, LMCA: left main coronary artery, PA: pulmonary artery, ALCAPA: anomalous left coronary artery from the pulmonary artery

MATERIAL and METHODS

The coronary angiography reports of 8,366 patients at our center between January 2013 and October 2018 were reviewed. The coronary angiography images of patients who were reported to have coronary anomaly were reevaluated by two experienced interventional cardiologists, and they reached an agreement on the origin of the anomalous coronary arteries. Coronary angiography indications were to investigate the coronary arteries in acute coronary syndromes or elective settings. Patients who had muscular bridge, coronary fistula, and/or complex congenital heart disease were not enrolled in the study. High "take-off" of coronary arteries, separate origin of conus or right ventricular branch in the right sinus of Valsalva (RSV), and the separate ostium of left anterior descending (LAD) and circumflex (CX) arteries in the left sinus of Valsalva (LSV) were regarded as a variant of normal anatomy, and they were not accepted as the AOCA.[4] Epicardial coronary artery stenosis exceeding 50% was considered as coronary artery disease. Ethical approval was obtained from Gaziantep University Medical Faculty, Cardiology Department (study protocol code: 2018/331).

RESULTS

Fifteen out of 8,366 patients (0.18%) have been detected to have AOCA (Table I). The mean age of these 15 patients was 56.4 years, and six (40%) of them were male. The most commonly detected anomaly was an anomalous origin of the CX originating from the right coronary artery (RCA) or RSV, which was found in seven patients (prevalence 0.08% or 46.6% of all AOCA). In four of these seven patients, CX was originated from the RCA (0.04% or 26.6% of all AOCA), and in the rest of three patients, CX was found to be originated from a separate ostium in the RSV (0.03% or 20% of all AOCA). Single coronary artery was seen in five patients (0.05% or 33.3% of all AOCA). It was originated from the RSV in three of them (0.03% or 20% of all AOCA) and from the LSV in two of them (0.02% or 13.3% of all AOCA). In one of the cases with single coronary artery of LSV origin, RCA was found to be originating from the distal of the CX and terminating near the RSV (Figure I). Another anomaly was LMCA originating from the RSV through separate ostium from RCA in two patients (0.02% or 13.3% of all AOCA).

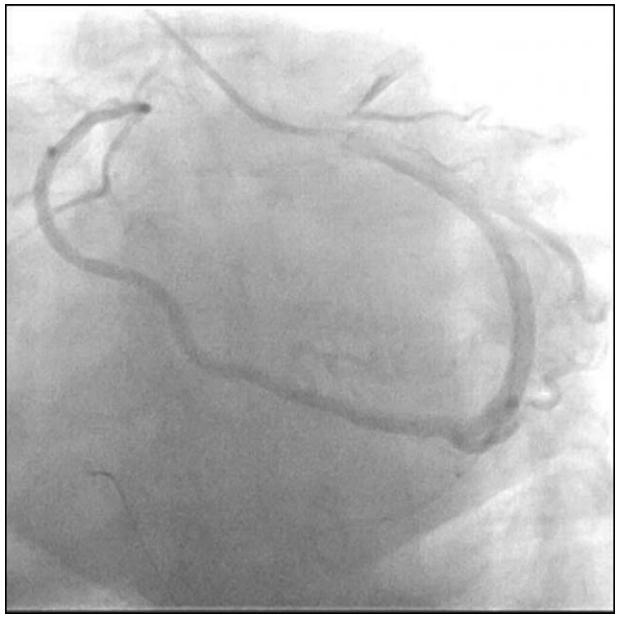

Figure I. Coronary angiography image of single coronary artery. RCA was originated from the distal of the LCX and it terminated near the RSV. RCA: Right Coronary Artery, RSV: Right Sinus of Valsalva

Anomalous left coronary artery from the pulmonary artery (ALCAPA) was detected in one patient (0.01% or 6.6% of all AOCA). Coronary artery disease was detected in four patients with AOCA (26.6% of all AOCA), and two of these patients presented with acute coronary syndrome.

Main Points

- Anomalous origin of a coronary arteries (AOCA) is a rare congenital cardiovascular anomalies as the prevalence was found at 0.18%.
- Origin of circumflex (CX) artery directly from right coronary artery (RCA) or through a separate ostium from right sinus of Valsalva (RSV) is the most commonly seen AOCA.
- Anomalous origin of coronary arteries can complicate coronary interventions.

DISCUSSION

In the present study, the AOCA prevalence was at 0.18%, and the anomalous origin of the CX artery from RSV (prevalence 0.08% or 46.6% of all AOCA) was most commonly seen in one patient. CX was originated directly from RCA or through a separate ostium from RSV. This finding was in keeping with previously published series, reporting that the CX originating from RCA or RSV is the most common coronary artery anomaly with angiographic prevalence at ranging from 0.08 to 0.41%. This anomaly might be important in the case of cardiac surgery; otherwise, it is thought to have little clinical importance.[5–7] AOCA might be presented with angina, syncope, palpitations, dyspnea, or sudden cardiac death (SCD). The link between AOCA and ischemic symptoms has not been clearly defined yet. The available data could not demonstrate the direct relation between these anomalies and typical myocardial ischemia-related signs and symptoms.[8] For instance, a study has reported that myocardial ischemia-related signs and symptoms

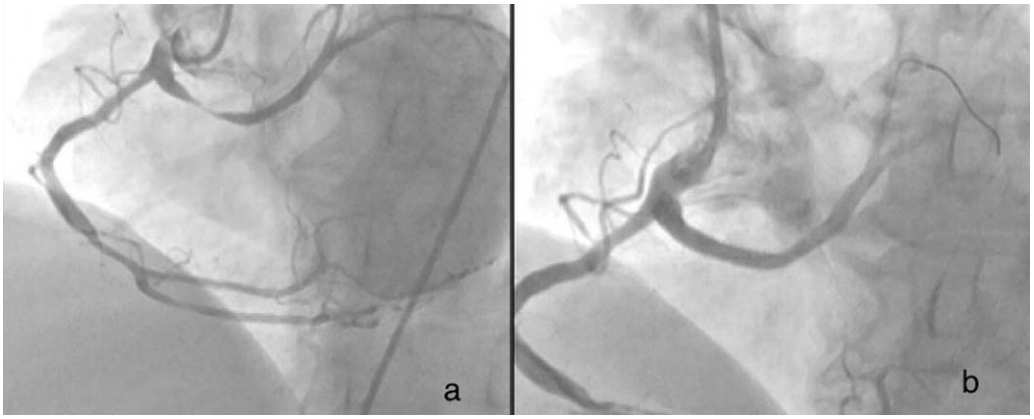

Figure 2. Coronary angiography images. (a) Single coronary artery was originating from RSV, and it was divided into RCA and LMCA. LMCA was long and giving two main branches as LAD and CX. LMCA was found to have stenosis around 90% severity in mid-segment. (b) After successful percutaneous coronary intervention with stent was performed. RCA, right coronary artery; LMCA, left main coronary artery; LAD, left anterior descending artery; CX, circumflex artery; RSV, right sinus of Valsalva.

