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

Aims and Scope

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

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

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

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

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

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Middle Black Sea Journal of Health Science

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

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

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

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

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

References

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

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

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

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

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

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

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

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

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

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

Structure

Title

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

Key words

Introduction

Methods

Results

Discussion

Conclusion

Acknowledgements

References (most 40)

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

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

Structure

Title

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

Key Words

Introduction

Methods

Results

Discussion

Conclusion

Acknowledgements

References (most 20)

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

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Structure

Title

Abstract (average 100-300 word)

Key words

Introduction

Case report

Discussion

Conclusion

Acknowledgements

References (most 20)

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d) Review articles

Structure

Title

Abstract (average 200-400 word)

Key words

Introduction

The compilation text also including appropriate sub-headings,

Conclusion

Acknowledgements

References (most 50)

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

Middle Black Sea Journal of Health Science

JUNE 2024 **VOLUME 10** **ISSUE 2**

CONTENTS

EDITORIAL

Our second issue of 2024

We are delighted to present original articles from various fields in this issue of our journal, aimed at offering new and valuable contributions to the world of science.

Enriched by the contributions of distinguished scientists, our content enhances the quality and diversity of our journal.

We hope that the articles in this issue will make significant contributions to scientific knowledge, and we look forward to bringing you more high-quality and original works in future issues.

Prof. Dr. Ülkü KARAMAN

Editor

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci
June 2024; 10(2): 137-154

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1400468

The Impact of Online Learning Methods on Nursing Students' Motivation During the Covid-19 Pandemic: A Mixed Method Study

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Abstract

Objective: Online learning methods and digital tools have become more popular since the COVID-19 pandemic. This study investigated the effect of online learning methods on nursing students' motivation during the COVID-19 pandemic.

Methods: This study adopted an explanatory sequential mixed research design involving a quasi-experimental single-group posttest and a qualitative design. The research was conducted in the spring semester of the 2020-2021 academic year at the department of nursing of a state university in Ankara, Turkey. The sample consisted of 237 students taking the "Surgical Diseases Nursing" course and the sample of the qualitative stage consisted of 20 students. The research had three stages. In the first stage, participants engaged in online interactive activities (Kahoot, Mentimeter, etc.), discussed case videos, and prepared cases based on group counseling throughout the semester. In the second stage, they discussed the group cases and then filled out the Instructional Materials Motivation Survey (IMMS) and the Achievement-Oriented Motivation Scale (AOMS). In the third stage, the researchers conducted three focus-group interviews to identify participants' experiences with online learning methods. The quantitative data were analyzed using descriptive statistics and Spearman's correlation coefficient, while the qualitative data were analyzed using content analysis.

Results: Participants had a total mean IMMS and AOMS score of 94.83±15.79 and 142.39±18.80, respectively. The results showed that participants were highly motivated by online learning methods. The focus-group interviews revealed three themes: "learning process," "learning method," and "personal development/experience.

Conclusion: Nursing students are highly motivated by online learning methods. Most nursing students believe online learning methods make them more motivated and interested, classes more fun, and new knowledge more permanent. They also think that online learning methods facilitate learning. Therefore, universities should offer nursing students more online learning methods.

Keyword: COVID-19; Nursing education; Surgical nursing; Online learning methods; Motivation; Distance education

Suggested Citation: Yıldız Emre N, Mercan Annak İ, Öztürk K, Kalkan N, Opak Yücel B, Irmak B, Bulut H, Güler S. The Impact of Online Learning Methods on Nursing Students' Motivation During the Covid-19 Pandemic: A Mixed Method Study Mid Blac Sea Journal of Health Sci, 2024;10(2):137-154.

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INTRODUCTION

Nursing education consists of two components which are the theory and clinical practice. Its objective is to ensure that students develop both cognitive, affective, and psychomotor skills. Therefore, nursing students are expected to put theory into practice (1, 2). However, all universities, including those in Turkey, shifted to distance learning due to the COVID-19 pandemic (3, 4). Students had to take all theoretical courses online and postpone clinical clerkships, which is an integral part of nursing education that allows students to practice providing care to patients in real-life settings (5).

Nursing students who receive online education cannot attain all learning outcomes because nursing education is an applied discipline that requires students to put their knowledge into practice in real-life clinical settings (3). Therefore, researchers raise concerns over possible adverse situations where nursing students and nurses cannot find the chance to deliver optimum care to their patients due to the lack of the knowledge and skills they are supposed to acquire during undergraduate education (6-9). Langegård et al. (7) conducted a qualitative study to investigate nursing students' experiences of a pedagogical transition from campus learning to distance learning based on digital tools. They reported that although most nursing students preferred face-to-face education to online learning, one-third preferred online learning based on digital tools. Yılmaz (9) focused on nurse educators' experiences concerning sustaining nursing skill teaching during the COVID-19 pandemic and found that most nurse educators had difficulty adapting to online teaching methods, evaluating their students, and making Internet connection stable and fast. Kızıltepe and Kurtgöz (6) also documented that nursing students who received distance education experienced learning difficulties and felt incompetent regarding clinical practice. Nursing academics are responsible for planning digital education to bridge the gap between theory and practice to turn students into qualified nurses. Therefore, the challenges brought on nursing education by the COVID-19 pandemic have forced authorities to find new solutions (5, 8), some of

which are online learning methods introduced to meet students' new needs that have emerged with the COVID-19 pandemic. Most nursing students are Generation Z members who live intertwined with technology and prefer to use technology-based applications and methods to meet almost all their needs (10). Academics should consider students' characteristics, adopt student-centered educational approaches, and integrate online learning methods into their lectures to meet their needs. Online learning methods facilitate interactive learning and improve student performance and satisfaction (11). For these reasons, it can be concluded that the use of online learning methods in nursing education would be beneficial.

Interactive learning settings enable students to improve themselves. Interactive methods play a crucial role in nursing education because they help students develop theoretical and clinical nursing skills (12, 13). Online interactive activities (games, videos, quizzes, small group meetings, case discussions, virtual museum visits, etc.) facilitate learning and strengthen student-teacher interaction (3). Mucuk, Ceyhan, and Kartın (14) focused on online interactive activities (Kahoot!, Quizizz, Padlet, etc.) to promote student engagement in distance learning and found that students were interested in online learning methods that they could access anywhere, anytime. In other words, online learning methods promote student engagement and motivation.

We need to better understand student motivation to increase the retention of nursing education and create an efficient learning approach. Motivation is a complex construct with multiple components. It results from a series of activation and orientation processes that lead to behaviors and actions toward realizing specific goals. It affects learning retention and academic performance. It also helps students develop positive attitudes toward their future professions. Therefore, we must use valid and reliable tools to assess their motivation (15). Online educational settings also affect student motivation (16), suggesting that we need to integrate technology into distance education to make nursing students more motivated during the COVID-19 pandemic (17). In a possible distance education scenario, students may encounter various problems related to focusing on the course and providing motivation. Learning practical training remotely and lack of experience may harm their professional lives. It is thought that the research results will guide us in minimizing the problems that may develop in nursing education in such a case.

This study had two objectives: (1) determining the effect of online learning methods on nursing students' motivation and (2) focusing on their experiences with those methods.

Research Questions

1. How do online learning methods affect nursing students' motivation during the COVID-19 pandemic?

2. What are nursing students' experiences with online learning methods during the COVID-19 pandemic?

METHODS

Study design

This study adopted an explanatory sequential mixed method design involving quantitative (quasi-experimental single-group posttest) and qualitative stages.

Research setting and characteristics

The research was conducted in the nursing department of the faculty of health sciences of a state university in Ankara, Turkey. The university used Perculus (an online learning management system) to offer distance education during the COVID-19 pandemic. Nursing students took the "Surgical Nursing" course for 200 minutes per week (100 minutes of theory and 100 minutes of practice) in the spring semester of the second year. The course aims to ensure that nursing students acquire knowledge and develop the right skills and attitudes toward surgical nursing.

Two hundred and forty-seven students took the "Surgical Nursing" course in the spring semester of the 2020-2021 academic year. The course was offered two days a week. It focused on theory in the first seven weeks and then covered clinical practice in the following three weeks for two days a week. On week 11 (once a week), all students watched some case videos (prepared by academics) and discussed them. At the end of week 11, the lecturer gave them a test about the cases. In the following three weeks, all students prepared cases in groups and then presented and discussed them.

Participants

The study population consisted of 247 second-year nursing students who took the "Surgical Nursing" course in the spring semester of the 2020-2021 academic year. No sampling was performed because the research was designed to reach the entire study population. The sample of the quantitative stage consisted of 237 students who took the "Surgical Nursing" course for the first time. The sample of the qualitative stage consisted of 24 students recruited using simple randomization (table of random numbers). The sample of the qualitative stage was divided into three focus groups of eight students. However, four students could not attend the focus-group interviews because they had Internet connection issues (n=3) or family issues (n=1). Therefore, the final sample of the qualitative stage consisted of 20 students. Each of the two focus-group interviews was conducted with six students, while one focus-group interview was conducted with eight students.

Data collection tools

The quantitative data were collected using a Personal Information Form, the Instructional Materials Motivation Survey (IMMS), and the Achievement-Oriented Motivation Scale (AOMS). The qualitative data were collected using a semi-structured interview guide developed by the researchers.

Personal information form

The personal information form was based on a literature review conducted by the researchers (3, 13, 14, 15). The form consisted of eight items on (age, gender, education, etc.).

Instructional Materials Motivation Survey

The Instructional Materials Motivation Survey (IMMS) was developed by Keller (18) to measure the effect of instructional materials on students' motivation based on the ARCS (Attention, Relevance, Confidence, and Satisfaction) Motivation Model. The survey consists of 36 items rated on a five-point Likert-type scale. It has four subscales: attention, relevance, confidence, and satisfaction (18). The survey was adapted to Turkish by Kutu and Sözbilir (19). The Turkish version consists of 24 items loaded on two subscales: (1) attention-relevance and (2) confidence-satisfaction. The survey has a Cronbach's alpha (α) of 0.83, which was 0.95 in the present study (Table 2). Five items (3, 12, 14, 16, and 18) are negative statements. The total score ranges from 24 to 120, with higher scores indicating higher motivation.

Achievement-Oriented Motivation Scale

The Achievement-Oriented Motivation Scale (AOMS) was developed by Semerci (20). The instrument consists of 35 items rated on a five-point Likert-type scale. The scale has four subscales: external effects, internal effects, growth of aim, and self-conscious. The scale has a Cronbach's alpha of 0.89, which was 0.94 in the present study (Table 2). The total score ranges from 35 to 175, with higher scores indicating higher achievement-oriented motivation.

Semi-structured interview guide

The semi-structured interview guide had one question:

-What are your experiences with online learning methods (online interactive activities, video discussions, and case presentations) during the COVID-19 pandemic?

Procedure

In the first week, the lecturer explained to all participants the syllabus of the "Surgical Nursing" course, including activities, homework assignments, and evaluation exams. She used different online learning methods (online interactive activities, video discussions, and case presentations) to deliver theoretical and practical classes. In the first seven weeks, she used online activities (Kahoot, Mentimeter,

Wordwall, Learningapps, Crosswordlabs, etc.) and interactive activities (true or false? puzzle, concept map, brainstorming, creating slogans, cases, etc.) at the beginning and end of classes.

In the following four weeks (8-9-10-11 week), the lecturer got all participants to discuss case videos prepared by academics. The videos consisted of seven cases, including preoperative and postoperative nursing care and discharge training. The cases were about coronary artery bypass graft, surgical intervention for intracranial hemorrhage, lumbar disc hernia repair, mastectomy, hip replacement, total laryngectomy, and general preoperative and postoperative care. The researchers wrote the scripts, shot the videos, and enacted the cases (role-play). Each class lasted 50 minutes (15 minutes of video and 35 minutes of discussion). All participants took the "Case Evaluation Test" in the eleventh week.

For the group activities, the researchers divided the participants into 24 groups of 10 to 11 in the first week of the semester. Each group had an academic as a mentor. Each group and its mentor (Zoom) had six recorded online meetings. Each mentor provided her group with a case. Each group formulated care plans based on concept maps, developed an educational material, and prepared a case discussion presentation. The groups presented their cases for three weeks (12-13-14 week). The lecturer administered the "Case Presentation Evaluation Form" to assess the case presentations.

The participants filled out the IMMS and AOMS at the end of the semester. The researchers created online (WhatsApp) groups for focus groups. The researchers and the participants set the appropriate time for the focus group interviews, which were then conducted via Zoom. The focus group interviews were conducted between July 09 and 12, 2021. Each interview lasted 45-55 minutes. The researchers (NYE, IMA, KO) transcribed the interviews and sent them to all participants for their consent.

Statistical analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS, v 22) at a significance level of 0.05. Numbers, means, and percentages were used for descriptive statistics. Median, minimum-maximum values, means, and standard deviations were used to determine scale scores. Spearman's correlation coefficient was used to determine the relationship between scale scores. The Pearson correlation coefficient values are specified as follows: 0.00-0.25 = very weak correlation; 0.26-0.49 = weak correlation; 0.50-0.69 = moderate correlation; 0.70-0.89 = strong correlation; and 0.90-1.00 = very strong correlation (21). Cronbach's alpha (Crα) values were calculated for reliability.

The qualitative data (interviews) were analyzed using content analysis based on the Miles-Huberman Model (22). In order to calculate the consistency rates of the codes created in the

research, the data of interviews were coded separately by researchers and the consistency rates were calculated by comparing the codes which made without notice. Three different researchers (IMA, KO, NYE) conducted first-order descriptive coding on the qualitative data. Then, three different researchers (BI, BOY, NK) conducted second-order interpretive coding on the qualitative data. In this research, the formula: Reliability= Number of Consensus/ Total Agreement + Number of Disagreement was used to calculate the inter-code consistency (code agreement rate) rate. If the consistency rate between codes (the percentage of agreement between codes) is above 80%, the coding is considered to have high reliability. The code agreement rate for the codes determined in the research was found to be 87.6%. Therefore, it is thought that the coding made in the research has high reliability (22). Afterward, the researchers developed themes and subthemes. They discussed the themes and subthemes and reached a consensus. The Consolidated Criteria for Reporting Qualitative Research (COREQ) was used as the qualitative research guide to analyze and report the data (23).

Ethical considerations

The study was approved by the ethics committee of the university (Date: 21.05.2021, No: E.88234). Permission was obtained from the head of the nursing department of the faculty of health sciences of the university (Date: 31.05.2021, No: E.96508). All students were briefed about the research purpose and procedure. Written informed consent was obtained from those who agreed to participate. The study was conducted according to the ethical principles of the World Medical Association's Declaration of Helsinki. All focus-group interviews were held and video-recorded online (Zoom). All participants were informed that the data would in no way be shared with third parties. Verbal consent was obtained from all participants.

RESULTS

This section presented the findings based on the quantitative and qualitative data.

Quantitative results

Participants had a mean age of 20.57±1.73 years. Most participants were women (89.5%). More than half of the participants had Anatolian high school degrees (74.7%) (Table 1).

The effect of online learning methods on motivation was assessed on a scale of 0 to 10. Participants had mean "theoretical lecturing," "online interactive activities," “video discussions,” and “case presentations" scores of 7.86±1.732, 8.28±1.882, 8.84±1.480, and 8.11±1.958, respectively (Figure 1).

Participants had a mean IMMS score of 94.83±15.79, while they had mean IMMS “attention-relevance” and “confidence-satisfaction” subscale scores of 45.07±7.72 and 49.75±8.93, respectively. Participants had a

mean AOMS score of 142.39±18.80, while they had mean “external effects,” “internal effects,” “growth of aim,” and “self-conscious” subscale scores of 52.29±6.92, 36.36±6.06, 26.32±3.79, and 27.40±5.37, respectively (Table 2).

Participants’ IMMS “attention-relevance” subscale scores were positively correlated with their AOMS “external effects” (r:0.625), “internal effects” (r:0.600), “self-conscious” (r:0.526), and “growth of aim” subscale scores (r:0.259) ($p<0.01$). Their IMMS “confidence-satisfaction” subscale scores were positively correlated with their AOMS “external effects” (r:0.513), “internal effects (r:0.559),” “self-conscious” (0.475), and “growth of aim” subscale scores (r:0.258) ($p<0.01$). Their IMMS total score was positively correlated with their AOMS total (r: 0.622) and “internal effects” (r: 0.615), “external effects” (r:0.595), “self-conscious” (r: 0.527), and “growth of aim” (r:0.277) subscale scores (Table 3).

Qualitative results

The interviews revealed three themes regarding participants' experiences with online learning methods during the COVID-19 pandemic. These themes were "learning process," "learning method," and "personal development/experience." Figure 2 shows the themes, subthemes, and codes.

Theme 1: Learning process

The theme “learning process” consisted of three subthemes: time management, online learning environment, and counseling.

Subtheme 1: time management

Participants stated that they had to study for their theoretical classes and exams all the time. They noted that the classes were too intense because they moved on too fast. The following are some quotes:

“…I kept studying because I thought it was an important course…” (P1)

“…So, it was a risky course also because it was a high-credit course. I kind of got tired of it because the classes were moving on too fast (P20)

“It was an intense course actually. I tried so hard not to miss anything important.” (P17)

Subtheme 2: Online learning environment

Participants remarked that they could watch and listen to the classes repeatedly. They noted that the course provided them with an environment for active discussion. However,

they added that they could not achieve learning retention. The following are some quotes.

We got the chance to watch the videos repeatedly anywhere, anytime on our phones or laptops and whatnot." (P9)

"Like, we could raise our hands and talk on Zoom, or the teacher asked us questions." (P8)

"…I watched all the videos, but I don't think they did much help. I mean, I don't think they were as effective as face-to-face learning because I couldn't manage learning retention. It's like; I was a bit worried about how to do them because I kept forgetting things as it was online." (P10)

Subtheme 3: counseling

Participants stated that their mentors helped them a lot with case presentations. They noted that their mentors were very enthusiastic and accessible. The following are some quotes:

"We could access our mentor easily. We could call her or email her. She helped us a lot, like, she would explain things we asked them about." (P9)

"…our mentor was very enthusiastic about teaching us new things." (P8)

"…we're in the middle of a pandemic. So, it's not easy for us to get a hold of our lecturer, I mean all our lecturers. But we had our mentor, and we could work in groups, which helped us a lot." (P2)

Theme 2: Learning method

The theme "learning method" consisted of three subscales: theoretical classes," "case videos," and "Web 2.0 tools."

Subtheme 1: theoretical classes

Participants stated that they had difficulty understanding the theoretical classes. They also noted that the theoretical classes had too little visuality. The following are some quotes:

"The classes were moving on too fast, so I had a hard time understanding what was going on." (P20)

"I think that the classes should have been more visual." (P19)

Subtheme 2: case videos

Participants regarded the case videos as useful tools that facilitated learning. The following are some quotes:

"The videos made me feel like I was with patients. The following discussions were also very helpful because we couldn't do any clinical clerkships." (P16)

"I got to see my mistakes or hear some classmates ask me questions that had never occurred to me. I took notes, which was good because the teacher asked some questions about them in the exam. So, they were tattooed in my

mind. They were great, I mean, the videos." (P17).

Subtheme 3: web 2.0 tools

Participants remarked that the Web 2.0 tools helped them enjoy learning and remember and summarize the things they learned. The following are some quotes:

"Puzzles and other interactive methods helped me keep what I learned in mind. For example, I realized that I learned better when I flicked through the book." (P9)

“The interactive methods made the theoretical classes more fun. I know that I keep the things I learn in mind when I enjoy learning them and put them into practice.” (P6)

“The interactive methods helped me see the things I missed out on during class. I noticed them and took notes of them. It was like a summary of the classes, which was great.” (P3)

Theme 3: personal development/experience

The theme “personal development/experience” consisted of two subthemes: emotions and contribution to development.

Subtheme 1: emotions

Participants remarked that the online learning method made them more motivated and confident. However, they noted that they were concerned that something was missing in terms of clinical practice. The following are some quotes:

"Puzzles and other interactive methods helped us keep the things we learn in mind. We were in a competition, like, who is better or who will finish the assignments faster and whatnot…I mean, it would've been all theoretical if it wasn't for the interactive methods. They, in a sense, motivated us." (P9).

"…We'll have to deal with a lot of problems during clinical practice." (P13)

"I watched the videos, but they were actually not as effective as face-to-face education. So, I'm a bit worried about clinical practice because distance education doesn't let me learn as much as I would with face-to-face education." (P10).

Subtheme 2: contribution to development

Participants noted that the online learning method helped them get experience and improve themselves academically. The following are some quotes:

"…We got some more experience. Also, our teachers prepared the interactive methods, but we got to do presentations, so we were like teachers, and so we ended up asking ourselves what to do, what to tell, and how to contribute to our classmates." (P2)

“This was like a preview for us; I mean, for the groups or individual presentations we’re gonna do in the future. I mean, I’m sure I’m gonna be like ‘Oh! I’d done that before, so I should add

this to my presentations because my students might like it.' In this way, I'll improve myself" (P4).

