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From the Editor

Dear Esteemed Readers,

Welcome to the inaugural issue of 2024! We're thrilled to unveil this meticulously curated compilation of articles tailored to engage and captivate healthcare professionals, particularly our esteemed primary care physicians. Our dedication remains steadfast in providing an invaluable compass for navigating the dynamic landscape of healthcare.

Within these pages, you'll discover a collection of eight research articles and a letter to the editor, each offering insights into pivotal advancements across critical healthcare domains.

As the leading primary care journal in Turkey, it is both our privilege and responsibility to serve as an indispensable resource for healthcare professionals in our region. We extend our heartfelt gratitude for your continued interest in our journal, reaffirming our commitment to delivering the latest research findings and evidence pertinent to primary care.

We invite you to immerse yourself in the thought-provoking articles contained herein, confident that they will both intrigue and inspire you. Your engagement and support fuel our mission to foster knowledge and innovation in primary care.

Stay tuned for our forthcoming edition, aimed to deliver an equally enlightening and thought-provoking experience.

Prof. Dr. Ahmet Keskin

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Research Article

Ankara Med J, 2024;(1):1-13 // doi 10.5505/amj.2024.02800

BLUE LIGHT AND PROTECTION AWARENESS AMONG UNIVERSITY STUDENTS: A SURVEY STUDY

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Abstract

Objectives: Our study aimed to evaluate the awareness levels of university students about the harmful effects of blue light and protection methods.

Materials and Methods: A cross-sectional survey study consisting of 20 questions was conducted online to university students in Ankara. After obtaining basic information about the participants, questions related to the hazardous effects of blue light, blue light sources, blue light filters and protectors were directed.

Results: A total of 387 participants were included in the study. 75.1% of the students thought of vision problems as the most harmful effect of blue light and phones, computers and televisions as blue light sources (93.8%). 58.8% of the students were using the blue light filter, 67.6% knew about blue light protective glasses, and only 26.9% were wearing them. The average daily computer, smartphone and television usage time was 3.18 hours, 5.2 hours and 0.5 hours, respectively. 71.5% of the students were taking breaks when using electronic devices, while 28.5% were not. 56.2% of the students were experiencing tired eyes, 49.7% headaches, 31.9% blurred vision, 30.8% dry eyes and 30.3% insomnia. 95.1% of the students were adjusting their settings to reduce the brightness. Students in medical fields were more aware of blue light-related sleep problems and blue light protective glasses than students in other fields.

Conclusion: Awareness of blue light was moderate among university students, however awareness of protective methods was lower. This study will contribute to increasing awareness on this issue in terms of protecting the health of young people, and subsequently general society.

Keywords: Blue light, digital devices, awareness, protection methods, university students

Introduction

Blue light is a type of high-energy visible electromagnetic wave that possesses a wavelength between 380 and 495 nm, and it is an important part of natural light. Despite its beneficial effects on the human body (keeping alertness and cognitive performance) during the day, blue light overexposure, especially before bedtime, has harmful side effects.[1,2] In the modern-day world, there are many blue light sources that are unnatural but have a great influence on human life and cause overexposure, and their number is increasing. These sources include smartphones, tablets, laptops, fluorescent lamps, light-emitting diodes (LEDs), liquid crystal displays (LCDs), mobile phone displays, modern flat panel displays and so on.[3]

In recent years, it has been noticed that blue light is especially harmful to the human eye and has caused concern.[4] It has begun to be argued that it causes many eye problems, from digital eye fatigue to macular degeneration, thus irreversible damage to the vision.[4] One of the situations of concern is that the percentage of transmission of blue light from the corneal surface to the retina is higher in children and teenagers than in adults.[3] In addition, its harmful effects on the brain and circadian rhythm, and therefore, sleep patterns have become seriously considered.[5] Disruption of the circadian rhythm, which is the body's internal clock that regulates the sleep-wake cycle, is thought to be caused by the harmful effects of blue light on the production of melatonin, a hormone involved in sleep regulation.[5] Difficulty in falling asleep, staying asleep and experiencing poor sleep quality have been associated with the blue light exposure in the evening or at night which is caused by melatonin production suppression process.[5] Prolonged exposure may cause chronic sleep disturbances, which may result to have increased risk of mood disorders and other health issues in people.[5]

A limited number of studies have highlighted the need for increased awareness and education on the potential health risks of blue light exposure.[6,7] By collecting information on knowledge and behavior related to blue light exposure, it is possible to gain a better understanding of the public's perception of the issue and identify potential areas for education and intervention. However, according to our knowledge, no study has been conducted to evaluate the level of blue light awareness among university students, who are the population that has the potential for longer exposure to electronic devices and has the capacity to direct the progress of society.

The purpose of this survey is to evaluate the awareness level of university students about blue light, its harmful effects and protection methods.

Materials and Methods

Participants and Design:

This cross-sectional survey study was conducted online after receiving ethical approval from the Ankara Bilkent City Hospital Ethics Committee (Approval number: E2-22-1502). The survey was designed by the Ankara Yildirim Beyazit University Ophthalmology and Neuroscience Departments. Google documents were used as a platform to create online questionnaires that were automatically hosted via a unique URL. The survey was shared via e-mail and social platforms, ensuring the participation of university students living in Ankara. The survey included 20 questions in total. Participants were first asked to confirm their willingness to participate, and then those who agreed were able to continue with the self-report survey. The questions were aimed at revealing the characteristics and basic information of the participants, their awareness of blue light and its harmful effects, and their knowledge of protection methods. Questions were asked in both English and Turkish language in order to reach as many respondents as possible.

Questionnaire:

1- I voluntarily agree to participate in this survey (Yes/No)

2- What is your age group? (18-25/ 25-30/ 30-35/ >35)

3- What is your gender? (Male/Female)

4- Do you smoke or use alcohol? (Yes/No)

5- Do you have any chronic disease (such as diabetes, hypertension, glaucoma, etc.), any medical condition that requires medication or use any medication (including supplements)? (Yes/No)

6- What is your level of education? (Undergraduate student/ Master student/ PhD student)

7- Which university do you study in?

8- What is your education field?

9- What are the most hazardous effects of blue light? (Brain damage/ Sight problem/ Sleep problem/ Aging/ Cancer/ Spinal pain)

10- Which of the following do you believe are the sources of blue light? (Phone, computer, TV/ Printer/ LED light/ Bathroom heater/ Gaming machine/ Do not know)

11- How often do you use the blue light filter option on your phone? (Always/ During the day/ During the night/ Never)

12- Have you ever heard about blue-light protective eyeglasses? (Yes/No)

13- The question is corrected as "Would you use these glasses? If you wouldn't, why? Choose one of the following". (I would use/I already use/Wouldn't use since feeling no difference between the two/Wouldn't use since feeling useless)

14- What is your daily computer usage time?

15- What is your daily smartphone usage time?

16- What is your daily television usage time?

17- Do you take breaks while using these devices for more than 2 hours? (Yes/No)

18- Do you suffer from one or more of the following conditions? (Dry eyes/Watery eyes/Tired eyes/Blurred vision/Headaches/Insomnia)

19- Do you adjust the settings on your device to reduce the brightness? (Yes/No)

20- Do you have compact fluorescent lights (CFL) or LED lights in your house? (Yes/No)

Statistical Analysis:

SPSS Statistics 22.0 was used for the statistical analysis. Responses were calculated as percentages. For the comparisons between the two groups, a chi-square test was performed. A p value lower than 0.05 was considered as statistically significant.

Results

A total of 535 responses were collected via an online questionnaire. One hundred forty-eight respondents were excluded for either smoking, using alcohol, having any chronic disease (such as diabetes, hypertension, glaucoma, etc.) or using any treatment (including supplements). We included participants only ≤35 years of age, and the largest proportion of respondents (74.6%) were in the 18-25 age range, while 9.8% were 25-30, and the rest were in the 30-35 age range. 70.9% of the survey participants were female and 29.1% were male. Among the 20 responding universities, students from Ankara Yildirim Beyazit University provided most of the participation (60%). Considering the education level of the study participants, 85.2% were undergraduate students, 9.1% were master students, and the remaining 5.7% were PhD students.

Figure 1: A: Awareness about the most hazardous effect of blue light **B:** Awareness about the sources of blue light

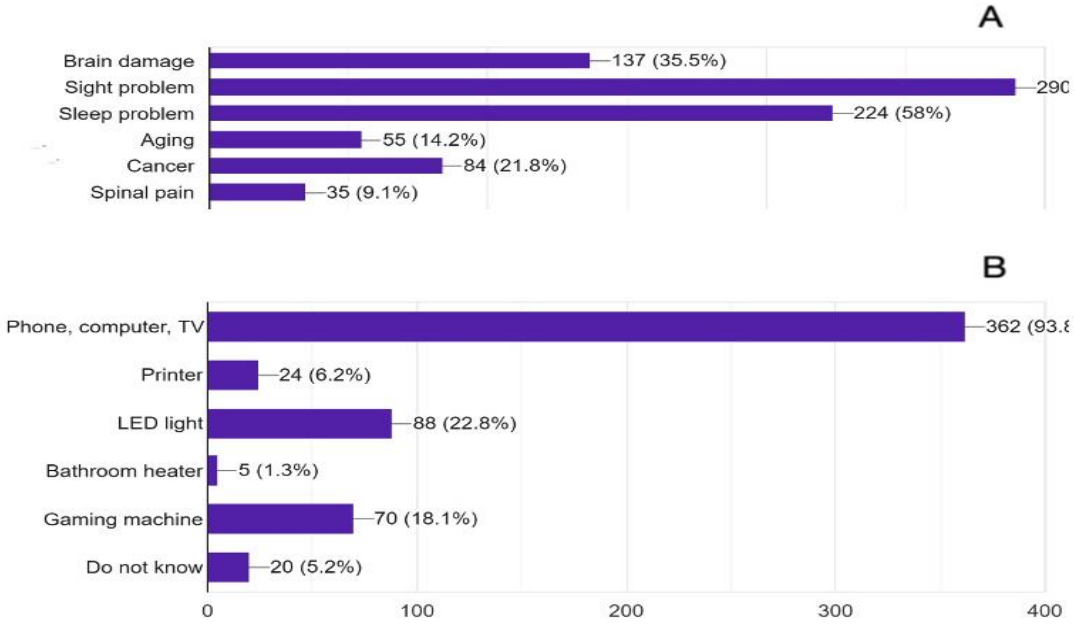

Figure 1A shows the responses about the most hazardous effects of blue light. For this question, the respondents were able to choose multiple answers. According to the data, respondents thought that the most harmful effects of blue light were vision problems (75.1%), sleep problems (58%), brain damage (35.5%), cancer (21.8%), aging (14.2%) and spine pain (9.1%).

Figure 1B shows the percentage of respondents who replied about the sources of blue light. For this question, the respondents were able to choose multiple answers. The data shows that 93.8% of the respondents thought that the sources of blue light were phones, computers and televisions. On the other hand, 22.8% thought that the LED light was a source of blue light, 18.1% thought that the gaming machine was a source, 6.2% thought that the printer emits blue light, and 1.3% thought that blue light could be generated from the bathroom heater. 5.2% of the respondents chose that they did not know the sources of blue light.

Figure 2: A: Usage of blue light filter by the participants **B:** Previous knowledge about blue light protective eyeglasses **C:** Participants thoughts about using blue light protective eyeglasses

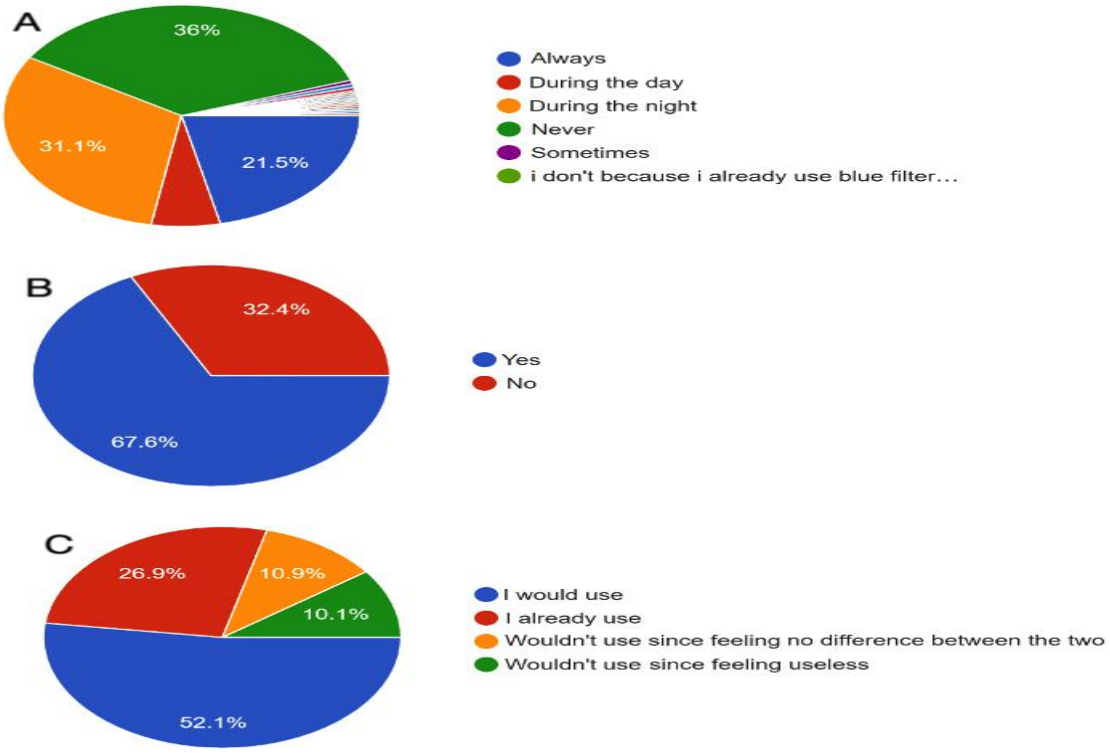

Figure 2A shows how often the respondents were using the blue light filter option on their phones. 36% said that they never use the blue light filter, while 31.1% were using it during the night, 21.5% of the respondents using the blue light filter all the time, and 6.2% said that they use the filter during the day hours. The rest, 5.2%, of respondents gave other insignificant answers. This indicates that more than half of the participants were using the blue light filter, and 52.6% of them used it during the night, which is the most recommended time to use the blue light filter.

Figure 2B shows the percentage of respondents who have heard about blue-light protective eyeglasses before. The data showed that 67.6% of the participants knew about blue light protective glasses, while 32.4% hadn't heard about it before.

Figure 2C shows the responses of the participants to question 13: "Would you use the blue light glasses, and do you think that it is protective?". More than half (52.1%) indicated that they would use it, and 26.9% said that they were already using the blue light filtering eyeglasses. However, 10.9% said that they won't use it because they can't find any difference from the normal eyeglasses, and 10.1% wouldn't use it because they think that it is useless.

Figure 3: Participants daily **A:** computer, **B:** smartphone, **C:** television usage time

Figure 3A shows the daily computer usage (in hours) of the participants. The average is 3.18 hours, with a minimum of 0 hours (82 responses) and a maximum of 14 hours (1 response). The most common number of hours of daily usage is 0 hours, with a total of 82 participants indicating that they don't use the computer daily. Figure 3B shows the daily usage of smartphones (in hours) by the participants. The average is 5.2 hours, with a minimum of 0.5 hours (2 responses) and a maximum of 15 hours (15 responses). The most common number of hours of daily smartphone usage is 5 hours, with a total of 74 participants. Figure 3C shows the daily usage of television (in hours) by the participants. The average time is 0.5 hours, with a minimum of 0 hours (267 responses) and a maximum of 6 hours (1 response). The most common time spent daily watching television is 0 hours, with a total of 267 participants.

Figure 4: A: Participants who take breaks or not while using blue light emitting devices for more than 2 hours **B:** Conditions experienced by participants after long screen time

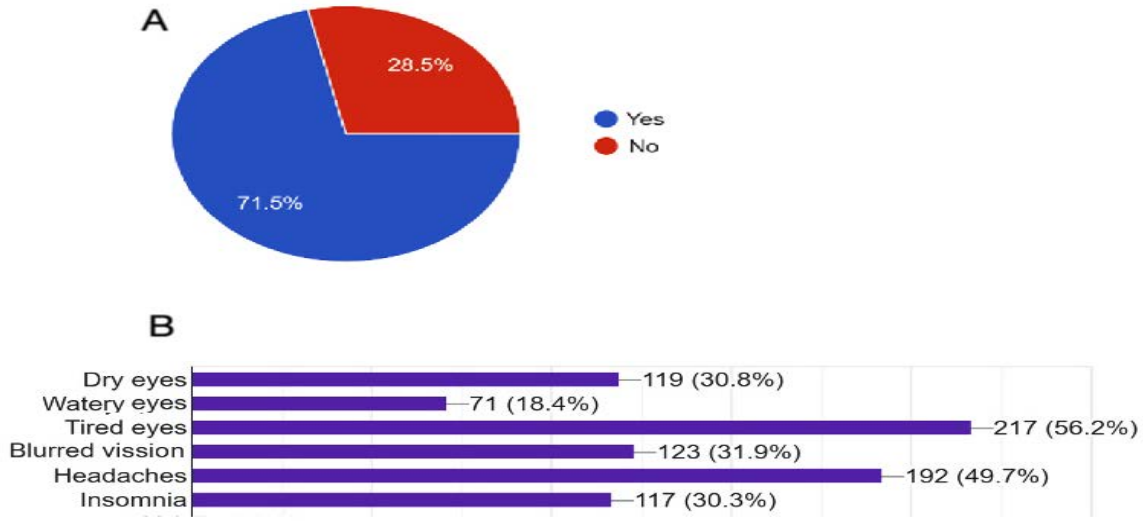

Figure 4A shows the responses of the participants to the question: "Do you take a break while using these devices for more than 2 hours?". More than half (71.5%) indicated that they take breaks when using electronic devices for more than 2 hours. However, 28.5% of the participants said that they don't take breaks while using blue light-emitting devices for long hours.

Figure 4B shows the most visual and neurological symptoms that the participants experienced after using blue light-emitting devices for long hours. For this question, the respondents were able to choose multiple answers. More than half of the respondents (56.2%) said that they experience tired eyes, 49.7% of the participants mentioned that they suffer from headaches, 31.9% said that they experience blurred vision, 30.8% said that they get dry eyes, 30.3% mentioned that they suffer from insomnia, and 18.4% were experiencing watery eyes. On the other hand, 8.03% of the participants indicated that they don't experience any of the symptoms mentioned above.