occurred only in one-third of coronary anomaly cases.[9] However, AOCA may result in major cardiovascular events and sudden death as it was reported to be the second cause of sudden death among young athletes in USA[10] and the third in Italy.[11] The causes of symptoms, ischemia, and SCD in patients with AOCA have been proposed to be related to anatomical features of coronary artery such as acute angle takeoff, slit-like or fish-mouth-shaped orifice, interarterial or intramural course, and hypoplasia of the proximal part of artery.[1] It has been hypothesized that transient impairment of blood flow due to compression of the anomalous coronary artery between the aorta and pulmonary artery during exercise could cause myocardial infarction and/or SCD; however, the mechanism has not been completely understood yet.[12]

The prevalence of single coronary artery in the present study was at 0.05%. Single coronary artery anomaly is a relatively uncommon, and the prevalence was reported between 0.024 and 0.044%. Single coronary artery does not usually lead to any symptoms, and it is detected incidentally on coronary angiography or autopsy. Furthermore, this anomaly does not affect the life expectancy of these patients. However, in the presence of a major crossing artery between pulmonary artery and aorta, an increase in risk of sudden death might be seen. Additionally, this could be fatal if severe stenosis occurs at proximal segment of single artery.[13,14]

In the present study, the prevalence of coronary artery disease and acute coronary syndrome of patients was found to be 26.6 and 13.3%, respectively. There are conflicting data about atherosclerosis in coronary anomalies. It was reported that coronary anomalies may lead to an increase in the development of premature atherosclerotic disease because of abnormal intracoronary hemodynamics,[15] while the other research has not reported such a relation.[16–18] Additionally, according to a research, the atherosclerosis was found to be less frequent in some anomalous vessel. In that study, patients who have an anomalous LAD were found to have significantly less atherosclerotic involvement compared to controls. Authors concluded that LAD mostly originated directly from RSV and had an anterior course to reach the anterior segment of the left ventricule. Therefore, the risk of development of atherosclerosis might decrease due to this long course of LAD without branching points.[16] In our study, one of the cases was presented with an acute coronary syndrome. In the patient, single coronary artery was originating from RSV, and it was divided into RCA and LMCA. LMCA was long and giving two main branches as LAD and CX. LMCA was found to have stenosis at around 90% severity in mid-segment. A Standart JR guiding catheter was used, and angioplasty with stent implantation was performed successfully (Figure 2). However, AOCA with acute coronary syndromes can have some challenges such as prolonged procedures, which may lead to serious complications. For instance, the possibility of crossing atherosclerotic lesion and/or delivering balloon and stent implantation might be compromised due to lack of support by guiding catheter.[19,20]

In this study, ALCAPA, also known as Bland–Garland–White syndrome, was seen in one patient (0.01% or 6.6% of all anomalies). She was a 46-year-old woman presented with congestive heart failure. Her transthoracic echocardiography showed a decreased left ventricular ejection fraction at 30%. Coronary angiography showed a giant tortuous RCA arising from RSV and extending collaterals to the left coronary system (Figure 3). Left coronary arteries could not be visualized with aortography. The CT angiogram showed the anomalous origin of the left coronary artery arising from the main pulmonary trunk (Figure 4). She underwent a surgery for reimplantation of the left coronary artery trunk onto the aorta. ALCAPA is a rare phenomenon that occurs in 1 in 300,000 live births. Congestive heart failure or myocardial failure develops in most of the patients with this anomaly during early infancy period, and mortality rates reach up to 90% for infants in the first year of life if ALCAPA is not treated. Patients can survive if collateral channels develop between normal RCA and the anomalous left coronary system as seen in our case.[6,21–23] Therefore, a dual coronary artery supply through reimplantation of the left coronary artery trunk onto the aorta for all patients with ALCAPA is a Class I recommendation.[1]

Additionally, there is another worth mentioning issue regarding imaging of coronary anomalies. Although coronary angiography is the gold standard diagnostic technique for coronary artery disease, it has some limitations for the evaluation of

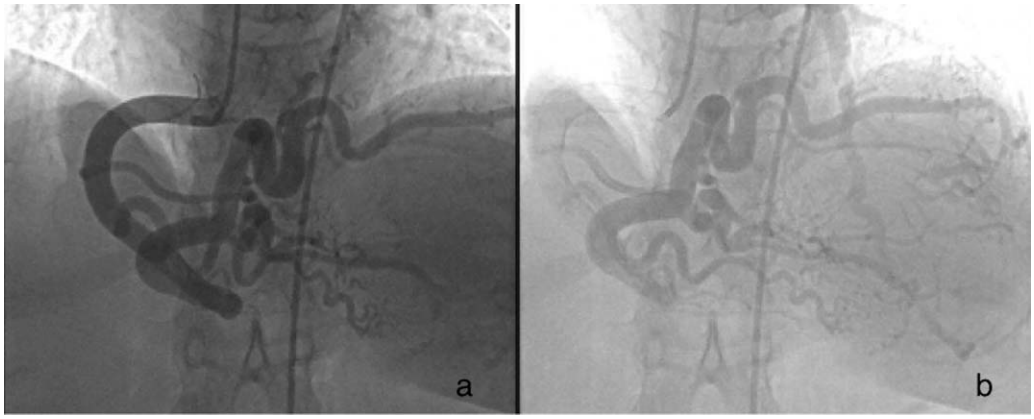

Figure 3. ALCAPA also known as Bland-Garland White syndrome. (a) Coronary angiography showed a giant tortuous RCA arising from RSV and (b) extending collaterals to the anomalous LCA.