Table 1 Sociodemographic characteristics (N= 237)

Sociodemographic Characteristics		**X̄±SD**	
Age (year)		20.57±1.73	
Grade point average (GPA)* **		3.11±0.36	
		N	**%**
Gender	Man	25	10.5
	Woman	212	89.5
Education (degree)	Anatolian High School	177	74.7
	Science High School	35	14.8
	Health Vocational High School	8	3.3
	Others**	17	7.2
Total		237	100.0

***** X̄: Mean; SD: Standard deviation
** Imam Hatip High School, Trade Vocational High School, Anatolian Imam Hatip High School
*** Out of 4

Table 2 IMMS and AOMS scores (N=237)

Scales and Subscales	**X̄±SD**	**Min- Max**	**Crα**
IMMS Subscales			
Attention-relevance	45.07±7.72	15.00-55.00	0.94
Confidence-satisfaction	49.75±8.93	17.00-65.00	0.89
Total	94.83±15.79	44.00- 120.00	0.95
AOMS Subscales			
External effects	52.29±6.92	12.00-60.00	0.93
Internal effects	36.36±6.06	9.00-45.00	0.89
Growth of aim	26.32±3.79	11.00-32.00	0.89
Self-conscious	27.40±5.37	7.00-35.00	0.92
Total	142.39±18.80	39.00-171.00	0.94

X̄: Mean; SD: Standard deviation; Min: minimum; Max: maximum

Table 3 The correlation between IMMS and AOMS subscale scores

	Scales	**AOMS Subscales**				
		External effects	Internal effects	Growth of aim	Self-conscious	**Total**
IMMS Subscales	Attention-relevance	r_s: 0.625 p= 0.000*	r_s: 0.600 p= 0.000*	r_s: 0.259 p= 0.000*	r_s: 0.526 p= 0.000*	r_s: 0.624 p= 0.000*
	Confidence-satisfaction	r_s: 0.513 p= 0.000*	r_s: 0.559 p= 0.000*	r_s: 0.258 p= 0.000*	r_s: 0.475 p= 0.000*	r_s: 0.557 p= 0.000*
	Total	r_s: 0.595 p= 0.000*	r_s: 0.615 p= 0.000*	r_s: 0.277 p= 0.000*	r_s: 0.527 p= 0.000*	r_s: 0.622 p= 0.000*

*p<0.01. r_s: Spearman's correlation coefficient

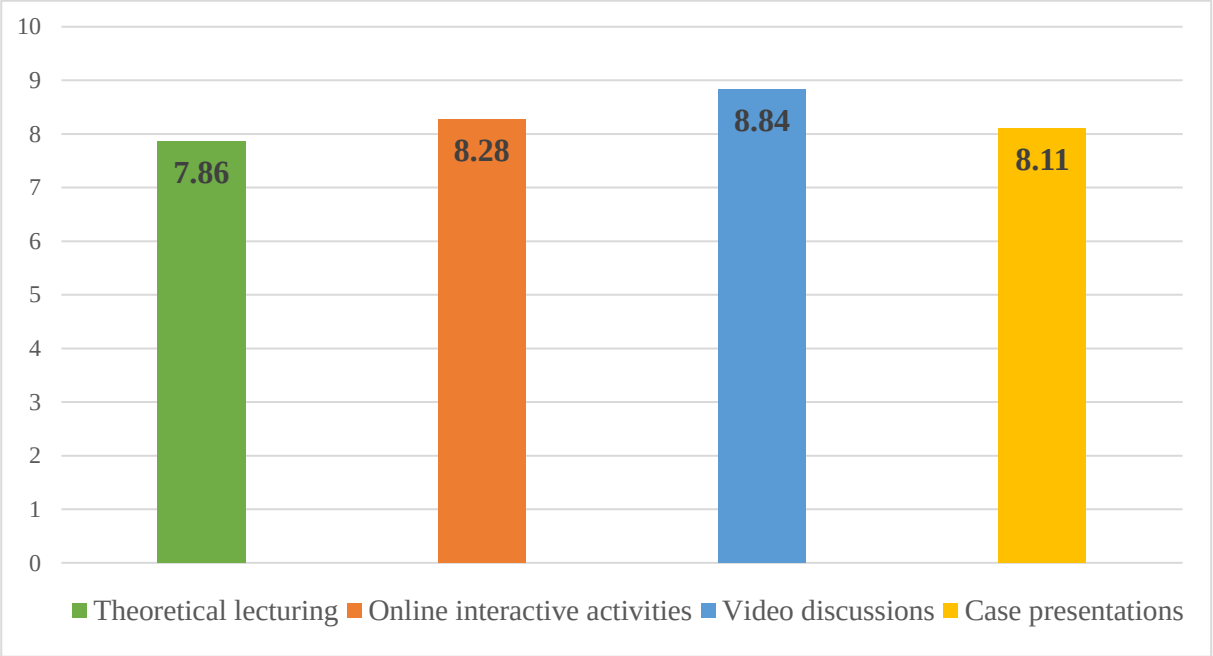

Figure 1. The effect of online learning methods on motivation (N:237)

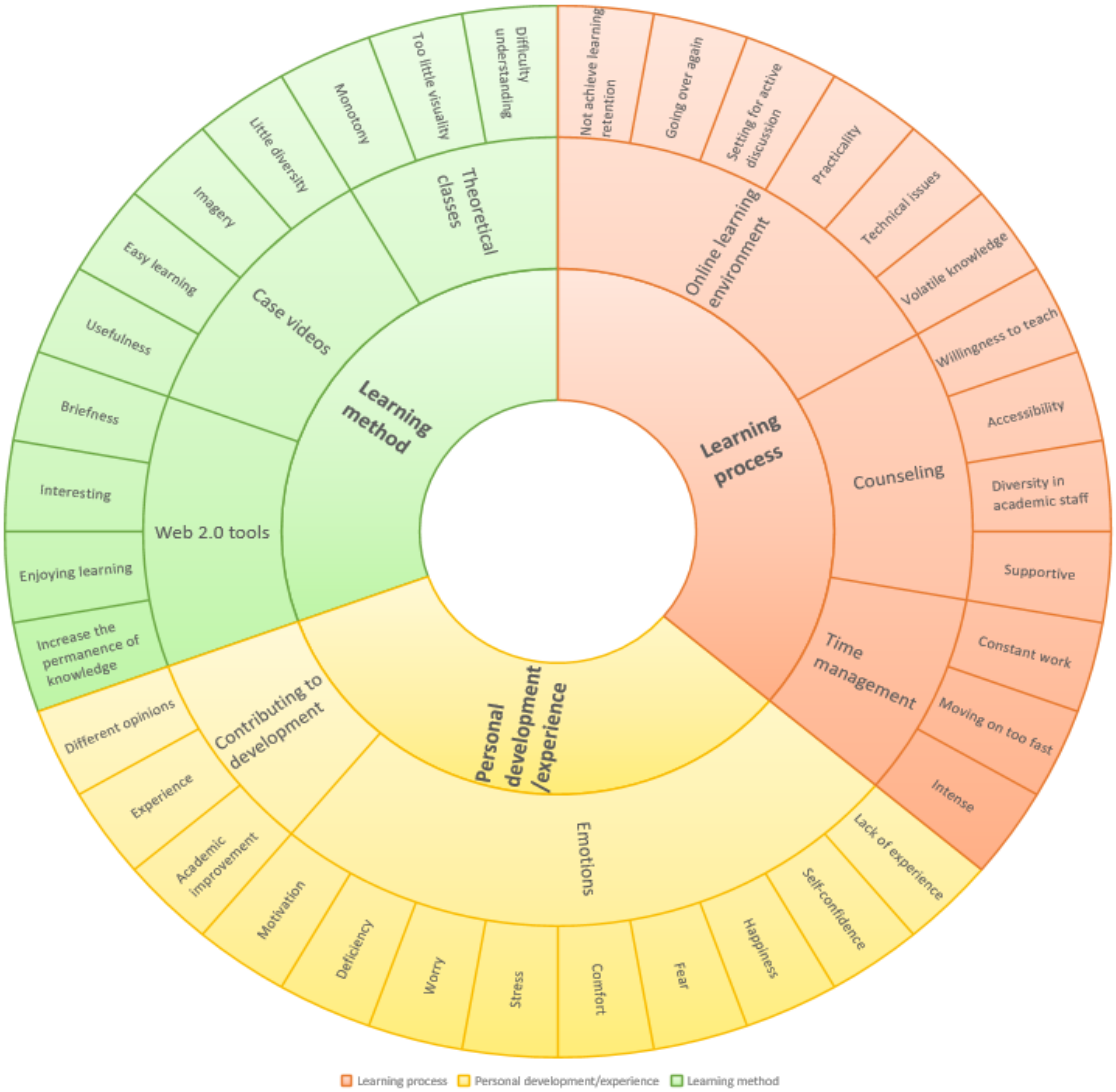

Figure 2. Participants' experiences with online learning methods during the COVID-19 pandemic

DISCUSSION

The COVID-19 pandemic caused almost all universities to shifted to online education (3, 4). The nursing departments in Türkiye adopted online learning methods to help students have clinical experiences that they could not have in real-life settings due to the pandemic (3).

This study identified the effect of online learning methods on nursing students' motivation levels and addressed their experiences with those methods. Our participants noted that online learning methods (online interactive activities, video discussions, and case presentations) motivated them and helped them go over the topics covered in the lessons. Video discussions and online interactive activities motivated our participants more than case presentations. Although they stated that online learning methods made them more motivated, they added that they were stressed and worried about being unable to do clinical clerkships because they faced some problems during online learning, such as time limitations and technical issues. They also noted that they had difficulty managing their time.

Nursing departments worldwide have adopted online learning methods since the onset of the pandemic. In line with our results, research shows that video discussions, online interactive activities, online games, and case presentations make nursing students academically more competent (24). Haslam (25) maintains that integrating online learning methods into nursing education has been a necessity for the whole world since the pandemic. However, Singh et al. (26) argue that universities should improve and diversify their existing systems and methods to integrate online learning methods into nursing education. Muslim et al. (27) found that almost all students participated in online lab activities developed for the SPSS course during the pandemic. Chang, Chung, and Yang (28) reported that online game-based learning was more effective than video-based learning for aspiration education provided to nursing students during the pandemic. Zhou, Huang, Cheng, and Xiao (29) reported that although traditional and online video-based learning methods were not superior to each other in terms of knowledge, skills, and learning outcomes, the latter satisfied nursing students more than the former.

Integrating online learning methods into nursing education before and during the pandemic is helpful because they increase students' motivation, academic performance, and self-confidence (16, 30). Saeedi et al. (30) found that simulations, cases, and videos motivated nursing students. Chang et al. (17) determined that interactive e-book training motivated nursing students to learn new things. Männistö et al. (31) also reported that collaborative learning in digital learning environments improved nursing students' interaction, cooperation, and problem-solving

skills and made them satisfied and motivated to learn new things. Bilik et al. (32) detected that the interactive web-based concept map method within the scope of the "Surgical Nursing" course motivated students to develop critical thinking skills.

Case-based learning methods motivate students to develop critical thinking skills (33). Yoo et al. (34) also found that case videos increased nursing students' motivation. Case-based learning helps nursing students develop communication and problem-solving skills and motivates them to learn new things (33).

Interactive methods during online courses increase student motivation (35-38). Öz and Ordu (35) found that Kahoot! motivated nursing students to learn more about intramuscular injections. Yu (36) determined that Kahoot! made nursing students academically more competent. Coveney et al. (37) reported that students found Kahoot! very useful because it motivated them and helped them prepare for the practical part of the nursing course. Aras and Çiftçi (38) also documented those Q&A sessions and Kahoot! motivated nursing students to learn new things.

Although our participants were motivated by online learning methods, they were concerned about clinical practice because they did not have much experience. They stated that online learning methods helped them enjoy learning and prepare for exams. They also added that those methods made them more willing to study. However, they noted that being away from clinics was a great loss of experience. Research has also shown that nursing students were greatly concerned about being unable to do clinical clerkships during the COVID-19 pandemic (24). Most Turkish students had difficulty adapting to distance education. Özkan, Taylan, and İlaslan (39) reported that Turkish nursing students were concerned about the lack of clinical practice. Therefore, the researchers recommended that nursing departments update their educational strategies to reduce students' anxiety. Kalanlar (40) also recommended that online nursing education integrate interactive learning methods and innovative learning strategies to increase student satisfaction and reduce stress.

The results of our literature review and research show that; online learning methods help us update nursing education in line with distance education. Many advantages of these methods can be listed. First, they can be remarkable for students who have difficulty following intensive topics in front of a computer for a long time. Second, they provide summary information about the topics that students have covered in class and help them review quickly. Third, they support the expectations of Generation Z students to create a learning environment intertwined with technology.

Fourth, they are activities that can be applied to all students simultaneously.

Limitations

Since the study was conducted in a single higher education institution, its generalizability was limited. This research is limited because it was conducted on a single group and only with a post-test. It is recommended that randomized controlled studies be conducted to measure the effects of online learning methods on students' motivation levels.

CONCLUSION

Our research results show that online learning methods motivate nursing students because they have positive experiences. However, despite the advantages of online learning methods, nursing students reported that they experience stress and anxiety due to the lack of clinical practice. Therefore, we think that universities should integrate different online learning methods into nursing education. Moreover, academics should find ways to enable nursing students to do clinical internships in a possible distance education situation.

Ethics Committee Approval: The study was approved by the ethics committee of the Gazi University (Date: 21.05.2021, No: E.88234). Permission was obtained from the head of the nursing department of the faculty of health sciences of the university (Date: 31.05.2021, No: E.96508).

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Consideratıon Of HPV Vaccination in Patients Applying to Ketem Outpatient Clinic. How Aware am I of the HPV Vaccine?

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Abstract

Objective: Human Papilloma Virus (HPV) infection causes a wide range of diseases, from genital warts to cervical cancer. Since HPV infection often progresses without symptoms, early diagnosis is difficult. The aim of the study is to determine the frequency of HPV positivity among women applying to KETEM polyclinic in Adıyaman province

Methods: This cross-sectional study was conducted through surveys among 273 women who applied to Adıyaman Central KETEM polyclinic. The applied questionnaire consists of 25 questions. Questionnaires were administered through face-to-face interviews. In addition to sociodemographic data, the questionnaires included questions about HPV vaccination. Chi-square, t-test and ANOVA tests were used as statistical analysis methods. $p<0.05$ was considered significant.

Results: The mean age of the participants was 47.12±8.60. 83.9% of the participants were housewives, 63.5% described their economic status as medium, and 79.7% had health insurance. The frequency of those who had a PAP-smear test before was 89.7%, and the frequency of those who had a PAP-smear for regular health check-ups was 60%. 2.6% of PAP Smear test results were positive. The frequency of those who received the HPV vaccine was 3.7%. The frequency of those who thought that the HPV vaccine was protective against cancer was 41.0%. The frequency of those who had heard of the HPV vaccine was 20.7%, the frequency of those who wanted to get the HPV vaccine was 86.3%, and the frequency of those who were considering having their children vaccinated against HPV was 89.3%. Age, education level and employment status affect the level of awareness about the HPV vaccine ($p<0.05$).

Conclusion: The frequency of those who received the HPV vaccine was quite low. Although one fifth of the participants had heard of the HPV vaccine, the majority were not against getting both themselves and their children vaccinated against HPV.

Keyword: HPV, Vaccine, Communicable Disease, Reproductive Health

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INTRODUCTION

Genital warts, known as condyloma acuminata, are a sexually transmitted viral infection caused by Human Papillomavirus (HPV) and are becoming more common day by day. Genital warts are single or multiple, soft, painless, cauliflower-looking structures. Although HPV infection plays a role in the development of cervical cancer, scientific studies have proven that it can cause cervical dysplasia, warts throughout the body, especially in the genital area, and cancer of the vulva/vagina, anus, and penis. It has been determined that HPV 16 (50-60%) and HPV 18 (10-12%) types are effective in more than 70% of cervical cancer worldwide. Since HPV infection often progresses without symptoms, early diagnosis is difficult. For this reason, it is important to identify risk factors, raise awareness of individuals at risk and direct them to receive health care, and follow-up evaluation (1).

More than 70% of sexually active women will be infected with HPV once in their lifetime. Each year, HPV infection causes 470,000 cervical cancers. More than 35 types of 16 HPV cause infection in the genital area. HPV 16 and 18 cause 70% of cervical cancer and high-grade cervical intraepithelial neoplasia. For this reason, a vaccine has been produced against HPV (2). The main purpose of the HPV vaccine is to reduce the incidence of anogenital cancer. Vaccines are divided into two groups: preventive and therapeutic vaccines. In particular, vaccine studies carried out to date have focused mostly on preventive vaccines. While preventive vaccines are now available, studies on therapeutic vaccines are still ongoing. The goal of the preventive vaccine is to prevent long-term infection and reinfection by creating an effective immune response in the area where HPV infection occurs. Therapeutic vaccination aims to eliminate a previous infection or to create a protective effect against the development of a malignant disease. Preventive vaccines provide protection against 2 high-risk HPV types, 16 and 18 (3).

The aim is to determine the frequency of HPV positivity among women applying to KETEM polyclinic in Adıyaman province and to obtain information about the approach of the women participating in the study to HPV vaccination.

METHODS

This is a descriptive study. The study was conducted among women who applied to

KETEM polyclinic in Adıyaman. The population of the study consisted of women aged 18 and over living in Adıyaman province, according to 2021 data. The formula n= Nt^2pq/d^2 (N-1)+t^2pq was used to determine the number of people to be sampled and the number of people to be sampled was calculated as 273 people with a 95% confidence interval, 23% (4) prevalence and 5% deviation.

The survey form was prepared by conducting the necessary literature review. The applied survey consists of 25 questions. The criteria for inclusion in the study group were determined as being a woman aged 18 and over who applied to the Ketem outpatient clinic and agreeing to participate in the study. The people to be included in the study were among women who applied consecutively and accepted the study as of 01/04/2022. Surveys were administered by interviewers through face-to-face interviews.

Necessary permissions for the study were taken from the Adıyaman University Non-Interventional Research Ethics Committee (decision dated 15.03.2022 and numbered 2022/3-29)

Statistical analysis

The obtained data were recorded in the statistical package program (SPSS 22.00) and error checks, tables and statistical analyzes were made through this program. Means are given along with standard deviations. chi-square, t-test and ANOVA tests were used as statistical analysis methods. A value of $p<0.05$ was considered significant.

RESULTS

The mean age of the participants was 47.12±8.60 (min-max: 38-60). All participants were married. The mean number of children was 3.67±1.77 (min-max: 0-10). 83.9% of the participants were housewives, 63.5% described their economic status as medium, and 20.3% did not have health insurance (Table 1)

The frequency of those who had a PAP-Smear test before was 89.7%, and the frequency of those who had the PAP-Smear test at the KETEM outpatient clinic was 54.9%. 59.8% of the participants reported that they had a PAP Smear test for regular health check-ups and 20.3% due to doctor's recommendation. 2.6% of the PAP Smear test results were positive and 9.6% could not be evaluated.

The frequency of those who received the HPV vaccine was 3.7%. The frequency of people who believed that the HPV vaccines were protective against cervical cancer was 41.0%. The frequency of those who had heard of the HPV vaccine was 20.7%, the frequency of those who wanted to get the HPV vaccine was 86.3%, and the frequency of those who were considering having their children vaccinated against HPV was 89.3% (Table 2).

Age, education level and employment status affect the level of hearing about the HPV vaccine ($p<0.05$) (Table 3).

Employment status affects the idea of getting HPV vaccination ($p<0.05$). (Table 4).

Table 1: Some sociodemographic characteristics of the participants.

	n	%
Employment status		
Employed	44	16.2
Unemployed	227	83.8
Socioeconomic status		
High	22	8.1
Medium	172	63.5
Low	77	28.4
Social security type		
Pension fund	74	27.3
Social Security Institution	60	22.1
Other	82	30.3
None	55	20.3

Table 2: Some participants' thoughts about the HPV vaccine.

HPV vaccination status	**n**	**%**
Yes	10	3.7
No	261	96.3
Does the HPV vaccine protect against cervical cancer?		
Yes	111	41.0
No	3	1.1
No idea	157	57.9
Have you heard of the HPV vaccine?		
Yes	56	20.7
No	215	79.3
Would you consider getting the HPV vaccine?		
Yes	234	86.3
No	37	13.7
Would you get your child the HPV vaccine?		
Yes	242	89.3
No	29	10.7

Table 3: Distribution of hearing about HPV vaccine according to some variables.

Age group, years	**Yes**	**No**	**Statistics**
30-40	21(37.5)	40(18.6)	
41-50	26 (46.4)	96 (44.7)	x^2=12.925
51 and above	9 (16.1)	79 (36.7)	p=0.002
Education			
Illiterate	4(7.1)	63(29.3)	
Literate	3(5.4)	37(17.2)	x^2=111.96
Primary school graduate	9(3.3)	99(36.5)	p=0.000
Highschool graduate and above	40(71.4)	16(7.4)	
Employment Status			
Employed	21(37.5)	206(95.8)	x^2=111.087
Unemployed	35(62.5)	9(4.2)	p=0.000
Economic status			
High	14(25.0)	8(3.7)	x^2=28.794
Medium	33(58.9)	139(64.7)	p=0.000
Low	9(16.1)	68(31.6)	

* Column percentages are shown on the table above

Table 4: Distribution of the idea of getting the HPV vaccine according to some variables

Age groups, years	**Yes**	**No**	**Statistics**
30-40	55 (23.5)	6 (16.2)	x^2=1.142 p=0.565
41-50	105 (44.9)	17 (45.9)	
51 and above	74 (31.6)	14 (37.8)	
Educational Background			
Illiterate	56 (23.9)	11 (29.7)	x^2=5.076 p=0.166
Literate	32 (13.7)	8 (21.6)	
Primary school graduate	93 (39.7)	15 (40.5)	
Highschool graduate and above	53 (22.6)	3 (8.1)	
Employment status			
Employed	43 (18.4)	1 (2.7)	x^2=5.771 p=0.016
Unemployed	191 (81.6)	36 (97.3)	
Economic status			
High	19 (8.1)	3 (8.1)	x^2=3.209 p=0.201
Medium	153 (65.4)	19 (51.4)	
Low	62 (26.5)	15 (40.5)	

* Column percentages are shown on the table above

DISCUSSION

HPV vaccination is very important because HPV infection can be prevented by vaccination and thus cervical cancer can be prevented. In our study, a very small number of participants (3.7%) reported that they had received the HPV vaccine. In a study conducted among nurses, 5.7% of the participants and in a study conducted among physicians, 15.3% of the participants were observed to have received the HPV vaccine (4). In a study conducted in mid-adult women, it was determined that 15.6% of them had ever received the HPV vaccine (5).

In the study carried out by Kızmaz et al. among female patients, it was observed that none of the participants had received the HPV vaccine (6). Studies conducted both among healthcare professionals and other groups in society show that the tendency to receive HPV vaccination is low in our country. In addition, the fact that the frequency of HPV vaccination among healthcare workers is higher than other groups in the society indicates that as awareness about HPV increases, the frequency of those vaccinated will increase.

Two out of every five women (41%) participating in the study think that the HPV vaccine is protective against cervical cancer. In a study conducted among midwifery students, it was determined that 6.6% of the participants viewed the HPV vaccine as protective against cervical cancer (7).

It was determined that one in every five women participating in our study had heard of the HPV vaccine before. In the study carried out by Başlı et al. at a vocational school of health, the frequency of hearing about the HPV vaccine was found to be 75.6% (8). In the same study, it was determined that the most important source of information was lessons. The

frequency of people hearing about the HPV vaccine from healthcare professionals is only 10.5% (8). In the study conducted by Grigore et al., 62.3% of women had heard of the HPV vaccine (9). In the study conducted by Charakorn et al. in Thailand, the frequency of people hearing about the HPV vaccine was found to be 36% (10). In the study conducted by Kızmaz et al., the frequency of people hearing about the HPV vaccine was found to be 40.1% (6). In a study conducted among women, it was shown that nearly half of the women did not have information about HPV vaccination and one in four women thought that HPV vaccination was not necessary, one in nine women did not get vaccinated because they did not pay attention about HPV vaccination (11).