Figure 5: A: Percentage of participants that adjusted their settings or not to reduce the brightness of their devices. **B:** Participants who have compact fluorescent light (CFL) or LED light in their houses or not

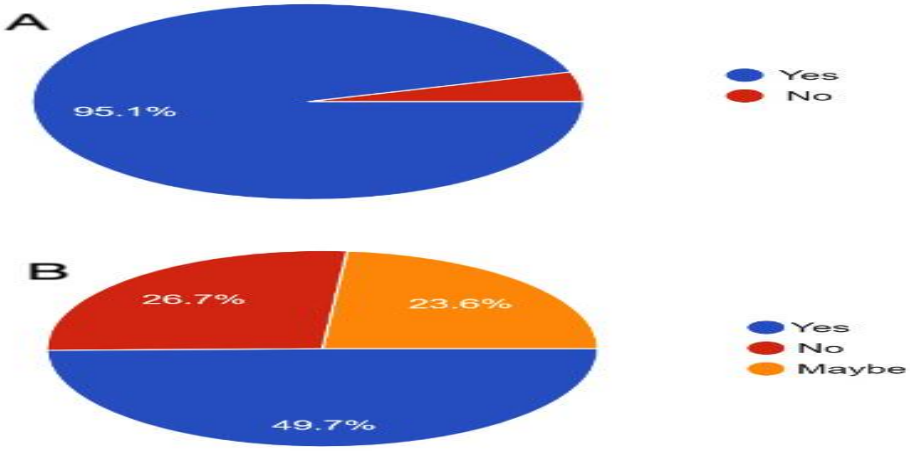

Figure 5A shows the percentage of respondents who adjust the settings on their devices to reduce the brightness. Most of the participants (95.1%) mentioned that they do adjust their settings in order to reduce the brightness, while the other 4.9% said that they don't often reduce their devices' brightness.

Figure 5B shows the percentage of participants who have compact fluorescent lights (CFL) or LED lights in their houses. 49.7% mentioned that they do have CFL or LED lights in their houses, while 26.7% said that they don't have CFL or LED lights, and 23.6% indicated that they are not sure whether they have these lights or not.

Lastly, we divided the participating students into two groups, studying medicine or other fields. A comparison of results between these two groups is given in Table 1. Participants in both medical and other fields thought that the most harmful effects of blue light were sight problems (72.19% vs. 79.26% and p:0.19), sleep problems (64.12% vs. 49.39% and p:0.01) and brain damage (32% vs 40.85% and p:0.54), respectively. Participants in both medical and other fields thought that sources of blue light were phone/computer/TV (93.27% vs. 94.51% and p:0.85), LED light (20.17% vs. 26.82% and p: 0.16) and gaming machines (15.24% vs. 21.95% and p: 0.07), respectively. The frequency of using the blue light filter option on their phones was higher among students in the medical field (61.42% vs. 55.5% and p>0.05), while the rate of never using them was higher among students in other fields (34.52% vs. 39.02% and p>0.05). Students in the medical field were significantly more aware of the existence of blue light protective glasses than students in other fields (75.33% vs. 56.70% and p<0.001), while students in other fields believed more that these glasses were protective and they could use (49.77% vs. 56.09% and p>0.05).

Table 1: Comparison of responses between students in the medical field and other fields

Questions and Responses	Students in the	Students in Other	p-
What are the most hazardous effects of blue			
Brain Damage	%32	%41.36	0.54
Sight Problems	%72.57	%78.39	0.19
Sleep Problems	%63.27	%50.61	**0.01**
Cancer	%22.57	%20.37	0.60
Aging	%17.69	%9.25	**0.02**
Spinal Pain	%7.08	%11.73	0.12
Don't Know	%0.88	%1.85	0.41
Which of the following do you believe is a			
Phone, computer, TV	%93.36	%93.83	0.85
Printer	%3.09	%9.25	**0.01**
LED light	%19.91	%25.93	0.16
Bathroom Heater	%0.88	%1.85	0.41
Gaming Machine	%15.04	%22.22	**0.07**
Don't Know	%5.31	%5.55	0.92
How often do you use the blue light filter			
Always	%20.79	%21.60	0.85
During the day	%5.31	%7.41	0.40
During the night	%33.63	%26.54	0.14
Never	%34.95	%36.42	0.77
Other	%4.42	%6.17	0.44
Have you ever heard about blue-light			
Yes	%75.66	%55.55	**<0.001**
No	%23.89	%44.44	**<0.001**
Would you use these glasses, and do you think			
I would use	%50.00	%56.17	0.23
I already use	%28.32	%24.07	0.33
Wouldn't use it since feeling no difference	%11.06	%11.11	0.99
Wouldn't use it since feeling useless	%11.94	%8.02	0.21

Discussion

Increased screen time due to the acceleration of digitalization after the COVID-19 epidemic and quarantine has further increased concerns about the harmful effects of blue light.[8] As such, it has become more essential that awareness must first be increased in order to be protected from the harmful effects of blue light. Afterward, the effect of blue light can be reduced by some methods, such as blue light-proof glasses and blue light-proof screen membranes. Although there are many types of blue light sources today, and we are highly exposed to them, our awareness and use of these protective methods are still very low. This awareness becomes even more important, especially among university students, where screen use is more common than in the general population. However, to date, no study has investigated the blue light awareness of this special group.

In this study, it was revealed that the majority of university students were aware of blue light-related vision (75%) and sleep problems (58%). Interestingly, 9.1% of the participants replied spinal pain was a consequence of blue light exposure, although it was not a relevant outcome. According to the review conducted by Wahl et al., chronic low-intensity blue light exposure right before bedtime may have substantial consequences on the circadian cycle and sleep quality.[5] Recently, a survey study conducted on children aged 1-3 years showed that the use of electronic devices that emit blue light in the dark just before bedtime affected sleep time by 16.5%.[9] Moreover, a recent review study emphasized that even just preventing blue light exposure at night, many metabolic and hormonal disorders, including circadian rhythm, can be controlled, mental health and cognitive performance can be improved, and even skin problems and the effects of premature aging can be reduced, and ultimately the quality of life can be increased.[10]

As for the sources of blue light, in our study, 93.8% of the students knew that blue light was sourced from screens such as phones, computers and televisions. This information was verified by previous research.[11] Despite their knowledge about the issue and its sources, their awareness about protection methods such as blue light-proof glasses was still low (67%), and the use of this protection method was even lower (27%). Although mobile phones are widely used devices and are known to emit serious blue light by students, only 21% of them use the blue light filter option on their phones routinely, and even 36% do not use it at all. Highlighting the importance of blue light filter use, a recent randomized clinical trial conducted on medical sciences workers showed that Pittsburgh Sleep Quality Index and Visual Function Questionnaire results were significantly improved after three months of use of blue light screen filters.[12] On the other hand, in our study, the collective average of screen time for university students was found to be around 8.88 h/day (3.18 + 5.2 + 0.5). This is relatively greater than that of the global screen time, which was recorded at about 6.96 h/day.[13] Nevertheless, our results indicate that most of the students were aware of the need to take screen breaks and reduce the brightness of their screens. Sheppard et al. suggest a range of management approaches for digital eye strain caused by prolonged screen exposures, which includes regular screen breaks and the consideration

of accommodative problems.[14] Analogously, Smith et al. found that decreasing the brightness of the screen was effective in reducing blue light.[15] In our study, the majority of students reported that they experienced tired eyes and headache symptoms when using the screen for long hours. These results go side to side along the findings of Erdinest et al., where the computer vision syndrome was explained, including eye fatigue, eye strain, blurred vision and headaches.[16]

Additionally, in this study, the collected responses were further analyzed by comparing the responses of those in the medical field with those of respondents within other fields. According to the results, students in the medical field were more aware of the sleep problems caused by blue light (64.12%) than those in the other fields (49.39%). This might be due to the information taught within the curricula about the circadian rhythm and the effect of blue light on melatonin. On the other hand, students in the nonmedical fields have a slightly better background regarding the source of blue light (94.51% for phones, computers and TV and 26.82% for LED lights). The usage of blue light filters shows a similar pattern in terms of both criteria. More respondents from the medical field, however, stated that they use blue light filters at night (34.52%), which also demonstrates their understanding of the circadian cycle; as for the awareness about blue light filtering glasses, medical field respondents had much higher knowledge (75.33%) than nonmedical respondents (56.70%). In contrast way, nonmedical respondents (56.09%) seem more eager to use those glasses than those in the medical fields (49.77%), stating the fact that a higher percentage of the latter already uses blue light filtering glasses (27.8%).

In conclusion, our study is the first to investigate blue light awareness among university students, a population with high exposure. The results suggest moderate awareness of blue light and its potential negative effects but low awareness of protection methods. This highlights the need for increased public education on the risks of blue light. Healthcare professionals should lead efforts to educate the public about blue light sources and their effects. Public health campaigns and education programs are essential to raise awareness and promote protective measures. Recommendations include the use of blue light filters, protective eyewear, and limiting screen time before bedtime. This study provides valuable insights into students' knowledge and behavior regarding blue light exposure, which will inform future initiatives to promote the healthy use of electronic devices. These efforts will ultimately improve the quality of life.

Ethical Considerations: This cross-sectional survey study was conducted online after receiving ethical approval from the Ankara Bilkent City Hospital Ethics Committee (Approval number: E2-22-1502).

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

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Research Article

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DETERMINANT FACTORS AFFECTING ADOLESCENT FRUIT AND VEGETABLE CONSUMPTION IN INDONESIA

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Abstract

Objectives: Adolescence is a critical period for getting used to eating fruit and vegetables for their health because it can affect health in adulthood. The behavior of adolescents in Indonesia who eat vegetables and fruit is still not in line with expectations. This study examined the factors influencing adolescent fruit and vegetable consumption in Indonesia.

Materials and Methods: The cross-sectional study used secondary data from the Indonesia Global School-Based Student Health Survey (IGSHS). The IGSHS sample comprises 75 schools, with 11.142 students representing three regions (Sumatra, Java-Bali, Outer Sumatra, and Java-Bali) in 26 provinces and 68 districts/cities in Indonesia.

Results: Age, soft drinks, and identified fast food consumption as determinants of fruit and vegetable consumption (p=0.001). Sex also affected fruit consumption (p=0.023). Adolescents who did not consume fast food were three times more likely to consume fruit than adolescents who did (OR=3.087, 95% CI=2.508-3.800). Meanwhile, adolescents who did not consume fast food were twice as likely to consume vegetables as those who did (OR=1.723,95% CI=1.395-1.731).

Conclusion: Age, soft drinks, and fast food consumption are determinants of fruit and vegetable consumption. These findings may provide meaningful recommendations for developing policies and health promotion programs to improve community nutrition by increasing the consumption of fruits and vegetables among adolescents to achieve a better nutritional status.

Keywords: Consumption, fruit, vegetables, adolescent, determinant, Indonesia.

Introduction

Fruit and vegetable consumption, particularly among adolescents, reduces noncommunicable disease deaths (NCDs).[1] The rising prevalence of NCDs, such as obesity, hypertension, diabetes, and hypercholesterolemia, is one of the growing health concerns among adolescents.[2] They link this condition to NCD risk factors, such as smoking, lack of physical activity, and inadequate consumption of fruits and vegetables. Fruits and vegetables contain various vitamins, minerals, and fiber. The fiber in vegetables and fruit helps to prevent diseases like heart disease, diabetes, and stroke by lowering bad cholesterol, controlling blood sugar levels, launching the digestive system, and making a person feel fuller so they don't overeat. One effort to prevent the occurrence of NCDs is to increase adolescent fruit and vegetable consumption.[3]

Noncommunicable diseases (NCDs) are long-term illnesses caused by genetic, physiological, environmental, and behavioral factors. According to etymology, NCDs can occur because of controllable or modifiable and uncontrollable risk factors. The death rate associated with NCDs is the highest in the world. According to WHO data, NCDs cause over 41 million deaths yearly, accounting for 71 percent of all deaths worldwide, with 77 percent occurring in low- and middle-income countries such as Indonesia.[4]

The main NCDs are cardiovascular diseases such as heart attacks and strokes, cancer, chronic respiratory diseases such as chronic obstructive pulmonary disease and asthma, and metabolic diseases such as diabetes.[5] These four disease groups account for over 80% of all premature deaths. Cardiovascular disease causes most deaths from NCDs (17.9 million) each year, followed by cancer (9.3 million), respiratory disease (4.1 million), and diabetes (1.5 million).[6]

Fruit and vegetable consumption is part of adolescents' daily diet. The WHO recommends 400 grams of vegetables and fruits per person per day for a healthy lifestyle, which includes 250 grams of vegetables (equivalent to 2 servings or two glasses of vegetables after cooking and draining) and 150 grams of fruit (equivalent to 3 fruits). One medium Ambon banana, one medium papaya, or three medium oranges, As much as 400-600 grams per person per day for Indonesians, especially adolescents and adults.[7]

Adolescence is a critical period for getting used to eating fruit and vegetables for their health because it can affect their health in adulthood. Many factors, such as taste, preference, delicacy, eating habits of parents and families, availability, affordability, and acceptability, influence teenagers' food choices.[8] The behavior of adolescents in Indonesia who eat vegetables and fruit is still not in line with expectations. Riskesdas data in 2013 states that 93.5% of the population of adolescents and adults consume vegetables and fruits below the recommended level, where the daily consumption of fruits and vegetables for adolescents and adults in Indonesia is only 57.1 grams.[9]

This study aimed to develop interventions to increase adolescent vegetable and fruit consumption. This is crucial research as it produces recommendations for increasing adolescent fruit and vegetable consumption, which requires a scientific, evidence-based strategy. Several previous studies show that the daily consumption of fruits and vegetables remains an unsolved issue. Fayasari's research (2020) shows that 67.1% of Indonesian adolescents consume less fruit, and 59.3% consume fewer vegetables.[10] Another study by Anggraeni and Sudarti (2018) discovered that only 4.3 percent of adolescents consumed adequate fruit and vegetables, at least 400 g per day. Asih Anggraeni and Sudiarti.[11] Oktavia et al. (2019) discovered that the frequency of vegetable consumption was less than three times per day in urban areas, which was 57.1 percent higher than in rural areas, which was 48 percent. Meanwhile, respondents in rural areas consumed fruit less than twice per day at a rate that was 85.7 percent higher than in urban areas by 39.8 percent.[12] This study aimed to examine the impact of determinant factors on adolescent fruit and vegetable consumption in Indonesia.

Materials and Methods

Study design and data sources

We conducted this study with a cross-sectional study. It used data from the 2015 Indonesia Global School-Based Health Survey (IGSHS) held by the *Health Research and Development Agency,* the Ministry of Health of the Republic of Indonesia, in collaboration with the World Health Organization and the *US Centers for Disease Control and Prevention.*

The student's ages ranged from 12 to 19 years. A two-stage cluster sample design was used to generate data representative of all Indonesian students in grades 7-12. The first step in sampling is the selection of schools with probabilities proportional to enrollment size. Following that, the class is chosen at random, and all students in the class are chosen. The Indonesian GSHS assesses alcohol, eating habits, drug use, hygiene, mental health, physical activity, sexual behavior, tobacco use, violence, and unintentional injury.

The sample size was determined using calculations performed by the CDC Atlanta America with the PC Sample School Selection Algorithm as a reference. This survey is a component of a more extensive global survey. The sample size was calculated using the Probability Proportional to Size (PPS) method, and the class sample was chosen to use systematic sampling. The IGSHS sample comprises 75 schools with 11,142 students from three

regions in Indonesia (Sumatra, Java-Bali, Outer Sumatra, Java-Bali) in 26 provinces and 68 districts/cities. The national school response rate is 100%, the student response rate is 94%, and the overall response rate is 94%.

The WHO's GSHS questionnaire was used, with minor modifications as needed. We collected data using a self-report questionnaire, paying particular attention to the anonymous aspect to avoid bias and the importance of information confidentiality. I asked students not to include their names or any other form of identification. They instructed respondents to complete the available questionnaire with an explanation or guide on how to do so. We gathered all information with the consent of the respondents and their parents, taking into account research permission and ethical considerations.

Ethical Approval

The WHO, the US Centers for Disease Control (CDC) Ethics Committees, and the Indonesian Ministry of Health allowed the initial survey. This research examined existing public data that is readily available online but stripped of all identifying information. The GSHS project provided permission to view the Indonesia dataset. Data source from: https://www.cdc.gov/gshs/countries/seasian/indonesia.htm, released on Feb 13, 2019.

Data collection

Determinant factor

This study's determinants were age, gender, hunger, soft drinks, and fast food. The question "How old are you?" defines an age. Age-separated early adolescents (11-14 years) and age-separated late adolescents (15-18 years) (n = 11127). Gender (n = 11111) was divided into two categories: males and females. Hunger (n=11093) was assessed using the question: "Have you ever felt hungry because there wasn't enough food in your house in the last 30 days?" with yes and no responses. Soft drinks (n=11086) were defined by answering yes or no to the question, "Did you drink carbonated soft drinks in the last 30 days?" Fast food consumption (n=1100) was assessed using the question "How often do you eat fast food?" with the codes 1 = 0 days, 2 = 1-3 days, and 3 = 4-7 days.

Consumption of fruit and vegetables

Fruit consumption was defined by the question, "Over the past 30 days, how many times a day did you usually eat fruit, such as pineapple, banana, orange, or watermelon?" with code 1 = < 3 times per day, and 2 = 3 times per day. The question measured vegetable consumption, "During the last 30 days, how many times a day do you usually eat vegetables, such as carrots, cabbage, spinach, or kale/kangkung? With the same code as fruit consumption.

Statistical analysis

We analyzed complex samples using primary sampling units, strata, and sample weights. The data analysis methods used were frequency distribution, percentage, chi-square, and multivariate logistic regression. The percentage of frequency distribution was used to analyze the characteristics of adolescents in Indonesia, including age, gender, the sensation of hunger, consumption of carbonated/soda drinks, fast food, and consumption of fruits and vegetables. The Chi-square test was used to analyze the relationship between the determinant factors (age, gender, sensation of hunger, consumption of carbonated/soda drinks, fast food) and consumption of vegetables and fruit. Multivariate logistic regression analysis with an odds ratio of 95% CI was used to estimate the relationship between fruit and vegetable consumption and determinant factors.

Furthermore, the ROC analysis was performed by looking at the AUC area. The area under the curve is an area that shows the level of accuracy of the prediction model and is calculated using a calculation method called Area Under Curve (AUC). Statistical analyses were performed using SPSS Version 21.0 software (SPSS Inc., Chicago, IL, USA). P-value < 0.05.

Results

Sample Characteristics

Early teens (11-14) accounted for 67.7% of Indonesian teenagers. The female gender outnumbers the male gender by 51.1%. Most adolescents in Indonesia do not experience hunger sensations in the same proportion as 56.7%. Most teenagers (96%) do not drink soft drinks and eat fast food 1-3 times per week (48.9%). In Indonesia, the majority of adolescents (84.2%) and vegetables (71.4%) do not consume fruit (Table 1).

The relationship between the determinants of fruit and vegetable consumption habits

The determinant factors related to adolescent fruit consumption were age, gender, soft drinks, and fast food, respectively, with p-values <0.001, 0.013, <0.001, and <0.001. Meanwhile, the determinant factors related to vegetable consumption in adolescents were age (p=<0.001), soft drinks (p=<0.001), and fast food (p=<0.001) (Table 2).

Table 1. Characteristics of Research Participants

Characteristics	n	Percentage
Age (n = 11127)		
Early teens	7537	67.7%
Late teens	3590	32.3%
Gender (n = 11111)		
Woman	5679	51.1%
Man	5432	48.9%
Hunger (n=11093)		
Yes	4799	43.3%
Not	6294	56.7%
Fizzy Drinks (n=11086)		
Yes	446	4%
Not	10640	96%
Fast food (n=1100)		
4-7 days	615	5.6%
1-3 days	5414	48.9%
Not	5051	45.6%
Fruit consumption (n=11021)		
Yes	1746	15.8%
No	9276	84.2%
Vegetable consumption (n=11090)		
Yes	3173	28.6%
Not	7918	71.4%

Determinant factors that affect fruit and vegetable consumption

Age, soft drinks, and fast food were determinants of fruit and vegetable consumption (p=<0.001). Gender influences fruit consumption (p=0.023). Adolescents who do not consume fast food are three times more likely to eat fruit than adolescents who do (OR=3.087,95% CI=2.508-3.800). Meanwhile, adolescents who do not consume fast food are twice as likely as those who do (OR=1.723, 95% CI=1.395-1731). (Table 3).