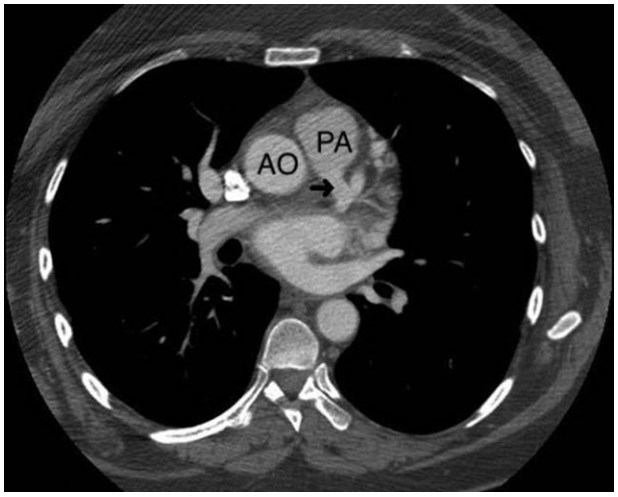

Figure 4. CT angiogram showed the anomalous origin of the LMCA arising from the main pulmonary trunk (arrow). PA, pulmonary artery; AO, aorta; RCA, right coronary artery; RSV, right sinus of Valsalva; LMCA, left main coronary artery.

coronary artery anomalies. Conventional coronary angiography has limited capacity in terms of providing the three-dimensional course of arteries and describing their precise relationship to neighboring anatomic structures such as pulmonary artery and aorta. Hence, multidetector CT angiography is usually necessary to delineate the proximal course and ostial origin of anomalous coronary arteries as a complementary imaging technique.[24,25]

In conclusion, AOCAs are rare congenital cardiovascular anomalies as the prevalence was found at 0.18% in the present study. The most commonly seen anomaly is the origin of CX artery directly from RCA or through a separate ostium from RSV. Anomalous origin of coronary arteries can complicate coronary interventions or cardiac surgeries. Therefore, being aware of coronary anomalies might be helpful for invasive cardiologists in terms of diagnosis and avoiding complications.

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CYPRUS JOURNAL OF MEDICAL SCIENCES

Case Report

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Acute Lobar Nephronia Secondary to Obstruction Due to Urolithiasis*

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Acute lobar nephronia (ALN) is a focal nonliquefactive bacterial infection affecting one or more renal lobules. Although it is a rare form of urinary infection, it has been diagnosed with increasing rates by the utility of ultrasonography (USG). The inflammatory markers are high in ALN, and it requires longer duration of antibiotic treatment. Effective treatment can prevent its progression to renal abscess. ALN may be seen in healthy children and those with urinary tract abnormalities as well. Here, we presented an infant with ureterolithiasis that developed ALN with prolonged fever. He was treated with intravenous antibiotics, and fever with USG findings were resolved. As ALN produces a mass lesion that may mimic other entities such as abscess or tumors, diagnosis is important for sufficient antibiotic treatment and avoidance of unnecessary invasive operations.

Keywords: Lobar nephronia, ureterolithiasis, bacterial infection, focal nephritis

INTRODUCTION

Acute lobar nephronia (ALN), also known as acute focal bacterial nephritis, is a rare process of bacterial urinary tract infection (UTI), presenting as an inflammation that affects one or more renal lobules. It represents the progressed form of acute pyelonephritis (APN) and the early stage of a developing renal abscess. Clinical presentation involves fever, vomiting, and abdominal pain. Patients have leukocytosis, elevation of C-reactive protein (CRP), pyuria, and infectious agent that may or may not be detected with urine culture. The cause is an ascending infection from the lower urinary tract or by hematogenous spread. The febrile period after antibiotic treatment is longer, and vomiting is more frequent in ALN than in APN. Also, the neutrophil count and CRP levels are higher in ALN. Urinary tract ultrasonography (USG) is very effective in diagnosis describing a hypoechogenic/hyperechogenic and hypoperfused lesion. It may be misinterpreted as an abscess or tumor.[1-3]

CASE PRESENTATION

A 13-month-old male patient was admitted with fever that he had for 3 days and vomiting for 2 days. Before admission to our hospital, a single dose of intramuscular antibiotic was administered at a different medical center. On admission to our hospital, he had fever as 39-40° C and pale skin on physical examination. He had a normal growth and a BCG skar. Laboratory test results included leucocyte 20,580 mm^{-3}, neutrophil 68%, hemoglobin 9.1 g dL^{-1}, mean corpuscular volume (MCV) 74.8 fL, red cell distribution width (RDW) 13, platelets 236,000 mm^{-3}, CRP 18 mg dL^{-1} (N: 0-0.5 mg dL^{-1}), urine analysis: leucocyte esterase: +++, pyuria, and bacteriuria.

USG showed a 5 mm calculus at the distal end of the left ureter (Figure 1a) and a hyperechogenic, hypoperfused area with a 30 mm diameter, leading to contour lobulation at the upper pole of the left kidney (Figure 1b). Immunoglobulin G, A, and M levels were normal according to his age.

The patient was given ceftriaxone treatment, and fever stopped on the third day. Urine culture was sterile but pyuria continued. Acidoresistant bacteria was negative in urine culture. Amikacin was added to the treatment and given for 7 days. Ceftriaxone was planned to be given for 14 days.

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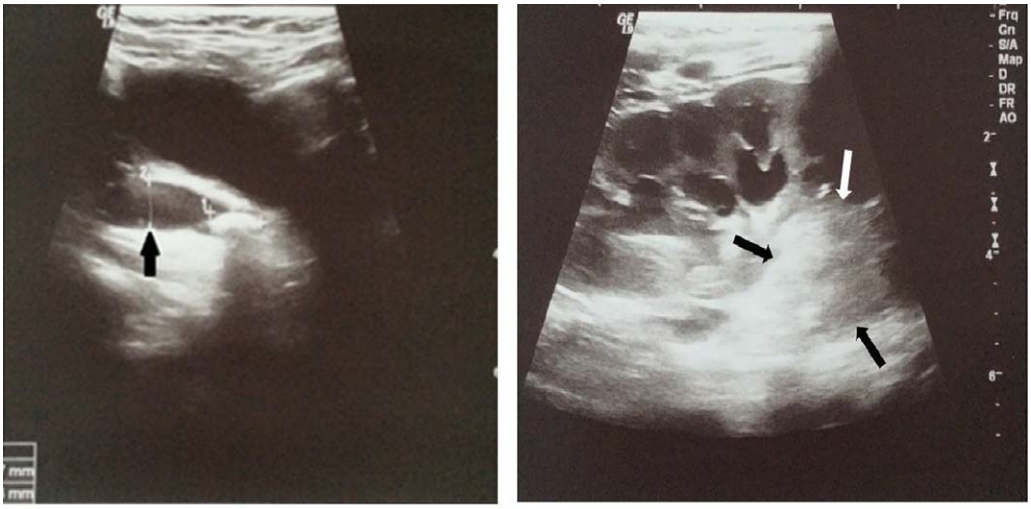