Eight out of ten women (86.3%) who participated in our study are considering getting the HPV vaccine for themselves and nine (89.3%) for their children. In Grigore's study, it was determined that half of the participants had positive opinions towards the HPV vaccine (9). In the study conducted by Kızmaz et al., after a brief information given to the participants, the frequency of those who wanted to be vaccinated reached 68.3%. In the study conducted by Showket et al. in India, it was observed that the frequency of those who wanted to be vaccinated was 13%, even among those who had knowledge about cervical cancer and HPV (12).

Having a good economic situation significantly affects the level of hearing about the HPV vaccine. In the study conducted by Üzüm et al., the frequency of non-routine vaccination was found to be high in people with high income (13). In the study conducted by Yasin et al., it was observed that the frequency of vaccination increased with increasing income (14).

CONCLUSION

It was observed that the percentage of participants hearing about the HPV vaccine was low. Those with a high level of education have a high rate of hearing about the HPV vaccine. It has been observed that people are considering getting vaccinated if the HPV vaccine is implemented in routine practice. Awareness can be increased by training on the prevention of cervical cancer. It will thus contribute to the maintenance of public health.

Ethics Committee Approval: This research complies with all the relevant national regulations, institutional policies and is in accordance the tenets of the Helsinki Declaration and has been approved by the Adıyaman University Non-Interventional Research Ethics Committee (decision dated 15.03.2022 and numbered 2022/3-29).

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Revisiting the Hygiene Theory; Hepatitis A and Tuberculosis Versus Atopy

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Abstract

Objective: According to the hygiene hypothesis an inverse association between allergic sensitization and exposure to infections and has been reported. In this study, we investigated the relationship between atopy and tuberculosis (TB) and hepatitis A virus (HAV) infections in children.
Methods: A cross-sectional study was performed and included 39 healthy children who were followed up with TB, 40 healthy children who were with HAV seropositive, and 30 healthy children who were seronegative for HAV and tuberculin skin test (TST) response as negative. Serological tests for HAV (anti-HAV immunoglobulin G), skin prick test (SPT) investigations for the detection of atopy, and TST were carried out.
Results: The study included 39 (16 males, 23 females) with TB, 40 (16 males, 24 females) with HAV seropositive, and 30 (10 males, 20 females) healthy controls. There was no statistically significant difference between the groups in terms of age and gender ($p>0.05$). The SPT positivity was 28.2% (n=11) in the TB group, 15% (n=6) in the HAV group, and 30% (n=9) in the control group. There was no statistically significant difference between the groups in terms of SPT positivity ($p=0.148$). There was no statistically significant difference between the groups in terms of total serum IgE level ($p=0.776$).
Conclusion: Our study does not support the hypothesis that HAV and TB suppress the development of atopy. We think that encountering infections during the immune maturation period is a condition that is protective in the development of atopy due to multifactorial reasons

Keyword: Hygiene hypothesis, asthma, atopy, hepatitis A, tuberculosis

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INTRODUCTION

It is seen that there has been a significant increase in the prevalence of allergic diseases all over the world in the last century (1,2). According to the hygiene hypothesis, the interaction of the natural environment and microorganisms with the immune system plays an important role in the regulation of the immune system and the development of allergic diseases. Changes in diet and the use of antibiotics affect the content and diversity of the human microbiome. Also, lifestyle and environmental changes cause changes in exposed microorganisms (1). The duration of exposure to these microorganisms and exposure in the early period of life is effective in the development of atopy. In addition, mode of delivery, breastfeeding, early human contact, number of siblings, and farm life play a role in the development of atopic diseases (3).

David Strachan first suggested in 1989 that "unhygienic contact" and infections in early life can prevent allergic diseases (4). Advances in T helper lymphocytes type 1 (Th1) / Th2 theoretically support the hygiene hypothesis (5). Subsequently, the hypotheses of "old friends" and "disappearing microbes" have also been associated with an increase in autoimmunity, cancer, and allergic diseases (6,7).

Infections can have different effects on a developing immune system. It is thought that certain infections may have a protective effect on allergic diseases depending on the characteristics of the infectious agent or the immune response of the host (3). The protective effect of infectious diseases against atopic diseases tuberculosis (TB) and measles, which are known to be potent inducers of Th1 response, have been studied. In addition, it is thought that some infections such as hepatitis A virus (HAV), Helicobacter pylori, and Toxoplasma gondii, which are thought to be indicators of hygiene deficiency, may be effective in preventing the development of allergic diseases (8–10). The absence of infections considered potentially protective may be associated with having a small number of siblings, excessive 'hygiene,' and the use of antibiotics and vaccines (10). Conflicting results have been reported in studies investigating the relationship between infections and atopy to date (11–16).

In this study, we investigated the effects of HAV and TB on atopy, evaluating the skin prick test (SPT) results and serum IgE levels of HAV seropositive and TB cases in comparison with a healthy control group without HAV and TB.

METHODS

Study Methods and Population

A cross-sectional study was performed in the tertiary pediatric allergy and clinical immunology center. The sample selection was performed using the simple random sampling method from the pool of cases that visited the outpatient clinic within one year. This study included 39 healthy children who were followed up with TB, 40 healthy children who were with HAV seropositive, and 30 healthy children who were seronegative for HAV and TST response as negative. Patients who had chronic pulmonary disease, malignancy, and primary immune deficiency were excluded based on clinical and laboratory screening (17). After the demographic and clinical characteristics of the cases were recorded from medical records, tuberculin skin test (TST) and SPT were performed and total serum IgE values were investigated. The results were compared with age and gender-matched controls. The diagnosis of TB was made based on clinical and radiological findings as well as microbiological identification. Hepatitis A was diagnosed with total HAV IgG antibody positivity in cases that were not administered the HAV vaccine. The diagnosis of TB was based on clinical and radiological findings, along with microbiological identification, and all patients had a history of former TB infection. Hepatitis A was diagnosed based on total HAV IgG antibody positivity in individuals who had not received the HAV vaccine, and none of the Hepatitis A patients had been vaccinated.

The Clinical Research Ethical Committee of Istanbul University-Cerrahpasa, Cerrahpasa Medical Faculty approved the study (Project Number: 14647). We state that the parents have given their written informed consent to be involved in the study, in accordance with the Declaration of Helsinki.

Tuberculin skin test

The tuberculin test values performed on the flexor side of the forearm of all cases with 5 tuberculin units were evaluated and recorded after 48-72 hours. Cases with a tuberculin test induration diameter of $\geqslant$ 10 mm were considered tuberculin reactivity. In addition, cases with a tuberculin reaction $\geqslant$ of 10 mm were investigated radiologically by family screening for possible tuberculosis disease.

Total serum IgE level

Those with a total serum IgE value above 100 IU/mL were considered significant in terms of atopy. Total serum IgE was tested nephelometrically using the BN2 nephelometer device (Siemens, Munich, Germany).

Skin-prick tests

All cases underwent the same SPT panel. Twenty-five most common allergens (Allergopharma, Reinbek, Germany) were used for the SPT. Allergens used for the test are grasses (velvet grass, fruit grass, crazy grass,

forest grass, meadow timothy grass tail, tea leaf), trees I mix (early flowering: alder, elm, hazelnut, poplar, willow), trees 2 mix (late flowering: birch, beech, oak, plane), weed mix (cart-track, weed, Xanthium strumarium), grasses/cereals (grass pollen mix with, wheat, barley, oat, rye), molds I-II (*Aspergillus fumigatus, Alternaria alternata, Cladosporium herbarum*), *Dermatophagoides farinae, Dermatophagoides pteronyssinus,* Mugwort, Birch, Nettle, Alder, Hazel, Rye, Engl plantain, Dog epithelia, Cat epithelia, Sheep's Wool, Peanut, Strawberry, Cacao, Cow's milk, Banana, and Tomato. Histamine (1.7 mg/mL) was used for positive control and isotonic (saline) for negative control. An SPT was performed on the forearm flexor skin of the cases. The reactivity was measured after 15 minutes. After the negative control value was removed in the SPT, the skin tests of the cases that showed reactivity of 3 millimeters or greater to at least one allergen were accepted as positive and evaluated as atopic.

Serological Tests

For serological evaluation, 5 milliliters of serum samples were taken from the cases and stored at -20 C until serological analysis tests were performed. Total HAV G antibody in serum samples was investigated by the ELISA method (DIA.PRO, Milano, Italy). Cases who were positive for HAV IgG antibodies and had not been vaccinated before were considered to have encountered HAV infection.

Statistical analysis

All the analyses performed were done by using the IBM SPSS 21.0 program (SPSS Inc., Chicago, IL, USA). The Shapiro-Wilk tests were used to check whether the continuous variables were normally distributed. The categorical variables were presented as numbers (percentages). The continuous variables were given as median values with the 25th and 75th percentiles (25p and 75p, respectively). The categorical variables were compared with the Chi-square test or Fisher's exact test. The continuous variables without normal distribution were compared with the Kruskal Wallis test (for three groups). The p-value <0.05 is considered significant.

RESULTS

The study included 39 cases of TB, 40 cases of HAV, and 30 healthy controls. There was no statistically significant difference between the groups in terms of age and gender, and it was found that they were comparable with each other ($p>0.05$).

The median age of the TB group was 9.8 (7.5-12.9) years. In the TB group, 82.5% of the cases were followed up for pulmonary TB and 17.5% for extrapulmonary TB. Ten percent of extrapulmonary TB cases were followed up due to lymphadenitis, 2.5% for peritonitis, 2.5% for skin involvement, and 5% for bone involvement. Microbiologically, the rate of identification of bacilli was 25%. There was a

history of atopic disease in 6 cases (15.4%) in the TB group. Four cases had a history of asthma and 2 cases had allergic rhinitis. There was no case with a history of HAV.

The median age of the HAV group was 11.0 (8.5-12.3) years. Five percent of the cases in the HAV group had a history of HAV. Only 1 case (2.5%) had a history of allergic rhinitis. There was no case with a history of TB.

Table 1. Demographic features and atopic status of the study groups.

	TB group (n=39)	**HAV seropositive group (n=40)**	**Control group (n=30)**	**p-value**
Age (year), median (q1-q3)	9.8 (7.5-12.9)	11.0 (8.5-12.3)	11.0 (9.0-12.2)	0.851[a]
Male/Female, n (%)	16/23 (41/59)	16/24 (40/60)	10/20 (33.3/66.7)	0.786[b]
Age at diagnosis (year), median (q1-q3)	8.0 (6.0-12.0)	-	-	-
History of atopy, n (%)	6 (15.4)	1 (2.5)	4 (13.3)	0.117[b]
History of TB n, (%)	39 (100)	-	-	-
History of HAV, n (%)	-	2 (5)	-	-
Family history of atopy, n (%)	1 (2.6)	2 (5)	2 (6.7)	0.713[b]
Family history of TB, n (%)	19 (48.7)	2 (5)	-	<0.001[b]*
Number of siblings, median (q1-q3)	1 (0-2)	1 (1-2)	1 (1-2)	0.447[a]
Pet keeping, n (%)	-	2 (5)	1 (3.3)	0.387[c]
Parental smoking, n (%)	29 (74.4)	22 (55)	17 (56.7)	0.155[b]
Tuberculin reactivity (mm), median (q1-q3)	16 (8-21)	0 (0-10)	0 (0-6)	<0.001[a]*
SPT positivity, n (%)	11 (28.2)	6 (15)	9 (30)	0.148[b]
Total serum IgE level (IU/mL)	24.0 (14.3-60.0)	26.0 (13.8-75)	33.5 (14.3-72.5)	0.776[a]
Anti-HAV IgG seropositivity, n (%)	18 (46.2)	40 (100)	-	<0.001[b]*

Abbreviations: TB: tuberculosis, HAV: hepatitis A virus, SPT: skin prick test, IgE: immunoglobulin E, IgG: immunoglobulin G, a: Kruskal Wallis tests, b: Chi-square test, c: Fisher's exact test, *: p<0.001

Table 1 legends: There was no inverse relationship between the hepatitis A virus (HAV), the tuberculosis (TB) group, and atopy.

The median age of the control group was 11.0 (9.0-12.2) years. There was a history of atopic disease in 4 cases (13.3%) in the control group. Three cases had a history of asthma and 1 case had allergic rhinitis. There was no case with a history of HAV or TB.

There was no statistically significant difference between the groups in terms of number of siblings, pet keeping, and parental smoking (p>0.05).

The median tuberculin reactivity was significantly higher in the TB group compared to other groups (p<0.001). The median tuberculin reactivity was not statistically significant between HAV and control groups. (p=0.498).

No allergic symptoms were observed in any of the cases while performing SPT. The SPT positivity was 28.2% (n=11) in the TB group, 15% (n=6) in the HAV group, and 30% (n=9) in the control group. There was no statistically

significant difference between the groups in terms of SPT positivity (p=0.148).

There was no statistically significant difference between the groups in terms of total serum IgE level (p=0.776). Table 1 summarises the demographic features of the study group.

DISCUSSION

In the present study, it was found that there was no reverse relationship between HAV seropositive and former TB patients and atopy (positivity of SPT) in children. SPT positivity was 28.2% in the TB group, 15% in the HAV group, and 30% in the control group.

Our results showing that there is no relationship between HAV seropositivity, TB history, and atopy contradict the hygiene hypothesis. These different results may be due to the small sample size, cross-sectional design, and use of self-reported data to qualify the results in our study. We postulate that certain unexplored variables in our study, including the method of delivery, breastfeeding, and genetic predisposition, may significantly contribute to the modulation of the infant's microbiota and subsequent implications for the development of allergic diseases and asthma (3,18).

In our study, SPT positivity was 15% in the HAV group. In the study of Kocabaş et al (19), SPT positivity was found to be 4.8% in the HAV seropositive group, while the SPT positivity in the healthy control group was found 32.2%. While the protective effect of HAV seropositivity has been demonstrated in studies made in developed countries (13,16), could not be demonstrated in studies made in underdeveloped societies (14,15). According to the Hispanic Community Health Study/Latino Study (HCHS/SOL) study failed to show associations between asthma and H. pylori or HAV seropositivity among large and diverse Hispanic/Latin adult populations (20). One possible explanation is that due to the different socioeconomic levels and vaccination programs, exposure to infection occurs at different ages (19). It has been suggested that the programming of memory T cells occurs in early childhood (11,15). Exposure to the infection at different ages causes different immunomodulation responses (21). Despite HAV IgG positivity, the absence of HAV history is associated with the fact that HAV infection in early childhood is often completely asymptomatic (22).

In our study, SPT positivity was 28.2% in the TB group. Anlar et al. reported that SPT positivity in active and inactive TB cases was found to be 9.5% and 8.3%, respectively. In the same study, SPT positivity was 31% in the healthy control group. They suggested SPT reactions can be suppressed in cases with TB(11). On the contrary, there are studies showing that it has no preventive effect on the development of atopy (12,23). The reason for the different results between the studies could be due to the different study designs, applied

BCG strains and doses, evaluation of test results, environmental factors, and genetic immune responses (24,25). In studies claiming that TB is protective against atopic diseases, it is suggested that the stimulation of Treg cells and anti-inflammatory pathways inhibit allergic inflammation (26). This may be due to the Th2 response that develops after a strong Th1 response during active TB, as a result of changes in an immune balance due to an adjuvant effect of M. tuberculosis or anti-TB drugs (11).

The prevalence of atopy has been shown to decrease as the variety of microorganisms exposed increases (9). It is thought that the effects of different infections on the risk of developing atopy may be different. C difficile, which usually colonizes the gut after antibiotic therapy, is more common in people living in a more "sterile" environment. This invasion disrupts the mucosal barrier and facilitates the entry of antigens (13).

Growing in a hygienic environment with less microbial exposure is thought to increase the atopy response by altering the Th1/Th2 balance (9). The low prevalence of atopy in type 1 diabetes cases with Th1 dominant response and high atopy prevalence in chronic hepatitis B virus carriers with insufficient Th1 response support the Th1/Th2 model (27). It has been suggested that higher serum IL-10 levels as a result of previous infections may be protective against atopic diseases (24). The fact that helminthic infections are associated with a lower prevalence of atopy, despite their Th2 response, contradicts the hygiene hypothesis (6). It has been suggested that the relationship of these infections with atopy is due to their anti-inflammatory response via TGF-beta and IL-10 (25).

The increased prevalence of allergies in people migrating from regions with low allergy prevalence to regions with high allergy prevalence is thought to be due to changes in environmental factors (28). The increase in asthma prevalence cannot be explained by the hygiene hypothesis alone (29). In addition, genetic background is another important factor that determines the atopy phenotype (21). The high rate of family history of atopy indicates the importance of genetic predisposition in atopic individuals (9). Gene polymorphisms that demonstrate the heterogeneity of the asthma phenotype and have been shown to cause increased susceptibility to asthma have been identified (9). T-cell immunoglobulin and mucin domains-containing protein 1 (TIM1) gene polymorphism have been shown to affect the severity of the disease in HAV seropositive individuals and protect them from atopic diseases (30). Possible interactions of environmental and genetic factors have been blamed for the increased prevalence of allergic diseases in developed countries (9).

Current approaches provide symptomatic relief but do not reduce the prevalence of atopic

diseases. Therefore, there is a need to develop preventive strategies for atopic diseases (3). Additional factors associated with microbiome interactions, such as exposure to allergens, and environmental pollution, may contribute (31). It is thought that recovery of human microbiota may help to reduce allergic disease risks (1). However, the evidence regarding the potential benefits of the administration of probiotics, prebiotics, or bacterial lysates is not yet sufficient (32). Wherein the objective, the protection of flora consisting of non-pathogenic microorganisms or is recovered.

In our study, objective measurements, including skin prick tests, serum IgE levels, and tuberculin skin tests, were used to assess atopy. The limitations of our study were its single-center design, cross-sectional nature, and inclusion of small sample sizes. We believe that generalizing this result would not be accurate due to the small sample sizes. Since this study is a cross-sectional study, there is no temporal relationship between atopy and exposure to infections. Therefore, it is not feasible to establish definitive conclusions regarding the cause-and-effect relationship between exposure to infection and atopy. A larger sample size, longitudinal, prospective, and multicenter studies, is necessary to confirm the relationship between atopic diseases and past infections.

CONCLUSION

In our study, which used objective methods, an inverse relationship was not found between exposure to infection and atopy. We think that the assumption that exposure to infections such as TB and HAV, which are frequently encountered in poor hygienic and low socioeconomic conditions during the immune maturation period, protects from atopy, is a condition that occurs due to multifactorial (genetic, developmental, and environmental) reasons.

Ethics Committee Approval: The study was approved by the local ethics committee of Istanbul University-Cerrahpaşa, Cerrahpaşa Medical Faculty (Project number: 14647).

We state that the parents have given their written informed consent to be involved in the study, in accordance with the Declaration of Helsinki.

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Evaluation of Alcohol Use Disorder Videos on YouTube: A retrospective Analysis

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Abstract

Objective: Alcohol-related health problems, including emergency admissions, are a significant concern globally. With the rise of internet usage, platforms like YouTube have become key sources of information on alcohol use disorder. This study aimed to evaluate the quality and content of English-language YouTube videos related to alcohol use disorder, utilizing criteria such as the Modified DISCERN scale, Global Quality Scale (GQS), and DSM-5 guidelines.

Methods: Of the 926 videos initially identified, 506 were included for analysis.

Results: Results revealed that while YouTube serves as a valuable educational resource for alcohol-related information, concerns exist regarding the accuracy and reliability of content, with a notable lack of videos uploaded by official institutions. Furthermore, despite the varying quality of videos, no statistically significant difference was observed based on the source of upload.

Conclusion: The findings highlight the need for improved algorithms to promote reliable content and greater involvement of official institutions in disseminating accurate information. Educational videos, especially those targeting emergency department patients, have the potential to enhance knowledge and facilitate informed decision-making regarding alcohol-related health issues. However, further research is warranted to assess the effectiveness of such interventions in reducing alcohol-related emergencies and burden on healthcare systems. Addressing these challenges could lead to more effective strategies for mitigating the harmful effects of alcohol misuse on public health.

Keyword: DSM-5, midified DISCERN, alkol use disorder, social media, emergency medicine, public health

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INTRODUCTION

Admissions to emergency departments due to alcohol poisoning or other alcohol-related health problems are relatively common (1). These conditions may require rapid and effective medical intervention. It's noteworthy that these applications may occur more frequently in societies where alcohol consumption is widespread. For instance, in Germany alone, approximately 100,000 patients are admitted to hospitals every year due to alcohol and alcohol-related health problems (2). This highlights the significant burden alcohol-related issues impose on healthcare systems worldwide.

Moreover, alcohol use and abuse are associated with approximately 60 different types of diseases and injuries (3). Shockingly, alcohol use ranks among the leading causes of death among individuals aged 12 to 20, particularly due to injuries, homicide, and suicide (4). These statistics underscore the urgent need for effective strategies to address alcohol-related harm, especially among vulnerable age groups.

Furthermore, alcohol addiction, also known as alcohol use disorder, is a prevalent issue with global implications. Alcohol addiction is a condition wherein a person consumes alcohol uncontrollably and involuntarily. This uncontrollable behavior can lead to harmful physical and psychological effects, significantly impacting an individual's daily life (5). Many individuals seek information and support through various online platforms, such as YouTube.

According to the DSM-5 (Diagnostic and Statistical Manual for Mental Disorders, 5th Edition), alcohol use disorder is defined as a disorder of alcohol consumption based on certain criteria. These criteria include symptoms such as loss of control over alcohol consumption, a strong desire to drink alcohol, an irresistible desire during alcohol consumption, and feelings of guilt or regret after alcohol consumption (6). Unlike the previous version of the DSM-4-TR, which distinguished between alcohol dependence and alcohol abuse, alcohol use disorder, as defined in the DSM-5 under the heading "Alcohol-Related Disorders," evaluates both conditions under the category of "Alcohol Use Disorder." This diagnosis is based on the presence of certain symptoms and is classified as mild, moderate, or severe according to the number of symptoms.

Video sharing platforms such as YouTube have become a popular source of access to information today. While YouTube reaches millions of users with its content in various fields, the importance of the Internet in accessing health information is gradually increasing. Research shows that the vast majority of Internet users access health-related information via the Internet. Recent research shows that 8 out of 10 Internet users access their health information via the internet (7). However, the quality and accuracy of the information provided in these videos can vary greatly, leading to potential consequences for those seeking help.