Table 2. Relationship of Determinant Factors with Fruit and Vegetable Eating Habits

Fruit consumption	Not	Yes	Total	p-value
Age				
Early teens	6133/82.4%	1310/17.6%	7443/100.0%	<0.001
Late teens	3133/87.9%	432/12.1%	3565/100.0%	
Gender				
Woman	4807/85.3%	828/14.7%	5634/100.0%	0.013
Man	4443/82.9%	915/17.1%	5358/100.0%	
Hunger				
Yes	4021/84.7%	725/15.3%	4746/100.0%	0.199
Not	5223/83.7%	1016/16.3%	6238/100.0%	
Soft drink				
Yes	260/59.0%	181/41.0%	441/100.0%	<0.001
Not	8992/85.2%	1556/14.8%	10548/100.0%	
Fast food				
0 days	4409/88.2%	592/11.8%	5001/100.0%	<0.001
1-3 days	4430/82.4%	946/17.6%	5376/100.0%	
4-7 days	407/67.5%	195/32.5%	602/100.0%	
Vegetable consumption				
Age				
Early teens	5150/68.6%	2353/31.4%	7503/100.0%	<0.001
Late teens	2757/77.2%	816/22.8%	3573/100.0%	
Gender				
Woman	4021/71.0%	1640/29.0%	5661/100.0%	0.546
Man	3875/71.8%	1524/28.2%	5399/100.0%	
Hunger				
Yes	3474/72.6%	1309/27.4%	4783/100.0%	0.050
Not	4413/70.4%	1853/29.6%	6266/100.0%	
Soft drink				
Yes	246/55.4%	198/44.6%	443/100.0%	<0.001
Not	7651/72.1%	2960/27.9%	10612/100.0%	
Fast food				
0 days	3727/74.0%	1307/26.0%	5034/100.0%	<0.001
1-3 days	3792/70.3%	1606/29.7%	5398/100.0%	
4-7 days	369/60.6%	240/39.4%	609/100.0%	

Table 3. Determinant Factors Affecting Fruit and Vegetable Consumption

Determinant factor	*p-value*	OR	95% CI	
			Lower bond	*Upper bond*
Fruit consumption				
Age				
Early teens	<0.001	0.65	0.55	0.77
Late teens	Ref.	Ref.	Ref.	Ref.
Gender				
Woman	0.023	0.84	0.73	0.97
Man	Ref.	Ref.	Ref.	Ref.
Soft drink				
Yes	<0.001	0.29	0.23	0.38
Not	Ref.	Ref.	Ref.	Ref.
Fast food				
0 days	<0.001	3.08	2.50	3.80
1-3 days	<0.001	1.99	1.65	2.38
4-7 days	Ref.	Ref.	Ref.	Ref.
Vegetable consumption				
Age				
Early teens	<0.001	0.65	0.53	0.81
Late teens	Ref.	Ref.	Ref.	Ref.
Soft drink				
Yes	<0.001	0.53	0.44	0.63
Not	Ref.	Ref.	Ref.	Ref.
Fast food				
0 days	<0.001	1.72	1.39	2.12
1-3 days	<0.001	1.45	1.22	1.73
4-7 days	Ref.	Ref.	Ref.	Ref.

Predictive ability models

It compares models of fast food predictive factors on adolescent vegetable and fruit consumption. The predictive factor used is fast food because we consider it the factor with the highest determinant, namely the odd ratio value, compared to other factors. The receiver operating characteristics curve was used for the model developed for consuming vegetables and fruits (Figure 1).

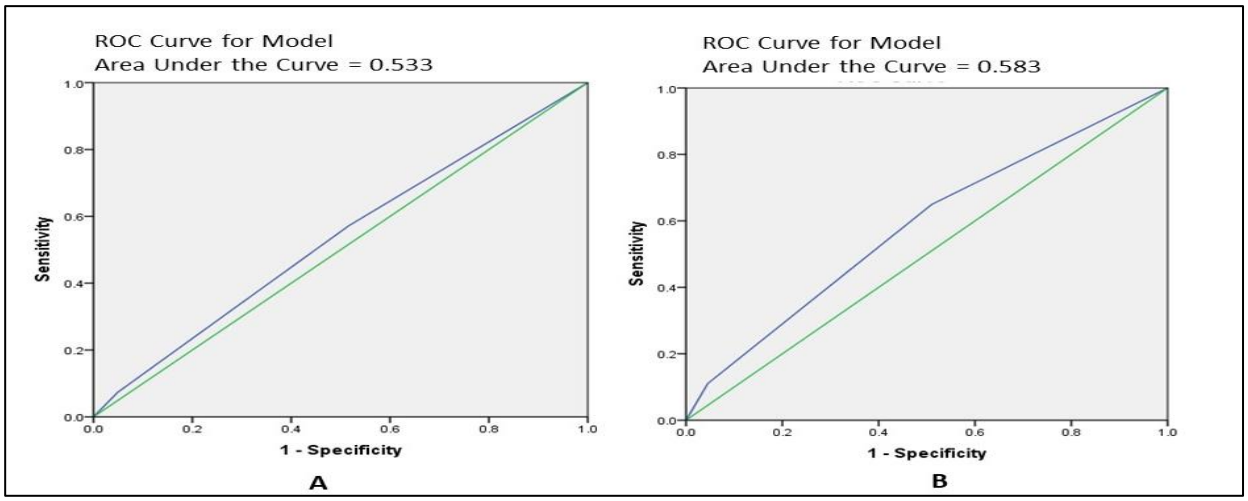

Figure 1. The receiver operating characteristics curve for the model was developed based on the consumption of vegetables and fruits. A. The area under the curve (AUC) in our model was found to be 0.533, equal to 53%. This means that adolescents who consume fast food correctly, with a value of 53%, are predicted to consume fewer vegetables. B. The area under the curve (AUC) in our model was found to be 0.583, equal to 58%. This means that adolescents who consume fast food correctly, with a value of 53%, are predicted to consume fewer fruits.

Discussion

The study found that age was related to fruit and vegetable consumption in adolescents (p=<0.001). These findings are consistent with Albani et al. (2027), who found that the consumption of fruits and vegetables in adolescents changed with age or decreased from childhood to young adulthood. According to the Theory of Planned Behavior (TPB), intention influences a person's eating behavior. Attitudes toward behavior, subjective norms, and perceived behavioral control all influence the emergence of behavioral intentions.[13]

Weak perceived behavioral control over fruit and vegetable consumption occurs as adolescents' knowledge of food options other than fruits and vegetables grows with age.[14] With an increasing variety of food and drink options, teenagers are no longer able to exhibit the behavior of consuming fruits and vegetables every day. Although adolescents believe that increasing age does not directly affect fruit and vegetable consumption behavior but only strengthens intentions, a lack of perceived behavioral control can directly affect fruit and vegetable consumption behavior.

The study found that soft drinks were associated with fruit and vegetable consumption in adolescents (p=<0.001), and soft drinks were associated with fruit and vegetable consumption in adolescents. This result

is in line with the research of Beal et al. (2019), which revealed that, in general, school-age adolescents consume unhealthy foods such as those low in fruits and vegetables and consume a lot of carbonated soft drinks. This is in line with the results of research by Jacob et al. (2020) and Khan et al. (2021). They concluded that consuming sugary drinks (carbonated) is a marker of poor dietary habits or reflects a food source with few choices of fruit and vegetables.[15]

Adolescents who drink a lot of soft drinks have a low intake of fruits and vegetables due to personal preferences. Preference is a choice made by consumers from among the various options available. Internal factors influence food preferences, namely conditions within a person that can affect food consumption, such as appetite, which is influenced by a person's physical and psychological conditions, such as sadness and fatigue, eating habits, and boredom caused by less varied food consumption.

Consuming food in large quantities outside can also cause boredom close to the primary mealtime. External factors exist outside of the individual and can influence food consumption. These factors include the taste of the food, its appearance, the variety of the menu, how it is presented, the cleanliness of the food, the cutlery, and the timing of the meal.[16] A low preference for eating fruit and vegetables or a lack of interest in the consumption of fruit and vegetables compared to the preference for the consumption of soft drinks causes the low consumption of fruits and vegetables in adolescents who drink soft drinks.

Fast food consumption was associated with adolescents' fruit and vegetable consumption ($p=0.001$). Adolescent fruit and vegetable consumption is associated with fast food. Fast food has little or no nutritional value, but it provides a lot of calories and fat, which can be an excellent way to save time in serving, but it isn't a great way to get nutrients. Another study discovered that more than half of adolescents (60.30%) consumed junk food in the previous 30 days, with public schools having the highest rate (65.1%), followed by private schools (56.3%). More than half of the participants consumed salty snacks (58.7%), followed by sweets (57.5%). Consumption time with friends was higher (83.9%).[17]

This finding is consistent with the findings of Cho and Kim (2018), who discovered a significant relationship between fast food and fruit and vegetable consumption behavior ($p = 0.001$).[18] This condition exists because fast food in the food industry has influenced teenagers' eating habits. Teenagers prefer ready-to-eat foods such as fried chicken and instant noodles to eat fruits and vegetables due to their busy schedules with college assignments and extracurricular activities. Adolescent fast food consumption can hinder healthy foods such as fruits and vegetables.

In adolescents, fruit and vegetable consumption is unrelated to hunger. In this study, we define hunger as the response to questions over the previous 30 days, how frequently participants feel hungry because there is not enough food at home, or to assess eating behavior by relying on physiological signals such as hunger for eating

activities. The findings of this study support the findings of Barad et al. (2019), who concluded that hunger is not significantly associated with adolescent fruit and vegetable consumption ($p = 0.91$).[19]

Various factors influence adolescent eating behavior and food consumption. Individual factors (cooking skills, food taste, dietary restrictions, as well as knowledge and perceptions), social factors (peer influence and social norms), university-related factors (campus culture and exam frequency), and environmental factors (availability of cooking resources and facilities, as well as food prices) have emerged as important factors influencing adolescents' eating behavior and food consumption and perceptual features), external food factors (information, social environment, physical environment). Personal state factors (biological features and physiological needs, psychological components), habits and experiences), and cognitive factors (knowledge and skills, attitudes, likes and preferences, anticipated consequences, and personal identity) are the main determinants of food choice.[20]

In conclusion, age, soft drinks, and fast food are determinants of fruit and vegetable consumption. Adolescents who do not consume fast food are three times more likely to consume fruit than those who consume fast food. Adolescents who do not consume fast food are twice as likely to consume vegetables as adolescents who consume fast food. To achieve a better nutritional status, health authorities must be able to develop policies and health promotion programs related to efforts to improve community nutrition by increasing adolescent fruit and vegetable consumption.

Ethical Considerations: The WHO, the US Centers for Disease Control (CDC) Ethics Committees and the Indonesian Ministry of Health allowed the initial survey.

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

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AWARENESS OF ADULT SYRIAN REFUGEE WOMEN ON FAMILY PLANNING METHODS

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Abstract

Objectives: Refugees remain among the most vulnerable groups regarding access to family planning services due to language barriers, lack of social support, and family planning services being left behind in crisis intervention programs. We aimed to evaluate the awareness of adult Syrian women regarding family planning.

Materials and Methods: This cross-sectional study was conducted on adult Syrian women who applied to Immigrant Health Centers (IHC) in September 2022. The sample size was calculated as 357 (95%confidence interval, 5% margin of error, and 50% frequency of not using family planning). A questionnaire designed by investigators, translated into Arabic, was applied to the participants. The Chi-Square Test was used to analyze the nominal data, and logistic regression analysis was performed.

Results: The ages of participants ranged from 18-65, with a mean of 30.9±9.3 and a median of 29. The frequency of using a Family Planning Method (FPM) was 40.3% (n=146). The frequency of using FPM was found to be lower in women younger than 25 years old and primary school graduates ($p<0.05$ for each). The age of marriage was between 13-35, and 40.3% of the women (n=146) were married under 18 years old. It was determined that 343 (94.8%) of the participants were pregnant at least once, 157 (45.8%) of the pregnant women had at least one miscarriage, and 18 of the participants (%63.6) experienced an unplanned pregnancy. Those who have information on FPM (Chi-square= 17.721; $p<0.001$) and those who received counseling services regarding FPM (Chi-square=13.362; $p<0.001$) were found to have a higher frequency of FPM usage.

Conclusion: We found that those with higher education levels and those who had received counseling regarding FPM had a higher frequency of using an FPM. Therefore, consultancy services should be expanded according to the education level of immigrants.

Keywords: Family planning, Syria, refugee, women, knowledge

Introduction

Family planning is essential to ensure gender equality and promote women's empowerment.[1] However, 270 million women, especially in developing countries, cannot access effective and safe family planning methods (FPM) for various reasons, including lack of access to information and services, fear of side effects, insufficient spousal-family support, and cultural-religious factors.[2,3] Refugees remain among the most vulnerable groups regarding FPM due to language barriers, lack of social support, and family planning services being left behind in crisis management programs.[4,5] The Syrian crisis started in 2011 and is the most important crisis of the last decades, and millions of people have been forcibly displaced. The United Nations Refugee Agency reported 6.6 million Syrian refugees worldwide, and 5.6 million stayed in countries around Syria. The three countries with the highest number of Syrian refugees were Turkey, with 64.9% (3.611.143), Lebanon, with 14.8% (825.081), and Jordan, with 12.2% (676.621).[6]

The SIHHAT project (Improving the Health Conditions of Syrians under Temporary Protection Provided by the Republic of Turkey and Improving Related Services) has been implemented by the Republic of Turkey Ministry of Health to enable Syrian immigrants living under temporary protection in Turkey to benefit from primary and secondary health services. In this context, "Immigrant Health Centers (IHC)" have been established in places where refugees live intensively, and direct health services such as family planning, vaccination, and mother and child health services are provided free of charge in these centers. In addition, Syrian health personnel trained by the Turkish Ministry of Health, bilingual (Arabic-Turkish) patient guidance staff, and support services personnel are employed to overcome the language barrier and provide efficient health services.[7] Two IHCs, Alemdağ and Babı-Şifa, provide service in Altındağ, one of the districts in Ankara where immigrants live intensely.[8] Our study aimed to evaluate the awareness of married adult Syrian women in terms of family planning who applied to Alemdağ and Babı-Şifa IHCs for various reasons.

Materials and Methods

This cross-sectional study was conducted on married Syrian women aged 18 and over who applied to Altındağ Alemdağ and Babı Şifa Immigrant Health Centers (IHC) in September 2022 after Ethics Committee approval (2022-08/149).

A total of 5026 married adult Syrian refugees, 3134 to Alemdağ IHC and 1892 to Bab-ı Şifa IHC, were applied in August 2022. Thus, the sample size was calculated as 357 in our study, assuming a 95% CI, 5% margin of error, and 50% frequency of not using FPM. Researchers prepared the questionnaire in Turkish and translated it into Arabic by native speakers. Then, a linguist fluent in Arabic and Turkish translated it back into Turkish. A pilot study was conducted on 10 Syrian women and was given its final form. The participants'

sociodemographic characteristics (age, gender, marital status etc.) were noted in the first part of the questionnaire. Family planning knowledge and quality (receiving family planning counseling, whether to use FPM, reasons for not using it) and pregnancy histories (first gestational age, number of children, mode of delivery, etc.) were recorded in the second part of the questionnaire.

The data obtained were evaluated using the SPSS IBM version 20.0 package program. In the descriptive findings section, categorical variables are presented as numbers and percentages, and continuous variables are presented as mean, standard deviation (SD) and median (maximum and minimum value). In addition, the Chi-Square Test was used to analyze the nominal data and logistic regression analysis was performed.

Results

The ages of the study participants ranged from 18-65, with a mean of 30.9±9.3 and a median of 29. The time spent by the participants in Turkey ranged from 1 to 11 years, with a mean of 6.5±2.2 and a median of 7 years. The frequency of using FPM was 40.3% (n=146). The frequency of using FPM was found to be lower in women younger than 25 years old and primary school graduates ($p<0.05$ for each) (Table 1).

The marriage age in the study group was between 13-35, and 40.3% of women (n=146) were married before the age of 18 (Table 2). It was determined that 343 (94.8%) of the participants were pregnant at least once, 157(45.8%) of the pregnant women had at least one miscarriage, and 218 of the participants (63.6%) experienced an unplanned pregnancy. Those with less than ten years of marriage and three/fewer living children had a lower frequency of FPM usage ($p<0.05$ for each) (Table 3).

While all participants stated they were familiar with family planning, only 79.6% knew the concept thoroughly (n=288). In addition, 14.6% of the women indicated that they got pregnant while using FPM at some point in their lives (n=53). Those who have information on FPM (Chi-square= 17.721; $p<0.001$) and those who received counseling services regarding FPM (Chi-square=13.362; $p<0.001$) were found to have a higher frequency of FPM usage. Participants were most familiar with IUDs, which were the most commonly used contraceptive method among participants (Table 4). It was determined that 17.2% of the participants did not use any modern FPMs (n=25). The multivariate analyses were performed among the variables found to be significant in univariate analysis (Table 5).