Figure 1. a,b. (a) Parasagittal sonography through the urinary bladder reveals an ureteral stone just before the ureterovesical junction (arrow) and proximal ureteral dilatation. (b) Coronal ultrasonography shows a well-defined cortical hyperechogenic area at the upper pole of the left kidney (arrows). Collecting system is also dilated

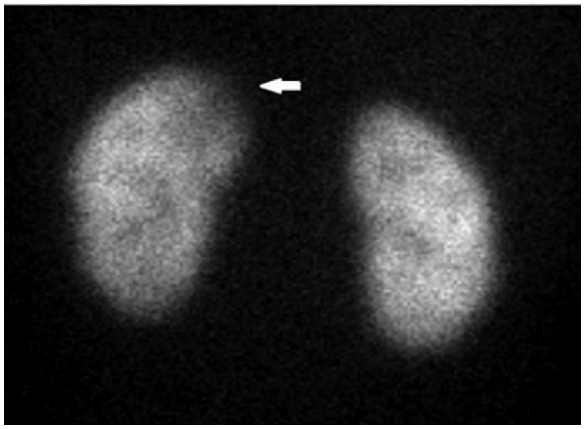

Figure 2. Paranchymal dysfunction at the upper pole of the left kidney (arrow)

Abdominal USG on the fifth day of hospitalization showed increased left pelvicaliectasia and dilatation along the whole ureter with a 8.5 mm diameter at the distal end. Calculus was measured 9 mm at the distal end of the ureter, and this measurement was more accurate due to ureteral dilatation. Focal area at the upper pole of the left kidney disappeared on this imaging. CRP was 4.8 mg dL^{-1}, pyuria continued, and repeated urine culture was again normal.

The patient was directed to pediatric surgery after the seventh day of admission. Pyuria was resolved, and CRP was 2.3 mg dL^{-1}. Detailed tests for the type of ureterolithiasis showed hyperoxaluria. Urinary oxalate/creatinine ratio was 0.08 (normal: <0.05). Calculus was removed ureteroscopically but could not be sent to stone analysis because it totally split up during the operation. Antibiotic treatment completed to 14 days. The presented case did not have vesicoureteral reflux (VUR), but he had renal scar at upper pole of the left kidney on scintigraphy (Figure 2). Nitrofurantoin prophylaxis was initiated after treatment.

Main Points

- ALN is a severe inflammatory renal bacterial infection that requires a long duration of antibiotic treatment.
- It can both occur in children with a urinary system abnormality or in those with normal anatomy.
- ALN is associated with high incidence of renal scar formation. Diagnosis and treatment are essential to avoid complications and unnecessary interventions.

DISCUSSION

A high incidence of urinary tract anomalies (22%) is found to be related to ALN. VUR was the most frequently (17%) seen anomaly, followed by hydronephrosis (7%). Less common pathologies are small kidney, single kidney, hydroureter, urethra with double orifice, and Cobb's collar.[4]

In another retrospective investigation of 25 pediatric ALN cases, 12 had urinary tract abnormalities (eight VUR, one megaureter, one urethral valve, one unilateral renal hypoplasia, and one megacystis megaureter with renal dysplasia). Twenty of them resolved with antibiotics, whereas renal parenchymal cysts remained in three cases, and focal scar in two cases.[5]

Sixteen children with ALN were retrospectively reviewed, and all of them had a predisposing condition. Three of them had VUR not requiring surgery, one had multiple renal calyceal diverticula, one had leukemia, and one had Hinman syndrome. Ten children needed surgery: four high grade VUR, one bladder diverticulum, two renal and perirectal abscess, one renal mass (Wilms tumor), one ureteric calculus, and one bladder calculus. The patient who needed stent for ureteric calculus was treated successfully with antibiotics, and ALN disappeared as in the other patients.[6]

Lobar nephronia in our patient was a consequence of obstruction and infection due to ureterolithiasis. Ureterolithiasis occured because of hyperoxaluria. ALN occurring directly due to hyperoxaluria was not defined in literature. ALN in this case resulted from an UTI due to the obstruction by any type of calculus.

In febrile UTIs, the diagnosis of ALN is possible with urinary USG performed by an expert, which is a very good and effective screening method. Computed tomography is described as a more sensitive and specific imaging method but has disadvantages like radiation and being invasive.[7]

In the beginning, the patient was considered as APN secondary to obstruction due to ureterolithiasis according to clinical signs and treated as APN. Sterility of urine culture was attributed to antibiotic treatment before admission. However, insufficient antibiotic response and definition of an inflammatory area with USG changed our diagnosis from APN to ALN.

ALN was defined by USG, and inflammation area regressed in 1 week. Voiding cystourethrogram was normal, but hypoactive lesion persisted as a scar on scintigraphy. In other words, in patient with ALN diagnosis, clinical condition, acute phase reactants, and acute inflammation on USG recovered 1 week after ceftriaxone and amikacin combination. However, scintigraphic signs persisted as scar. Antibiotics and removal of obstruction did not prevent scar formation. Nitrofurantoin was initiated after considering patient's age, history of UTI, and renal scar. Relapse of UTI or calculus was not observed during the 1 year follow-up.

ALN is a severe infection requiring long antibiotic duration, in which the patients should be treated with intravenous antibiotics for 2-3 weeks. It results in a high incidence of renal scarring diagnosed on follow-up with renal cortical scintigraphy. Frequency of renal scar development is not always dependent on treatment duration. In a prospective study with 109 ALN and 109 APN pediatric patients, renal scar incidence was similar in both groups taking antibiotic for 2 and 3 weeks. However, renal scar was much higher in ALN (89%) than in APN (34.9%) patients. Children with longer duration of fever and higher inflammation markers were also more susceptible for scar.[8]

The presented case is a rare condition as an ureterolithiasis predisposing ALN that was treated with intravenous antibiotics and evaluated with renal cortical scintigraphy. Calculus analysis revealed hyperoxaluria. Hyperoxaluria, in this case, may directly cause renal damage as defined in the literature. Other than crystalluria, genetical polymorphisms in inflammasome-dependent innate immunity and toll-like receptors may be responsible for ALN development.[9-11]

As ALN produces a mass lesion that may mimic other entities, diagnosis is important for sufficient antibiotic treatment and avoidance of unnecessary invasive operations.

Informed Consent: Verbal informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Conception - İ.B., S.K; Design - İ.B., S.K.; Supervision - İ.B., M.K., S.K.; Data Collection and/or Processing - İ.B.; Analysis and Interpretation: İ.B., M.K., S.K.; Literature Review - İ.B., S.K.; Writing - İ.B., S.K.; Critical Review - İ.B., M.K., S.K.