In particular, the increase in content production on platforms such as YouTube and the lack of supervision mechanisms raise concerns among health care providers and government agencies about the accuracy and quality of health-related content Decently. Alcohol use disorder is especially common in young adults (8). The use of social media is again common in this age group. Video sharing sites such as YouTube are one of the Decently used media for alcohol consumption among young people and information sharing in this field. In this context, it is important to evaluate the alcohol use disorder content found on YouTube Health service providers and government agencies express concerns about the accuracy and quality of the information available on this platform. The source of the concerns is mainly based on two reasons. The first is the increase in the use of YouTube by content uploaders, especially for sharing personal and observational information; secondly and more importantly, there are minimal guidelines and interventions for controlling and regulating the content of the material uploaded to the site (9).

Misinformation concerning alcohol use disorder in YouTube videos is widespread, potentially leading individuals to adopt erroneous advice or beliefs. The Substance Abuse and Mental Health Services Administration emphasizes the critical importance of providing accurate and reliable information in addressing substance use disorders (SUDs) and co-occurring disorders (CODs), which encompass mental health conditions. Ensuring that individuals seeking guidance on alcohol use disorder receive evidence-based and current information is essential to mitigate potential harm from misinformation. Efforts to bridge the gap between treatment needs and actual care for individuals with CODs underscore the necessity of disseminating accurate information to promote better outcomes in managing these complex conditions (10).

In our study, we aimed to examine the videos containing alcohol use disorder content on the YouTube platform and to examine the quality of the content and its compliance with the DSM-5 criteria. This assessment is intended to investigate the availability of YouTube as a

reliable educational resource by measuring the quality and accuracy of content.

METHODS

The focus of the research is to examine content related to alcohol use disorder in English-language videos published on the YouTube (YouTube©, https://www.youtube.com; YouTube, LLC, San Bruno, CA, USA) platform for their potential to provide basic information to the general population. During this evaluation process, compliance with the Modified DISCERN scale, the Global Quality Scale (GQS) scale, and the DSM-5 manual guidelines were taken into account.

The research was designed with a cross-sectional analytical design. Between May 18, 2013, when the DSM-5 guide was first published, and January 18, 2024, it was uploaded to the YouTube platform and analyzes were carried out on videos in English. Keywords used to search for videos include "alcoholism", "alcohol dependence", "alcohol abuse", "alcohol exposure", "alcohol use disorder", "alcohol misuse", "alcohol withdrawal", "unhealthy alcohol use", "alcohol". intoxication", "alcoholic patients", "alcohol related problems", "drinkers", "problem drinking", "alcohol dependent patients", "alcohol addiction", "SAI-AD", "alcoholism treatment", "alcohol use treatment" , and "alcoholic". Searches performed with these keywords formed the basis for guiding the data collection process of the study. All videos suggested by the search engine after entering the keywords were recorded and watched for potential inclusion in the study. Videos that met the exclusion criteria were excluded from the study. Videos that met the following exclusion criteria were not included in the study:

• Non-medical content (ads, news or interviews)

• Videos published in a language other than English

• Videos with ads

• Live action images without educational content (real-life videos)

• Comedy or funny content that is not intended for educational purposes

• Duplicate images

• Videos that do not include the topic of alcohol use disorder

• Videos containing topics other than alcohol use disorder

• videos published before 2013

• Content that requires membership and fees

• Short videos that YouTube defines as "Shorts"

The videos included in the study were carefully examined by two emergency medicine specialist physicians. In cases where there is a dispute between two physicians, the opinion of a third emergency medicine specialist physician was consulted Dec. The videos were evaluated in detail according to the Modified DISCERN

scale, Global Quality Scale (GQS) scale, DSM-5 guidelines and Video Power Index (VPI).

The reliability and integrity of the information contained in the content were evaluated using the modified DISCERN scale. For each question, an evaluation was made in the form of "Yes": 1 point, "No": 0 points. The answers given to each question were collected and the overall reliability and integrity level of the video was determined.

- Are the sources used valid? (Valid studies, neurology specialists)
- Is the information provided balanced and impartial?
- Are additional information sources specified for the patient/Octopus?
- Did the video address controversial or ambiguous topics?

The Global Quality Scale (GQS) scale has been used to evaluate the video quality. On this scale, the scoring ranges from December 1 to Dec 5, and the different score ranges represent certain quality levels. The scoring system and its definitions are stated below.

- ***Low Quality (1-2 Points):*** This December of points refers to low quality. The video content is insufficient, the information may be incomplete or misleading. The flow is poor and is not useful for patients.
- ***Medium Quality (3 Points):*** A medium quality score means that the video content is generally poor, some information is missing, and the streaming is suboptimal. Although some important information has been discussed, others are insufficient and may be partially useful for patients.
- ***High Quality (4-5 Points):*** This interval of points represents high quality. The video content is usually well-streamed and contains most of the relevant information. However, some issues may be missing. Such videos are useful for patients and offer complementary information.
- ***Very High Quality (5 Points):*** The highest scores represent the high-level quality of the video content. The flow and presentation are excellent and extremely convenient for patients. These videos provide complete and clear information and cover all important topics.

The DSM-5 Guideline includes diagnostic criteria for making a diagnosis of alcohol use disorder, as well as other psychiatric diseases,. Unlike the DSM-4, sub-diagnoses such as "Addiction", "Abuse", "Harmful Use" have been removed and the diagnosis name "Alcohol Use Disorder" has been given. There are 11 different criteria for the diagnosis of alcohol use disorder in the guideline. These are used to determine mild, moderate and severe disorders; 2-3 criteria indicate mild, 4-5 criteria indicate moderate, and 6 or more criteria indicate severe disorder. The criteria are as follows and one point is given for each criterion:

• Alcohol is usually taken in larger quantities than desired or for a longer period of time.

• There is a persistent desire or unsuccessful efforts to reduce or control alcohol use.

• Too much time is spent on activities necessary to obtain alcohol, use it, or get rid of its effects.

• A strong desire or urge to use alcohol.

• Repetitive alcohol use that causes inability to fulfill basic role obligations at work, school or home.

• Continuous alcohol use continues despite the problems caused or exacerbated in the social or interpersonal area. Dec.

• Withdrawal or reduction of important social, professional or recreational activities due to alcohol use.

• Repeated alcohol use in physically dangerous situations.

• Despite the use of alcohol, the continuation of a constant or uncomfortable condition that occurs or worsens due to alcohol.

• Development of tolerance: Drinking an increased amount of alcohol to achieve drunkenness or the desired effect, or a decrease in the effect of the same amount of alcohol.

• Appearance of withdrawal symptoms: Alcohol withdrawal syndrome or alcohol use to relieve or prevent alcohol withdrawal symptoms.

Another evaluation scale, the Video Power Index (VPI), was used to examine the effectiveness and power of videos. The VPI calculation is done with the following formula:

Video Power Index = ((Like Rate x View Rate) / 100)

The calculations of the liking rate and the viewing rate are as follows:

Liking Ratio = (Number of Likes x 100) / (Number of Likes + Number of Dislikes)

View Rate = (Number of Views / Days)enme Oranı = (İzlenme Sayısı / Günler)

The like rate indicates how many people liked a video, while the view rate indicates the average daily number of views of the video. The multiplication of these values forms the VPI and reflects the effectiveness and power of a video.

Statistical Analysis

The statistical analysis in the study was conducted using IBM SPSS 20.0. Descriptive analyses were presented indicating percentages, means, standard errors, medians, 25th and 75th percentiles. Mann Whitney U test was used for comparisons between two groups. Kruskall Wallis test was employed for comparisons among more than two groups. Pearson Chi-Square test was utilized for comparisons between cross-tables. The results were presented in graphs and tables.

RESULTS

As a result of the research, 926 videos were obtained. 506 Videos were included in the study. 420 pieces of video were excluded from the study after examination. The reasons related to the exclusion from the study are summarized in Flow Chart (figure 1).

The results in the table were reached when the videos included in the study and the videos removed from the study were compared. In the study, when parameters such as video vduration, view count, like count, dislakie count, like ratio view ratio and video power index were examined, no statistically significant difference was found between the groups in the videos excluded from the study and the videos included in the study (table 1). When looking at the sources of the videos included in the study, the findings in the graph were determined. Official institutions account for the smallest share, contributing just 0.8% of the videos. Health professionals are a more significant source, producing 28.3% of the content. Videos from patients and their relatives make up 14.8%, while rehabilitation institutions contribute a similar portion, at 13.4%. The most notable observation is that a large segment of the videos, 42.7%, originates from unknown sources.

The 506 videos included in the study were analyzed according to DISCERN. When the videos were examined in the study, it was seen that controversial issues were not mentioned in many videos. Additional sources were stated in 25.5% of the videos. In 68% of the videos, information was presented in a balanced and unbiased manner. In 80.4% of the videos, the sources from which the information in the videos are taken are valid sources. The understandability of videos was found to be 76.5% (table 2).

The average DISCERN score is 2.54±0.38 points. Median and percentage values are given in the table according to source of videos. There is no significant differences are detected in DISCERN score when divaded groups according to source of videos.

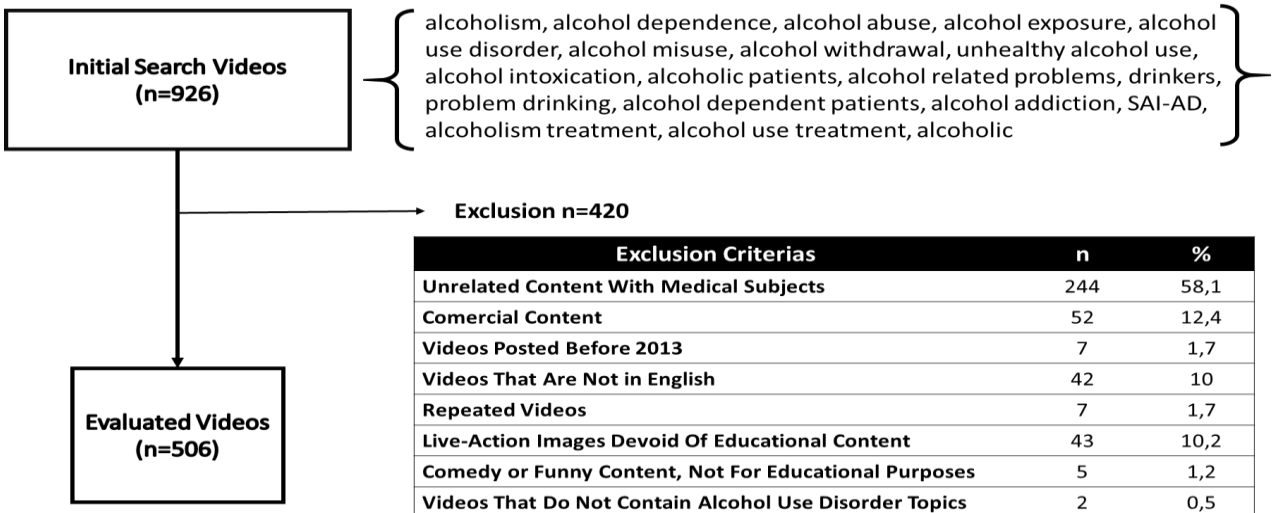
Videos were evaluated according to GQS. It was found that 1% of the videos were of very high quality. However, generally the videos were rated as medium quality (35%) and good quality (22%). The percentage of videos identified as low and very low quality were 28% and 14%, respectively (table 3).

In the analyzes conducted according to the Video Power Index, no statistically significant difference was detected between the groups when the sources of the videos were taken into account (figure 5).

Videos uploaded by official institutions are generally evaluated as medium and good quality. It was observed that the videos uploaded by health professionals were predominantly medium quality and poor quality. It was observed that good and medium

quality videos were more common in the videos uploaded by patients and their relatives. It was observed that videos in the medium and poor quality categories were more common in videos whose source could not be identified (unknown)

When the videos included in the study were examined according to the DSM-5, it was seen that the average video mention score of the categories in the DSM-5 was 10, and Deciency in this score was not detected between the groups.



Exclusion Criterias	n	%
Unrelated Content With Medical Subjects	244	58,1
Comercial Content	52	12,4
Videos Posted Before 2013	7	1,7
Videos That Are Not in English	42	10
Repeated Videos	7	1,7
Live-Action Images Devoid Of Educational Content	43	10,2
Comedy or Funny Content, Not For Educational Purposes	5	1,2
Videos That Do Not Contain Alcohol Use Disorder Topics	2	0,5
Videos Containing Topics Other Than Alcohol Use Disorder	18	4,3
Total	420	100

Figure 1. Flow Chart

Table 1. Comprasion of Videos Which Excluded and Accepted

Comprasion of Videos Which Excluded and Accepted

		Mean	Std. Error	Median	25. Percentil	75. Percentil	P Value
Video Duration	*Accepted*	776	68	411	173	843	0,738
	Excluded	698	480	266	148	1680	
View Count	*Accepted*	113575	20731	1350	142	15547	0,190
	Excluded	133367	117829	30924	795	199653	
Like Count	*Accepted*	245998	63877	17	2	183	0,155
	Excluded	1566752	1566625	241	13	2350121	
Dislike Count	*Accepted*	51	12	0	0	7	0,211
	Excluded	74	67	15	0	111	
Like Ratio	*Accepted*	98	1	100	98	100	0,555
	Excluded	99	2	100	95	100	
Viewing Ratio	*Accepted*	141	38	2	1	13	0,300
	Excluded	14	7	19	1	21	
Video power index	*Accepted*	166	45	3	1	19	0,431
	Excluded	14	7	18	1	20	

Mann Whitney U Test

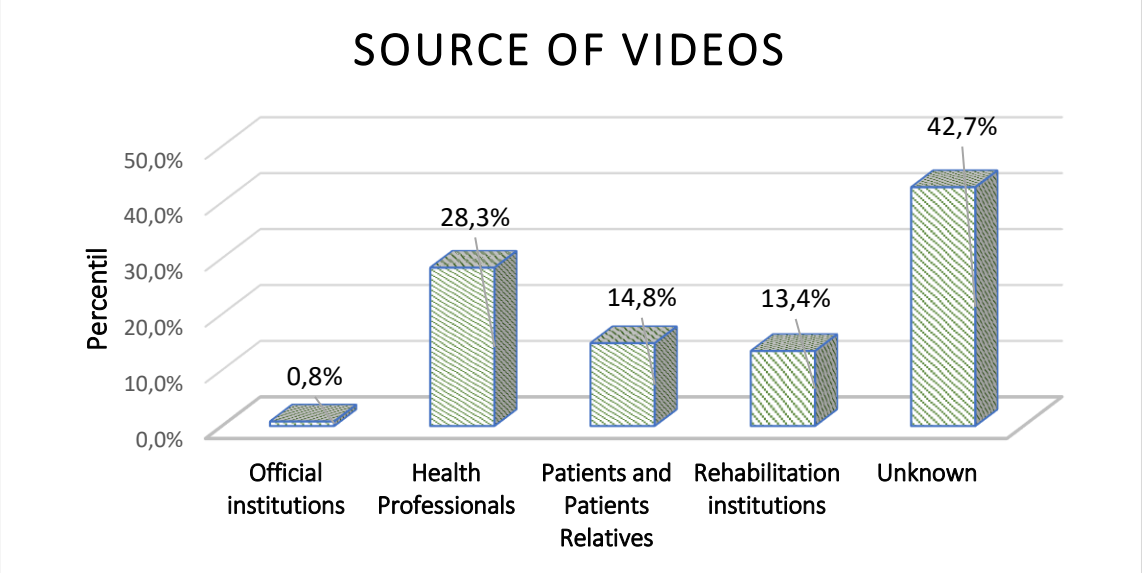


Figure 2. Source of Videos

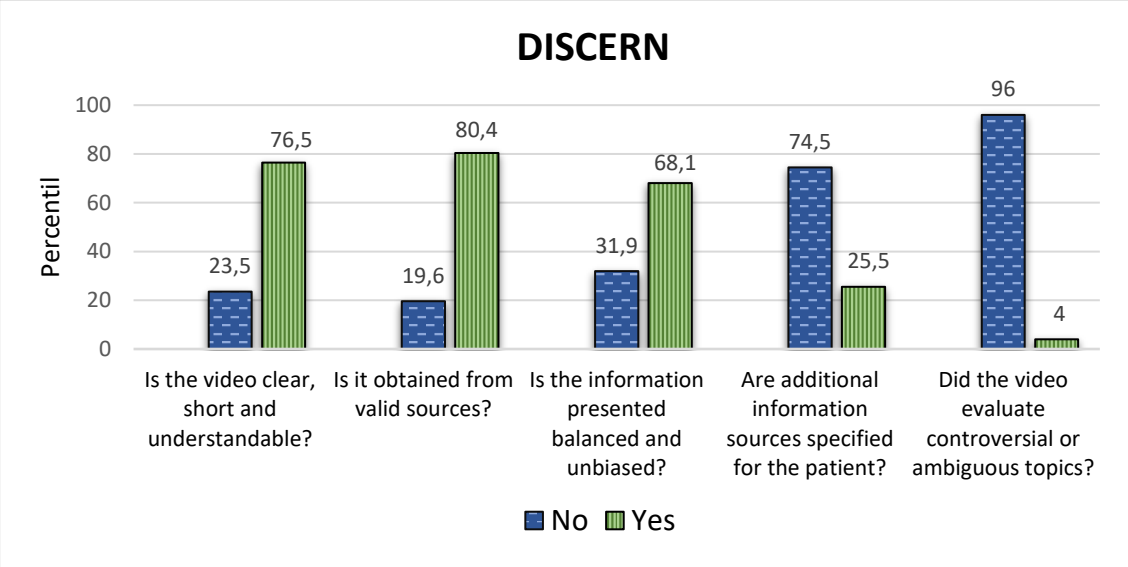


Figure 3. DISCERN

Table 2: DISCERN comparison of videos by sources

	DISCERN			
Source of Video	Median	25. Percentil	75. Percentil	P value
Official institutions	2,5	1,5	3	
Health Professionals	3	2	3	
Patients and Patients Relatives	2	2	3	0,610
Rehabilitation institutions	2	2	3	
Unknown	2	2	3	

Kurskal Wallis Test

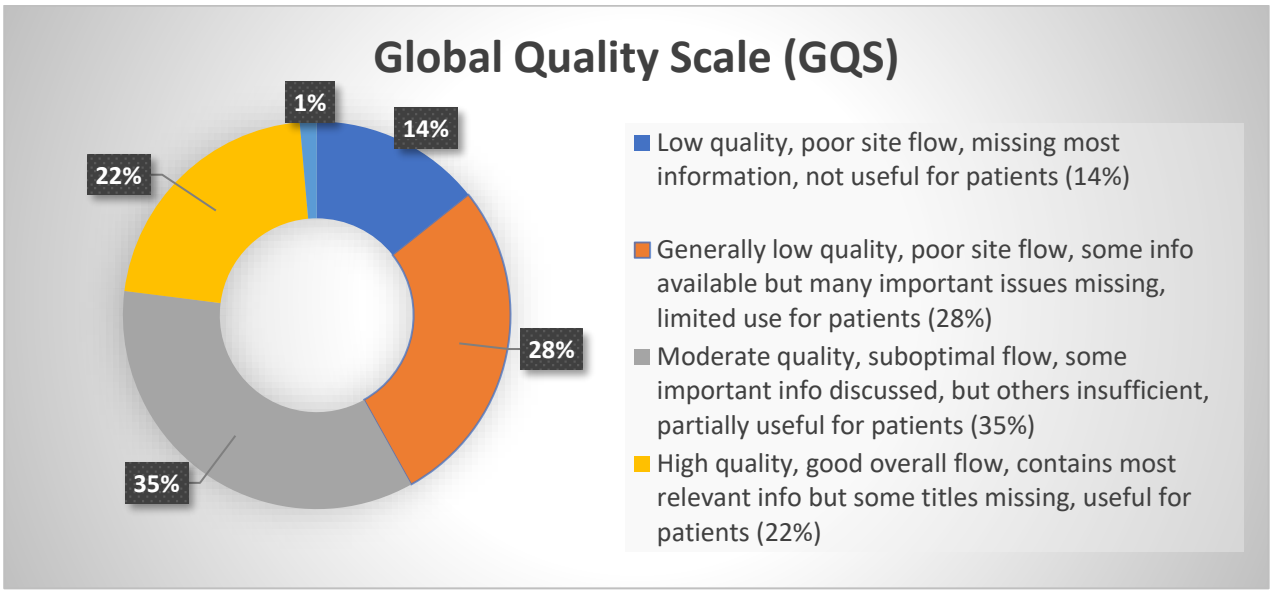


Figure 4. Global Quality Scale

Table 3. Video Power Index

	Video Power Index			
Source of Video	Median	25. Percentil	75. Percentil	P value
Official institutions	1,195	9,115	197,95	
Health Professionals	0,23	1,59	13,3	
Patients and Patients Relatives	0,61	3,2	63,69	0,367
Rehabilitation institutions	0,58	1,225	7,97	
Unknown	0,16	2,455	27,38	

Kurskal Wallis Test

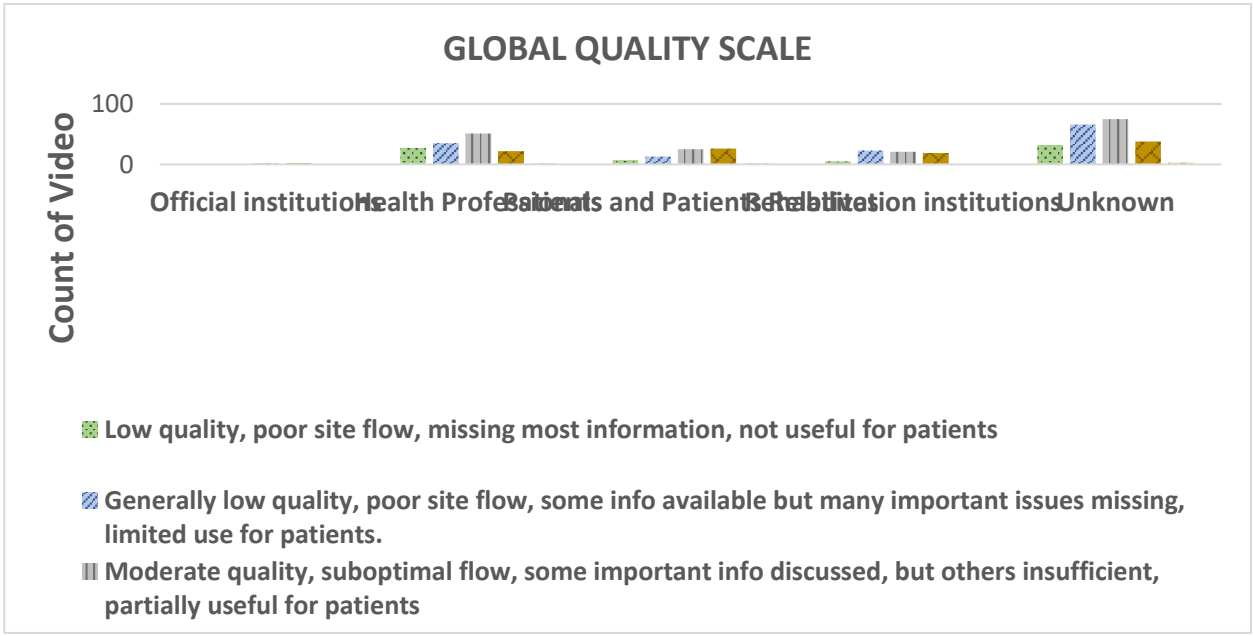


Figure 5. Global Quality Scale

Pearson Chi-Square 0,031

DISCUSSION

Alcohol use is an important health problem in today's societies. Many people turn to various resources to get rid of alcohol addiction or reduce alcohol consumption. With the development of the internet age and the widespread use of social media, people conduct their research on alcohol addiction and consumption on platforms such as YouTube. YouTube hosts videos that provide information about the pathogenesis, diagnosis, treatment and prevention of various health conditions (9).