Table 1. The sociodemographic characteristics and FPM usage of the participants

Characteristics	n (%)	FPM usage		Chi-Square, p
		No, n (%)	Yes, n (%)	
Age (year)				
≤25	**121 (33.4)**	**89 (73.6)**	**32 (26.4)**	**16.866, 0.000**
26-34	141 (39.0)	80 (56.7)	61 (43.3)	
≥35	100 (27.6)	47 (47.0)	53 (53.0)	
Period lived in Turkey (year)				
≤4	60 (16.6)	38 (63.3)	22 (36.7)	3.584, 0.167
5-8	248 (68.5)	152 (61.3)	96 (38.7)	
≥9	54 (14.9)	26 (48.1)	28 (51.9)	
The educational level of women				
No Graduation	49 (13.5)	32 (65.3)	17 (34.7)	**10.119, 0.038**
Primary school	96 (26.5)	**67 (69.8)**	**29 (30.2)**	
Middle School	90 (24.9)	47 (52.2)	43 (47.8)	
High school	78 (21.5)	47 (60.3)	31 (39.7)	
University/Graduate	49 (13.6)	23 (46.9)	26 (53.1)	
The educational level of husbands				
No graduation certificate	40 (11.0)	26 (65.0)	14 (35.0)	8.472, 0.076
Primary school	114 (31.5)	79 (69.3)	35 (30.7)	
Middle School	108 (29.8)	57 (52.8)	51 (47.2)	
High school	52 (14.4)	29 (55.8)	23 (44.2)	
University/Graduate	48 (13.3)	25 (52.1)	23 (47.9)	
Working status of women				
Employed	51 (14.1)	30 (58.8)	21 (41.2)	0.000, 1.000
Unemployed	311 (85.9)	186 (59.8)	125 (40.2)	
Working status of husbands/partners				
Employed	216 (59.7)	122 (56.5)	94 (43.5)	2.260, 0.133
Unemployed	146 (40.3)	94 (64.4)	52 (35.6)	
Level of income				
Low	107 (29.6)	70 (65.4)	37 (34.6)	2.810, 0.245
Middle	213 (58.8)	115 (55.8)	91 (44.2)	
High	42 (11.6)	26 (61.9)	16 (38.1)	
Smoking Status				
Yes	36 (10.0)	19 (52.8)	17 (47.2)	0.503, 0.478
No	326 (90.0)	197 (60.4)	129 (39.6)	
Chronic illness				
Yes	38 (10.5)	19 (50.0)	19 (50.0)	1.231, 0.267
No	324 (89.5)	197 (60.8)	127 (39.2)	
Total	362(100.0)	216 (59.7)	146 (40.3)	

Table 2. Pregnancy characteristics of the participants

Pregnancy characteristics	Median (min.-max.)	Mean±SD
Marriage age (year)	18 (13-35)	18.7±3.6
Length of marriage (year)	9 (1-51)	11.9±9.4
First gestational age (year)	19 (13-43)	19.8 ± 3.9
Total number of pregnancies (n)	4 (1-16)	3.9 ± 2.3
Number of living children (n)	3 (1-12)	3.3 ± 1.8

Table 3. Comparison of patient characteristics and FPM usage

Characteristics	n (%)	FP usage		Chi-square, p
		No, n (%)	Yes, n (%)	
Consanguineous marriage				
Yes	121 (33.4)	73 (60.3)	48 (39.7)	0.033, 0.856
No	241 (66.6)	143 (59.3)	98 (40.7)	
Age of marriage				
<18	146 (40.3)	85 (58.2)	61 (41.8)	0.214, 0.644
≥18	216 (59.7)	131 (60.6)	85 (39.4)	
Length of marriage				
≤5	89 (24.6)	65 (73.0)	24 (27.0)	**12.901, 0.002**
6-10	119 (32.9)	74 (62.2)	45 (37.8)	
≥11	**154 (42.5)**	**77 (50.0)**	**77 (50.0)**	
Age of the first gestation				
<18	84 (24.5)	46 (54.8)	38 (45.2)	0.400, 0.527
≥18	259 (75.5)	152 (58.7)	107 (41.3)	
Total number of pregnancies				
1-2	**98 (28.6)**	**70 (71.4)**	**28 (28.6)**	**12.980, 0.002**
3-4	134 (39.1)	76 (56.7)	58 (43.3)	
≥5	111 (32.4)	52 (46.8)	59 (53.2)	
Miscarriage				
No	186 (54.2)	107 (57.5)	79 (42.5)	0.007, 0.935
Yes	157 (45.8)	91 (58.0)	66 (42.0)	
Number of miscarriage				
1	90 (57.3)	54 (60.0)	36 (40.0)	1.795, 0.408
2	44 (28.0)	22 (50.0)	22 (50.0)	
Three and more	23 (14.6)	15 (65.2)	8 (34.8)	
Unplanned pregnancy				
Yes	218 (63.6)	125 (57.3)	93 (41.6)	0.037, 0.848
No	125 (36.4)	73 (58.4)	52 (41.6)	
Pregnancy while using an FPM at any time of life				
No	309 (85.4)	187 (60.5)	122 (39.5)	0.414, 0.520
Yes	53 (14.6)	29 (54.7)	24 (45.3)	
Number of live births				
0-1	62 (18.1)	43 (69.4)	19 (30.6)	**11.879, 0.003**
2-3	157 (45.8)	98 (62.4)	59 (37.6)	
≥4	**124 (36.2)**	**57 (46.0)**	**67 (54.0)**	
Number of living children				
0-1	62 (18.1)	43 (69.4)	19 (30.6)	**11.879, 0.003**
2-3	157 (45.8)	98 (62.4)	59 (37.6)	
≥4	**124 (36.2)**	**57 (46.0)**	**67 (54.0)**	
Delivery type in the first pregnancy				
Vaginal	287 (86.4)	159 (55.4)	128 (44.6)	0.485, 0.486
C-section	45 (13.6)	28 (62.2)	17 (37.8)	
Desire to have children				
Yes	236 (65.2)	155 (65.7)	81 (34.3)	**10.175,0.001**
No	126 (34.8)	61 (48.4)	65 (51.6)	
Considered the ideal number of children				
≤3	124 (34.3)	73 (58.9)	51 (41.1)	0.050, 0.823
≥4	238 (65.7)	143 (60.1)	95 (39.9)	
The period between pregnancies				
≤1	13 (3.6)	4 (30.8)	9 (69.2)	4.855, 0.088
2	95 (26.2)	56 (58.9)	39 (41.1)	
≥3	254 (70.2)	156 (61.4)	98 (38.6)	
Total	362 (100.0)	216 (59.7)	146 (40.3)	

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Table 4. The awareness of the participants on family planning

Variables	n (%)
Status of receiving counseling family planning services	
Yes	171 (47.2)
No	191 (52.8)
The source of the knowledge on family planning*	
Health personnel	123 (57.2)
Friend, neighbor, etc.	47 (21.9)
Internet	25 (11.6)
Written-visual media	20 (9.3)
The status of having adequate knowledge of family planning	
Yes	288 (79.6)
No	74 (20.4)
Known FPMs*	
IUD	178 (27.5)
Breast-feeding	108 (16.6)
Oral Contraceptive	98 (15.1)
Condom	84 (12.9)
Calendar method	72 (11.1)
Coitus interruptus	42 (6.5)
Tubal ligation	11 (1.7)
Others	56 (8.6)
Preferred FPMs*	
IUD	71 (48.6)
Condom	26 (17.8)
ARROW	23 (15.8)
Breast-feeding	9 (6.2)
Calendar method	8 (5.5)
Retraction	8 (5.5)
Tubal ligation	1. (0.6)
Reasons for not using FPMs*	
Sexual abstinence	13 (5.8)
Religious	31 (13.8)
I don't trust their guardianship	24 (10.7)
I want children	104 (46.2)
My husband/partner doesn't want	49 (21.8)
Our elders don't want	4 (1.8)
Unplanned pregnancy status	
Yes	218 (63.6)
No	125 (36.4)
The termination of unplanned pregnancies*	
Abortion/curettage	81 (35.4)
Live birth	148 (64.6)
Decision makers regarding having children	
Elder family members	5 (1.4)
Woman	24 (6.6)
Husband	48 (13.3)
The mutual decision of the couple	285 (78.7)
Decision makers regarding FPMs	
Woman	32 (8.8)
Husband	20 (5.5)
The mutual decision of the couple	310 (85.6)
Who do you think should use the FPMS?	
Woman	132 (36.5)
Male	18 (5.0)
Both of them	212 (58.6)
Availability of the FPMs	
Free of charge from health institutions	98 (67.1)
From the pharmacy	38 (26.0)
Other**	10 (6.8)
Do you know the FPMs are free of charge in IMHs	
Yes	277 (76.5)
No	85 (23.5)
Total	**362 (100.0)**

* Numbers and percentages are given over the number of answers, ** Market, medical, personal care, and cosmetic product sales centers, a: Vaginal douche, spermicide, vaginal ring

Table 5. Multivariate analysis results

Variables		OR (CI 95%)
Age (year)	≤25	1
	26-34	1.5 (0.7-2.9)
	≥35	1.9 (0.8-4.7)
The educational level of women	No Graduation	1
	Primary school	0.6 (0.3-1.4)
	Middle School	1.6 (0.7-3.5)
	High school	1.2 (0.5-2.7)
	University	2.5 (0.9-6.5)
Length of marriage (year)	≤5	1
	6-10	0.8 (0.4-1.8)
	≥11	0.8 (0.3-2.1)
Total number of pregnancies	1-2	1
	3-4	2.3 (1.0-5.1)
	≥5	2.4 (0.8-6.8)
Number of live births	0-1	1
	2-3	0.6 (0.3-1.5)
	≥4	0.9 (0.3-2.7)
Number of living children	0-1	1
	2-3	0.9 (0.3-1.8)
	≥4	1.2 (0.4-3.7)
Desire to have children	Yes	1
	No	1.2 (0.2.0)

Discussion

Immigrants remain vulnerable to adequate health care due to unfavorable living conditions, low income, health insurance problems, and language barriers. Especially women, who constitute one of the disadvantaged groups, are faced with inadequate prenatal care, premature birth and miscarriage, high fertility due to insufficient use of FPMs, and many other reproductive health problems.[9] Determining the knowledge of migrant women towards FPMs has a crucial role in reproductive health care planning. In this study, we aimed to evaluate the awareness of married adult Syrian women regarding family planning services.

We found that less than half of the refugee women (40.3%) were using any kind of FPMs, while those using modern FPMs were only one-third of the participants. In a study on Syrian refugees in Turkey, the prevalence of using FPM in married women aged 15-49 was 43%, while using modern methods was 24%. In the same study, the prevalence of using FPM was found to be 70% of married Turkish women, and using traditional methods was 21%.[10] It has been reported that the frequency of using FPM among Syrian immigrants living in Turkey varies between 37.8% and 71.2%10-13, while it was between 34.5-and 53.9% among Syrian immigrants living in other countries.[14,15] Moreover, the prevalence of using FPM was 54%, and the unmet FPM need was less than 20% before the Syrian war (2009), according to World Bank statistics.[16] Thus, the frequency of FPM usage is reduced in Syrian refugee women in Turkey and other countries compared to the pre-war

period. The Syrian war, the public health catastrophe of the 21st century, has led to a disruption in health services.

Cift et al. stated that the most common reasons for Syrian refugees not using FPM are wanting more children in the future, religious reasons, and husbands' desire to have more children.[17] Ontas et al. found that the most common reasons are the fear of harming their health and the husbands' desire for more children.[12] In a study conducted in Jordan, it was reported that although the awareness of Syrian refugee women about modern contraceptive methods is high, misperceptions about side effects and lack of information about access to health services remain challenging for using FPM.[5] Moreover, Cherri et al. stated that the use of FPM by Syrian refugee women before they have children causes the husband's family to think that the bride is infertile or that the reproductive health will be harmed after the use of FPM and creates the perception that the man may need a second marriage.[18]

The cost, accessibility, and practicality of FPMs affect women's preferences. Sometimes, difficulties accessing these products may cause people to shift their preferences. The IUD is one of the most commonly used modern contraceptive methods worldwide due to its long-acting effect and high success rate.[19] Studies on Syrian immigrants in different countries have reported comparable results.[15,20] Like the literature, the most preferred modern method among women was the IUD, followed by the condom.

It is known that Syrian migrant women have a higher marriage rate, marry young, have high fertility rates, and have common adolescent pregnancies.[11,21] Today, the average birth age in the Organization for Economic Co-operation and Development (OECD) countries is 30, while it is between the ages of 28-30 in Turkey.[22] On the other hand, 55% of Syrian immigrant women were married before the age of 20, 38% before the age of 18, and 12% before the age of 15, and 209 out of every thousand women gave birth between the ages of 15-19.[10] In forced migrations, girls are married off early by their families for economic deprivation, security problems, and fear. Early marriages are caused by the immigration-related poor conditions and the socio-cultural structure of Syrian women; thus, early pregnancies are inevitable in Syrian refugees.[23] We observed that the marriage age decreased to 13 years, and the age of first births increased to 16. By this data, the frequency of using FPM was lower in younger women.

Syrian immigrants stated that the appropriate number of children was six in the study conducted in Lebanon.[18] These findings were compatible with studies conducted in Turkey.[10,24] Suitably, the average number of children among Syrian migrant women is suggested to be between 3 and 5.13,15,20. Similar to these findings, we found that nearly half of the women had at least four children. In addition, 78.7% of the participants stated that the decision to have children was a joint decision of the couple, which is lower than the average of Turkish couples.[10] Cherri et al. suggested that the decision was made mainly by the husband and his family, while West

et al. indicated that the majority of women make FPM decisions together as a couple; however, 27% of women stated that their husbands make the final decision.[5,18] In Syria, a patriarchal society, the final decision is expected to be given by the man and his family.

The educational level of women and their husbands is a critical variable in fertility behavior; as the education level of women increases, the fertility rate decreases.[25] Therefore, education has a direct impact on the frequency of FPM usage. Similar to the different studies from Turkey, Jordan, and Lebanon, we found that Syrian refugee women with a low level of education had a lower frequency of FPM use.[5,23,24]

Smith et al. stated that 38.5% of Syrian immigrants in Jordan received counseling regarding family planning,[15] while it was 47.2% in our study. The knowledge, attitude, and behavior model suggests that the knowledge of individuals would change their attitudes positively, which would be expected to be reflected in their behavior.[26] By the knowledge, attitude, and behavior model, the frequency of FPM usage was higher in those who received counseling regarding family planning. Thus, providing sources to increase the knowledge of Syrian immigrants is essential to increase the frequency of using FPM.

The importance of primary health care services, where individuals can easily access health services and where cost-effective, both therapeutic and preventive health services are provided as a whole, increases even more for sensitive groups. The situations that immigrants are exposed to during migration, their pre-existing health problems, and their inability to adapt to the culture and language of the immigrant society make the current situation even more difficult. For this reason, primary health care services, which form the basis of health services, are the most effective and cheapest way to remove obstacles, especially for disadvantaged groups.

The most important limitation of this study is that causality could not be established due to its cross-sectional nature. Additionally, it cannot be generalized because it is single-centered.

In conclusion, the use of family planning services among Syrian migrant women is highly correlated with patriarchal and traditional norms and the harmful effects of war and forced migration. Furthermore, since the educational level of individuals is closely related to the frequency of FPM usage, it is essential to create a positive environment regarding family planning counseling. Therefore, developing and implementing intervention programs for Syrian immigrant women to gain a deeper understanding of reproductive health and family planning methods is crucial.

Ethical Considerations: Ethics committee permission numbered 2022-08/149 was obtained from the Health Sciences University Non-Interventional Clinical Research Ethics Committee.

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

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Research Article

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INVESTIGATION OF BIRTH ANXIETY THAT MAY DEVELOP IN NULLIPARIOUS FEMALE HEALTH WORKERS WORKING IN THE DELIVERY ROOM AND THE FACTORS AFFECTING IT: A CROSS SECTIONAL DESCRIPTIVE STUDY

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Abstract

Objectives: Birth anxiety is defined as a negative evaluation of the prepartum, partum and postpartum period and an anxious approach to labor. In our study, it was aimed to reveal the prevalence of birth anxiety among nulliparous health workers working in the delivery room and to investigate some factors that may be effective in the development of birth anxiety and the relationship between these factors.

Materials and Methods: The study, which was planned to be based on a cross-sectional descriptive questionnaire, involved 160 nulliparous female health personnel who were working in the delivery room of Başakşehir Çam and Sakura City Hospital Gynecology Clinic between 01.10.2022 and 01.11.2022. The study used the 19-question Sociodemographic Data Form and the 13-question Scale of Traumatic Childbirth Perception (STCP) prepared by the researcher as data collection tools.

Results: 160 nulliparous female health personnel participated in our study. It was found that half of the patients had moderate birth anxiety. A statistically significant negative relationship was found between the total score of the STCP and the age (years). Those who witnessed a complicated birth had higher overall scores of the STCP compared to those who did not. Participants who preferred cesarean delivery had higher overall scores of STCP compared to those who preferred normal birth.

Conclusion: The study findings suggest that nulliparous female health personnel experience birth anxiety, and several factors contribute to the development of birth anxiety. Therefore, it may be recommended that professional support is provided to female health personnel before and during pregnancy.

Keywords: Delivery room, health personnel, birth anxiety, primary care

Introduction

Pregnancy and childbirth have an important and special place in most women's lives. In addition to the fact that childbirth is a miraculous experience, most women experience birth anxiety because it is an uncontrollable action with an unknown end.[1] Birth anxiety is defined as a negative evaluation of the prepartum, partum and postpartum period and an anxious approach to labor.[2] Birth anxiety can cause many problems as a result of the effects of secreted stress hormones on the body and mind.[3]

Many biological, psychological and sociological factors, such as advanced age, being lonely and unemployed, interventional vaginal delivery, emergency cesarean section and premature birth, can be effective in the formation and triggering of birth anxiety.[4]

In a study conducted in Turkey, It has been reported that the prevalence of birth anxiety in multiparous pregnant women is 40% and 46.6% in primiparous pregnant. [5] A study by Toohill et al. found that 31.4% of nulliparous women experienced severe birth anxiety.[6] In the literature, it has been determined that most of the studies on birth anxiety are for pregnant women, and the studies examining the perception of birth of nulliparous health workers are insufficient.

The objective of this study was to investigate whether working in the delivery room causes birth anxiety in nulliparous female health workers. Additionally, we aimed to determine whether factors such as the duration of working in the delivery room and the number of births seen have an impact on the development of birth anxiety.

Materials and Methods

The study was cross-sectional and descriptive. The study included 160 nulliparous midwives, obstetrician and gynecology assistant physicians and specialists, and rotational assistant physicians from family medicine, pediatrics and other departments who between the ages of 18-45, provided consent to participate and were actively working in the delivery room of Başakşehir Çam and Sakura City Hospital between 01.10.2022 and 01.11.2022.

The study population was calculated using the traditional formulation method.[7]

Of the 425 people actively working in the delivery room, 54 were excluded because they were male, 46 were not in the 18-45 age range, 42 were primiparous or multiparous, and 11 did not give consent to participate in the study. The sample size for the remaining 272 delivery room workers was 160, with a 95% confidence interval. The study was completed with 160 people who answered and completed all the survey questions.

In the study, the 19-question Sociodemographic Data Form and the 13-question Scale of Traumatic Childbirth Perception (STCP) were used as data collection tools. The questionnaire consisting of 32 questions was applied face to face. Since the survey was conducted face-to-face, care was taken to ensure that the participants responded to all questions and that there was no missing data.

Sociodemographic Data Form

The sociodemographic data form is a 19-question questionnaire designed by the researcher to collect information about the participant's age, branch, years of experience in the profession, time spent in the delivery room, experience of witnessing births, complications or stillbirths, whether they have had a singleton birth and, if so, the number of births, number of children wanted, pregnancy history, reasons for termination of pregnancy, recommended method of delivery for patients and preferred method of delivery for themselves.

The scale of Traumatic Childbirth Perception

The Scale of Traumatic Childbirth Perception was developed by Yalnız et al. (2016) to evaluate the perception levels of traumatic birth in women of reproductive age.[8] The scale includes the anxiety, fear, worry and trauma that a woman may experience when she thinks about the phenomenon of childbirth. The questionnaire consists of a total of 13 questions, and each question has a score of 1-10, from nothing to the most severe. The lowest score that can be obtained from the scale is 13, while the highest score is 130. As the score increases, the level of perception of childbirth as traumatic also increases. Permission was obtained from the researchers who developed the scale for its use. The Cronbach's alpha value of the scale was calculated as .895.

The independent variables in the study were age, marital status, branch, years in practice, years in the delivery room, delivery complications and stillbirths, deliveries and number of births, and current pregnancies and reasons for abortion, and several dependent variables were desired number of children, desired number of children, preferred method of delivery, and method of delivery recommended to patients.

Statistics

IBM SPSS version 25.0 (SPSS Inc., Chicago, Illinois, USA) package program was used for data analysis in the study. When the data of the study were examined in terms of normality assumptions, Kolmogorov-Smirnov

values were determined as p>0.05. Therefore, Pearson correlation analysis was performed using parametric tests to determine the relationship between scale scores and various variables. In addition, the Independent Samples T-test and One Way ANOVA test were applied from parametric tests to determine whether there was a significant difference between the scale scores and the sociodemographic data and various variables of the participants. If the difference between the groups was significant, the Sidak test was used from the Post-Hoc tests to determine which groups the significance was between. P<0.05 was considered statistically significant.

Results

In Table 1, a frequency analysis of the sociodemographic data of the participants is given.