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

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Case Report

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Imaging Features of Nonenhancing Diffuse Midline Gliomas (DMGs) with Histone H3 K27M Mutation: Spectroscopy and Perfusion Imaging Findings

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Diffuse midline gliomas (DMGs) with the histone H3 K27 mutation is a brand-new tumor according to the 2016 World Health Organization Classification of Tumors of the Central Nervous System. In this case report, we characterize the magnetic resonance imaging (MRI) aspects with the literature review. Instead of biopsy, MRI techniques are used to diagnose the tumor and determine the treatment choice despite the correlation with the prognosis. We present the case of high-grade astrocytic tumors with H3 K27 mutation in a 19-year-old woman. MRI revealed a DMG. There was no paralysis of extremities or cerebellar deficit detected in physical examination. MRI showed a tumor in the pons, which is a hypo intense on T1-weighted imaging and a hyper intense on T2-weighted imaging. A non-enhancing lesion was discovered during a Gd-MRI examination. In perfusion imaging, there was no distinct perfusion rising in the tumor. *N*-Acetyl-aspartate (NAA):Cr ratio was 0.57, and choline (Cho):Cr ratio was 0.78. In conclusion, perfusion and spectroscopy findings are helpful for nonenhancing DMG diagnosis.

Keywords: Diffuse midline glioma, perfusion MRI, spectroscopy

INTRODUCTION

Being classified as a new type of tumor in the World Health Organization 2016 Edition of Tumors of the Central Nervous System, the diffuse midline glioma (DMG), H3 K27M mutant, manifests in the thalamus, brain stem, and spinal cord of children and adolescent.[1] Castel et al.[2] note that the occurrence of each mutation varies based on the primary location. They demonstrate how the frequency of H3.3 K27M mutation in all thalamic gliomas cases tripled the rate of the H3.1 K27M mutation. Proving the point, Nakata et al.[3] detected 20% H3F3A K27M mutant gliomas among 10 adults with cerebellar high-grade gliomas.

In this paper, we introduce an uncommon case of young person pontine high-grade DMG with H3 K27M mutation.

CASE PRESENTATION

A 19-year-old woman was examined in an ear–nose–throat outpatient clinic with a complaint of hearing loss in the last 2 months. After obtaining an informed consent, a DMG was found through magnetic resonance imaging (MRI) (Figure 1). There was no paralysis of extremities or no cerebellar deficit in the physical examination. MRI showed a tumor involving in the right mesencephalon, pons, and superior bulbous. It was enlarging the brainstem and compressing the fourth ventricle. The tumor was also noted to have a hypointensity on T1- and hyperintensity on T2-weighted images with T2/FLAIR mismatch. Following the gadolinium-based contrast material injection, the tumor did not enhance (Figure 1 a-d), and no cystic lesions were present. The tumor had a minimum Apparent diffusion coefficient (ADC) value of 1.41×10^{-3} mm^2 s^{-1}, kurtosis value of 532, choline (Cho)/Cr ratio of 0.98, *N*-acetyl-aspartate (NAA)/Cr ratio of 0.57, and relative cerebral blood volume (rCBV) value of 0.78.

DISCUSSION

DMG is a rare infiltrative astrocytoma centered in the pons and is a highly malignant tumor that affects children and adolescents. They have a bad prognosis with most of the patients deceasing within a year from diagnosis.[4] In the

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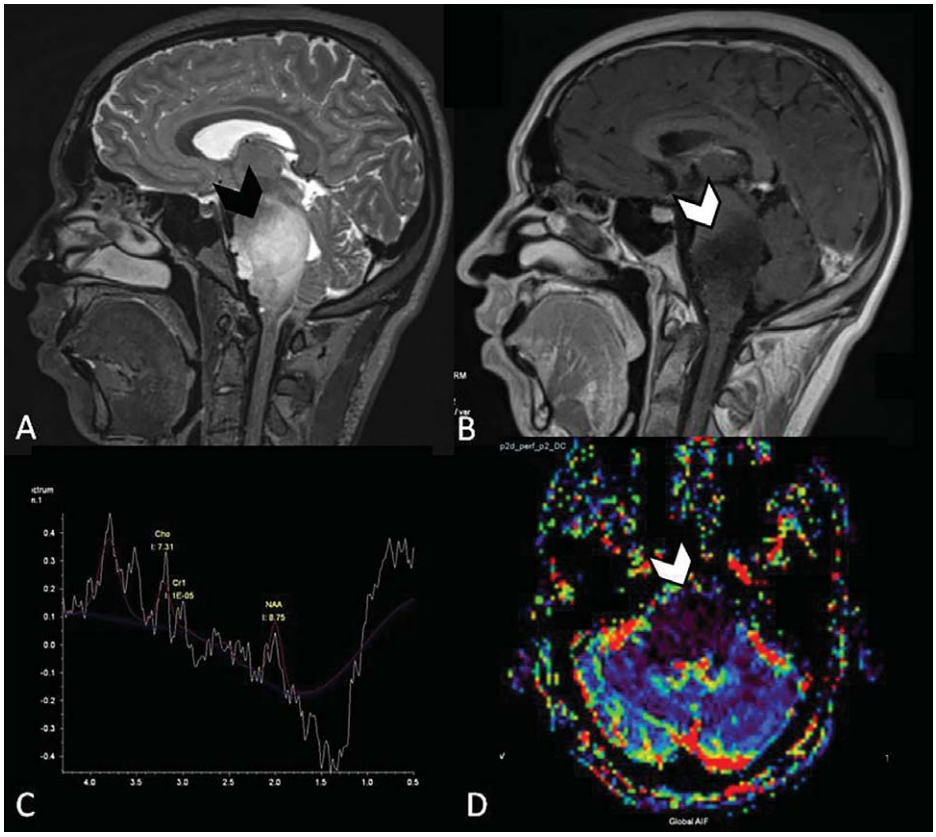

Figure 1. a-d. (a) Sagittal T2-weighted magnetic resonance imaging (MRI-MAGNETOM Aera 1.5T, Siemens, Erlangen, Germany) shows the mass in pons (black arrowhead). (b) Contrast-enhanced sagittal MRI shows a nonenhancement mass (white arrowhead). (c) Axial multivoxel MR spectroscopy shows the low NAA. (d) Perfusion-CBV map image shows low perfusion values (white arrowhead).

United States, approximately 100-150 children are diagnosed annually with DMG.[5]

Surgery and radiotherapy are limited solutions for the treatment. DMG diagnosis has traditionally been made on clinical grounds based on characteristic symptoms and MRI findings.