The effect of YouTube videos on alcohol abuse can be multifaceted. On one hand, YouTube can serve as a platform for educational content, providing valuable information about the risks and consequences of alcohol abuse, as well as resources for seeking help and support. However, on the other hand, YouTube may also host content that glamorizes or normalizes excessive alcohol consumption, potentially perpetuating harmful behaviors or misconceptions about alcohol use. In studies, tobacco and alcohol images on yotube are often included in the lyrical and visual content of popular music videos and are seen by a very large proportion of young people (11). On the contrary, there are few professional institutions on YouTube that support individuals considering quitting alcohol use disorder (12).

In our study, the contents of the videos uploaded to the YouTube platform were examined and analyzes were made according to the sources that uploaded the video. Based on search queries, approximately 45% of the videos uploaded to YouTube were excluded because they were not related to advertising, entertainment or alcohol abuse. This rate is quite high. The keywords used in the search engine are generally written to obtain information about alcohol addiction. However, only 55% of the consequences faced by users are related to alcohol addiction. This shows that users are forced to watch too many advertisements and irrelevant videos in their efforts to obtain information about alcohol addiction and consumption.

Providing accurate, reliable information to users in health-related searches is important for public health. This situation should be taken into account and different algorithms should be used for users searching for health-related information. However, as we observed in our study, this situation is not taken into account in YouTube's search engine. Developing new search algorithms or creating artificial intelligence-based search engines is important to provide more accurate and faster information to users.

Patients with chronic diseases are increasingly relying on internet-based resources to manage their conditions (13). According to surveys conducted by the Pew Research Center, for 75 percent of such patients, their decisions about how to treat their condition are influenced by information obtained through online health

information searches (14). Health service providers and government agencies express concerns about the accuracy and quality of the information available on this platform (15). The reliability of information sources on sites such as Youtube is not guaranteed by the company. For this reason, there is a risk of spreading misleading information. Therefore many authors and researchers recommend that governments, professional organizations, and healthcare professionals actively participate in YouTube by developing and uploading such videos to YouTube. In this way, it will be easier to disseminate accurate and reliable information and reach people (16).

The source of the vast majority of the 45% of the videos included in the study could not be identified. The videos uploaded by official institutions and associations to the online platform only account for only 14% of the total number of videos. Videos uploaded by health professionals are 28%. There is no verification system for the accuracy of the information provided for videos that are of interest to public health and have the potential to reach all people globally. In the analyses conducted according to the Global Quality Scale, videos were generally evaluated as medium and high quality. When the videos were decoupled into groups according to their sources, it was seen that there was no difference between the groups in the power index of the videos. This situation indicates that the risk of spreading the erroneous information mentioned above is significantly higher. It is an indication that the user is watching videos without paying enough attention to the information provider source. Official institutions need to upload more, or an algorithm should be developed in which videos are presented more Decently to those uploaded by official institutions in health-related requests in search engines.

In the analyses conducted according to DSM-5, it was seen that the video sources were mentioned in the categories given in DMS-5 during the video duration. In the DSM-5, 11 different parameters have been categorized for alcohol use disorder, and alcohol use disorder is classified according to the scores given to these categories. When analyzing videos, it is usually seen that all the features are mentioned in the vast majority of videos.

The use of alcohol among young people is increasing recently. An international problem requires an international solution. Action should be taken by the alcohol industry and its marketers, public health policy makers, non-governmental organizations and international organizations to prevent the recurrence or overcoming of high levels of alcohol-related harm(17). In this case, YouTube can play an important role in terms of appealing to a wide population.

Emergency medicine physicians are one of the departments that most often encounter alcohol-related health problems. It is also known that

such applications may be seen more frequently in societies where alcohol consumption is widespread. This situation highlights that alcohol-related problems are a significant burden on health systems.

Video access sites such as YouTube should have educational videos for patients who go to the emergency department with such complaints, where the emergency physician can direct the patient after the patient's discharge and provide information about alcohol to the patient. In these videos, patients can provide information about issues such as the effects of alcohol, symptoms of alcohol use disorder and healthy lifestyle options. These videos should be uploaded by official institutions and the accuracy of the information contained in them should not be doubted. Videos prepared and approved by official health organizations contain reliable and accurate information. It is also important that the content in these videos is understandable and accessible, so that it becomes understandable and usable by a wide audience. In addition, these videos can offer practical tips and guidance on dealing with emergencies associated with alcohol use. In this way, patients can make more informed decisions at home after being discharged from the emergency department and seek appropriate help when necessary. Such educational videos can increase the level of knowledge of both patients and healthcare professionals and contribute to the prevention of alcohol-related health problems.

CONCLUSION

In conclusion, the presence of reliable and accessible educational videos on platforms like YouTube can potentially have a positive impact on emergency admissions related to alcohol-related issues. By providing accurate information and guidance, these videos may help individuals make more informed decisions about their alcohol consumption, potentially reducing the frequency of emergency department visits due to alcohol-related health problems. However, further research is needed to fully assess the effectiveness of such educational interventions in mitigating the burden of alcohol-related emergencies on healthcare systems.

Ethics Committee Approval: Ethics committee approval for this study was obtained from the Balıkesir Atatürk City Hospital Scientific Research Ethics Committee. Decision no: 2024/02/08

Peer-review: Externally peer-reviewed

Author Contributions: Concept: ÖFT, AÇ, Design: ÖFT, ZKE, Data Collection and Processing: İEİ, ÖFT, AÇ, FM, SÖ, Analysis

and Interpretation: ZKE, RY, HG, Writing: ÖFT, AÇ, AOK, TSM.

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

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Examining the Secondary Traumatic Stress Levels of Emergency Service Healthcare Workers in Contact and Non-Contact with Covid-19 Pandemic Patients

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Abstract

Objective: The fight against the Covid-19 pandemic has not only been limited to physical risks but has also led to profound psychological impacts. Secondary traumatic stress (STS) is an important concept reflecting the effects of traumatic experiences frequently encountered by healthcare workers. This study aims to investigate the levels of STS experienced by emergency department healthcare workers during the Covid-19 pandemic. The research aims to provide insights into the impact on the mental health of healthcare workers during and after the Covid-19 pandemic. Furthermore, the analysis of the data obtained will yield important conclusions for understanding the long-term effects of the pandemic and preparing healthcare systems for such crises.

Methods: The study population consisted of doctors, nurses, and other healthcare personnel (health officers, midwives, technicians, paramedics, aides, etc.) working in emergency departments. The study covered 239 participants from various provinces within the authors' network.

Results: The study found no significant variation in STS based on whether participants lived in a major city or not. However, significant differences were identified based on gender. Additionally, significant differences were observed in the "avoidance", "arousal" subscales, and total score of STS based on the job categories of emergency department staff. Furthermore, STS scores varied significantly based on years of service among emergency department staff. Moreover, the study identified significant differences in STS scores based on the frequency of encounters with Covid-19 patients during the pandemic.

Conclusion: According to the data obtained, factors such as gender, years of service, and professional experience need to be considered to support the mental health of emergency department staff. It is also important to develop support programs and coping strategies specifically for female employees. Moreover, in extraordinary situations like the Covid-19 pandemic, it is essential to strengthen coping strategies for traumatic experiences among emergency department staff and facilitate access to supportive resources. This approach can ensure the sustainability of healthcare services and preserve the health and well-being of emergency department staff.

Keyword: Covid-19 pandemic, healthcare worker, secondary stress level.

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INTRODUCTION

The Covid-19 pandemic has posed a formidable challenge to healthcare systems and professionals worldwide. Emergency healthcare workers, in particular, have been at the forefront of this pandemic, continuously battling for the diagnosis and treatment of patients (1,2). However, this struggle has not been limited to physical risks alone; it has also led to profound psychological effects.

Secondary traumatic stress is a type of stress experienced by individuals who empathize with and internalize the suffering of those who have experienced traumatic events, even if they have not directly experienced trauma themselves (3,4). The level of secondary traumatic stress reflects the impacts of traumatic experiences frequently encountered by healthcare workers due to the nature of their profession (5). This stress is experienced by witnessing patients' suffering or internalizing what they have experienced. Particularly for professionals like emergency healthcare workers who are constantly exposed to traumatic cases, secondary traumatic stress can have serious effects on both their occupational risks and mental health.

Therefore, investigating the level of secondary traumatic stress is a crucial step in understanding the psychological needs of healthcare workers and providing appropriate support mechanisms (6-10). This study aims to explore the level of secondary traumatic stress experienced by emergency healthcare workers during the Covid-19 pandemic. Specifically, it aims to compare the levels of secondary traumatic stress between healthcare workers who have and have not been in contact with pandemic patients. Understanding how emergency healthcare workers cope with this type of stress is essential for developing measures to safeguard their mental health and enhance service quality.

By addressing gaps in the research literature, this study aims to provide insights into the impact on the mental health of healthcare workers during and after the Covid-19 pandemic. Furthermore, the analysis of the data obtained will provide important findings for understanding the long-term effects of the

pandemic and preparing healthcare systems for such crises.

METHODS

Study design, Participants and Data Collection

ChatGPT

The study population consisted of doctors, nurses, and other healthcare personnel (health officers, midwives, technicians, assistants, etc.) working in the emergency department. A web-based cross-sectional survey was conducted between May 19th and August 8th, 2020, during the global COVID-19 pandemic. Data for the study were collected from responses to questionnaires prepared in Google Forms. The study included 239 participants from various provinces within the authors' network.

Data collection tools in the study included a "Personal Information Form" consisting of 10 demographic and descriptive questions designed according to the research hypotheses, as well as the "Secondary Traumatic Stress Scale (STSS)." The Turkish adaptation of the STSS, developed by Yıldırım, Kıdak, and Yurdabakan (12), is based on the scale originally developed by Bride et al. (11). This scale, comprising 17 items rated on a five-point Likert scale (Never (1), Rarely (2), Sometimes (3), Often (4), and Very often (5)), is designed to measure the level of secondary traumatic stress developed by healthcare professionals working with traumatized individuals. Possible scores on the scale range from 17 to 85, with higher scores indicating higher levels of impact. The scale includes three subscales named "emotional intrusion," "avoidance," and "arousal." Items 2, 3, 6, 10, and 13 assess emotional intrusion symptoms, items 1, 5, 7, 9, 12, 14, and 17 assess avoidance symptoms, and items 4, 8, 11, 15, and 16 assess arousal symptoms. The internal consistency reliability coefficient (Cronbach's alpha) for the scale was found to be 0.91, and for the emotional intrusion, avoidance, and arousal subscales, the calculated internal consistency coefficients were 0.84, 0.78, and 0.82, respectively (Yıldırım et al., 2018).

Statistical analysis

All statistical analyses were performed using SPSS v26 (IBM Inc., Chicago, IL, USA) software. The assumption of homogeneity of variances was checked using Levene's test. When this assumption was met, Student's t-test or one-way ANOVA was used to compare independent groups; otherwise, Welch's t-test or Welch's ANOVA was used. Tukey's multiple comparison test was used to determine differences between groups after ANOVA, while Games-Howell's multiple comparison test was used after Welch's ANOVA. All comparisons were two-tailed, and a p-value less than 0.05 was considered statistically significant.

RESULTS

Total of 239 individuals participated in the study, comprising 46.9% males and 53.1% females. Of the participants, 51.9% were doctors, 38.1% were nurses, and 10.0% held other positions (health officers, midwives, technicians, assistants, etc.). Regarding the age distribution, 38.9% of participants were in the 18-30 age range, 41.8% were in the 31-40 age range, 15.1% were in the 41-50 age range, and 4.2% were in the 51-64 age range. Additionally, it was determined that 77.4% of the participants resided in major cities (Table 1).

The distribution of participants' use of cigarettes, alcohol, and sedative medications, the distribution of their working hours during the COVID-19 pandemic and encounters with infected patients, and the frequencies and percentages of the responses to the questions asked in the STSS survey are provided in Tables 2-4.

Table 1. Frequencies and percentages of participant characteristics

		n	%
Gender	Male	112	46.9
	Female	127	53.1
Age	18-30	93	38.9
	31-40	100	41.8
	41-50	36	15.1
	51-64	10	4.2
Is the city you live in a metropolitan city?	Yes	185	77.4
	No	54	22.6
Working period (years)	1-5	84	35.1
	11-15	47	19.7
	15 ↑	57	23.8
	6-10	51	21.3
Colleague	Doctor	124	51.9
	Nurse	91	38.1
	Orher	24	10.0

Table 2. Frequencies and percentages of the participant about smoking, alcohol and sedating medication uses.

	Never		Rarely		Often	
	n	%	n	%	n	%
Do you use medical or paramedical sedatives or relaxants?	211	88.3	18	7.5	10	4.2
Do you consume alcohol?	151	63.2	67	28.0	21	8.8
Do you smoke?	125	52.3	48	20.1	66	27.6

Table 3. Frequencies and percentages of the participant about Covid-19……..

		n	%
What was the frequency of encountering daily Covid-19 patients during the pandemic period you worked?	Never	8	3.3
	Rarely	50	20.9
	Mostly	131	54.8
	Always	50	20.9
What was your monthly working hours during the Covid-19 pandemic?	Normal mesai süresi	90	37.7
	Normal mesai süresinden az (esnek mesai)	80	33.5
	Normal mesai süresinden fazla	69	28.9

Table 4. Frequencies and percentages of STSS

	Never		Very little		Sametimes		Often		Very styliish		$\bar{X}$	S_X
	n	%	n	%	n	%	n	%	n	%		
1. I felt emotionally numb.	56	23.4	51	21.3	80	33.5	40	16.7	12	5.0	2.6	1.2
2. My heart started racing when I thought about my sessions with clients..	117	49.0	53	22.2	41	17.2	26	10.9	2	0.8	1.9	1.1
3. I felt as if I was reliving the trauma experienced by my client(s)	127	53.1	48	20.1	40	16.7	21	8.8	3	1.3	1.8	1.1
4. I had difficulty sleeping	71	29.7	47	19.7	52	21.8	38	15.9	31	13.0	2.6	1.4
5. I felt hopeless about the future.	56	23.4	50	20.9	62	25.9	35	14.6	36	15.1	2.8	1.4
6. Reminders of my sessions with clients saddened me.	85	35.6	63	26.4	53	22.2	31	13.0	7	2.9	2.2	1.1
7. I had reduced desire to be around others in social settings.	38	15.9	54	22.6	59	24.7	45	18.8	43	18.0	3.0	1.3
8. I felt nervous.	41	17.2	52	21.8	44	18.4	69	28.9	33	13.8	3.0	1.3
9. I was less active than usual.	52	21.8	41	17.2	53	22.2	55	23.0	38	15.9	2.9	1.4
10. I found myself thinking about my sessions with clients involuntarily, even when I didn't intend to.	71	29.7	60	25.1	66	27.6	31	13.0	11	4.6	2.4	1.2
11. I had difficulty concentrating.	66	27.6	59	24.7	62	25.9	41	17.2	11	4.6	2.5	1.2
12. I avoided people, places, or things that reminded me of my sessions with clients.	105	43.9	56	23.4	44	18.4	28	11.7	6	2.5	2.1	1.1
13. I wanted to avoid working with my clients.	137	57.3	42	17.6	38	15.9	16	6.7	6	2.5	1.8	1.1
14. I wanted to avoid working with some of my clients.	95	39.7	54	22.6	49	20.5	27	11.3	14	5.9	2.2	1.2
15. I became easily fatigued.	52	21.8	47	19.7	64	26.8	44	18.4	32	13.4	2.8	1.3
16. I felt like something bad was going to happen.	60	25.1	53	22.2	52	21.8	47	19.7	27	11.3	2.7	1.3
17. I noticed gaps in my memory regarding my sessions with clients.	95	39.7	54	22.6	59	24.7	23	9.6	8	3.3	2.1	1.1

Table 5. Descriptive statistics of STSS

	Items	n	Minimum	Maximum	Mean	SD	Cronbach's Alpha
Intrusion	2, 3, 6, 10, 13	239	5.0	25.0	10.16	4.66	0.894
Avoidance	1, 5, 7, 9, 12, 14, 17	239	7.0	35.0	17.71	6.72	0.881
Arousal	4, 8, 11, 15, 16	239	5.0	25.0	13.62	5.61	0.906
STSS-Total	1-17	239	17.0	85.0	41.48	16.18	0.957

Table 6. Descriptive statistics of STSS according to gender and living in a big city or not

	Is the city you live in a metropolitan city?							
	Yes			No			t	p
	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X		
Intrusion	185	10.27	4.60	54	9.78	4.90	0.682[a]	0.496
Avoidance	185	17.85	6.64	54	17.20	7.04	0.605[b]	0.547
Arousal	185	13.81	5.69	54	12.96	5.33	0.970[a]	0.333
STSS-Total	185	41.93	16.10	54	39.94	16.51	0.793[a]	0.429
	Gender							
	Male			Female			t	p
	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X		
Intrusion	112	8.92	3.80	127	11.25	5.07	-4.049[b]	<0.001
Avoidance	112	16.17	5.80	127	19.06	7.19	-3.439[b]	<0.001
Arousal	112	12.03	5.05	127	15.02	5.73	-4.253[a]	<0.001
STSS-Total	112	37.12	13.67	127	45.33	17.27	-4.099[b]	<0.001

[a]: Student t-test
[b]: Welch's t-test

Table 7. Descriptive statistics of STSS according to job

	Doctor			Nurse			Other			F	p
	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X		
Intrusion	124	10.00	4.54	91	10.78	4.91	24	8.63	4.01	2.202	0.113
Avoidance	124	18.23 [a]	6.41	91	18.09 [a]	6.93	24	13.58 [b]	6.31	5.211	0.006**
Arousal	124	13.88 [a]	5.34	91	14.07 [a]	5.92	24	10.54 [b]	5.04	4.134	0.017*
STSS-Total	124	42.10 [a]	15.32	91	42.93 [a]	17.10	24	32.75 [b]	14.84	4.053	0.019*

F: One-way ANOVA
*:<0.05, **:<0.01
Means that do not share a common letter are significantly different at p<0.05

Table 8. Descriptive statistics of STSS according to working period

	Working period (years)													
	1-5			6-10			11-15			15↑			F	p
	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X		
Intrusion	84	10.26 [a]	4.62	51	11.67 [a]	4.99	47	10.57 [a]	5.11	57	8.32 [b]	3.37	6.633+	<0.001
Avoidance	84	18.73 [a]	6.32	51	20.33 [a]	6.53	47	17.40 [a]	7.11	57	14.11 [b]	5.67	9.683	<0.001
Arousal	84	14.82 [a]	5.18	51	15.53 [a]	5.88	47	13.30 [a]	5.70	57	10.39 [b]	4.50	10.795	<0.001
STSS-Total	84	43.81 [a]	15.04	51	47.53 [a]	16.56	47	41.28 [a]	17.26	57	32.81 [b]	13.04	9.296	<0.001

F: One-way ANOVA
F+: One-way ANOVA
Means that do not share a common letter are significantly different at p<0.05

Table 9. Descriptive statistics of STSS according to length of service

	Never			Rarely			Often			F	p
	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X		
	Medical or paramedical use of sedative or relaxant substances										
Intrusion	211	9.95	4.68	18	11.89	3.85	10	11.40	5.27	1.813	0.165
Avoidance	211	17.42	6.78	18	19.72	5.96	10	20.10	6.23	1.642	0.196
Arousal	211	13.31	5.63	18	15.67	4.89	10	16.30	5.56	2.690	0.070
STSS-Total	211	40.69	16.32	18	47.28	13.66	10	47.80	15.14	2.193	0.114
	Alcohol use status										
Intrusion	151	10.09	4.78	67	10.30	4.53	21	10.24	4.39	0.051	0.950
Avoidance	151	17.42	6.70	67	17.97	7.08	21	18.90	5.73	0.517	0.597
Arousal	151	13.44	5.51	67	13.70	6.02	21	14.57	5.19	0.381	0.684
STSS-Total	151	40.95	16.16	67	41.97	17.06	21	43.71	13.72	0.309	0.735
	Smoking Status										
Intrusion	125	10.13	4.65	48	11.02	4.56	66	9.59	4.73	1.317	0.270
Avoidance	125	17.54	6.76	48	19.27	6.59	66	16.88	6.66	1.850	0.159
Arousal	125	13.62	5.52	48	14.42	5.90	66	13.03	5.59	0.847	0.430
STSS-Total	125	41.29	16.19	48	44.71	16.15	66	39.50	16.08	1.464	0.233

F: One-way ANOVA

Table 10. The variation based on responses to the question 'What was the frequency of encountering daily Covid-19 patients during the pandemic period you worked?' in relation to STSS

	Never			Rarely			Mostly			Always			F⁺	p
	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X		
Intrusion	8	6.38 [b]	2.07	50	9.50 [a]	3.86	131	11.04 [a]	4.77	50	9.12 [a]	4.87	10.254	<0.001
Avoidance	8	9.50 [c]	2.73	50	16.22 [b]	5.85	131	19.34 [a]	6.20	50	16.24 [b]	7.71	25.761	<0.001
Arousal	8	7.00 [c]	2.27	50	11.54 [b]	4.97	131	15.33 [a]	5.01	50	12.26 [b]	6.32	28.732	<0.001
STSS-Total	8	22.88 [c]	6.42	50	37.26 [b]	14.08	131	45.70 [a]	14.98	50	37.62 [b]	18.30	25.017	<0.001

F⁺: Welch's ANOVA
Means that do not share a common letter are significantly different at p<0.05

Table 11. The variation based on responses to the question 'What was your monthly working hours during the Covid-19 pandemic?' in relation to STSS.