Table 1. Sociodemographic Data About Participants (n=160)

Demographic variables		**n or Median (Min-Max)**	**% or Avg. ±SS**
Age		28.0 (20.0-38.0)	27.51±2.74
	27 years and younger	75	46.87
	Over 27 years old	85	53.13
Marital status	Married	58	36.37
	Single	102	63.75
Profession	Doctor	119	74.37
	Midwife	20	12.50
	Nurse	21	13.13
Maternity ward tenure (months)		8.0 (1.0-84.0)	15.71±16.54
	0-6 months	78	48.75
	7-12 months	26	16.25
	13 months and older	56	35.00
Did you contribute to the birth?	Yes	90	56.25
	No	70	43.75
If yes, how many births have you contributed?	 0-50 births 51-100 births Over 100 births	42.50 (1.0- 1000.0) 51 13 26	113.14±189.98 56.66 14.44 28.90
Have you witnessed a complicated birth?	Yes	126	78.75
	No	34	21.25
Have you seen a stillbirth?	Yes	101	63.12
	No	59	36.88
Which method of delivery would you like to choose for yourself?	Vaginal birth	90	56.25
	Cesarean delivery	70	43.75
Which delivery method do you recommend to patients?	Vaginal birth Cesarean delivery	143 17	89.37 10.63

The age of the participants was divided into two categories: below and above 27 years, as the average age of the participants was 27 years, in order to achieve a homogeneous distribution. When we look at the frequency distribution of the data regarding various variables of the participants, it was determined that %46.87 of them under 27 years old, 48.8% of them worked in the delivery room between 0-6 months, 93.8% of them had both normal and cesarean delivery, 78.8% of them witnessed complicated birth, 63.1% of them witnessed stillbirth, 56.3% of them contributed birth, 56.3% of them wanted to give birth with the vaginal birth method and 89.4% of them recommended the patients to give birth with the vaginal birth method.

According to the STCP scoring, it was seen that 50% of the participants had a moderate level, 18.8% had a high level, 3.1% had a very high level, 22.5% had a low level, and 5.6% had a very low level of traumatic childbirth perception in the frequency distribution obtained regarding the scores they received from the scale.

The arithmetic means of the participant's responses to the STCP items are given in Table 2.

Table 2. The Arithmetic Mean of the Participants' Responses to the Scale of Traumatic Childbirth Perception Items

The Scale of Traumatic Childbirth Perception Items	**Avg.**
M1. To what extent are you afraid of the thought of giving birth?	6.80
M2. How anxious is the thought of giving birth?	6.72
M3. How scared are you of losing control in childbirth?	6.33
M4. How afraid are you of dying in childbirth?	4.52
M5. To what extent do you think the interventions during childbirth will harm you?	5.28
M6. How much does the thought of physical damage to the genital area, which is the birth tract during childbirth (tears, fragmentation, enlargement, swelling, pain, deformity, etc.) worry you?	**7.36**
M7. How much does the thought of having a normal birth scare you?	6.63
M8. How scared are you of losing control at the height of your labor?	6.34
M9. How often does the thought of childbirth come to your mind and make you restless?	3.17
M10. How anxious would you be about accompanying a friend to her birth?	3.01
M11. When faced with a situation that reminds you of childbirth, do you feel alienated from your surroundings or as if you are watching yourself from the outside?	2.44
M12. How anxious do you feel when you see a news, movie, or series about childbirth on TV?	2.40
M13. When the thought of giving birth comes to mind, do you feel your heartbeat quicken?	2.85
Overall score	**4.91**

Avg: Average

According to the results of this analysis, the general arithmetic mean of the numerical values of the participants' answers to the STCP items was determined as 4.91. It was determined that the participants got the highest score from M6 and the lowest score from M12.

The results of the analysis regarding the comparison of the total scores of the participants in terms of various variables are given in Table 3. According to the results of this analysis, a statistically significant difference was found between the total score of the STCP and the question "Have you witnessed a complicated birth?" (t=2.172, p=0.031). Those who witnessed a complicated birth were found to have higher STCP total scores compared to those who did not. A statistically significant difference was found between the total score of the STCP and the question "Which delivery method do you want to choose for yourself?" (t=- 3.573 p<0.001).

In Table 4, the scale scores applied to the participants and the relationships between various variables were shown by Pearson correlation analysis. According to the results of this analysis, a statistically significant negative relationship was found between the total score of the STCP and the age (years) (r=-0.177, p=0.026). A statistically significant negative relationship was found between the total score of the STCP and the question "How many children do you want?" (r=-0.320 p<0.001).

There was no statistically significant difference between the total score of the STCP and age (p=0.051), marital status (p=0.990), occupation (p=0.752), the branch in which the physician worked (p=0.505), tenure in the profession (p=0.297) and duration of duty in the delivery room (months) (p=0.257), but there was a statistically significant difference between the "Did you witness a complicated birth?" question (t=2.172, p=0.031). Those who witnessed a complicated birth had higher overall scores of the STCP compared to those who did not.

Table 3. Comparison of the Mean Scores of the STCP According to Various Characteristics of the Participants (n=160)

Variables	N	STCP Total Mean±SD	t, F	p
Age				
27 years and younger	75	67.37±21.58	1.967	0.051
Over 27 years old	85	60.71±21.16		
Marital status				
Married	58	63.81±20.62	-0.012	0.990
Single	102	63.85±22.16		
Profession [b]				
1) Doctor	119	63.46±21.49	0.285	0.752
2) Midwife	20	67.20±20.66		
3) Nurse	21	62.76±23.44		
Maternity ward tenure (months)[b]				
1)0-6 months	78	62.14±21.55	1.369	0.257
2)7-12 months	26	70.12±15.60		
3) 13 months and older	56	63.29±23.65		
Did you contribute to the birth? [a]				
Yes	90	64.13±20.53	0.196	0.845
No	70	63.45±22.94		
Have you witnessed a complicated birth? [a]				
Yes	126	65.73±20.58	2.172	**0.031**
No	34	56.79±23.86		
Have you seen a stillbirth? [a]				
Yes	101	64.30±19.97	0.342	0.733
No	59	63.03±24.18		
Which method of delivery would you like to choose for yourself? [a]				
Vaginal birth	90	58.65±21.81	-3.573	**<0.001**
Cesarean delivery	70	70.50±19.41		

a: Independent samples t-test, b: One way ANOVA, Post-Hoc: Sidak, p<0.05, STCP: Scale of Traumatic Childbirth Perception

Table 4. Correlation Analysis Results of Scale Scores Applied to Participants and Relationships Between Various Variables

		1	2	3	4	5	6
1- STCP Total	R	1					
	P						
2-Years (years)	R	-0.177*	1				
	P	**0.026**					
3- What is your year in the profession?	R	-0.090	0.631**	1			
	P	0.255	**<0.001**				
4-How long did you work in the delivery room? (months)	r	0.047	0.087	0.330**	1		
	p	0.551	0.276	**<0.001**			
5- How many births have you contributed?	r	0.002	0.121	0.060	-0.187	1	
	p	0.984	0.257	0.573	0.077		
6-How many children would you like?	r	-0.320**	0.044	0.004	-0.074	-0.221	1
	p	**<0.001**	0.608	0.962	0.389	0.057	

*Correlation is significant at 0.05 level (Pearson correlation test), ** Correlation is significant at 0.01 level (Pearson correlation test), STCP=Scale of Traumatic Childbirth Perception

Discussion

The findings of this study, which is a specialty thesis to determine the birth anxiety that working in the delivery room and seeing birth can cause on nulliparous female health personnel and the factors affecting it, are discussed in the literature.

In the literature, it has been determined that most of the studies on birth anxiety are for pregnant women, and the studies examining the perception of birth of nulliparous health workers are insufficient. In our study, the sample group was determined to be nulliparous female health personnel due to the fact that they spent time with women during the birth process and witnessed this process one-on-one, and it is thought that they will contribute to the relevant literature.

Studies have reported varying rates of birth anxiety due to cultural and geographical differences and differences in how anxiety is measured. According to a study conducted abroad in 2009 on birth anxiety, 48% of pregnant women reported moderate, and 26% reported a high degree of anxiety.[9] Pusuroglu conducted a review in our country, which revealed that around 20% of pregnant women experienced moderate levels of birth anxiety, while 15% experienced severe levels.[10] In our study, which supports the literature, it was found that 50% of the universe had moderate levels of birth, 18.8% had high levels, 3.1% had very high levels, and 22.5% had low levels of birth anxiety.

There are many factors that affect the anxiety of birth, such as age, occupation, and previous negative birth experiences. According to Nieminen's 2009 study on birth anxiety, there is a positive correlation between age

and anxiety levels during childbirth.[11] Research suggests that advanced age can cause birth anxiety due to factors such as women's planned lifestyles, the fear of unfinished projects and the desire to keep everything under control in the face of the return of the modern world.[11] In contrast to these studies in the literature, Rouhe states a study in 2015 found that younger people experience more anxiety at birth.[12] In 2020, a study by Bıyık and Aslan reported greater birth anxiety at a young age.[13] A statistically significant negative relationship was found between age and the STCP scores in the nulliparous health workers who participated in our study, supporting this literature. The fact that the majority of young pregnant women are nulliparous and do not have experience with childbirth may cause more birth anxiety.

Birth anxiety is one of the most important factors affecting birth preference. In a study conducted on health personnel, 39.3% of midwives and 58.3% of physicians stated that they would prefer cesarean delivery for themselves.[14] In Duman's study in which nulliparous female health workers questioned their birth preferences, 57.4% of the participants stated that they would prefer vaginal delivery, 23.1% stated that they would prefer cesarean section, and 19.5% stated that they were undecided.[15] It was seen that 56.3% of the nulliparous health personnel who participated in our study preferred vaginal delivery for themselves, while 43.7% preferred cesarean delivery. The data obtained in the study are consistent with the literature. This finding showed that the participants who preferred cesarean delivery scored high on the STCP. It has been seen that birth anxiety is effective in the cesarean section preference of female health workers.

Another issue in which birth anxiety can be effective is the situation of having children. A study conducted at the School of Nursing in 2017 stated that women with birth anxiety may prefer to adopt or even be childless instead of pregnant.[16] In our study, no significant difference was found between the participants' desire to have children and the scores obtained from the STCP. This result showed that the birth anxiety experienced by the participants did not affect their desire to have children. This finding is inconsistent with the literature. This can be explained by the fact that the study was conducted on nulliparous women and that the participants wanted to taste the feeling of motherhood. In the study, the number of children requested by the participants was questioned, and the STCP total score of the participants who wanted to have an only child was higher than that of the participants who wanted to have 2 or 3 more children. This data from the study showed that consistent with the literature, birth anxiety leads women to want to have fewer children.

A study conducted by Stoll et al. in Canada found that young women with low levels of birth anxiety were affected by poor birth history and complications.[17] According to the research conducted by Nieminen, women who have a history of birth with complications using methods such as vacuum and forceps in their previous birth experience more birth anxiety than women who do not develop complications in childbirth.[11] In the literature, there are studies showing that the history of complicated birth increases the anxiety of childbirth, but there is no contribution to the literature on the effect of having a complicated birth on health workers. In

our study, it was seen that the STCP score was high in health workers who had a complicated birth. According to the findings obtained in the study, seeing a complicated birth causes birth anxiety in nulliparous female health workers.

One limitation of the study is that it was conducted in a tertiary health center, which is the highest level in the referral system, and this may have increased the risk of complicated and difficult labor. Another limitation is that it was a questionnaire study, which means that the results are based on the respondents' declarations.

In conclusion, this study was conducted to investigate the birth anxiety that may develop in nulliparous female health workers working in the delivery room and the factors affecting it.
Based on the results, half of the participants experienced moderate levels of birth anxiety. The results indicate that there was no significant difference in experienced birth anxiety between the different branches of participants. According to the study, young participants had a higher rate of birth anxiety.
When the factors that may cause birth anxiety are examined, it is seen that the years spent in the profession, the duration of working in the delivery room, the number of births seen and the stillbirths have no effect on birth anxiety. Nulliparous female health personnel who witnessed complicated births were found to have higher birth anxiety.
As stated by many sources that birth anxiety is effective in the choice of birth method; in this study, it was seen that female health personnel preferred the elective cesarean section method at a higher rate for herself compared to vaginal delivery recommended to her patients.
According to the results of our study, seeing birth causes anxiety in nulliparous female health personnel. Considering this result, it may be recommended that female health personnel receive support from a professional team before and during pregnancy. The duty of family physicians is to approach the patient's profession in accordance with the profession of pregnant women and to manage the process by considering such factors, especially in female health workers.

Ethical Considerations: Ethical approval was acquired from Başakşehir Çam ve Sakura City Hospital Clinical Research Ethics Committee Presidency (12/10/2022-2022.10.326).

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

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PROSPECTIVE ANALYSIS OF E-SCOOTER ACCIDENTS IN DIYARBAKIR CITY, LOCATED IN SOUTHEASTERN TÜRKİYE

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Abstract

Objectives: Although the use of e-scooters is new, e-scooter traumas have also increased as they began to be used. Our aim in this study is to draw attention to the increasing number of e-scooter accidents and to contribute to the measures that can be taken in this regard.

Materials and Methods: We planned the study when we started to receive scooter injuries that we had never encountered in the emergency department of our hospital. As a result of our research, we learned that the use of scooters in our province started in the first quarter of 2022. After creating the study plan and obtaining the approval of the ethics committee, we started collecting cases. From the scooter accidents admitted to the emergency department of our hospital, we included all patients with complete information, including those who agreed to participate in the study and who gave parental consent from accident victims under the age of eighteen. Patients who provided false and incomplete information and refused to participate in the study were not included.

Results: While the total number of patients admitted was n=247, n=205 patients were included in our study. Of the patients admitted to the emergency department, 39% (n=80) were female and 61% (n=125) were male. When the trauma sites of the patients were analyzed, it was found that 78.05% (n=160) had extremity trauma, 19.51% (n=40) had head-neck trauma, and 2.44% (n=5) had vertebral trauma.

Conclusion: We are of the opinion that serious injuries can be prevented and e-scooters can be made a safer means of transportation by making the necessary legal arrangements, eliminating the infrastructure problem of the cities, building appropriate roads and expanding the use of personal protective equipment.

Keywords: Emergency department, e-scooter, trauma, micro-mobility.

Introduction

Micromobility is a fairly new concept, and its definition is being developed day by day. In its most general definition, micromobility is a system in which small vehicles, especially electric scooters and bicycles, are rented or owned within the city and used for short-term transportation.[1,2] Using just human-powered vehicles, like bicycles, skateboards, scooters, and skates, is known as micromobility.[3,4] Since their introduction in 2017, electric scooters have been used in major cities across the US, Europe, New Zealand, and Singapore to address a variety of transportation-related policy objectives.[5-8]

The official regulation regarding the e-scooter system in Turkey came into force with the "E-scooter Regulation," published in the official newspaper on April 1, 2021. The regulation defines an electric scooter as "an electric vehicle that has a maximum speed of 25 km/h, has wheels, a brake mechanism, can have steps and a handle, can include a vertical steering mechanism, and can be used while standing." The age limit for using an e-scooter is set at 15. As stated in the general issues regarding the use of e-scooters, it was noted that if there is a separate bicycle lane, the highway cannot be used, its use is not allowed in areas where the maximum speed is over 50 km/h, and more than two electronic scooters cannot be used side by side. In addition, it was mentioned in more detail that it could not be used in a way that would endanger traffic safety and where parking is allowed and prohibited. It was stated that passengers other than the driver cannot use the e-scooter.[9]

Regrettably, as e-scooters become more and more popular, injuries related to them have also started to rise in recent times. Given how recently e-scooters were introduced to the public, there is comparatively little global data on musculoskeletal injuries associated with their use. However, new research from the USA, Singapore, Austria, Germany, and New Zealand indicates that this is a developing issue.[5–8,10,11]

E-scooters are usable, particularly when helmets and other personal protection equipment are not worn, and they may accommodate two riders. Furthermore, we frequently witness e-scooter drivers on main roads due to the absence of designated e-scooter routes. Companies have issued cautions about using these e-scooters, which have a maximum speed of 25 km/h. However, because cities lack proper infrastructure, numerous countries have reported injuries from e-scooter incidents.[12,13]

The population-adjusted frequency of injuries connected to e-scooters in the United States rose from 1.53 per 100,000 persons in 2014 to 9.22 per 100,000 people in 2019.[7] Similarly, once an urban e-scooter sharing system was implemented in New Zealand, there was a notable rise in e-scooter-related injuries, from two to 35 per week. Serious injuries were found to have significantly increased, particularly to the axial bones and extremities.[8] According to recent research, e-scooters are frequently linked to high-energy trauma and have

the potential to inflict major musculoskeletal injuries.[11] There have been documented deaths from e-scooter incidents in Texas, London, and Washington.[14,15]

Our goal in doing this study was to look at the demographic breakdown of e-scooter incidents that came to our emergency room. The effects of e-scooters on public health will be clarified by an examination of e-scooter accidents, and the significance of laws governing their usage will increase.

Materials and Methods

When we started to receive scooter injuries that we had never encountered before in our hospital emergency department, we planned the study. As a result of our research, we determined that the use of scooters started in the first quarter of 2022 in our province. After creating the study plan and obtaining the approval of the ethics committee, we started to collect cases. We conducted our study in the emergency medicine clinic of the Health Sciences University Gazi Yaşargil Training and Research Hospital in Diyarbakır Province. We recorded scooter injuries that applied to the emergency clinic within three months after obtaining ethics committee approval. We included all patients with complete information, who agreed to participate in the study, and who gave parental consent from accident victims under the age of eighteen who were admitted to the emergency department of our health sciences university, Gazi Yaşargil Training and Research Hospital. Patients who did not consent to participate in the study, patients with incomplete information, and patients whose parental consent could not be obtained were not included in the study. While the total number of applicants was 247, 205 patients were included in our study. We examined these patients in terms of age, gender, trauma area, pathological positivity of the patient, the relevant clinic that intervened in the patient's pathology, need for surgical intervention, treatment done, need for hospitalization, discharge, and, if hospitalized, duration of hospitalization. None of our patients had protective equipment.

The informed consent form was obtained from patients. The authors declare that human rights were respected according to the Declaration of Helsinki. The research protocol was reviewed and approved by the Health Sciences University Gazi Yaşargil Training Research Hospital Clinical Research Ethics Committee (date: 21.04.2022, number:77).

Statistical Analysis

The SPSS program was used for analysis. First of all, the distribution of the data was examined by performing Shapiro-Wilk's test. The Student’s test was used for continuous variables if there was a normal distribution, and the Man Whiney U test was used if there was no normal distribution. Quantitative variables are shown as mean±SD (standard deviation) and median (minimum /maximum) in the tables, while categorical variables

are shown as n (%). Variables were examined at a 95% confidence level, and those with a p-value less than 0.05 were considered significant.

Results

Of the patients admitted to the emergency department, 39% (n=80) were female and 61% (n=125) were male. The youngest patient was 13 years old, and the oldest was 44 years old. The average age was measured at 22.93±8.085. When the trauma area of the patients was examined, 78.05% (n=160) were found to be extremity trauma, 19.51% (n=40) were head and neck trauma, and 2.44% (n=5) were vertebral trauma. While 75.61% (n=155) of the patients had a soft tissue laceration, 24.39% (n=50) had a fracture in any region (extremity, head and neck, vertebra). All of the patients who applied were discharged with full recovery as a result of the treatment processes. When the inpatients were evaluated in terms of gender, 50% (n=15) were female and 50% (n=15) were male. Of the 30 patients who received inpatient treatment from the hospital, 4.87% (n=10) were admitted to the intensive care unit, and 9.76% (n=20) were admitted to the relevant clinical service. The characteristics of the patients are shown in Table 1.