Imaging features of H3 K27M mutant gliomas were the absence of heterogeneous contrast enhancement and necrosis in half of cases.[6] Pons gliomas are a variable degree of contrast enhancement and uniformly enhancement in the spine. Cervical spine gliomas show cerebrospinal fluid-based spread. The thalamic and pontine gliomas demonstrated local recurrence.

Although DMG diagnosis is mostly established by examining its radiographic and clinical features, stereotactic biopsy is a minimal morbid procedure and allows for a definitive histopathological classification.[7,8] The standard radiotherapy is available for treatment in children.[9,10]

Two major conclusions have been drawn out from numerous studies on the topic: DMGs molecular features differ from those of adult and pediatric supratentorial hemispheric gliomas, and distinct subcategories with differing genetic, epigenetic, and proteomic makeup attributes exist within DMG classification.[11]

The variations among the location of gliomas in pediatric and adult patients may be a substantial determiner of tumor act and morphology. Gliomas are most typically encountered within the hemispheres or midline structures of supratentorial region in adult patients, whereas in children, infratentorial lesions are more commonly confined to the brainstem. Generally, brainstem gliomas produce only 1% of adult high-grade gliomas compared with 10% of pediatric gliomas.[12]

In pediatric gliomas, the various mutations in histone 3 genes are based on their varying locations. While H3.1 K27M and H3.3 K27M mutations are frequently encountered in patients with DMG and midline nonbrainstem high-grade gliomas, the H3.3 G34R/V mutation is solely observed in hemispheric high-grade gliomas.[13]

Due to the scarcity of standardization, the impact spectroscopy on patient control has been ambiguous. In our case, Cho:NAA ratio was 0.8 in the center, and variation was high. Increased Cho:NAA ratio variation in mass voxels determined by multivoxel spectroscopy can give information about poor clinical prognosis.[14] Cho is an integral member of cell membranes, while NAA is mainly in normal neurons. Elevated Cho:NAA can be associated with an increased number of cells, cell turnover, and injured cells. Steffen-Smith and coworkers's[15] published study identified a threshold value; Cho:NAA was 2.1 that allows classification of patients by risk. Cho:NAA was 0.8 in our patient. Patients with a lesser value have a significantly higher survival chance compared with patients who had at least one examination with recorded higher values.

Increased rCBV values in DMG were found to be associated with mortality rate in one study.[15] Although quite a few rCBV cutoff values to predict poor or more favorable outcome without histopathological grading have been published, the most widely accepted is that of 1.75, projected by Law et al.[16] in adult gliomas. In our patient, rCBV value was 0.78.

In conclusion, imaging features of H3 K27M mutant gliomas were the absence or heterogeneous contrast enhancement and necrosis in half of cases. Perfusion and spectroscopy findings of DMG are helpful for diagnosis.

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Conception - O.T.; Supervision - N.B.; Materials - O.T.; Data Collection and/or Processing - O.T.; Analysis and/or Interpretation - N.B.; Literature Review - M.D.; Writing - O.T.; Critical Reviews - O.T., M.D., N.B.

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

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Review Article

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Canavan Disease and Recent Advances

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Canavan disease (CD) is a rare autosomal recessively inherited leukodystrophy. The genetic defect related to the aspartoacylase gene. The clinical characteristics of CD include hypotonia, macrocephaly, developmental delay, and visual impairment within the first year of life. There is currently no cure for CD, however, new therapeutic modalities and gene therapy options are under investigation. Possible mechanisms in the pathogenesis include astrocytic edema caused by *N*-acetyl-L-aspartic acid (NAA) serving as a water pump and diminished acetate that is required for myelin synthesis. The current diagnostic approach to identify CD cases includes the demonstration of increased urinary NAA level, diminished or absence of enzyme activity in cultured skin fibroblasts, the loss of white matter including U-fibers in magnetic resonance (MR) imaging, NAA peak in MR spectroscopy (MRS), and genetic testing, in which more than 70 mutations have been identified. Among these diagnostic approaches, the NAA peak detected with the use of MRS is highly characteristic of CD and is the cornerstone in early diagnosis.

Keywords: Canavan disease, diagnosis, neuroimaging, genetic, treatment

INTRODUCTION

Canavan disease (CD) is a rare, autosomal recessive leukodystrophy that is characterized by spongy degeneration of the white matter of the brain.[1] Degenerating white matter is replaced by fluid that is named as vacuolating myelinopathy.[2] CD is caused by a defect in the aspartoacylase (ASPA) gene, encoding the enzyme aspartoachylase, which has a role in hydrolyzing *N*-acetyl-L-aspartic acid (NAA) and provides an acetyl group to oligodendrocytes for myelin synthesis.[3–6] A defect in aspartoachylase results in diminished myelin biosynthesis, dysmyelination, and brain edema.[7] Although CD is prevalent among the Ashkenazi Jewish population, it also has an incidence of 1:200,000-1:400,000 among the non-Jewish population. The mutation responsible for CD among the two populations may differ.[8]

MECHANISM OF CD

NAA found only in neurons.[8] NAA and NAA related dipeptide *N*-acetyl-aspartyl-glutamate (NAAG) is transported from the cytoplasm to the extracellular space after synthesis within the neuron. Then NAA is taken up by oligodendrocytes using a dicarboxylic acid transporter and hydrolyzed by ASPA to aspartate and acetate. Acetates are then used in the synthesis of fatty acids, and they are used for the production of myelin lipids.[9]

Decreased levels of NAA have been reported in many other neurodegenerative disorders, but elevated NAA is characteristic of CD. The exact pathophysiologic mechanism causing white matter degeneration in the case of increased NAA is yet unknown. Several hypotheses, however, have been established for possible pathophysiology.

CD is characterized by an increase in NAA in addition to a decrease in acetate and myelination.[10–12] The loss of function of ASPA causes a reduction in free acetate, while NAA is essential for the synthesis of myelin lipids that is crucial for myelination in the central nervous system (CNS), particularly during the postnatal period.[10] Impaired lipogenesis was postulated to be the reason for spongiform degeneration in CD.[13,14] In an ASPA knockout mice model, polar and nonpolar lipid levels that are crucial for myelin synthesis were found to be lower when compared to the control group.[13] Cerebroside and sulfatide reduction has also been reported in human and the rat CD model. Although a reduction in the lipids level has been demonstrated, it may not have a direct relation with the severity of the disease, indicating that deficiency of acetate may not be the only underlying pathology of CD.[9]

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NAA was suspected to serve as a water pump removing metabolic water from the mitochondria of neurons. Accumulation of NAA results in astrocytic edema and formation of vacuoles.[15] In contrast, NAA was shown to be nontoxic even at high concentrations. No changes were detected in NAA levels in CD mice models following the introduction of the entire ASPA gene.[16,17] Aquaporin (AQP) 4 is a water transporter and is the principal member of the AQP family in the CNS, which is expressed by astrocytes.[15,18,19] Clarner et al.[20] demonstrated that AQP4 was present throughout the cytoplasm in the CD mice model and was located only in astrocytic end-feet in control mice. AQP4 was thought to be a new therapeutic target for partial prevention of spongy degeneration through the regulation of astroglial water homeostasis.