	Normal working hours			Less than normal working hours (flexible working hours)			More than normal working hours			F	p
	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X	n	$\bar{X}$	S_X		
Intrusion	90	10.89	4.99	80	9.89	4.53	69	9.52	4.29	1.898	0.152
Avoidance	90	18.86	6.52	80	17.26	7.00	69	16.72	6.53	2.249	0.108
Arousal	90	14.56	5.39	80	13.43	5.90	69	12.61	5.45	2.448	0.089
STSS-Total	90	44.30	15.96	80	40.58	16.70	69	38.86	15.51	2.428	0.090

F: One-way ANOVA

The Cronbach's alpha coefficient of this scale and all dimensions is 0.88–0.96, with good reliability (Table 5).

Neither the total nor the sub-dimension scores of the STSS showed significant differences based on whether the city of residence was a major city or not (p>0.05). However, a significant difference was observed in STSS scores based on gender, with women having higher averages in both the total and sub-dimension scores (p<0.001) (Table 6).

The 'Intrusion' sub-dimension of the STSS did not differ significantly according to the task groups of the participants (p>0.05). However, the 'Avoidance' and 'Arousal' sub-dimensions and the total score of the scale showed significant differences according to the task groups of emergency service workers (p<0.01, p<0.05, p<0.05, respectively). While there was no significant difference in the 'Avoidance', 'Arousal', and 'Total' scores between doctors and nurses working in emergency services (p>0.05), the 'Avoidance', 'Arousal', and 'Total' scores of other emergency service workers were statistically significantly lower than those of both doctors and nurses (p<0.05) (Table 7).

STSS scores showed significant differences according to the years of service of emergency service workers (p<0.001) (Table 8). While there was no significant difference among those with years of service of '1-5 years,' '6-10 years,' and '11-15 years' (p>0.05), the scores of those

with '15 years and over' of service were significantly lower ($p<0.05$).

STSS scores did not show significant differences based on the use of medical or paramedical sedatives or relaxants, alcohol, and smoking among emergency service workers ($p>0.05$) (Table 9).

Significant differences were found in STSS scores based on the responses of emergency service workers to the question, 'How often do you encounter COVID-19 patients on the days you work during the pandemic?' ($p<0.001$) (Table 10). The 'Intrusion' sub-dimension of the scale was found to be significantly lower among those who never encountered COVID-19 patients compared to those who did encounter them daily ($p<0.05$). There was no significant difference between those who encountered COVID-19 patients daily and those who answered 'rarely,' 'mostly,' and 'always' ($p>0.05$). For the 'Avoidance' sub-dimension, those who encountered COVID-19 patients daily had significantly lower scores compared to those who never encountered them ($p<0.05$). While there was no significant difference between those who encountered COVID-19 patients 'rarely' and 'always' ($p>0.05$), the 'Avoidance' scores were significantly higher among those who answered 'mostly' ($p<0.05$). The same pattern was observed for both the 'Arousal' sub-dimension and the total score of the scale.

STSS scores did not show significant differences based on the responses of emergency service workers to the question, 'What is your monthly working hours during the COVID-19 pandemic?' ($p>0.05$) (Table 11).

DISCUSSION

In the study, neither the total nor the sub-dimensions of the STSS showed significant changes based on whether the city of residence was a large city or not. However, it was determined that the STSS significantly varied by gender. It was found that women had higher averages in both the total and sub-dimensions. This suggests that the size of the city is not a determining factor for secondary traumatic stress levels among healthcare workers. In the study, women had higher averages in both total STSS scores and sub-dimensions. This finding can be interpreted as female healthcare workers experiencing secondary traumatic stress more intensely than their male colleagues. Similarly, Derya et al. (10) found a significant relationship between gender and STSS. Orrù et al. also found that STSS scores were higher in women than in men (13). Other studies have yielded similar results (14, 15). However, Ilhan and Küpeli (9) did not find a difference between gender and STSS.

In the study, the 'Avoidance' and 'Arousal' sub-dimensions and total scores of the scale showed significant differences according to the task groups of emergency service workers. While there was no significant difference between the

'Arousal', 'Avoidance', and 'Total' scores of doctors and nurses, it was observed that the 'Avoidance', 'Arousal', and 'Total' scores of other emergency service workers were statistically significantly lower than those of both doctors and nurses. These findings demonstrate differences in secondary traumatic stress levels among emergency service workers according to their task groups. While no significant difference was found between doctors and nurses, other emergency service workers were found to have lower levels of these stress symptoms. This may suggest that the different tasks of emergency service workers affect their levels of secondary traumatic stress and that these professional groups may have different coping mechanisms. In similar studies, Salameh et al. found higher percentages of STSS in nurses (16). Other studies have also yielded similar results (4, 7, 14, 17). No studies were found in the literature comparing the sub-dimensions of the STSS scale used in this study.

In the study, STSS scores showed significant differences according to the years of service of emergency service workers. However, no significant difference was found among those with '1-5 years', '6-10 years', and '11-15 years' of service, while the scores of those with '15 years and over' were found to be significantly lower. This can be explained by the fact that those who have worked in the emergency environment for many years' experiences less secondary traumatic stress. The results suggest that the professional experience of emergency service workers may have a significant impact on secondary traumatic stress. Long-term service may allow emergency service workers to develop coping mechanisms for occupational stress and better adapt to traumatic experiences. From another perspective, the professional experience of emergency service workers can be considered an important factor in supporting the sustainability of healthcare services.

In the study, significant differences were found in STSS scores based on the responses of emergency service workers to the question, 'How often do you encounter COVID-19 patients on the days you work during the pandemic?'. The 'Intrusion' sub-dimension of the scale was found to be significantly lower among those who never encountered COVID-19 patients compared to those who encountered them daily. No significant difference was found between those who encountered COVID-19 patients daily and those who answered 'rarely,' 'mostly,' and 'always'. However, the 'Avoidance' sub-dimension was found to be significantly lower among those who never encountered COVID-19 patients. The 'Avoidance' scores were found to be significantly higher among those who answered 'mostly'. The same pattern was observed for both the 'Arousal' sub-dimension and the total score of the scale. The 'Intrusion' sub-dimension of the STSS scale was found to be

significantly lower among emergency service workers who never encountered COVID-19 patients daily. This can be interpreted as those who did not have contact with COVID-19 patients experiencing fewer symptoms of intrusion caused by such traumatic experiences. The lack of significant differences in the 'Intrusion', 'Avoidance', and 'Arousal' sub-dimensions and the total score between those who encountered COVID-19 patients 'rarely', 'mostly', and 'always' suggests that the frequency of encountering COVID-19 patients does not affect the secondary traumatic stress levels of emergency service workers. However, a significant difference was found in the 'Avoidance' sub-dimension between those who never encountered COVID-19 patients and those who mostly encountered them. Additionally, the 'Avoidance' sub-dimension scores were found to be higher among emergency service workers who mostly encountered COVID-19 patients. This indicates that the frequency of encountering COVID-19 patients daily has a significant impact on avoidance and arousal symptoms. The traumatic experiences faced by workers during the COVID-19 pandemic may have influenced their stress symptoms and caused functional impairments.

CONCLUSION

The study found that gender, years of service, task groups, and the frequency of encountering COVID-19 patients daily had a significant impact on STSS scores. Women generally had higher STSS scores, with a notable difference in the 'Avoidance' sub-dimension. Additionally, those with long-term service and those who did not encounter COVID-19 patients daily had lower STSS scores.

In this context, it is important to consider factors such as gender, years of service, and professional experience to support the mental health of emergency service workers. Developing support programs and stress management strategies for female workers is crucial. Furthermore, training and guidance programs to enhance the coping skills of new emergency service workers should be established. Given the impact of daily encounters with COVID-19 patients on STSS levels during the pandemic, providing psychosocial support to healthcare workers during such periods is essential. Strengthening coping strategies and facilitating access to supportive resources for emergency service workers in extraordinary situations like the COVID-19 pandemic will help maintain the sustainability of healthcare services and protect the health and well-being of emergency service workers.

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CASE REPORT

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Dorsal Dislocation of First Metacarpophalangeal Joint: A Case Report

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Abstract

Dislocations of the first metacarpal joint are less common than many other joint dislocations. In uncomplicated cases, closed reduction may be attempted, whereas in complicated cases, surgery may be required. We report the case of an 89-year-old patient with a first metacarpophalangeal joint dislocation that underwent closed reduction. The patient was treated with a thumb spica splint for 2 weeks. At the 2-week follow-up, the patient had a similar range of motion in the first metacarpophalangeal joint as in the contralateral hand. However, the patient did not return for the subsequent follow-up visits, so long-term outcomes could not be assessed.

Keyword: Dislocation, metacarpophalangeal joint, closed reduction

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INTRODUCTION

Dorsal dislocation of the first metacarpophalangeal joint is a rare trauma. Success can be achieved with closed reduction under local anesthesia. However, in some complicated cases, open reduction may be required.

CASE

An 89-year-old male patient presented to the emergency department complaining of right hand pain after falling in the bathroom. He had a deformity appearance and pain in the first metacarpophalangeal (MCP) joint of the right hand. He also had 40 degrees of hyperextension and some flexion of the MCP joint. Radiographic examination of the patient revealed that the first MCP joint was dislocated dorsally (Figure 1).

Figure 1. Dislocated radiographs of the patient admitted to the emergency department. A is the AP view, B is the lateral view.

Figure 2. Reduced radiographs of patient. A is AP view, B is lateral view.

Neurovascular examination before reduction was normal. The patient was informed of the procedures to be performed before reduction, and informed consent was obtained. The patient was locally anesthetized. Then, reduction was performed using the technique described by Farabeuf in his cadaver studies (1). It was observed that the deformity improved. Neurovascular examination after reduction was normal. Radiographs were obtained after reduction (Figure 2). When the joint was considered reduced, we applied a thumb spica splint to the patient and were called for follow-up.

When the patient came for follow-up at week 2, the splint was removed, and control radiographs were viewed. It was noted that the range of motion of the patient's 1st MCP joint was similar with the other hand. Although the patient was called for a checkup, he did not come back for a checkup.

DISCUSSION

The thumb is a biomechanical unit composed of resistant ligaments and muscles that can withstand the pinching and grasping movements of the hand and fingers (2). There is an angle of approximately 80 degrees of pronation between the trapezoid and the metacarpal relative to the other fingers (3,4). This angle, together with the metacarpophalangeal joint (MCF), provides extensor, abduction, and rotational movements of the finger. Static stabilizers of the MCP joint are the volar plate and collateral ligaments. Dynamic stabilizers are abductor pollicis brevis, adductor pollicis, flexor pollicis brevis, and extensor pollicis brevis. The volar plate prevents dorsal dislocation of the MCP joint during a pinching action (4).

Injuries may vary depending on the direction of the force applied to the MCP joint (5). Dorsal dislocations of the MCP joint usually occur after a sudden hyperextension force is applied to the joint (6). MCP joint dislocations are rare injuries (7). Dorsal dislocations of the MCP joint are more common than volar dislocations (8).

It is necessary to see AP, lateral and oblique radiographs for diagnosis, but evaluation is more difficult due to the superposition of the other fingers on the lateral radiograph (9).

Closed reduction attempts are usually successful. Closed reduction requires infiltration with local anesthesia in many cases because of muscle laxity, whether or not sedation is used (9). Farabeuf's suggestion for reduction is to press the phalanx at right angles on the metacarpal, press on the sesamoids, and then push the phalanx in a semicircle on the articular surface (1). The most important factor preventing closed reduction is the intervening volar plate structure (10). The use of only straight traction can complicate a simple dislocation (7). In complex dislocations, closed

reduction may lead to complications, requiring open surgery (11).

There is no consensus on immobilization after reduction. Immobilization for more than two weeks is unnecessary and early movement results are better (12).

CONCLUSION

Dorsal dislocation of the MCP joint is less common in the thumb than in the other fingers. In the reduction of such dislocations, a false closed reduction with traction alone should be avoided. The specialist performing the reduction should be familiar with the clinical and radiographic features of the fracture and understand the anatomy, potential complications, and limitations of the various approaches. Otherwise, a simple dislocation may turn into a complicated dislocation. In addition, special attention should be paid to the collateral ligaments after reduction. Early mobilization is important to avoid joint stiffness in these patients. We believe that treatment of this dislocation is effective when closed reduction is performed with appropriate maneuvers.

Ethics Committee Approval: The presented study is qualitative and consent was obtained by giving information about the study by one-toone interviews with the subjects who agreed to participate. The study was carried out by paying attention to the Declaration of Helsinki.

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CASE REPORT/REVIEW **DOI:** 10.19127/mbsjohs.1417861

Vitamin B12 and folate deficiencies, elevated homocysteine and their roles in the biochemical basis of neuropsychiatric diseases in children and adolescents: Case series, review and recommendations

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Abstract

Vitamin B12 and folate deficiencies can be frequently seen in children and adolescents and may manifest with neuropsychiatric symptoms. Vitamin B12 and folate deficiencies and the associated increase in homocysteine are related to one-carbon metabolism (OCM) and may play a role in the pathogenesis of childhood and adolescent psychiatric disorders.

Therefore, a case series and review on OCM will be presented here. Twelve cases with vitamin B12 and folate deficiency and increased homocysteine among those admitted to the child and adolescent psychiatry clinic were retrospectively examined. It was found that vitamin B12 and folate deficiency and increased homocysteine may cause depressive symptoms, anxiety disorders, obsessive compulsive disorder, anger control problems, self-harming behaviors, suicidal thoughts and attempts in children and adolescents.

According to these data, vitamin B12 and folate deficiency and the resulting increase in homocysteine may cause psychiatric symptoms in some children and adolescents. In addition, literature on OCM has been reviewed.

The diagnosis and treatment methods for vitamin B12 and folate deficiencies are summarized for clinicians.

Keyword: Vitamin B12, folate, homocysteine, one-carbon metabolism, child and adolescent psychiatry, anxiety, depression

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INTRODUCTION

Vitamin B12 and folate deficiencies are common vitamin deficiencies in children and adolescents. In a study conducted in Venezuela, vitamin B12 deficiency reached 12% among children and adolescents, while low folate levels were found in 30% of all age groups. In adolescents, this rate may even rise to 82% (1). In vegetarian adolescents, vitamin B12 deficiency can be seen in one third of adolescents (2). While this rate can reach 86% in vegetarian children, it may reach 41% in adolescents (3). In India, while vitamin B12 deficiency was found in 32.4% of adolescents, it was detected in more than half of obese adolescents (4). In a cross-sectional study of adolescents in European countries, serum vitamin B12 was found to be low in 2%, while holotranscobalamin, which forms the active part of total vitamin B12, was found to be low in 5%. However, folate deficiency had rates of 10% (5). It was reported that 37.3% of adolescents in Slovenia receive insufficient vitamin B12 in diet (6). In recent years, vitamin B12 deficiency has been increasing in adolescents and manifests with neuropsychiatric symptoms (7).

Folate and vitamin B12 metabolism, with very common deficiency, may play a role in the etiopathogenesis of some neuropsychiatric diseases. In a previous study we conducted, vitamin B12 levels were found to be lower in children and adolescents with obsessive compulsive disorder. However, although folate levels did not differ significantly, they were found to be low in the patient group and close to significance (p=0.083). Homocysteine (Hcy) was found to be significantly higher in the patient group. Accordingly, it was concluded that biochemical reactions called one-carbon metabolism (OCM), which are related to vitamin B12, folate and Hcy, may play a role in the pathophysiology of neuropsychiatric disorders in childhood and adolescence (8). Again, in a study conducted with 89 children and adolescents with major depressive disorder, vitamin B12 levels were found to be significantly lower in children and adolescents with depression, while Hcy was found to be increased. In fact, while there was a negative correlation between the severity of depressive symptoms and vitamin B12 levels, there was a positive correlation with high Hcy. Folic acid, on the other hand, was found to be almost significantly (p=0.052) low in the patient group. In the same study, the folate levels of the patient group were found to be 11.23% lower than the normal range (9). In a very recent study of adolescents, vitamin B12 deficiency was associated with more severe depression and anxiety symptoms. In this study, the severity of depression and anxiety were correlated with vitamin B12, folate and Hcy, albeit weakly (10). In addition, it was found that taking more B vitamins with diet during adolescence is associated with lower depressive symptoms

(11). Studies conducted with children with attention deficit and hyperactivity disorder (ADHD) also suggested that low vitamin B12 and folate may be risk factors. Studies reported that vitamin B12 and folate are low and Hcy is high in ADHD and autism spectrum disorder (ASD) patients. In addition, in one of these studies, low vitamin B12 was inversely correlated with hyperactivity, impulsivity and oppositional behaviors (12). In a postmortem study, low vitamin B12 was found, as well as increased Hcy and decreased methionine synthase activity,in the brain tissues of people with ASD (13). In another study, low vitamin B12 and folate levels in ASD patients had a negative correlation with the severity of ASD, while a positive association was found with Hcy (14). In a study conducted with children with special learning disability, vitamin B12 was found to be low and homocysteine was increased and close to significance, while folate was found to be significantly lower in the patient group (15). There are only two studies on this subject in children and adolescents with early-onset schizophrenia. According to them, Hcy was increased in the patient group (16,17). It was reported that vitamin B12 deficiency is more common in children with tension-type headache as a neurological symptom compared to the healthy control group. Apart from headache, vitamin B12 deficiency can manifest as non-specific neurological symptoms such as syncope, dizziness, hypotonia, convulsions, hand tremor, ataxia, paresthesia, fatigue, and difficulty concentrating. In addition, these symptoms may occur without hematological findings (18).

One-Carbon Metabolism and pathophysiology

With these findings, it is necessary to examine how OCM, involving vitamin B12, folate and homocysteine, plays a role in neuropsychiatric diseases. OCM includes chain reactions that produce S-adenosyl methionine (SAM), the universal methyl donor used in methylation reactions, which is the best known epigenetic mechanism (19). These biochemical reaction chains essentially involve two cycles: the folate cycle and the methionine cycle. All biochemical reactions in these two cycles are collectively referred to as OCM (Figure 1). Vitamin B12 and folate are cofactors in these chemical reactions. Methionine synthesis occurs by the enzyme methionine synthase, of which vitamin B12 is a cofactor, providing methyl from methyl folate to Hcy. In addition, as a result of OCM, purine-pyrimidine nucleotides and some amino acids are synthesized. One of the most important tasks of OCM reactions is to produce SAM. When SAM used in DNA and histone methylation decreases, gene expression is disrupted. More than 100 methylation reactions, including not only DNA and histones, but also proteins, phospholipids, hormones and neurotransmitters must occur within the cell. In order for them to maintain their normal functions, these reactions

require methyl transfer from SAM (Figure 2). When Hcy increases, SAM production decreases in OCM reactions and instead S-adenosylhomocysteine (SAH) formation increases. SAH is an inhibitor of SAM-dependent methylation reactions. Membrane fluidity also depends on the availability of sufficient SAM. SAM is also used in transsulfuration reactions and polyamine synthesis. These have important roles in cell growth, survival and maintenance of normal cell functions. Vitamin B12 and folate are essential in maintaining the normal course of OCM reactions. In addition, OCM produces precursors of DNA bases. Vitamin B12 is required for myelin, neurotransmitter and DNA synthesis in brain tissue. With folate and vitamin B12 deficiency, SAM production decreases and Hcy levels increase. In fact, this increase in Hcy levels is a sensitive indicator of vitamin B12 and folate deficiency. Methyl-folate is required for the conversion of Hcy to methionine-by-methionine synthase, and vitamin B12 acts as a cofactor in this reaction. Therefore, this reaction does not progress in vitamin B12 and folate deficiency and Hcy cannot be converted to methionine. As a result, an increase in Hcy occurs. Increased Hcy, together with methylmalonic acid (MMA), can be seen in neuropsychiatric diseases without hematological findings. Hcy is a toxic substance that damages neurons and vascular endothelium (Figure 3). Increased Hcy can cause DNA damage, mitochondrial dysfunction and apoptotic activation. The most important reason for the increase in Hcy is insufficiency of B vitamins. In addition, chronic renal failure, hypothyroidism, some malignant tumors and some drugs (antiepileptics, methotrexate, L-dopa, lipid lowering drugs, oral contraceptives, antidiabetic drugs) may also cause Hcy increase. Consuming too much coffee, smoking, alcohol and age have effects on Hcy increase. Deficiency or polymorphisms of enzymes that play a role in OCM can also cause Hcy increase. Increased Hcy leads to homocysteinylation of proteins, which leads to disruption of protein functions. In addition to all these, increased Hcy causes synaptic dysfunction and neuronal damage in the following ways: As an NMDA receptor agonist, it causes excitotoxicity, which in turn leads to neuronal DNA damage. Thus, calcium efflux into the cell increases. Endoplasmic reticulum stress occurs. This increases oxidative stress with the formation of reactive oxygen molecules. The apoptotic cascade can be activated. Hcy can cause cytochrome-c release and caspase activation. In the presence of hyperhomocysteinemia (HHcy), Hcy is converted to Hcy-sulfinic acid and Hcy-cysteic acid by oxidation. These two molecules act as endogenous ligands of NMDA receptors and thus cause excitotoxicity (20). In recent studies, it was found that Hcy also activates cytokines and pro-inflammatory molecules. Hcy induces

an inflammatory response with the activation of microglia in the brain. It was also suggested that HHcy impairs barrier functions by causing inflammation (21). Vitamin B12 and folate deficiency and pathophysiology of OCM can also cause immune system abnormalities. Deficiency of these two vitamins may cause significant deterioration in immune response. Vitamin B12 deficiency may result in a decrease in the cytotoxicity of natural killer cells and immunoglobulin production and changes in lymphocyte ratios (22).