There was no statistical significance between gender and trauma site, indication for hospitalization, duration of hospitalization, and surgical needs of the patients. P values were respectively ($p=0.105$, $p=0.203$, $p=0.603$, $p=0.916$). A significant statistical finding was found between the relevant clinic that treated the patient and the patient's surgical need ($p = 0.005$). A statistically significant finding was found between the positive findings found in the patients and the need for surgery ($p<0.001$). A statistically significant value was found between the hospitalization status of the patients and their surgical needs ($p<0.001$). A statistically significant value was found between the discharge status of the patients and their surgical needs ($p<0.001$).

Table 1. The characteristics of the patients

Gender (n=205)	
Female	39% (n=80)
Male	61% (n=125)
Age (n=205)	
Smallest	13
The oldest	44
Mean±SD	22.93±8.085
Trauma Zone (n=205)	
Extremity	78.05% (n=160)
Head Neck	19.51% (n=40)
Vertebra	2.44% (n=5)
Positive Finding (n=205)	
Incision	75.61% (n=155)
Fracture	24.39% (n=50)
Intervention Made (n=205)	
Dressing	70.73% (n=145)
Plaster- Splint	21.95% (n=45)
Suture	7.34% (n=15)
Intervening Expert (n=205)	
Emergency Medicine	73.17% (n=150)
Orthopedics	19.51% (40)
Brain Surgeon	2.44% (n=5)
Plastic Surgery	2.44% (n=5)
Dentist	2.44% (n=5)
Need for Surgery (n=205)	
Surgery	12.2% (n=25)
No Surgery	87.8% (n=180)
Discharge and Admission (n=205)	
Outpatient Discharge	85.37% (n=175)
Lie Down	14.63% (n=30)
Hospitalization Duration (n=30)	
5 Days	2.44% (n=5)
6 Days	2.44% (n=5)
7 Days	2.44% (n=5)
10 Days	4.87% (n=10)
11days	2.44% (n=5)

Discussion

Because of their affordability and ease of use, e-scooters have grown popular in our nation, but accidents involving them are on the rise. Certain nations and localities have implemented laws governing the usage of e-scooters. However, it has come to light that users do not strictly adhere to regulatory requirements, such as age restrictions and the use of protective gear.[16] E-scooters are becoming more and more common because it's easy to rent them instead of buying one, which has led to an increase in e-scooter-related injuries. Similar to our

study, prior research has shown that patients in their 30s were the most common age group for scooter-related injuries.[17]

The age of use of e-scooters varies from country to country (it is 12 years in France, 14 years in Germany, and 16 years in the Netherlands).[18] Although the age of use should be over 15 according to the legislation in Turkey, we also encountered users under this age in our study. Despite this, the fact that individuals are legally prohibited from using e-scooters due to their age is one of the first reasons why it is necessary to introduce additional measures and controls. Although e-scooters are designed for one person to ride, in our study, it was observed that two people are often together on this type of vehicle. This situation supports the idea that legal regulations are insufficient and campaigns and inspections should be carried out to prevent injuries caused by e-scooter accidents. Gender determination has not been made very often in studies on e-scooter use. In our study, 39% (n=80) were female, and 61% (n=125) were male. Although the male population is more likely to use e-scooters, our study showed that e-scooter accidents may occur at similar rates in both genders.

It's been noted from earlier research that a relatively small percentage of e-scooter incidents involve the use of protective gear.[16,19] According to Trivedi et al.'s research, 94.3% of e-scooter users did not wear a helmet.[16] 95.7% of patients who applied to the emergency room after an e-scooter accident did not wear a helmet, according to another survey.[20] The fact that none of the patients who applied for our study had protective gear on them confirmed the findings of previous investigations. The fact that e-scooters are relatively new in the city where we reside could be one of the factors contributing to the high percentage of helmet non-use.

Furthermore, research comparing the use of E-scooters and bicycles in the literature notes that the most basic safety precaution, donning a helmet, is more prevalent while using bicycles than it is when using E-scooters. [18]

According to a study, head trauma accounted for 40% of patient admissions to the emergency room.[20] Major cerebral hemorrhage was recorded in 1.1% of e-scooter riders in Copenhagen research.[21] 5.2% was the maxillofacial fracture rate in the Bressler et al. research. Nonetheless, 66% of the patients did not wear a helmet during the events.[22] 19.51% (n= 40) of the head and neck trauma in our study was found. According to Trivedi et al.'s study, the hospitalization rate for e-scooter accidents was 6%, while the rate for critical care was 0.8%.[16] In another study, the hospitalization rate was determined to be 5.7%, and the intensive care hospitalization rate was 1.4%. [20] In our study, these rates are 14.6% (n=30) and 4.87% (n=10), respectively. These high rates suggest that incidents involving e-scooters can cause catastrophic injuries and expensive medical bills. It is possible to construct regions where e-scooters can utilize their own roads by making infrastructure arrangements. Major trauma can thus be avoided.

In one study, the most injured areas in E-scooter accidents were the lower and upper extremities,[23] and in another study, the injured areas were determined as the extremities, while fractures were most frequently seen

in the upper extremities. [11] In our study, the most common injuries were determined to be extremity traumas 78% (n=160). The most frequent extremity injuries and the most severely damaged locations in recent studies are similar to injuries connected to the usage of motorized two-wheeled vehicles or E-scooters in traffic with identical traffic laws published in the literature. This demonstrates the need for protective gear to be advised and worn, particularly for users of e-scooters, in order to safeguard delicate body parts. This circumstance makes it clear that the policies outlined in numerous articles of comparable legislation must be put into action and closely observed.[24]

Limitations

The patients under 18 years of age whose parental consent could not be obtained and whose relatives could not be reached were not included in the study. We were not able to question the patients' experience of scooter use. Alcohol and drug use of the accident victims could not be questioned. However, the fact that the study was a single-center study is one of the limiting factors.

In conclusion, because they are inexpensive, eco-friendly, and simple to rent owing to applications, e-scooters have replaced other forms of mobility in our daily lives. We think that if the infrastructure issue in cities is resolved by enacting the required laws, constructing suitable roads, and increasing the usage of personal protection equipment, serious injuries can be avoided, and e-scooters can be made a safer mode of transportation. It should be noted that the usage of e-scooters in these regions poses dangers for traffic, pedestrians, and drivers, which could increase the severity of the accident, given that the accident sites are primarily pedestrian sidewalks or main streets. Although there are some limitations in our study, effective and remarkable results were obtained for the region we live in. We believe that it will contribute to both the evaluation of patients applying to the emergency department in terms of trauma and the organization of the city in terms of public health.

Ethical Considerations: The research protocol was reviewed and approved by the Health Sciences University Gazi Yaşargil Training Research Hospital's Clinical Research Ethics Committee. The study was conducted in accordance with the Declaration of Helsinki (date: 21.04.2022, number: 77).

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

Informed Consent: An informed consent form was obtained from patients.

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Research Article

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ANALYSIS OF THE RELATIONSHIP BETWEEN BLOOD GAS PARAMETERS AND ELECTROCARDIOGRAPHY IN PATIENTS WITH DYSPNEA

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Abstract

Objectives: Dyspnea, a frequently encountered life-threatening symptom in Emergency Department admissions, prompts the utilization of various diagnostic tests such as blood gas analysis, complete blood count, and electrocardiography (ECG) to ascertain its cause and severity. This study aims to assess the association between blood gas parameters, complete blood count results, and electrocardiographic parameters. Additionally, the investigation focuses on identifying malignant arrhythmias and abnormalities in repolarization parameters (PR interval, QRS interval, QTc interval, Tp-e interval, and Tp-e/QTc ratio) in patients admitted to the Emergency Department with dyspnea.

Materials and Methods: The study includes individuals aged 18 and above who were admitted to the emergency department due to dyspnea. Upon admission, the patient's electrocardiographic parameters, blood gas results, complete blood count values, and other relevant laboratory findings were documented.

Results: Among the 385 patients studied, with a mean age of 64.6±17.7 years, 52.7% (n=199) were male. Analysis of the ECG results revealed a statistically significant prolongation of the QRS interval in acidotic and hypercapnic patients with dyspnea (p=0.041 and p=0.015, respectively). Similarly, the QTc interval was found to be significantly longer in acidotic and hypoxic patients presenting with dyspnea (p=0.011 and p=0.026, respectively).

Conclusion: Acidotic, hypoxic, and hypercapnic patients with dyspnea exhibited significantly prolonged QRS and QTc intervals. These findings suggest an elevated probability of ventricular arrhythmias in these patients.

Keywords: Dyspnea, electrocardiography, QRS interval, QTc interval.

Introduction

Dyspnea, characterized by the sensation of uncomfortable or difficult breathing, poses a significant threat to life and is a prevalent symptom among patients seeking care in Emergency Departments (EDs). Defined as the physician's interpretation of shortness of breath and the patient's response to this sensation, dyspnea can stem from various causes, ranging from less serious to severe, with a considerable portion linked to cardiac or respiratory disorders.[1,2] The incidence of Emergency Department admissions has been consistently rising, and dyspnea stands out as a major and frequent complaint leading to these admissions.[3] Hence, a prompt and accurate diagnosis of the underlying pathology causing dyspnea is imperative.[4]

To unravel the complexities associated with dyspnea, EDs employ numerous diagnostic tests aimed at identifying the cause and assessing its severity. Among these, blood gas analysis plays a crucial role in diagnosing and quantifying respiratory insufficiency, as well as evaluating acid-base disturbances in dyspneic patients upon admission. This diagnostic approach has been extensively applied in clinical studies examining various diseases associated with dyspnea.[5] Furthermore, blood count and other laboratory tests are essential for a comprehensive differential diagnosis at the time of admission.

Electrocardiography (ECG) emerges as a pivotal tool in the differential diagnosis of conditions such as acute coronary syndrome and pulmonary thromboembolism, which commonly manifest with dyspnea. Early utilization of ECG during admission facilitates the detection and assessment of cardiac arrhythmias. Markers such as PR interval, QRS and QTc intervals are indicative of risk factors that may lead to malignant ventricular arrhythmias, as established by previous studies.[6] Notably, the Tpeak-Tend (Tp-e) interval has been identified as a crucial parameter reflecting ventricular repolarization, while the Tp-e/QT ratio, independent of heart rate changes, provides more accurate results than QT dispersion.[7,8]

This study is designed to comprehensively evaluate the interplay between venous blood gas parameters, complete blood count results, and electrocardiographic parameters. The primary focus is on investigating malignant arrhythmias and alterations in transmural repolarization indicators, including PR interval, QRS interval, QTc interval, Tp-e interval, and Tp-e/QTc ratio, in patients admitted to the ED with dyspnea. The findings are expected to enhance our understanding of the intricate relationships between these parameters and contribute valuable insights to the management and diagnosis of dyspnea-related conditions.

Materials and Methods

Inclusion Criteria

This study was conducted within the Emergency Department of a tertiary hospital, focusing on patients aged 18 and above who were admitted due to dyspnea. Demographic parameters, including age, gender, comorbid diseases, electrocardiographic parameters, and laboratory results, were retrospectively obtained from hospital records in a six-month period. Electrocardiographic parameters, venous blood gas results, complete blood count values, and other laboratory findings were meticulously recorded at the time of admission. Patients meeting the inclusion criteria were subsequently enrolled in the study.

Exclusion Criteria

Participants under the age of 18, individuals for whom electrocardiograms (ECGs) were unattainable and subjects utilizing antiarrhythmic medications were deliberately omitted from the study cohort.

Definitions

All patients underwent a 12-lead ECG upon admission, with measurements conducted manually by a specialized cardiology professional. Evaluation of intervals included the PR interval, measured from the beginning of the P wave to the initiation of the QRS segment; the QRS interval, determined as the distance between the beginning of the Q wave and the end of the S wave; the QT interval, calculated from the beginning of the QRS complex to the downslope of the T wave. The corrected QT (QTc) interval was derived using Bazett's formula.[9] Additionally, the Tp-e interval, representing the distance from the peak of the T wave to its end, was assessed.[10]

This study received approval from the local ethics committee (ESH/GOEK 2022/13) and adhered to the principles outlined in the Helsinki Declaration.

Statistical Analysis

Data were presented as "mean ± standard deviation (SD)" for normally distributed variables, "median (interquartile range (IQR))" for non-normally distributed variables, and proportions for categorical variables. Normality distribution was assessed using the Shapiro–Wilk test and the Levene test was employed to test the homogeneity of group variances. Spearman correlation analysis was utilized to evaluate correlations between ECG results and other variables. A significance level of $P<0.05$ was considered for statistical significance. The data analysis was conducted using SPSS 20.0 (IBM SPSS Ver. 20.0; IBM Corp, Armonk, NY, USA).

Results

A total of 385 patients presenting with dyspnea symptoms were included in the study upon admission to the emergency department. The mean age of the study population was 64.6±17.7 years, with 52.7% (n=199) being male. Detailed demographic variables are presented in Table 1.

Table 1. Demographic parameters of the study population

Demographic Variables	
Age, years (mean±SD)	64.6±17.7
Gender, male (n, %)	199 (52.7%)
Hypertension (n, %)	154 (40.0%)
Diabetes Mellitus (n, %)	107 (27.8%)
Coronary Artery Disease (n, %)	77 (20.0%)
Chronic Obstructive Lung Disease (n, %)	54 (14.0%)

The examination of electrocardiographic parameters and venous blood gas results revealed noteworthy findings. Among the study population, 15.1% (n=58) had atrial fibrillation, while 83.9% (n=323) exhibited sinus rhythm. Additionally, 68.5% of the patients had heart rates within the normal range (n=264), while 31.5% demonstrated heart rates exceeding 100 bpm, indicative of tachycardia. Blood gas analysis indicated that 25.4% of the patients experienced acidosis (n=98), and 13.2% showed signs of alkalosis (n=51). Detailed electrocardiographic measurement results and blood gas findings are summarized in Table 1.

Correlation analyses unveiled significant relationships between various parameters. Positive correlations were observed between heart rate and lactate levels ($p<0.001$, $r=0.192$), while the QRS interval exhibited a negative correlation with pH ($p=0.041$, r:-0.105) and a positive correlation with pCO2 ($p=0.015$, $r=0.124$). QTc interval displayed a negative correlation with pH ($p=0.011$, $r=-0.130$) and SO2 ($p=0.026$, $r=-0.114$), along with a positive correlation with lactate levels ($p=0.039$, $r=0.105$). Detailed results of the correlation analysis between ECG parameters and blood gas results are presented in Table 2.

Table 2. ECG parameters and laboratory results of the study population.

ECG Parameters	
Rate, bpm, [median (IQR)]	87 (74-106)
PR interval, ms, [median (IQR)]	154 (137-174)
QRS interval, ms, [median (IQR)]	100 (90-115)
QT interval, ms, [median (IQR)]	374 (344.7-412.0)
QTc interval, ms, [median (IQR)]	454 (428-484)
Tp-e interval, ms, [median (IQR)]	35 (25-45)
QT dispersion, ms, [median (IQR)]	40 (30-60)
Tp-e/QT ratio, [median (IQR)]	0.10 (0.06-0.13)
Tp-e/QTc ratio, [median (IQR)]	0.08 (0.05-0.11)
Laboratory Parameters	
pH, [median (IQR)]	7.39 (7.34-7.42)
PCO2, mmHg, [median (IQR)]	43.6 (38.5-50.3)
PO2, mmHg, [median (IQR)]	32.0 (23.9-42.9)
SO2, [median (IQR)]	58.4 (28.5-77.5)
Lactate, mmol/L, [median (IQR)]	1.5 (1.1-2.1)
WBC, 10^3/µL, [median (IQR)]	9.4 (7.3-11.9)
HGB, g/dl, (mean ± SD)	12.8 ± 2.3
MCV, fL, (mean ± SD)	89.0 ±7.4
MCH, pg, [median (IQR)]	28.9 (27.1-30.4)
MCHC, g/dl, [median (IQR)]	32.0 (31.1-33.3)
RDW, %, [median (IQR)]	13.4 (12.3-14.9)
NEU, 10^3/µL, [median (IQR)]	5.85 (4.44-8.61)
Mono, 10^3/µL, (mean ± SD)	0.71 ± 0.30

Bpm: Beats per minute, ms: millisecond, pH: potential of hydrogen, pCO2: partial pressure of carbon dioxide, p02: partial pressure of oxygen, SO2: saturation of oxygen, mmHg: milimetres of mercury, mmol/L: milimoles per liter, L: liter, µL:microliter, dl: deciliter, WBC: white blood cell, g: gram, HGB: haemoglobin, MCV: mean corpuscular volume, fL:femtoliters, MCH: mean corpuscular haemoglobin, pg:picograms, MCHC: mean corpuscular haemoglobin concentration, RDW: red cell distrubition width, NEU: neutrophil, Mono: monocytes

Exploring the associations between ECG parameters and complete blood count results, several noteworthy correlations emerged. Heart rate exhibited positive correlations with white blood cell (WBC) count ($p<0.001$, $r=0.277$), RDW levels ($p<0.001$, $r=0.276$), and neutrophil counts ($p<0.001$, $r=0.300$), but demonstrated negative correlations with MCH levels ($p=0.032$, $r=-0.110$) and MCHC levels ($p=0.010$, $r=-0.132$). PR interval displayed negative correlations with WBC count ($p=0.003$, $r=-0.168$), platelet counts ($p=0.002$, $r=-0.171$), PTC values ($p=0.001$, $r=-0.180$), and neutrophil count ($p=0.021$, $r=-0.130$). Positive correlations were observed between the QRS interval and monocyte count ($p=0.022$, $r=0.118$), while negative correlations were noted with platelet levels ($p=0.008$, $r=-0.136$). QT interval demonstrated positive correlations with lymphocyte count ($p=0.034$, $r=0.109$), eosinophil count ($p=0.040$, $r=0.105$), and negative correlations with WBC count ($p<0.001$, $r=-0.214$), RDW ($p=0.022$, $r=-0.118$), neutrophil count ($p<0.001$, $r=-0.208$), and monocyte count ($p=0.012$, r=-

0.128). QTc interval exhibited positive correlations with WBC count (p=0.020, r=0.119), RDW (p<0.001, r=0.252), and neutrophil count (p=0.007, r=0.139) while demonstrating negative correlations with hemoglobin levels (p=0.006, r=-0.139) and MCHC levels (p=0.003, r=-0.150). Tp-e interval displayed a negative correlation with RDW (p=0.006, r=-0.152). QT dispersion showed positive correlations with PTC values (p=0.042, r=0.155), neutrophil levels (p=0.021, r=0.176), and negative correlations with MCHC values (p=0.008, r=-0.202). The Tp-e/QTc ratio exhibited a negative correlation with MCV values (p=0.021, r=-0.248).

Discussion

This study sheds light on the association between dyspnea and electrocardiographic parameters, venous blood gas results, and complete blood count values, offering valuable insights into the potential risk of cardiac arrhythmias in specific patient groups. The findings indicate that dyspneic patients with acidosis, hypoxia, and hypercapnia exhibit prolonged QRS and QTc intervals, suggesting an elevated risk for cardiac arrhythmias.