It has been demonstrated that the elevation of oxidative stress markers can cause the loss of oligodendrocytes and demyelination in the first few days after birth, and in turn, NAA was thought to have a role in the metabolic integrity of oligodendrocytes.[21]

Additionally, nucleosomal histones are components of chromatin, and their function is modulated by acetylation. A decrease in acetate may disturb the expression of genes involved in the maturation of oligodendrocytes.[22] Previous findings do suggest that immature oligodendrocytes have higher NAA levels than mature oligodendrocytes or astrocytes. It indicates the importance of the function of ASPA in immature oligodendrocytes.[23] ASPA plays an important role in the maturation of oligodendrocytes and also contributes to the pathophysiology of CD.[24]

Conversely, NAA may affect NMDA receptors in oligodendrocytes resulting in demyelination. The effect of NAA or NAAG on the oligodendrocytes' NMDA receptor is probably not a major contributor to white matter damage.[25]

THE CLINICAL COURSE OF CD

Symptoms usually emerge after a period of normal development, which occurs during the first few months of life, a rapid course of progression of CD then occurs. The major symptoms of CD include hypotonia, macrocephaly, feeding difficulties, developmental delay, and visual impairment.[26–28] Macrocephaly becomes evident after birth, usually during the first year of life.[9,26] The classical triad of the infantile CD in early childhood is hypotonia, macrocephaly, and head lag.[9] There are, however, a few cases that also report normocephaly or microcephaly.[29–32] Ataxia, poor sucking, and intellectual disabilities have also been reported in CD patients.[9]

In the later stages of the disease, patients develop optic atrophy and spasticity. They usually become highly debilitated including the loss of ambulation, difficulty in swallowing, and seizures. A long term prognosis is still poor in infantile CD, and patients are unlikely to survive beyond adolescence. Some patients with milder forms may survive beyond the second decade of life.[9]

Main Points

- Canavan disease (CD) is a rare genetically inherited disorder that is characterized by hypotonia, macrocephaly, developmental delay and visual impairment within first year of life.
- The NAA peak detected in MRS is highly characteristic of CD and important in early diagnosis.
- Although more than 70 mutations had been described, genetic testing anables genetic consultation.

The onset of mild/juvenile CD often begins after 5 years of age. It is characterized by a mild developmental delay of speech and motor skills, developmental delays may also be nonspecific, and may not be immediately recognized.[33,34] The adult-onset of symptoms may resemble symptoms associated with the condition of multiple sclerosis.[33] In addition, severe retinal degeneration had also been reported in a patient with CD.[35]

DIAGNOSTIC TESTS FOR CD

Laboratory Tests

Diagnosis is based on neurological findings, laboratory tests, cultured skin fibroblasts, neuroimaging, and genetic testing collectively.

Laboratory findings, neuroimaging, and genetic testing are crucial to distinguish CD from other neurodegenerative disorders.

Serum and urine NAA levels are elevated in patients with CD. Excessive urinary NAA excretion was found to be almost 200 times higher than the amounts found in normal age-matched individuals or obligate carriers.[36]

In a study including 17 CD patients, one patient had elevated serum NAA levels while another six patients had high urine NAA concentrations. In 10 CD patients of an infantile group, neither serum nor urine samples had elevated NAA levels.[37] Additionally, the urine concentrations of NAA and the severity of their symptoms did not correlate in two siblings with CD.[7] Therefore, urinary NAA excretion levels may not be completely reliable criteria for the diagnosis of CD.

Cultured skin fibroblasts can be used to asses ASPA enzyme activity. It can demonstrate low enzyme activity even in the absence of a known ASPA gene mutation; however, it may not be reliable because the activity may vary with culture conditions.[10,34,38] Aspartoachylase enzyme production is very low in normal amniocytes and chorionic villi, which makes the detection of this enzyme unreliable in prenatal diagnosis.[39]

Neuroimaging

The MRI of the brain in CD patients demonstrates macrocephaly and a diffuse loss of white matter including subcortical U-fibers and usually bilateral globus pallidus and thalamus involvement. Putamen and caudate nucleus are spared, which is very typical for CD. Cerebellum and brain stem tracts may also be affected.[2,40–43] Rarely multiple rounds or oval cystic changes can be observed in white matter causing a honeycomb appearance.[44] In infantile CD, before characteristic findings emerge, cytotoxic edema with restricted diffusion on brain MRI may be observed.[45] Multiple small cysts in white matter predominantly in the posterior regions causing spongy appearance in infantile CD patients have also been reported.[46]

In the case of mild/juvenile CD brain, MRI does not display general white matter disease, instead of increased signal intensities in the basal ganglia have been demonstrated in many children with mild/juvenile CD.[47–49] A case report of juvenile

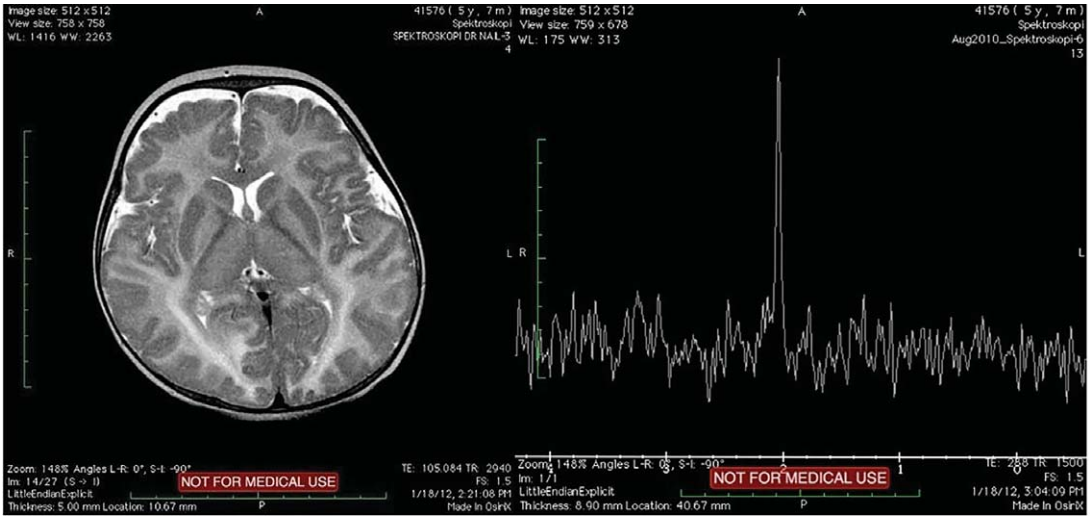

FIGURE I. MRI demonstrating delayed myelinization at corpus collosum, capsula interna genu, and posterior limb. Hyperintensity of both globus pallidus, thalamus, dorsal aspect of brain stem, corticospinal tractus, and cerebellum. MRS demonstrating a prominent NAA (N-aspartyl aspartate) peak on posterior deep white matter lobe.