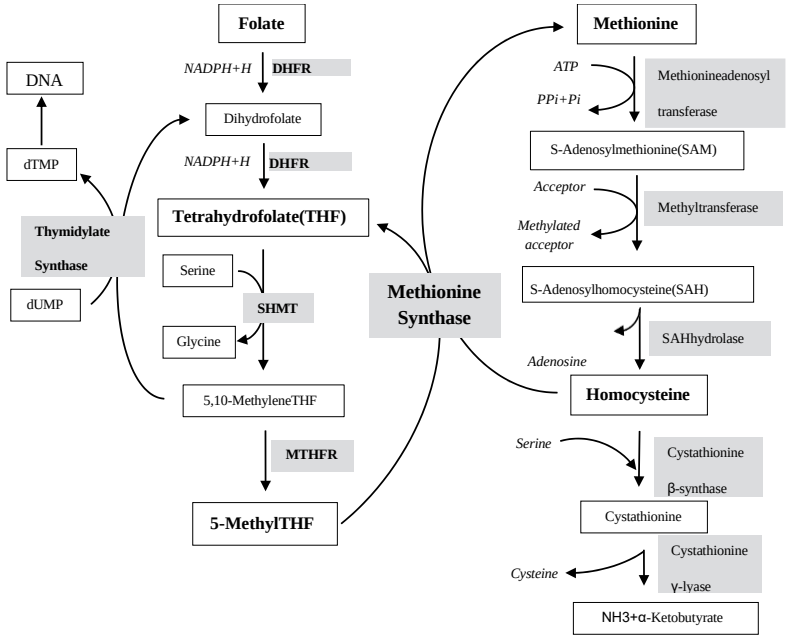

Figure 1. One-carbon metabolism: Folate and Methionine (Homocysteine) cycles
Abb: DHFR: Dihydrofolate reductase; MTHFR: Methylenetetrahydrofolate Reductase SHMT: serine hydroxymethyltransferase

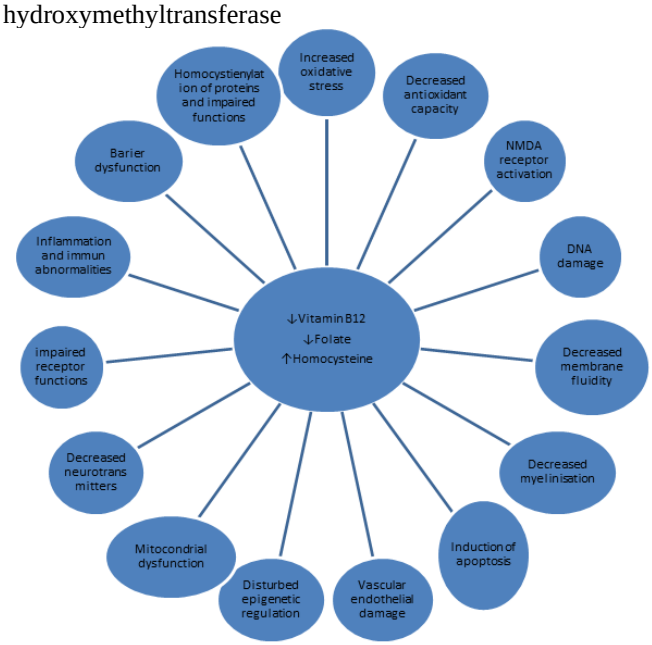

Figure 3. Possible pathophysiological effects of vitamin B12-folate deficiency and increased homocysteine

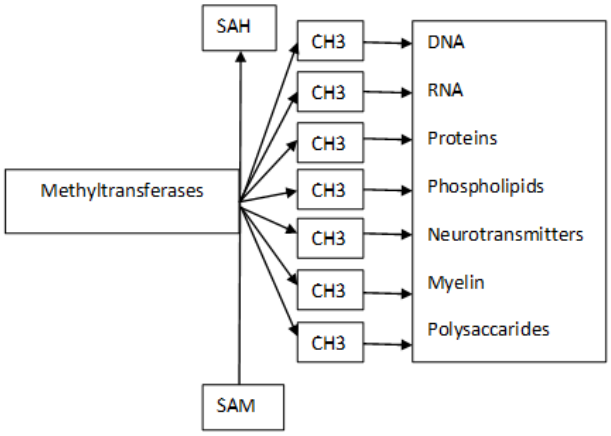

Figure 2. Metyhlation reactions

Adult patients with cardiovascular disease develop depressive disorder significantly if HHcy is elevated. Bjelland et al. (2003) investigated the relationship between vitamin B12, folate, Hcy and depression in 5948 subjects, and stated that the risk of developing depression is twice as high in the case of high HHcy (Hcy level exceeding 15 µmol/l) (23). A decrease in monoamine neurotransmitter metabolites (5HIAA, HVA, MHPG (3-methoxy-4-hydroxyphenyl glycol) was found with HHcy in depressive patients. That is, it is considered that serotonin, dopamine and noradrenaline levels decrease in cases of vitamin B12 and folate deficiency and HHcy. It was stated that Hcy is also associated with schizophrenia and mood disorders in adolescents and may contribute to the pathogenesis (16). In a study conducted in Taiwan with children aged 6-13 years, a positive association was found between Hcy and depression and anxiety levels in boys aged 12-13 years (24).

Vitamin B12

Vitamin B12 is a complex water-soluble vitamin that cannot be synthesized by plants and animals. It is synthesized only in the colons of some animals by some bacterial species. Therefore, most intake of vitamin B12 is only possible with animal foods. Vitamin B12 can be stored in the liver for several years. However, children and adolescents who do not eat meat, vegetarians and those who eat little or have unique eating habits may develop vitamin B12 deficiency. In children and adolescents, vitamin B12 deficiency is the most common cause of inadequate intake and abnormal absorption, excluding inborn errors in transport and metabolism. The main functions of vitamin B12 are hematological red cell formation, neurological functions and DNA synthesis (25).

Folate

Folate (also referred to as folic acid or vitamin B9) is mostly found as a water-soluble vitaminin animal foods (especially liver), eggs, and green leafy vegetables. Since people cannot synthesize folate, they have to obtain it from external sources. Folate can be destroyed during cooking. In addition, folate is not a vitamin that is stored in excess in the body (26). Antiepileptic drugs used for affective disorders and epilepsy may also cause folate and vitamin B12 deficiency and HHcy increases (27). In addition, food processing and storage techniques used in the food industry can cause loss of water-soluble vitamins (28). Therefore,

vitamin levels may be low in people who are considered to be eating normally.

Considering the above effects of vitamin B12-folate deficiency and HHcy, they play an important role in childhood and adolescent neuropsychiatric diseases. Adequate amounts of these vitamins are indispensable for healthy brain tissue. Here, it is reported that 12 children and adolescents with various psychiatric disorders had concomitant vitamin B12 and/or folate deficiency and HHcy status. In addition, a review and some recommendations about the diagnosis and treatment methods for vitamin B12 and folate deficiency are presented.

CASE SERİES

Selection of cases and procedure

Cases were selected retrospectively between 2016-2022 among those who applied to Ordu University Medical Faculty Training and Research Hospital Child and Adolescent Psychiatry Outpatient Clinic. Cases with significant vitamin B12 and/or folate deficiency showing psychiatric symptomatology were collected. The study included 12 cases in total. The medical records of the cases were reviewed, and those who did not have medical disease detected (chronic systemic, inflammatory, infectious diseases and neurological diseases) were included. In addition to vitamin B12 and folate, homocysteine levels, hemogram parameters, routine biochemistry measurements, thyroid function tests, ferritin, and CRP values were identified. In addition, Kovacs' Children's Depression Inventory (CDI), State–Trait Anxiety Inventory (STAI–I, STAI–II), and Yale Brown Obsessive Compulsive Disorder Scale (Yale Brown OCD Scale) tests were applied to the participants regarding their psychiatric condition. Diagnoses had been made by an expert child and adolescent psychiatrist, according to DSM 5 criteria, as a result of individual interviews, family interviews, and appropriate psychometric tests. However, the diagnosis was also confirmed by clinical psychologists in our department. Accordingly, the participants were diagnosed with major depressive disorder (MDD), generalized anxiety disorder (GAD), or obsessive-compulsive disorder (OCD). Information about dietary status was collected from patients and their families. Information about whether they had been vegetarian or not, whether they had eaten animal food (such as meat, milk, and egg consumption) and their diet were recorded. They were asked whether they had received nutritional support in the last year before the diagnosis. Psychopharmacological treatment (sertraline or fluoxetine) was administered to the patients in accordance with their diagnosis. In addition, patients were given vitamin B12 and/or folic acid supplementation according to their vitamin deficiency status. Pediatric consultation was requested when necessary. Appropriate supportive interviews

were also conducted. These patients were followed up at various intervals from 6 months and 1 year. After 12 participants had shown improvement in their symptoms during this period, their treatment was terminated. Written informed consent was obtained from the participants and their families that their information would be included in an anonymous case report.

Instruments and blood measurements

Children's Depression Inventory (CDI)

This scale, which measures the level of depression in children and adolescents, was developed by Kovacs in 1981. This test is the most commonly used and researched scale in children and adolescents. The Turkish validity and reliability study was performed by Öy et al. in 1991. The 27-item scale is filled in by the child or adolescent themselves. The cut-off point for this scale was determined to be19. A score of 19 and above is considered pathological.

State–Trait Anxiety Inventory (STAI–I, STAI–II)

STAI-I and STAI-II were developed to determine the levels of state and trait anxiety in children and adolescents by Spielberger et al. Öner and Le Compte conducted a Turkish validity and reliability study in 1985. Each scale consists of 20 items (40 items in total). While STAI-I measures the anxiety state of an individual at a certain moment, STAI-II measures the level of anxiety regardless of the current situation. Scores from both scales range from 20 to 80. Cut-off points are 45.

Yale-Brown Obsessive Compulsive Scale (Y-BOCS)

This test was developed by Goodman et al. in 1989. Turkish validity and reliability tests were performed by Karamustafalioglu et al. in 1993. The scale is scored by the clinician. There are 10 items. Each item is rated between 0 (no symptoms) and 4 (maximum symptoms). A score of 8-15 is considered mild obsessive-compulsive symptoms. A score between 16 and 23 indicates moderate disease, while a score above 23 indicates severe disease.

Vitamin B12 measurements

Total vitamin B12 measurements were routinely performed in the laboratory of our hospital. The measurement was made on serum separated from blood taken from patients in the morning after an overnight fast. Vitamin B12 wasmeasured by chemiluminescent micro particle Intrinsic Factor ARCHI-TECT B12 assay with commercial kits supplied by Abbott Laboratory. Normal range was evaluated as 187-883 pg/ml.

Folate measurements

The measurement of this vitamin is routinely done in the biochemistry laboratory of our hospital. Folate was measured by chemiluminescent micro particle folate-binding protein ARCHI-TECT Folate assay with

commercial kits fromAbbott Laboratory. Since folate values are affected by food, they were measured after an overnight fast. Normal range was determined as 3.1-20.5 ng/ml.

Homocysteine measurements

Plasma separated from blood taken from the patients after an overnight fast was transferred to the external laboratory contracted with our hospital on the same day, and then the measurement was made. Total homocysteine was measured by chemiluminescent immunoassay method using kits supplied by Abbott Laboratory. Normal range was determined as 4.7-10.3 umol/L.

Case 1

A 15-year and 10-month-old male patient attempted suicide by hanging himself in an impulsive manner. His mother went to him because she heard a voice and saved him. Two weeks previously, he attempted suicide by taking drugs. In the last 3 months, there were thoughts of death, research of death methods, wanting to be alone, concentration of anxiety, being away from friends, distress and unhappiness, and malaise. In detailed interviews with the patient and his family, no obvious psychosocial problems were detected. He played sports and had good friendships. There were no dynamic problems in his family. Depression score was found to be high on the Kovacs'depression inventory. In addition, anxiety levels were found to be high on the STAI-1 and 2 anxiety scales. Thyroid function tests, routine biochemistry and hemogram values were normal in routine blood tests. No pathological finding was detected on cranial MRI. Vitamin B12 level was found to be low at 181 pg/ml. Homocysteine was found to be quite high at 43.5 umol/l. Folate was close to the lower limit at 3.6 ng/ml. Vitamin B12 deficiency did not affect the hematological picture. The patient was diagnosed with MDD and GAD. Antidepressants were started in addition to supportive interviews. Vitamin B12 (first IM, then tablet) and folic acid supplementation were added to this treatment. His condition improved during the following months (Table 1).

Case 2

A 14-year and 8-month-old male patient presented with complaints of shyness, unhappiness, malaise, fear of death, weakness, crying a lot, and seeing the world as a dream in the last 6 months. There were no suicidal thoughts. No significant psychosocial problem was detected that could cause these complaints. In routine measurements, pathologically, vitamin B12 value was found to be significantly low at 131 pg/ml. Folate level was normal at 6.2 ng/ml. Homocysteine level was high at 22.3 umol/l. Vitamin B12 deficiency did not affect the hematological picture. He received high scores on the depression and anxiety scales. The patient was diagnosed with MDD and GAD. Firstly, IM vitamin B12 treatment was

administered in addition to antidepressants. Oral supplementation was then initiated. After 2-3 months of treatment, the symptoms clearly disappeared.

Table 1. Characteristics of the cases and laboratory results

Case no	Sex	Age	Clinical presentation	Psychometric test	Vitamin B12 (187-883 pg/ml)	Folate (3.1-20.5 ng/ml)	Homocysteine (4.7-10.3 umol/l)	Diagnosis	Treatment
C1	M	15 years 10 months	Suicide attempt by hanging, concentration of anxiety, wanting to be alone, unhappiness	↑anxiety ↑depression	↓181 pg/ml	3.6 ng/ml	43.5 umol/l	MDD+GAD	Antidepressant Vitamin B12 (IM)
C2	M	14 years 8 months	shyness, unhappiness, malaise, fear of death, weakness, crying a lot	↑anxiety ↑depression	↓131 pg/ml	6.2 ng/ml	22.3 umol/l	MDD+GAD	Antidepressant Vitamin B12 (IM)
C3	M	17 years 3 months	Inattention, forgetfulness, weakness, unhappiness, lack of pleasure, fainting, anger problems	↑anxiety ↑depression	↓<83 pg/ml	3.6 ng/ml	46.8 umol/l	MDD	Antidepressant Vitamin B12 (IM)
C4	F	14.5 years	fears, inability to sleep alone, worrying about unimportant things, tantrums, dizziness, irritability	↑anxiety	↓168 pg/ml	3.2 ng/ml	23.9 umol/l	GAD	Antidepressant Vitamin B12 Folic acid
C5	F	15 years 10 months	unhappiness, introversion, crying, reactivity, sleep problems	↑anxiety ↑depression	↓174 pg/ml	↓1.8 ng/ml	57.5 umol/l	MDD+GAD	Antidepressant Vitamin B12 Folic acid
C6	M	15.5 years	unhappiness, self-harm, attempted suicide by taking medication 5 times, tantrums	↑anxiety ↑depression	↓181 pg/ml	↓2.2 ng/ml	34.6 umol/l	MDD	Antidepressant Vitamin B12 Folic acid
C7	F	17 years	Irritability, outbursts of anger, general anxiety and restlessness, unhappiness, crying a lot, headaches, forgetfulness	↑anxiety ↑depression	↓133 pg/ml	6.8 ng/ml	22.2 umol/l	MDD+GAD	Antidepressant Vitamin B12
C8	M	14 years 10 month	Nervousness, reactivity, distress, depression, feeling lonely, unhappiness, self-harm, suicidal ideation	↑anxiety ↑depression	↓93 pg/ml	4 ng/ml	23.1 umol/l	MDD+GAD	Antidepressant Vitamin B12
C9	M	16 years	palpitations, numbness in hands and feet, tantrums, general anxieties and fears, forgetfulness, allergy to meat	↑anxiety	↓163 pg/ml	↓3 ng/ml	31.8 umol/l	GAD	Antidepressant Vitamin B12 Folic acid
C10	F	16.5 years	Self-harm, suicide attempt, forgetfulness, carelessness, unhappiness	↑depression ↑anxiety	↓90 pg/ml	4 ng/ml	23.2 umol/l	MDD	Antidepressant Vitamin B12 Folic acid
C11	F	15 years 9 months	Unhappiness, suicidal ideation, obsessions, forgetfulness	↑obsessions ↑depression ↑anxiety	↓150 pg/ml	9.3 ng/ml	21.4 umol/l	MDD+ OCD	Antidepressant Vitamin B12
C12	F	16.5 years	Difficulty swallowing solid food, inability to touch other people's belongings, rereading and rewriting, counting	↑ obsession	335 pg/ml	↓3 ng/ml	29.9 umol/l	OCD	Antidepressant Vitamin B12 Folic acid

Footnote: MDD: Major Depressive Disorder; GAD: Generalized Anxiety Disorder; OCD: Obssesive Compulsive Disorder

Case 3

A 17-years and 3-months-old male patient applied to our clinic with complaints of inattention, forgetfulness, weakness, unhappiness, lack of pleasure, fainting, and anger problems. He stated that he was not a vegetarian but ate almost no red meat. He smoked 10 cigarettes a day. In routine examinations, vitamin B12 values were undetectable (<83pg/ml). Folic acid value was close to the lower limit at 3.6 ng/ml. Homocysteine value was quite high at 46.8 umol/l. Among the hemogram parameters, the MCV value was higher than normal at 99.2 fL (normal value: between 80-97). Peripheral smear was requested with pediatric consultation. Hematological findings of vitamin B12 deficiency such as neutrophil hypersegmentation were not observed. No pathology was detected on cranial MRI. Depression and anxiety scores were high in

psychometric measures. No significant psychosocial problems were detected in family and personal interviews. A diagnosis of MDD due to organic causes was made. The patient was given antidepressants as well as vitamin B12 supplementation. In the following months, his clinical condition improved, along with his laboratory findings.

Case 4

A 14.5-year-old female patient applied with complaints such as fears, not being able to sleep alone, worrying about unimportant things, unnecessary fears, tantrums, dizziness, and quick temper that emerged in recent months. She ate very little red meat. Depression score from psychometric tests was below the cut-off score. Anxiety scale scores were high. In the measurements, vitamin B12 level was pathologically low at 168 pg/ml. Folate level was also at the lower limit (3.2 ng/ml). Homocysteine level was high at 23.9 umol/l. With the diagnosis of GAD, her treatment was arranged as antidepressants as well as vitamin B12 and folate supplements. In the following months, a significant improvement was observed in her condition.

Case 5

A 15-year and 10-month-old girl applied to our clinic with complaints such as unhappiness, introversion, crying, reactivity, and sleep problems in the last few months. Although she was not a vegetarian, she ate very little red meat. It was determined that she had dynamic problems in the family. Depression and anxiety scores were significantly high. In laboratory measurements, the folate level was found to be very low at 1.8 ng/ml. Vitamin B12 level was also found to be low at 174 pg/ml. Homocysteine level was found to be quite high at 57.5 umol/l. No abnormality was found in the blood count. The patient was diagnosed with MDD and GAD. In addition to antidepressant treatment, vitamin B12 and folic acid support was given. In addition, supportive psychotherapeutic interviews were given to the patient. In this case, not only family dynamic problems, but also vitamin deficiencies contributed to the clinical picture. It was observed that her condition improved during follow-up examinations.

Case 6

A 15.5-year-old male patient came to our clinic with unhappiness, self-harm (in the form of scratching his arm), suicide attempt by taking drugs 5 times, and tantrums. He smoked a pack of cigarettes a day. Although he was not a vegetarian, he consumed very little red meat. Depression and anxiety scores were very high. In laboratory measurements, folate value was 2.2 ng/ml and vitamin B12 value was found to be low at181 pg/ml. Homocysteine was also found to be high at 34.6 umol/l. No significant pathology was detected in other laboratory measurements. With the diagnosis of MDD, vitamin B12 and folic acid were added to the

treatment along with antidepressants. His condition improved during follow-up examinations.

Case 7

A 17-year-old female patient was admitted to our clinic with complaints of irritability, outbursts of anger, general anxieties and restlessness, unhappiness, crying a lot, headaches, and forgetfulness. No significant psychosocial problems were detected in herlife. The STAI-1 and 2 anxiety scales, which are psychometric tests, were also high. Kovaks Depression Inventory showed a situation close to the cut-off score of 16 points. However, according to clinical observation, her depressive symptoms were evident. In laboratory findings, folate value was normal at 6.8 ng/ml, while vitamin B12 was low at 133 pg/ml. Homocysteine value was high at 22.2 umol/l. Other laboratory values were normal. As a result, the patient was diagnosed with GAD and MDD. In her treatment, vitamin B12 supplementation was administered in addition to antidepressants. Her condition improved in further interviews.

Case 8

A 14-year and 10-month-old male patient came to our clinic with complaints of extreme nervousness, reactivity, distress, feeling lonely, unhappiness, self-harm, and suicidal ideation. No significant dynamic problems were detected in individual and family interviews. Depression and anxiety scores were high in psychometric tests. In laboratory measurements, pathologically, vitamin B12 was found to be very low at 93 pg/ml, while homocysteine was found to be high at 23.1 umol/l. Folate level was 4 ng/ml. According to clinical observation and psychometric measurements, the patient was diagnosed with MDD and GAD. In addition to antidepressant treatment, vitamin B12 support was given. His psychiatric status improved within 6 months.

Case 9

A 16-year-old male patient came to our clinic with complaints of palpitations, chest tightness, numbness in his hands and feet, tantrums, general anxieties and fears, and forgetfulness, which were occurring for the past year and intensified recently. First of all, pediatric cardiology consultation was requested due to cardiological complaints. No cardiac pathology was detected. The patient had a meat allergy. When he eats meat, redness, swelling and itching develop in his eyes. Therefore, he never consumes red meat. No significant psychosocial problems were detected in family and individual interviews. Depression scores were not high, but anxiety scales were high. He smoked 10 cigarettes a day. In the laboratory tests, folate was at low levels of 3 ng/ml and vitamin B12 was at 163 pg/ml pathologically. There were no hematological findings. His homocysteine level was quite high at 31.8umol/l. With the diagnosis of GAD, folic

acid and vitamin B12 support (first IM) was given in addition to antidepressants. In the following months, a significant improvement was observed in his condition.

Case 10

A 16.5-year-old female patient applied to our outpatient clinic with her family with complaints such as self-harming behaviors, suicide attempt by taking pills, unhappiness, forgetfulness, carelessness, desire to cry, suicidal ideation, and decreased academic performance. As a result of individual and family interviews, there were prominent depressive symptoms, although there were no significant psychosocial problems. Depression and anxiety scores were also found to be high in psychometric tests. Complaints about cognitive functions such as forgetfulness, inattention, and decrease in academic success were notable. No hematological abnormality was observed in laboratory measurements. Thyroid function tests and routine biochemical analyses were also normal. Vitamin B12 value was determined to be quite low at 90 pg/ml. Folate value was close to the lower limit at 4 ng/ml. The Hcy value was 23.2 umol/l, more than twice the upper limit. In addition to antidepressants, vitamin B12 IM and oral folic acid were added to the patient's treatment with individual supportive interviews after the diagnosis of MDD. After 6 months of control, her condition was observed to improve.