The dyspnea-related increase in respiratory effort triggers anaerobic respiration, leading to lactate accumulation.[11] Simultaneously, dyspnea patients may experience cardiac arrhythmias and heightened heart rates due to increased respiratory work.[12] The positive correlation observed in this study between heart rate and lactate levels aligns with existing literature.

The study delves into the significance of white blood cell (WBC) count and its subtypes as markers of stress and inflammation in dyspnea. Elevated WBC counts have been correlated with an increased risk of atrial fibrillation (AF) and cardiac arrhythmias.[13] Additionally, the study reveals that as hemoglobin levels drop, compensatory mechanisms are activated to counter tissue hypoxia.[14] The predominant factor crucial for addressing hypoxia is an elevation in cardiac output. Hemodynamic mechanisms achieve this by diminishing afterload, augmenting preload, and inducing positive inotropic and chronotropic effects. Moreover, in anemic patients, the heart rate escalates due to chemoreceptors activated by hypoxia.[15] In the present study, it was found that the heart rate rises concomitantly with an increase in WBC count and neutrophil count. Concurrently, the heart rate was found to escalate as the mean corpuscular hemoglobin (MCH) level and mean corpuscular hemoglobin concentration (MCHC) level decreased, aligning with previous research findings.

Prolongation of PR interval, associated with worse outcomes such as AF, stroke, and death, is highlighted.[16] The research has demonstrated that the extension of the QRS interval may lead to myocardial ischemia and ventricular arrhythmias, contributing to potentially fatal conditions.[17,18] In a study conducted by Terzano et al., it was observed that hypercapnia could elevate arterial blood pressure, stimulate increased cardiac output, and enhance the propensity for arrhythmias in patients with chronic obstructive pulmonary disease (COPD).[19] In this study, we observed a prolongation of the QRS interval in acidotic and hypercapnic patients exhibiting

dyspnea. Suzuki et al. reported in their study that the onset of AF correlated with elevated monocyte and WBC counts.[20] In our study, we identified a shortened PR interval with elevated WBC and neutrophil counts, while the QRS interval was prolonged with an increased monocyte count.

Prolongation of the QTc interval is recognized as a contributing factor to the occurrence of malignant ventricular arrhythmias and sudden cardiac death.[21] In a study conducted by Stewart et al., it was determined that QTc prolongation is prevalent in hypoxemic chronic obstructive pulmonary disease (COPD), posing a heightened risk of mortality.[22] Our study corroborates these findings, revealing an elevated QTc interval in patients characterized by acidosis, hypoxia, and heightened lactate levels. In the investigation undertaken by Fava et al., Red Cell Distribution Width (RDW) emerged as a valuable indicator for prognostic evaluation across a spectrum of cardiovascular conditions, including AF, stroke, and heart failure.[23] Likewise, Simsek et al. established a correlation between anemia and AF in their study.[24] Consistent with earlier research, our study identified a lengthening of the QTc interval associated with elevated RDW, WBC and neutrophil counts, as well as diminished hemoglobin and MCHC levels.

In our study, an assessment of the Tp-e interval and Tp-e/QTc ratio was undertaken. Existing literature demonstrates an association between the Tp-e interval, Tp-e/QTc ratio, ventricular repolarization abnormalities, and an elevated risk of cardiac arrhythmia.[6,25,26] This association has been substantiated in studies by Onur et al., revealing an increased Tp-e interval in patients with COPD.[27] Contrary to these findings, our study did not observe significant differences in Tp-e interval and Tp-e/QTc ratio among patients presenting with dyspnea. Furthermore, in their research, Rayes et al. highlighted the association between adverse outcomes in critically ill patients and individuals with cardiovascular disease and factors such as anemia, elevated RDW, or mean corpuscular volume (MCV).[28] In our investigation, we identified a prolonged Tp-e interval with low RDW values and a prolonged Tp-e/QTc ratio with low MCV values.

QT dispersion, indicating regional disparities in ventricular repolarization, is found to increase in dyspnea patients with high neutrophil levels and low MCHC values. This heightened heterogeneity in myocyte repolarization is identified as a potential risk factor for ventricular arrhythmias.[29] In this study, QT dispersion was found to increase at high neutrophil levels and at low MCHC values.

In summary, the study provides comprehensive insights into the intricate relationships between dyspnea, electrocardiographic parameters, and hematological markers, paving the way for further research and clinical considerations in managing dyspneic patients with potential cardiac risks.

In conclusion, in summary, our study identifies significant electrocardiographic parameter disturbances associated with ventricular arrhythmias and AF in dyspnea patients. While existing literature has explored various aspects of dyspnea, our research stands out as the first comprehensive study evaluating all

electrocardiographic parameters—PR interval, QRS interval, QTc interval, Tp-e interval, Tp-e/QTc ratio, and QT dispersion—in conjunction with blood gas and complete blood count results. The implications of these findings are substantial, potentially influencing treatment approaches for dyspnea patients.

Despite the absence of arrhythmias detected at the time of admission, our study underscores the importance of continuous monitoring for potential cardiac arrhythmias in dyspnea patients. Recommendations for further management may include 24-hour Holter monitoring or extended hospitalization with continuous ECG monitoring, particularly for patients exhibiting abnormal PR interval, QRS interval, Tp-e interval, and Tp-e/QTc ratio.

Limitations

A notable limitation of our study is the reliance on a single ECG taken at the time of admission. Given the dynamic nature of cardiac arrhythmias, an extended follow-up period for rhythm control would provide a more comprehensive understanding of the long-term implications in dyspnea patients. Additionally, the manual assessment of ECG by a single physician introduces a potential source of bias. To enhance the study's robustness, future research should involve multiple physicians in the ECG assessment process, ensuring a more rigorous and unbiased evaluation of electrocardiographic parameters in dyspnea patients.

Ethical Considerations: This study received approval from the local ethics committee (ESH/GOEK 2022/13) and adhered to the principles outlined in the Helsinki Declaration.

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

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ASSESSMENT OF PERIPHERAL NERVE INJURIES BY ELECTRONEUROMYOGRAPHY AFTER KAHRAMANMARAŞ EARTHQUAKES (ON FEBRUARY 6, 2023)

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Abstract

Objectives: This study aimed to assess the peripheral nerve injuries among survivors after the two consecutive Kahramanmaraş Earthquakes with magnitudes of 7.7 Mw and 7.6 Mw.

Materials and Methods: In the study, the medical records and electroneuromyographic findings of 94 earthquake victims who referred to Ankara City Hospital and underwent electroneuromyography analysis were analyzed.

Results: Peripheral nerve damage was most common in the lower extremities. The presence of crush syndrome was closely associated with peripheral nerve damage (p=0.049).

Conclusion: Peripheral nerve injuries require special attention as they may cause serious disability.

Keywords: Earthquake, electroneuromyography, peripheral nerve injury

Introduction

On February 6, 2023, two earthquakes, the first with a magnitude of 7.7 Mw in Kahramanmaraş Pazarcık at 04:17 and the second with a magnitude of 7.6 Mw in Elbistan approximately nine hours later, caused massive destruction over an area of 108,812 km^2 encompassing 11 provinces. According to AFAD reports, there were 50783 fatalities, 115,353 injuries, and 37,984 collapsed buildings.[1,2]

There were a high number of casualties and injured people. The first of the two earthquakes occurred in the early morning hours while most people were asleep, and the second occurred approximately 9 hours later and was unexpected. Although subsequent earthquakes of lesser intensity are expected, the second earthquake was more severe, affecting many of the people who survived the first one while they were entering their damaged houses to collect their belongings.

Reaching the earthquake survivors underneath the building wreckage also took longer than expected due to the size of the affected area and the extent of the quake damage. Survivors were trapped under debris for more than 296 hours after the earthquake. Being trapped under debris for a prolonged period may have increased the risk of complications.

Survivors extracted from debris entrapment in the acute period were referred to 3rd-level hospitals to undergo initial interventions for critical and urgent medical conditions such as traumatic fractures, compartment syndrome, organ injuries, crush syndrome, and head trauma (skull fracture). However, the earthquakes also significantly damaged regional hospitals. The surviving patients who were referred to Ankara City Hospital—approximately 600 km from the earthquake epicenter—were treated in the relevant departments and underwent treatment for peripheral nerve injuries in our electrophysiology laboratory four days after the earthquake. While head trauma, visceral organ injuries, fractures, crush syndrome, and organ failures were the focus of treatment and care services due to their tendency to result in patient death in the initial days and weeks after the earthquake, peripheral nerve injuries became one of the primary reasons for post-survival disabilities as time progressed.

The aim of the current study was to assess the demographic characteristics and early electroneuromyography (ENMG) findings of earthquake survivors diagnosed with peripheral nerve injury.

Materials and Methods

The current research is an observational descriptive study approved by the ethics committee of Ankara City Hospital (04.26.2023/E1-23-3481). Written consent was obtained from all participants. There were no patients with impaired consciousness that would prevent confirmation. The consent of 9 pediatric patients included in the study was obtained from their legal guardians. Following the earthquake, 94 patients transferred to Ankara City Hospital and treated in the relevant clinics were referred to the ENMG laboratory to diagnose their peripheral nerve injuries. These patients were also followed up in orthopedic, plastic surgery, internal medicine, and general intensive care clinics for several complaints, such as multiple traumas, compartment syndrome, and crush syndrome. The researchers reviewed the medical records of patients already referred for electrodiagnostic examination because they had motor loss and/or sensory symptoms in their extremities. A Keypoint (Alpine, Denmark) device was used for the ENMG examination.

Statistical analysis

The data were evaluated in the statistical package program IBM SPSS Statistics Standard Concurrent User V 26 (IBM Corp., Armonk, New York, USA). Descriptive statistics were given as the number of units (n), percentage (%), mean ± standard deviation (m±SD), median (M), minimum (min) and maximum (max) values. The normal distribution of the data of numerical variables was evaluated using the Shapiro-Wilk normality test. In comparisons regarding the number of damaged nerves, the Mann-Whitney U test was used since the data did not have a normal distribution. Relationships between variables were examined with Spearman's rho coefficient since the data did not provide a normal distribution. A value of $p<0.05$ was considered statistically significant.

Results

The 94 patients with extremity trauma were aged 7 to 66 years, with a mean age of 33 years. There were 45 male patients and 49 female patients. The average time spent under the rubble was 28 hours. Eleven people underwent electrodiagnostic examination within the first 20 days after the earthquake. Then, the number of cases examined in the first, second, and third months after the earthquake was 49, 17, and 17, respectively. The time between the ENMG test request and the testing date ranged from 1 to 12 days. The average number of damaged nerves detected by the ENMG test in patients was 3. The number of associated injuries, such as fractures, compartment syndrome, and crush syndrome, accompanying peripheral nerve damage, are summarized in Table 1. Sixteen of 44 patients with fractures underwent surgery. Compartment syndrome was present in 59 of 51 patient extremities. Fasciotomy was performed on 46 extremities of 37 of these patients. Thirty-three of the patients with crush syndrome needed hemodialysis.

Table 1. Demographic characteristics and injuries accompanying peripheral nerve damage

	$\bar{x}$±SD	*n (%)*
Age (year)	33±13.27	
Gender, Female **Male**		49 (52.13) 45 (47.87)
Time spent under the rubble (hours)	28.27±26.66	
Damaged nerve	3.04±2.21	
Concomitant injury		
Fracture		44 (46.80)
Compartment syndrome		51 (54.25)
Crush syndrome		48 (51.06)
Multiple injuries		44 (46.80)

Statistics are given as a number (n), percentage (%), $\bar{x}$: mean, SD: Standard deviation.

Considering 94 patients, there were nerve injuries in 129 extremities, 48 and 81 of which were upper and lower, respectively. There were also 114 peripheral nerve injuries, 35 localized in the upper extremity and 79 in the lower extremity, 33 plexus injuries—15 were brachial, 18 were lumbosacral—and six multiple cervical root avulsions. Table 2 displays the distribution of the injured nerves, crush syndrome, compartment syndrome, and their relationship with fracture. No relationship was detected between the number of damaged nerves and the duration of stay under the collapse (r=0.115, p=0.268).

When compared to the group in terms of the presence of crush syndrome, compartment syndrome and fracture, the presence of crush syndrome seems to be closely related to peripheral nerve damage (p=0.049). They are summarized in Table 3.

Although there were suggestive symptoms of peripheral nerve injury, the ENMG analysis of 36 extremities, 24 of which were lower and 12 of which were upper, could not be performed for the reasons listed in Table 4.

Table 2. Distribution of the injured nerves and concomitant other factors

Peripheral nerve injury	n	Partial axonal	Total axonal injury n	Crush syndrome n/%	Compartment syndrome (fasciotomy) n, %	Fracture n, %	Multiple concomitants n, %	Time spent under the rubble (hours) m (min-max)
Median nerve	8	4	4	2/25	5(4) 62.50%	0	1 12.50%	20 (5-49)
Ulnar nerve	13	8	5	7/53.84	6(4) 46.15	3 23.07	4 30.76	26 (1-49)
Radial nerve	11	5	6	5/45.45	5(3) 45.45	3 27.27	3 27.27	17 (1-49)
Axillary nerve	3	3	0	2/66.66	1 33.33	1 33.33	1 33.33	24 (4-40)
Femoral nerve	1	1	0	1/100	1 100		1 100	13
Obturator nerve	1	1	0	0/0	1(1) 100	1 100	1 100	12
Sciatic nerve	27	21	6	22/81.48	11(10) 40.74	4 14.81	10 37.03	31 (5-160)
Peroneal nerve	38	28	10	13/34.21	8 (6) 21.05	5 13.15	5 13.15	27 (1-96)
Tibial nerve	12	8	4	3/25	4(4) 33.33	2 16.66	0 0	12 (1-80)
Brachial plexus	15	12	3	8/53.33	5(4) 33.33	1 6.66	4 26.66	40 (1-160)
Lumbosacral plexus	18	11	7	12/66.66	4(3) 22.22	5 27.77	4 22.22	25 (2-72)
Cervical root avulsion	6	6	0	3/50	0	1 16.66	1 16.66	49 (2-160)

Table 3. Relationship of nerve injury to other accompanying injuries

Number of Damaged Nerves			
	$\bar{x}$±SD	*z*	*p value*
Victims with Crush syndrome	3.56±2.61	1.961	**0.049**
Victims without Crush syndrome	2.50±1.54		
Victims with Compartment syndrome	3.27±2.37	1.089	0.276
Victims without Compartment syndrome	2.76±1.99		
Victims with Fracture	3.36±2.43	1.256	0.209
Victims without Fracture	2.76±1.98		
Victims with Multiple injury	3.31±2.41	1.099	0.272
Victims without Multiple injuries	2.80±2.01		

$\bar{x}$: mean, SD: Standard deviation, *z*: Mann Whitney U test

Table 4. Reasons for exclusion

Edema	2 (5.55%)
Fasciotomy	23 (63.88%)
Plaster-external fixator	10 (27.77%)
Pain-intolerance	1 (2.77%)

Statistics are given as number (percentage %) values.

Discussion

The cross-sectional data gathered from 94 earthquake survivors through testing in the electrophysiology laboratory of the city hospital may add to the sparse literature on the electrophysiological findings of post-disaster peripheral nerve injuries; hence, it potentially put forth an approach for assessing peripheral nerve injuries. ENMG is an auxiliary diagnostic method delivering reliable data on the presence or absence of peripheral nerve injury, its severity, and extent, if any.

Peripheral nerve injuries may ensue from various types of traumatization, including lacerations, crushing, stretching, angulation, increased compression on the nerve, or prolonged external pressure for hours. Acute pressures may result in paranodal, segmental demyelination.[3] Demyelination also leads to conduction block, manifesting itself by weakness and sensory loss. Experimental studies of compression-based nerve injury revealed that the intensity and incidence rate of conduction block varies depending on the severity and duration of the compression. Such electrophysiological variations may be identifiable within 24 hours of injury.[4] Axonal injury may occur if the pressure and crushing are severe and lengthy or if the entire nerve is under compression. Hence, under pressure, the intraneural venous blood flow of the nerve is impaired, vascular permeability increases, the blood-nerve barrier becomes permeable, and endoneurial edema ensues. Nerve fiber dysfunction is triggered by an altered metabolic environment and increased intrafascicular pressure. This context leads to axon transport distortion. In acute compressive neuropathies, motor fibers are significantly more affected since they are less resistant than sensory nerves. Thin myelinated and unmyelinated fibers are affected when the pressure is so severe that it induces axonal degeneration of the thick myelinated nerves. Then, in addition to muscle weakness, severe sensory and autonomic dysfunction manifests.[3] When the axon is disrupted by severe crushing or acute stretching, Waller degeneration begins distally within 24 hours, and the axon and myelin sheath are fragmented. While these changes are concurrent, the distal part of the nerve still retains its ability to conduct impulses for the first few days.[5]

In addition to being trapped under building debris in earthquakes, some other reasons—regardless of severe earthquake damage—such as being trapped under overturned objects, being stuck between household items,

or stepping on broken and sharp objects on the floor while attempting to leave the house without shoes, [six] and pulling out extremities that have remained under the weight for hours and have become anesthetized[7] may typically result in peripheral nerve injury. It is also viable to consider long bone fractures and joint dislocations among the reasons. Even if there is no external pressure in a narrow space beneath the wreckage for an extended period, retaining a compelling flexion-extension posture that stretches the nerve may also result in nerve injury.[8]

In the aftermath of the 1999 Marmara Earthquake, Uzun et al. reported that the lower extremities of 80 patients were more severely injured than the upper extremities. They further noted that distal peripheral nerves in the same patient group were more injured than proximal peripheral nerves.[7] Another study focusing on surviving children in the earthquake documented that lower extremity distal peripheral nerve injuries were prevalent among children, similar to the adult group. The incidences of peripheral nerve injury and total axonal damage in the first ENMG analysis were higher in the pediatric age group than in the adult group.[9] Salimi et al. [six] also indicated that lower extremity injuries were common in people trapped under debris as a result of the Bam earthquake; however, fracture-based nerve injuries were more frequently humeral shaft fractures. They also reported that survivors sustained radial nerve injury more frequently than ordinarily predicted humeral shaft fractures. These significant injury rates might most likely be due to fractures sustained during rescue from wreckage or improper patient handling.[6]

In their research, in which they analyzed the incidence of peripheral nerve injury in 523 patients after the Wenchuan Earthquake, He et al.[8] scrutinized the variables associated with the nerve injury score. They revealed that the incidences of muscle, tissue, nerve, and vascular injury, compartment syndrome, and crush injury corresponded with nerve injury scores, whereas there was no relationship between open injury and nerve injury scores. They further reported the prevalence of sciatic nerve injury due to prolonged stay in passive body positions, stretching the nerve in a narrow space without direct external mechanical forces. This extensive case study disclosed that earthquake pressure injuries typically result from direct nerve compression, thereby causing nerve deformation. Direct nerve compression by an external object or compression or twisting of the nerve by a broken bone is among the causes of direct nerve compression. Apart from localized compression injuries that occur due to direct nerve compression, disruption of blood flow to the nerve due to crush and compartment syndrome or soft tissue injuries causing damage to the nerve vascular bed has also been reported among the causes of nerve injury.[8]

In their study in which they examined peripheral nerve palsy in 25 patients after the 1995 Hanshin-Awaji Earthquake, Yoshida et al.[10] reported that crush syndrome, compartment syndrome, prolonged nerve compression, and staying in a compelling posture in which the joint is in the forced flexion-extension and compressing the nerve were among the causes of nerve injury.