CD had been reported with distinct pons involvement in addition to caudate nucleus and basal ganglia without white matter involvement.[50] In another case report with mild clinical presentation, diffuse cortical abnormality without significant white matter involvement had been reported.[51] Similar changes have also been described in individuals with mitochondrial diseases.[47,52]

MR spectroscopy (MRS) reveals marked elevations of the NAA, which is characteristic of CD. Low choline (Cho)/creatine (Cr) ratio, high myoinositol (mI)/Cr ratio, and high lactate levels have also been observed in some CD patients.[41] Diffusion-weighted has demonstrated restricted diffusion with low apparent diffusion coefficient (ADC) values in the early stages of the disease probably due to myelin vacuolation, whereas increased diffusion and high ADC values are demonstrated in later stages of the disease.[41,42]

An example of MRI and MRS of a patient with CD is shown in Figure I.[31] Elevation of NAA in the brain can be detected by MRS before detecting an increase in the levels of NAA in the urine, therefore making MRS a favorable early diagnostic tool for CD.[53]

Genetic Testing

Genetic testing is not only important for the diagnosis of CD but also critical for genetic counseling and prenatal testing. The ASPA gene is located on the short arm of chromosome 17 at 17p13.2 location with an autosomal recessive inheritance (OMIM 271900).[54] More than 70 mutations have been described to be associated with the ASPA gene thus far.[3] Sistermans et al.[55] reported that two mutations account for about 98% of the alleles of Ashkenazi Jewish patients known as E285A and Y231X. In non-Jewish patients of European origin, the A305E mutation accounts for 50% of alleles.

Patients with mild/juvenile CD are usually heterozygous with one mild variant and one severe variant with residual ASPA activity.[47,51,56]

A correlation among clinical presentation, enzyme activity, and genotype for CD had been reported by Mendes et al.[57]

DIFFERENTIAL DIAGNOSIS OF CANAVAN DISEASE

Differential diagnosis of CD includes other neurodegenerative disorders that are associated with a normal or large head circumference. Alexander disease, Tay-Sachs Disease, Metachromatic Lecodystrophy, and Glutaric acidemia type I may be examples of differential diagnosis of CD. Also, viral infections, mitochondrial disorders, particularly Leigh syndrome, and metabolic disorders such as nonketotic hyperglycinemia can cause spongy degeneration of the brain. Cases of mild/juvenile CD may, therefore, be misdiagnosed as a mitochondrial disorder.[34]

GENETIC COUNSELING

After identification of the pathogenic variant, high-risk relatives are recommended to be tested. If a specific variant is not known, prenatal diagnosis is based on the measurements of NAA in amniotic fluid.[34] The frequency of carriers among Ashkenazi Jewish populations ranges from 1:37 to 1:40. Population screening is recommended for Ashkenazi Jewish individuals.[58]

Treatment

There is no specific treatment for CD, and the available treatment is designed to increase the patients' quality of life. Adequate nutrition, hydration, and control of seizures with anticonvulsants are recommended. Acetazolamide was demonstrated to be beneficial by reducing intracranial pressure.[59]

However, new therapeutic approaches are under investigation.

CLINICAL TRIALS

Lithium citrate decreases NAA in the brain of patients with CD and rat models. The introduction of lithium citrate supplied better scores in gross motor function without statistical significance and parental reports of improvement in alertness and visual tracking when compared to baseline.[60,61]

Glycerily triacetate treatment has been shown to increase acetate levels in the brain of rats; however, the same treatment did not demonstrate any improvement in patients with CD. As it has no significant side effect or toxicity, this drug is now being used in patients with CD. Early intervention of treatment was postulated to be important.[62,63]

Topiramate has been reported to decline head growth velocity in two subjects with CD.[64]

EXPERIMENTAL REPORTS

NAA, calcium acetate, ethanol, lipoic acid, lithium chloride, pyrazole and derivatives, sodium valproate, and triheptanoin showed different results. They are candidates for future trials.[65]

In a recent mice study, a prolonged survival had been demonstrated in a cell-based therapy using induced pluripotent stem cells-derived neural progenitor cell and oligodendrocytes progenitor cells.[66]

GENE THERAPY

Gene therapy aims to increase ASPA activity by insertion of the ASPA gene. In mice and CD patients that have received gene therapy treatment, demonstrated an increase in ASPA production and activity.[67,68] In turn, there was a reduction of NAA levels in CNS and improved spongy degeneration in some cases.[69,70] However, those changes were transient in some of the cases[70] and confined to just a local area of the intracerebral injection site.[71,72] In an animal study, motor defects that were improved have shown to relapse in the later stages of life.[69]

In a recent study, there has been a breakthrough in the treatment of murine CD using a novel gene therapy approach. Although many studies focus on oligodendrocytes, astrocytes were hypothesized to be the origin of spongiform leucodystrophy in CD patients. The wild type gene had been inserted into astrocytes in that study.[73,74]

Clinical applications of gene therapies were done by adenovirus-associated virus (AAV).[75] Additionally, neuroinflammatory responses after CNS-targeted delivery of AAV-mediated gene therapy are a critical concern to establish the immune suppressive strategies, clinical protocols, and so on.[76]

CONCLUSION

The infantile CD is one of the poor prognostic neurodegenerative disorders. It starts within the first year of life. There is no curative treatment available; however, new therapeutic approaches including gene therapy are under investigation. MR and MRS are noninvasive primary tests that can demonstrate specific findings. Additionally, genetic testing is useful for both definite diagnosis and genetic counseling. The demonstration of the absence or diminished enzyme activity becomes important in cases with no known mutations. Early diagnosis is important for the early implementation of available treatment options in addition to genetic counseling.

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