Case 11

A 15-year and 9-month-old female patient came to our outpatient clinic with depressive symptoms such as suicide attempt, unhappiness, and suicidal thoughts, as well as obsessive symptoms related to uncertainty, controlling behaviors, cleanliness and contagion. She smoked a pack of cigarettes a day. Depression and anxiety scores were found to be high on psychometric tests. The Yale-Brown OCD scale score was found to be high at 21. A diagnosis of MDD and OCD was made as a result of detailed psychiatric examination and family interviews. In routine blood measurements, vitamin B12 was found to be pathologically low at 150 pg/ml. The Hcy value was found to be high at 21.4umol/l. Vitamin B12 treatment was added to her psychopharmacological treatment. Her condition improved in 6 months-1 year follow-up.

Case 12

The female patient was 16.5 years old, and applied to our clinic with complaints such as difficulty in swallowing solid food due to feeling like it would get caught in her throat, not being able to touch or use other people's belongings, dislike of her body, thoughts about her throat looking bad, being unsure, and re-reading and re-writing due to being unsure of what she read and wrote. In psychometric tests, in addition to pathologically high trait anxiety, a moderately increased obsession score (Yale

Brown OCD scale) of 16 points was found. In the blood measurements, folate was found to be pathologically low at 3 ng/ml. Although vitamin B12 (335 pg/ml) was normal, Hcy value was high at 29.9 umol/l. In addition, the ferritin value was low at 4.38 ng/ml (4.63-204). Hematological parameters revealed microcytic anemia. Iron therapy was started with pediatric consultation. Folic acid was urgently added to her psychopharmacological treatment. Although vitamin B12 was within normal limits, we added vitamin B12 orally to the treatment because values were close to the lower limit, and it has no toxic effects. In the following months, her symptoms regressed.

Table 2. Measurement methods in Vitamin B12 deficiency

Methods	Interpretation
Total Vitamin B12 (cobalamin)	It is inexpensive and widely used. But it does not show the active form. False positive and negative values are common.
Holotranscobalamin	It is an expensive and uncommon test. Indicates the active form of total cobalamin. It is the parameter that shows the earliest deficiency. It provides the transport of B12 into cells.
Homosistein	It is sensitive but not specific for vitamin B12. It is affected by kidney and thyroid functions. Age, alcohol, smoking, drugs, and coffee consumption can affect the result. It also increases in folic acid and B6 deficiency.
Metilmalonic asit	It has high diagnostic sensitivity. But it is not a routine measurement. It may be affected by kidney functions. False positive values may occur. It is also measured in urine. It requires advanced technology and is more costly.

DISCUSSION

In this study, cases who applied to a child and adolescent psychiatry clinic with psychiatric symptomatology and found to have vitamin B12 and/or folate deficiency and accompanying Hcy increase in laboratory examinations are presented. As stated in the introduction, there are reports that vitamin B12, folate and homocysteine, which are related to OCM, may play a role in the physiopathology of many psychiatric disorders seen in children and adolescents.

When these cases are evaluated in general, vitamin B12 deficiency and Hcy increase are present in all cases except one, and in some cases, folate deficiency accompanies this. In one case, it was observed that only folate deficiency was accompanied by an increase in Hcy. The common clinical features of all these adolescents are mostly combined anxiety and depressive symptoms. If expanded a little more, it is understood that symptoms of unhappiness, suicidal thoughts or attempts, general concerns, anger control problems, and self-harm come to the forefront. Sometimes these are combined with psychosomatic symptoms such as headache, lethargy, combativeness, weakness and fainting. Sometimes cognitive symptoms like forgetfulness and inattention are observed.

According to the information obtained from the individual and family interviews of the cases, stress that could cause depressive and anxiety symptoms was not common or evident in the cases.

HHcy is evaluated in 3 groups as mild (15-30 umol/l), moderate (30-100 umol/l) and severe (>100 umol/l). The causes of HHcy were mentioned above (29). Considering the causes of HHcy, there is no medical condition that can cause HHcy in each of these cases. All cases were evaluated in terms of thyroid, kidney and liver function tests and no pathology was detected in any of them. Chronic medical conditions were not detected in the registry examinations of the cases. In addition, all cases were within the normal BMI range. Only some cases were smokers. Smoking is also a factor that increases the level of Hcy. Another important common feature seen in most of the cases was that although they were not vegetarian, they consumed very little animal food. Animal foods are very important sources of vitamin B12.

There are some limitations in the evaluation of these cases. First of all, enzyme deficiencies or polymorphisms that may cause HHcy were not examined. If enzyme deficiencies were present, the level of HHcy would be very severe and cause symptoms in young childhood. Polymorphisms may be found in these cases and may contribute to the development of HHcy. Further research is needed in this regard. In addition, cases should be examined in terms of atrophic gastritis. Further investigations such as autoantibodies and gastric endoscopy were not performed in these cases. However, the fact that not all cases here had gastric complaints reduces this possibility. The fact that vitamin B12 and folate deficiencies accompany HHcy in these cases suggests that deficiencies of these vitamins significantly contribute to the development of HHcy. In addition to the treatment of depression and anxiety with antidepressants, supplementation with vitamin B12 and/or folate, and significant improvement in symptoms during follow-ups within six months to one year suggest that vitamin deficiencies and HHcy may cause neuropsychiatric symptoms. This is also consistent with a report that vitamin B12, folate, and SAM supplementation may have beneficial effects in mood disorders (30). It is also necessary to measure vitamin B6 (pyridoxine) because there may be an increase in Hcy with vitamin B6 deficiency. This study had a retrospective nature. It is difficult to reach a definite cause-effect relationship here. Another missing aspect of the study is the lack of other laboratory measurements that may indicate vitamin B12 and folate deficiency (such as holotranscobalamin and erythrocyte folate level).

The literature includes extensive researched showing that HHcy may cause neurodegenerative diseases and

neuropsychiatric findings, mostly in the elderly, and it was thought that this age group may be more sensitive. However, children and adolescents may be more sensitive to these vitamin deficiencies and HHcy due to reasons such as growth, development, cell proliferation, and neuroplastic processes (31). Therefore, the role of HHcy and vitamin deficiencies in neuropsychiatric diseases in children and adolescents needs to be further clarified. In addition, clinicians should consider these vitamin deficiencies and HHcy in adolescents presenting with psychiatric symptoms.

Diagnostic methods forVitamin B12 and Folate deficiency

In this study, only routine measurements were examined. In fact, there is no gold standard test that can show both vitamin B12 and folate deficiency (Table 2). The vitamin B12 values used here are for total cobalamin in plasma. This test may not reflect intracellular vitamin B12 status and by itself is not a completely reliable indicator of deficiency (32). Vitamin B12 is used as a cofactor in two enzymes. One of them is methionine synthase and methionine is synthesized from Hcy, and the other is methyl malonyl coA mutase, which converts methylmalonic acid (MMA) to succinyl coA (32). Therefore, MMA and Hcy increase in vitamin B12 deficiency. These two tests better reflect vitamin B12 deficiency. Holotranscobalamin (Holo-TC) is the active form of vitamin B12 and helps to diagnose deficiency at an early stage. Holo-Tc is present as 6-20% of total cobalamin. Even if the total vitamin B12 level is normal or marginal, evaluating Holo-Tc may provide more accurate results (33). In addition, as seen in the cases here, vitamin deficiencies may not be reflected in blood parameters. In other words, unexplained neuropsychiatric symptoms can be observed without hematological findings. In this regard, iron deficiency anemia, which is common in children and adolescents, should not be forgotten. Because iron deficiency anemia may overshadow the hematological findings of vitamin B12 (32). It should also be considered that even if serum vitamin B12 levels are normal, clinical signs can be seen. This may not reflect actual vitamin B12 deficiency in the tissues. Hcy and MMA measurement may also be required. In addition, routinely-measured serum vitamin B12 levels may be falsely high, and, it is necessary to be careful. As a result, measuring plasma total homocysteine for the evaluation of vitamin B12 deficiency seems more reasonable due to being routine, sensitive but non-specific, and having moderate cost.

Fewer tests are available to assess folate status. The serum or plasma folate level can be measured, but this reflects short-term folate deficiency. Instead, erythrocyte intracellular folate levels can provide information about tissue folate stores. However, this test is not routine (34). In addition, erythrocyte folate

levels may decrease in vitamin B12 deficiency. Therefore, measuring serum Hcy levels is a test with moderate cost and high diagnostic utility for detecting folate deficiency.

Treatment of Vitamin B12 and Folate deficiency

Oral vitamin supplements can be given for vitamin B12 and folate deficiency. However, if there is a problem with vitamin absorption, this method may not be very effective. The most common form of vitamin B12 therapy is intramuscular (IM) administration of cyanocobalamin. However, oral administration of vitamin B12 can correct deficiency in children who develop vitamin deficiency due to nutritional deficiency. Oral supportive therapy may be an advantageous treatment method considering the pain of the IM method in children. In adults, no significant difference in efficacy was found between oral and IM therapy (35). Apart from these two methods, vitamin B12 can also be given in the form of sublingual spray or by intranasal administration. Both of these methods were shown to be effective in the treatment of vitamin B12 in children (36). In particular, sublingual spray can be an easy, effective and more practical treatment method. Vitamin B12 levels that improve after treatment should not be misinterpreted. Treatment should be continued even if the levels are within the normal range. In addition, the fact that vitamin B12 levels in serum are in the normal range does not mean that treatment should not be given. However, the absence of hematological findings should not suggest that treatment is not necessary.

Although there are studies conducted in elderly patients, the level of vitamin B12 in brain tissue may be found to be low, even if the serum vitamin B12 level is within the normal range. Here, the CSF/serum vitamin B12 ratio may be a better indicator (37). Of course, this is not an easy method. However, this shows that vitamin B12 values in the normal range may not reflect brain tissue vitamin values. Folic acid (synthetic form of folate) can be easily given as oral treatment. Since these two vitamins are water-soluble, the excess is excreted in urine. There is no report in the literature that vitamin B12 administration causes serious side effects.

Although it was reported that folic acid may contribute to the emergence of conditions such as obesity, insulin resistance and epilepsy in children who are born after excessive doses are given to pregnant women, there is no report that it causes any side effects in children and adolescents. However, when vitamin B12 deficiency is present, adding only folate therapy can mask vitamin B12 deficiency, so care should be taken. However, low folate levels may be associated with poor response to antidepressant treatment. Adding folic acid to treatment increases the effectiveness of antidepressant treatment (38). In addition, adding vitamin B12 to treatment may ensure

that neurotrophic factors such as BDNF, which have an important role in the pathogenesis of depression, are maintained at appropriate levels. In animal studies, vitamin B12 supplementation caused an increase in BDNF in the cortex and hippocampus (39). In addition, an increase in Ntrk-2 expression occurs through epigenetic regulation with vitamin B12 supplementation. Ntrk-2 is a BDNF receptor, the tropomyosin/tyrosine receptor kinase B gene. BDNF and its receptor are involved in the pathogenesis of depression and antidepressant response (40). As with folate supplementation, adding vitamin B12 to treatment in depressed patients with inadequate response to antidepressants may provide clinical improvement after supplementation. In many studies, higher vitamin B12 levels were shown to be associated with better response to treatment. Individuals who do not have any clinical symptoms despite having low vitamin B12 levels are also prone to develop symptoms later. Therefore, these individuals should also take vitamin supplements. As a result, it may be beneficial to add vitamin B12 and folate (or their metabolic product, SAM) to treatment for people with mood disorders, and these vitamins should be used to improve treatment outcome (30).

For the treatment of low vitamin B12 in the adolescents in this study, we first attempted to increase the vitamin levels quickly by IM administration. Injections continued once a day for the first 5 days, and then once a month for 6 months. In addition, oral folic acid and vitamin B12 treatments were begun. The intensity and discomfort due to the psychiatric symptoms of the patients indicated the need to start psychopharmacological treatment. It would be unethical not to begin this treatment. Therefore, as a result of vitamin supplementation and psychopharmacological agents, the symptoms of the patients decreased within six months to one year. Of course, it is difficult at this stage to distinguish whether this decrease is due to the psychopharmacological agent or vitamin supplementation, or the positive effects of both.

CONCLUSION

Child and adolescent psychiatrists should suspect vitamin B12 and folate deficiency in patients who attend with different neuropsychiatric symptoms. Some recommendations were made to clinicians in this regard (Table 3). It is important to know the methods for diagnosis and treatment of deficiency of these two vitamins, which are indispensable for healthy brain tissue and functions. Although it is thought that deficiency of these two vitamins is not common in children and adolescents in developed countries, higher deficiency rates than expected can be observed in children and adolescents due to differences in eating habits.

Table 3. Recommendations to clinicians

- It may be beneficial for child and adolescent psychiatrists to measure vitamin B12 and folate, especially in adolescents presenting with depressive and anxiety symptoms.
- In cases where vitamin b12 and folate deficiency is thought, the next test such as homocysteine may give more accurate results.
- Child and adolescent psychiatrists can question their patients' diets, and also make dietary recommendations when necessary.
- Having a normal diet does not mean that vitamin B12 and folate deficiency will not develop.
- Vitamin B12 and folate deficiency are not only seen in the elderly. It can also be seen in children and adolescents.
- Since the vitamins necessary for healthy brain tissue can be taken less, especially in those who consume less animal foods, such as vegetarians, these people may be accompanied by mental symptoms.
- Serum vitamin B12 and folate levels in the normal range should not mean that there is no deficiency. Vitamin values in brain tissue may be lower than serum values. It would be better if vitamin supplementation was done, especially at values close to the lower limit of the normal range.
- Due to brain development, cell proliferation, and increased neuroplastic processes, children and adolescents may be more susceptible to vitamin B12 and folate deficiency and one-carbon metabolism pathologies.
- Existing vitamin deficiencies may not be reflected in the blood picture. Even clinical signs may not have appeared. Supplementation should be given to these risky people.
- Child and adolescent psychiatrists can add vitamin B12 and folic acid to their psychopharmacological treatments. These are non-toxic or negligible, and supplementation therapy is easy and inexpensive. They also increase the effectiveness of antidepressants.

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The Impact of Electromagnetic Fields on Human Health: A Review

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Abstract

The electromagnetic field (EMF) is a physical concept consisting of electric and magnetic fields produced by the motion of charged particles and plays a ubiquitous role in modern society. EMFs are present in various forms, ranging from extremely low frequency (ELF) fields produced by power lines to radiofrequency (RF) fields emitted by wireless communication devices. While EMFs are essential for technologies like electricity generation, telecommunications, and medical imaging, concerns have been raised regarding their potential impact on human health. The literature has explored the relationships between EMF exposure and health outcomes, including cancer, reproductive health, and neurological disorders. Despite ongoing debate and inconclusive evidence, efforts are underway to mitigate exposure and establish regulatory guidelines. The effects of EMF on human health is a complex and multifaceted issue and research points to potential effects on various aspects of health, including neurological, reproductive and developmental effects. Although significant associations have not been found in some studies, growing evidence suggests that continuity in research is important in assessing and mitigating potential health risks associated with EMA exposure.

Keyword: Electromagnetic Field (EMF), Mobile Phone, Radiofrequency (RF), Microwave ovens, Base stations

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INTRODUCTION

Technology has the potential to affect human health in many ways. Base stations emitting radiofrequency waves, high voltage lines, television-radio transmitters and electrically operated devices create electromagnetic fields

(1,2). This electromagnetic field is known to be a biological risk factor (3–5). The Second World War was the period when the electronics industry developed very rapidly. Electromagnetic radiation has become widespread thanks to radar, medical applications and the development of satellite systems and devices used in daily life (6).

Electromagnetic radiation has created a new phenomenon called electromagnetic pollution over time. Ionizing radiations, such as X and gamma rays, which cause cancer as a result of genetic damage, have very high photon energy, sufficient to break atomic bonds and create ionization (7). On the other hand, non-ionizing radiation, which cannot break atomic bonds because it has weak photon energy, includes infrared radiation, ultraviolet radiation, radiofrequency (RF) and microwaves, and is emitted by mobile phones, wireless networks, computers and microwave ovens (8).

Electromagnetic field and Wi-Fi

EMF is a physical effect consisting of electric and magnetic fields in which charged particles exert a force on other charged particles around them. They exist in various forms, from extremely low frequency (ELF) fields generated by power lines and electrical devices to radiofrequency (RF) fields emitted by wireless communication devices such as mobile phones and Wi-Fi routers (9,10).

The electromagnetic field also plays a major role in the functioning of smartphones, power lines, home appliances and wireless communication systems such as WiFi. WiFi, a technology based on electromagnetic radiation, has made its use widespread by allowing wireless connection and communication. The deployment of WiFi networks has expanded significantly from local access networks to include larger, mesh networking technologies (11).

Although these areas are an important part of modern life, many concerns have been expressed about their potential effects on human health (12-14). The debate surrounding the health effects of EMFs is complex and ongoing (15). Although it has been suggested that EMFs may have negative effects on health when exposed to long-term or high levels, the scientific community has not reached a consensus on this issue (16).

However, in some studies, It has been reported that EMF exposure may have various negative effects on human health, such as being a carcinogenic factor, causing changes in brain physiology, and playing a role in the pathogenesis of some non-specific diseases (17).

Concerns have also been raised about the potential long-term health effects of continued exposure to EMFs due to the increasing prevalence of technologies such as in-vehicle wireless sensor networks and automotive radars

used for advanced driver assistance systems (18).

Electromagnetic field and mobile phone

One of the most widely studied sources of EMFs about human health is cell phones (19). They are widely used in various sectors, including health, education and communication (20). The possible impact of the use of mobile phones on human health is still being questioned. Several studies have investigated the impact of mobile phones on human health, with particular emphasis on the potential risks associated with prolonged exposure to electromagnetic waves (21). One of the main concerns is the emission of electromagnetic radiation from mobile phones, which has been classified as a possible human carcinogen (22).

These devices emit RF radiation, which has led to concerns about their potential to increase the risk of brain tumors, particularly among heavy users (23–25). While some studies have suggested a possible link between long-term cell phone use and certain types of brain tumors, the overall scientific evidence remains inconclusive (22).

However, there are studies showing that mobile phone RF radiation emissions may have harmful effects on cognitive functions and mental health (26). Additionally, the potential effects of mobile phone use on behaviors such as addiction and sleep disorders have also been investigated (27).

Mobile phone base stations should not be installed in public living and usage areas such as stadiums, kindergartens, hospitals, parks where children, patients and the elderly are more likely to be present due to the health risks they pose. The effects of mobile phones on human health are a complex and multifaceted issue that warrants further investigation. While concerns about the potential adverse health impacts associated with mobile phone use have been raised, there is also evidence supporting the feasibility and effectiveness of mobile-based services for healthcare delivery. As mobile phone usage continues to proliferate, it is essential to comprehensively understand the implications for human health and well-being (28).

Mobile phones have been leveraged to improve maternal health services, facilitate remote consultations, and enhance access to healthcare in low and middle-income countries (29).

In addition, the use of mobile phone reminders as appointment reminders in the follow-up of newly diagnosed HIV-positive patients reveals the potential of mobile technology to positively affect health outcomes (30).

Electromagnetic field and microwave oven

The microwave oven is a common kitchen appliance that uses electromagnetic radiation to heat and cook food (31). Overall, the study of microwave ovens and their magnetic fields encompasses a wide array of scientific and

practical considerations, ranging from food science and cooking processes to environmental and industrial applications. There are studies investigating the effects of electromagnetic radiation and cooking processes in microwave ovens on foods (31). Additionally, research has explored the non-uniform temperature distribution during microwave heating of food materials, highlighting the industrial applications of microwave energy (32). Concerns have been raised regarding the electromagnetic pollution of the environment due to leakage radiation from microwave ovens, emphasizing the need to understand the spatial and temporal changes in the electromagnetic field generated by these appliances (33). Additionally, in order to optimize the performance and safety of microwave ovens, there are studies on the measurement and controllability of electromagnetic radiation inside them. (31).

Electromagnetic field and base stations

Base stations are known as cellular transceiver stations and facilitate wireless communication by sending and receiving signals to and from mobile devices. Base stations are an important part of the infrastructure of telecommunications, but they have effects on human health in terms of exposure to electromagnetic fields (34). RF emitted by base stations while communicating with mobile devices are a type of non-ionising radiation, unlike ionising radiation. Since radiofrequency has low energy unlike ionising radiation, it is not known to directly cause DNA damage (35). Many countries have established safety guidelines and regulations on exposure to radiofrequency radiation. These guidelines aim to protect public health and are based on scientific research (36).

The possible health effects of exposure to electromagnetic fields emitted by base stations have been the subject of research. Studies are reporting that radiofrequency fields emitted from base stations can affect human cells and tissues (37,38). Exposure of people living close to base stations to high levels of non-ionising electromagnetic fields may have adverse health effects (39). Although possible links between radiofrequency radiation and adverse health outcomes such as headache, cancer, reproductive problems and neurological effects have been suggested, the evidence remains inconclusive. There is a significant correlation between some symptoms, particularly headache, and measured power density (40,41). There is also evidence that subjective symptoms and hypersensitivity to various electromagnetic field sources of numerous mobile phones and base stations have been reported (42,43). However some studies have reported inconsistencies between the possible consequences of electromagnetic fields emitted from cellular base stations on human health (44).

To better understand the possible health effects of exposure to electromagnetic fields from base stations, it is important to conduct comprehensive and rigorous research.

Studies have indicated that EMF exposure may lead to a range of health issues, including memory loss, fatigue, sleep disturbances, and headaches (45). Furthermore, long-term exposure to EMF has been associated with an increased risk of breast cancer in women, potentially linked to alterations in melatonin production (46). Concerns have also been raised about the potential impact of EMF on the central nervous system, with particular focus on the brain and the blood-brain barrier (47). Despite the uncertainty surrounding the health effects of EMFs, there are measures that individuals can take to minimize their exposure. These include using hands-free devices or speakerphone options when using cell phones, keeping electronic devices away from the body whenever possible, and limiting the use of wireless technology, especially near the body (48). In addition to individual efforts, regulatory agencies play a crucial role in setting guidelines and standards for EMF exposure. Organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the World Health Organization (WHO) regularly review scientific literature and provide recommendations to protect public health (49).

CONCLUSION

In conclusion, the effects of EMFs on human health are a complex and multifaceted issue, with research indicating potential impacts on various aspects of health, including neurological, reproductive, and developmental effects. While some studies have not found significant associations, the growing body of evidence underscores the importance of continued research and vigilance in assessing and mitigating potential health risks associated with EMF exposure.

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