In our study, we detected single or multiple nerve injuries in 129 extremities of 94 patients. There were also 26 fractures and one joint dislocation coexisting with the nerve injury. Sixteen of the 26 fractured extremities—segmental fractures—were treated with surgery. Of the 129 extremities with nerve injury, 59 had compartment syndrome, and 51 of them were associated with nerve damage. Forty-six of the 59 extremities with compartment syndrome were treated with fasciotomy. There were fractures and compartment syndrome in ten extremities. Half of them, on the other hand, were patients with crush syndrome. Leaving aside the femoral and obturator nerve injuries, of which we saw one case each, multiple co-occurrences of crush syndrome, compartment syndrome and fractures were most present in individuals with ulnar nerve injuries in the upper extremity and in those with sciatic nerve injuries in the lower extremity. Peripheral nerve injury was detected more frequently in the lower extremities. The frequency of ulnar nerve injury in the upper extremity and peroneal nerve injury in the lower extremity was high.

The brachial plexus was the source of 15 of the 48 upper extremities with peripheral nerve injuries, corresponding to a high rate of approximately 1/3 (31.25%). The brachial plexus is highly vulnerable to neural injuries due to its superficial location and close proximity to skeletal structures. For instance, it could sustain traction injuries, become trapped and crushed between the clavicle and the ribs under it, or sustain damage from bone fragments, displaced muscles, or hematomas.[3] There was lumbosacral plexus injury in 18 (22.22%) of the 81 lower extremities with peripheral nerve injury. Traumatic injury to the lumbosacral plexus may occur in individuals with pelvic junction fractures, especially those with sacrum fractures.[3] Considering their relationship with the fracture, only one case of the 15 brachial plexus injuries was related to a clavicle fracture. Only five of the 18 individuals with lumbosacral plexopathy had a fracture of the sacrum. More than half of the patients with both brachial and lumbosacral plexus injuries were patients with crush syndrome (53.33% and 66.66%, respectively), most of whom also developed compartment syndrome.

Peroneal and sciatic injuries were the two most common nerve injuries identified in the lower extremity. Plexus damage was more common in the upper extremity, followed by ulnar nerve damage. In patients with crush syndrome, peripheral nerve damage was most frequently detected in the sciatic nerve. Approximately 81.48% of sciatic nerve injuries were concomitant with crush syndrome. Sciatic nerve damage was also seen most frequently in patients with compartment syndrome. In 31.81% of sciatic injuries, crush syndrome was accompanied by compartment syndrome, and in 9.09%, crush syndrome was accompanied by fracture. The ulnar nerve was most commonly affected in the upper extremity, and half of these patients also suffered coexisting crush syndrome, compartment syndrome, and fracture.

Peripheral nerve injuries may ensue concomitantly with fractures, fracture dislocations, and dislocations alone. Considering all injuries, five fibular, two tibial, a radial, a brachial plexus, and three lumbosacral plexus injuries were directly and solely related to fractures. However, since the study excluded some fractures and extremities

due to plaster, external fixation, and other factors, it is difficult to infer that these coexistences are distinct from those typically anticipated. The examination findings strongly suggested a potential peripheral nerve injury, even without the results of the electrodiagnostic analysis on 36 extremities. Open fasciotomy and the presence of a plaster cast-external fixator were the most typical reasons restricting ENMG analysis.

As mentioned above, sensorial nerves are more pressure-resistant than motor fibers. Sensory nerve injuries identified in the participant patients were concomitantly present with moderately severe motor nerve injury. The opposite also holds almost the same ratios, indicating that it is associated with the fact that crush injuries in participant patients were severe enough to affect the sensory and motor fibers significantly. Four patients had nearly all axonal injuries in the motor fibers that did not interfere without interfering with the sensory nerve. The first of these cases was about the radius fracture affecting the deep branch of the radial nerve; however, the other three were about tibial shaft fractures affecting the deep fibular nerve. Their sensory nerves were undamaged, whereas isolated motor nerves were injured.

Considering the case series in our study, the findings indicated that earthquake-based peripheral nerve injuries were not associated with direct nerve injury or deformation but were associated with crush and compartment syndromes. While the nerves of the bodily organs underneath the wreckage initially remain under pressure due to external forces, there is a potential for ischemic injury to the nerve due to hypoperfusion of the neural tissue if crush-related compartment syndrome develops. In addition to direct neural trauma, peripheral nerve damage is more likely to occur in the presence of rhabdomyolysis, compartment syndrome, and crush syndrome.[8,10] Compartment syndrome is a condition in which the increase in hydrostatic pressure in the osseous compartment induces muscle and nervous tissue hypoperfusion, leading to cellular anoxia, ischemia, and cell death.[11] Muscle infarction and nerve injury ensue at high compartment pressures. Compartment syndrome may result in rhabdomyolysis, and conversely, rhabdomyolysis may result in compartment syndrome.[12] Fasciotomy is a radical compartment syndrome treatment. It restores circulation with decompression, potentially inhibiting kidney failure and irreversible neurological injury by minimizing the risk of necrosis developing in the muscle. Routinely performed fasciotomies in the early period can reduce the muscle mass subject to necrosis, the severity of renal failure, the risks of peripheral neuropathy and ischaemic contracture, but they potentially increase the risk of infection.[13]

The literature review revealed that peripheral nerve injury is common in patients with rhabdomyolysis and crush syndrome.[8,10,14,15] Consequently, numerous interrelated issues that contribute to, trigger, and exacerbate each other will lead to multifactorial nerve injuries, making it challenging to identify the primary cause. Our results similarly revealed that peripheral nerve damage was significantly more common in patients with crush syndrome.

Peripheral nerve injuries have a considerable impact on long-term quality of life despite not being a life-threatening complication of earthquake-related traumas. Most cases assessed in the current study were associated with compartment and crush syndromes. However, this outcome is most likely due to more severe cases being referred to our hospital. The fact that the patients had multiple traumas, needed intensive care, and were coping with more critical health issues might have delayed their ENMG analyses. However, serial ENMG analyses within the first month may be helpful for patients requiring very early and early treatment. These are patients with clean incisions and neurotmesis. Although it is more beneficial to wait for other cases with neuropraxia and axonotmesis, serial ENMG examinations are crucial because rehabilitation is needed in this period, and close monitoring is required to see whether recovery, degeneration or regeneration develops. It is essential to immediately mobilize all available resources in post-disaster periods and focus on measures to prevent disability and increase the likelihood of survival.

Peripheral nerve injuries in earthquake victims are mostly seen in the distal nerves of the lower extremities and are often accompanied by crush syndrome. They require special attention as they may cause serious disability.

Ethical Considerations: This study was approved by the Ethics Committee of Ankara City Hospital (04.26.2023/E1-23-3481).

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

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Research Article

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EFFECTS OF PIRFENIDONE ON ISCHEMIA-REPERFUSION INJURY IN RAT EPIGASTRIC ISLAND FLAP MODEL: EXPERIMENTAL STUDY

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Abstract

Objectives: Pirfenidone is a non-peptide synthetic low molecular weight substance with anti-inflammatory, antioxidant and antifibrotic effects. Its positive effects have been shown on ischemia-reperfusion injury in various tissues such as testis, kidney, liver, lung and small intestine. Our aim is to investigate the effects of Pirfenidone on ischemia-reperfusion injury in skin flaps.

Materials and Methods: Eighteen Wistar male rats were divided randomly into three groups: Sham, Ischemia-Reperfusion (IR) and Pirfenidone plus Ischemia-Reperfusion (IR+Pirf). The epigastric island flap was elevated and returned to its place in the Sham group. In the second group (IR), the flap was elevated, and flap perfusion was interrupted with an avascular clamp for eight hours. In the third group (IR+Pirf), 300 mg/kg Pirfenidone was given orally before ischemia. Tissue samples were taken to evaluate biochemical substances (1st day) and histopathologic examination (7th day). On the seventh day, standardized photographs were taken to calculate the viable areas of the flap and all animals were sacrificed.

Results: Tissue MPO levels were statistically higher in the IR+Pirf group than in the Sham and IR groups ($p=0.006$). Tissue MDA levels were statistically higher in the IR+Pirf group than in the IR group ($p=0.026$). The lymphocyte count was lower in the Sham group than in the IR and IR+Pirf groups ($p=0.002$). The reepithelization ratio was higher in the IR+Pirf group than in the IR and Sham groups $p=0.010$). Flap survival areas showed no significant difference between groups ($p=0.194$).

Conclusion: As a conclusion, single dose treatment of Pirfenidone in rat skin flap ischemia-reperfusion model enhanced significantly re-epithelization and has no significant effect on flap survival.

Keywords: Pirfenidone, epigastric, island flap, ischemia-reperfusion.

Introduction

The aim of reconstructive surgery is to eliminate tissue deficiencies caused by various reasons and to restore form and function together. For this purpose, tissue pieces called flaps are frequently used. In free flap operations, the flap remains ischemic during the transfer of the flap taken from the donor site to the recipient area. If this ischemia period is prolonged above a critical level, tissue damage continues to increase even if reperfusion develops. This phenomenon is called ischemia-reperfusion injury, which is one of the most important limitations that increase morbidity in flap surgery.[1]

Prolongation of ischemia causes the accumulation of hypoxanthine in the tissue, resulting in the formation of superoxide radicals and an increase in tissue damage. Additionally, endothelial damage causes activation of the inflammatory process and migration of neutrophils to the region. In this context, scientific studies mainly focused on either increasing antioxidant activity or suppressing the inflammatory process.[2]

Pirfenidone is a non-peptide synthetic low molecular weight substance with anti-inflammatory, antioxidant and antifibrotic effects.[3,4] Its antioxidant property is supported by the continuation of nitric oxide production, which plays an active role in the fight against free radicals.[3] Based on the above-mentioned effects of pirfenidone, its effects on ischemia-reperfusion injury in tissues such as testis, kidney, liver, lung and small intestine have been investigated in the literature, and it has been shown to have positive effects.[1,3,5-7]

There was no literature study about the effects of pirfenidone on the skin flap ischemia–reperfusion model. Therefore, our aim is to investigate the effects of Pirfenidone on the inflammatory response and oxidative tissue damage in ischemia-reperfusion injury.

Materials and Methods

All animals have received humane care in compliance with the "Guide for the Care and Use of Laboratory Animals," and ethical consent was obtained from Gazi University Laboratory Animal Local Ethic Committee (Date:28/12/2023, Approval Number: E-66332047-604.01.02-546170). The epigastric island flap is a flap with a fixed anatomy in rats; the main vascular pedicle enters from the inguinal region as a superficial epigastric artery and vein. It can be obtained from both sides of the midline based on a single vascular pedicle. Therefore, we planned to elevate our flap with a size of 6x3 cm, with a single vascular pedicle, crossing the midline only up to random pattern feeding.[8] (Figure 1)

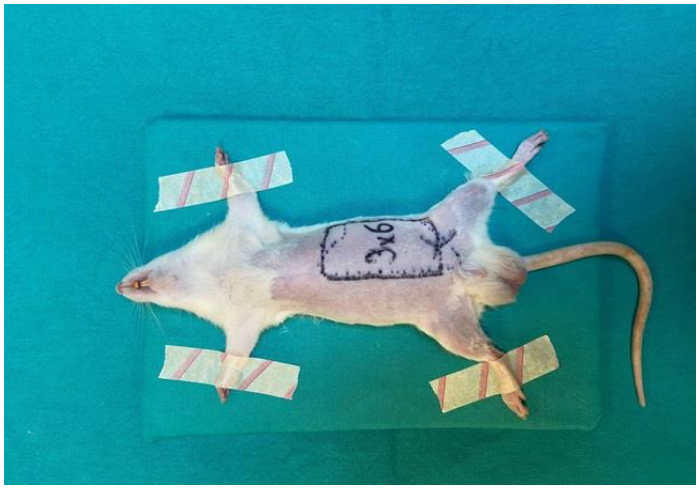

Figure 1. Flap planning.

Eighteen Wistar male rats were divided randomly into three groups. In the first group (Sham group), the epigastric island flap was elevated and returned to its place without any ischemia-reperfusion injury. The reason for the creation of this group was that surgical stress could also affect flap circulation.[9] In the second group (IR), surgery and ischemia-reperfusion injury were planned. In order to create the same stress in rats in this group, an equal volume of 0.5% carboxymethylcellulose solution that does not contain Pirfenidone was given by oral gavage before the surgical procedure. Then, the flap was elevated, and the flap circulation was interrupted for 8 hours with a microvascular atraumatic clamp (Figure 2).

Figure 2. The atraumatic microvascular clamp was applied to the main vascular pedicle.

The flap was returned to its place; the rats were awakened. When the 8-hour ischemia period was completed, the clamp was removed with forceps under mild anesthesia, the circulation was checked, and if necessary, the area was repaired with suturing. In the third group (IR+Pirf), surgery and ischemia-reperfusion injury were planned.

Pirfenidone (supplied by Apex Bio, Houston, TX, USA) was administered orally to this group at a dose of 300 mg/kg by dissolving it fresh in 1 ml of 0.5% carboxymethylcellulose at the beginning of the experiment.[6]

All animals were monitored for seven days. On the 1st day of the experiment, 1 cm standardized tissue samples were taken from the distal part of the flap for biochemical analysis under short-term anesthesia from all groups.[1] On the 7th day, standardized photographs were taken to calculate the viable areas of the flap and tissue samples were taken for histopathological tests.[9,10] Flap survival areas were calculated with Image J software (National Institutes of Health and the Laboratory for Optical and Computational Instrumentation (LOCI), University of Wisconsin, USA). Following the completion of these procedures, the experimental animals were sacrificed by giving a high dose of anesthetic (150 mg/kg i.p. route) to stop the cardiac blood flow.[9]

Biochemical analysis

Malondialdehyde (MDA) levels (indicators of ischemic tissue damage), myeloperoxidase (MPO) activity (correlates with the amount of neutrophil migration), glutathione peroxidase (GPx) and superoxide dismutase (SOD) enzyme activity levels (indicators of tissue antioxidant capacity) were investigated.[9,11-15]

Tissue MDA levels were determined using the method described by Ohkawa et al. The principle of this method is based on the spectrophotometric measurement of the red color due to the complex formed by the MDA in the sample with Thio barbituric acid (TBA) at an ambient pH of 3.5 after the proteins in the homogenate are bound with sodium dodecyl sulfate (SDS).[11] Tissue MPO activity is based on the reduction of O-dianisidine by oxidation of H2O2 by tissue homogenate and measurement of reduced O-dianisidine at 410 nm.[12] GPx activity was determined by a modification of the double enzyme method of Paglia and Valentina. In this method, the rate of GSSG formation is determined at a wavelength of 340 nm by the decrease in the optical density of the mixture as a result of the conversion of NADPH to NADP.[13] A colorimetric commercial kit was provided for measurement. SOD activities are based on the principle defined by Yi-Sun, that xanthine forms $O_2^{\cdot-}$ with xanthine oxidase, and this creates a colored compound with NBT, and this color intensity is measured spectrophotometrically. The higher the SOD activity in the environment, the less intense the color will be, as it will remove $O_2^{\cdot}$.[14] A colorimetric commercial kit was provided for measurement. Tissue protein levels were studied with the Lowry method, and MDA, MPO, SOD and GPx results were given per mg protein.[15] The biochemistry specialist was blinded to group information.

Histopathological analysis

Tissue samples taken from the distal flap on the seventh day were subjected to sectioning after routine procedures and after they were stored in Formol. Inflammation (absent/mild/moderate/severe), re-epithelization (absent/<50%/>50%/keratin), collagen orientation (absent/vertical/mixt/horizontal), fibroblast (absent/mild/moderate/severe), neovascularization (absent/weak/moderate/marked), collagen (absent/mild/moderate/severe) and necrosis (absent/epidermal/epidermal and dermal/ dermal loss) were examined and scored in tissue sections with hematoxylin-eosin staining under light microscope and these parameters were compared between groups.[16] The histopathologist was blinded to group information.

Statistical Analysis

All data were expressed as mean ± standard deviation. SPSS version 26 programs were used in the analysis of the data. The $p<0.05$ value was considered statistically significant. After the normality check (Kolmogorov-Smirnov), 'One way ANOVA' or 'Kruskal Wallis' tests and post-hoc analysis with Bonferroni correction were used to detect statistically significant differences between the groups.

Results

Biochemical Results

Statistical analysis of biochemical substances showed a significant difference in tissue MPO levels and tissue MDA levels between groups. According to the post hoc test, tissue MPO levels were statistically higher in the IR+Pirf group than in the Sham and IR groups ($p=0.006$).

Tissue MDA levels were statistically higher in the IR+Pirf group than the IR group ($p=0.026$) but statistically the same in the Sham group. Although the mean GPx level was higher in the IR+Pirf group compared to other groups, this difference was not statistically significant. Table 1 summarizes these results (Table 1).

Histopathologic Examination

Lymphocyte and reepithelization scores showed a statistically significant difference between groups. The lymphocyte count was lower in the Sham group than in the IR and IR+Pirf groups ($p=0.002$). Additionally, the reepithelization ratio was higher in the IR+Pirf group than in the IR and Sham groups ($p=0.010$). Polymorphonuclear leukocyte and fibroblast count, collagen orientation, collagen count, necrosis and neovascularization did not show a significant difference between groups. Table 2 summarizes statistically significant; Table 3 summarizes statistically non-significant differences.

Table 1. Tissue biochemical substance statistical values.

	Groups	Mean±SD	Min-max	P value	Post-hoc p values
MPO (U/mg protein)	1	0.48±0.13	0.38-0.73	**0.003**	1-2:1.00
	2	0.48±0.34	0.11-0.91		**1-3:0.006**
	3	1.29±0.54	0.6-1.77		**2-3:0.006**
SOD (U/mg protein)	1	67.42±16.55	48.46-97.01	0.76	-
	2	60.7±23.52	26.92-96.4		
	3	60.9±11.93	46.97-77.15		
GPx (U/mg protein)	1	89.56±36.34	55.75-138.56		
	2	87.73±22.47	55.9-117.03		
	3	102.97±30.82	67.88-149.49		
MDA (nmol/mg protein)	1	11.94±3.02	7.98-15.18	**0.027**	1-2:0.913
	2	9.63±2.55	6.41-12.95		1-3:0.212
	3	16.16±5.17	11-21.12		**2-3:0.026**

P<0.05 is considered significant. (Group 1= Sham, Group 2=IR, Group 3= IR+Pirf)

Table 2. Lymphocyte and reepithelization scores.

	Groups	Mode, Min-max	P value	Post-hoc p values
Lymphocyte	1	0.0, 0.0-0.0	**.002**	**1-2:0.023**
	2	1.0, 0.0-2.0		**1-3:0.001**
	3	1.0, 1.0-3.0		2-3:0.25
Reepithelization	1	0.0, 0.0-3.0	**.010**	1-2:0.815
	2	0.0, 0.0-3.0		**1-3:0.012**
	3	3.0, 3.0-3.0		**2-3:0.006**

P <0.05 is considered significant. (Group 1=Sham, Group 2=IR, Group 3=IR+Pirf)

Table 3. Statistical results of other histopathologic criteria.

	P value
Polymorphonuclear leukocyte	0.066
Collagen Orientation	0.317
Collagen	0.191
Fibroblast	0.733
Necrosis	0.065
Neovascularization	0.138

P<0.05 is considered significant.

Epidermal necrosis, dermal inflammation and unorganized collagen fibers were seen in Sham group rats (Figure 3).

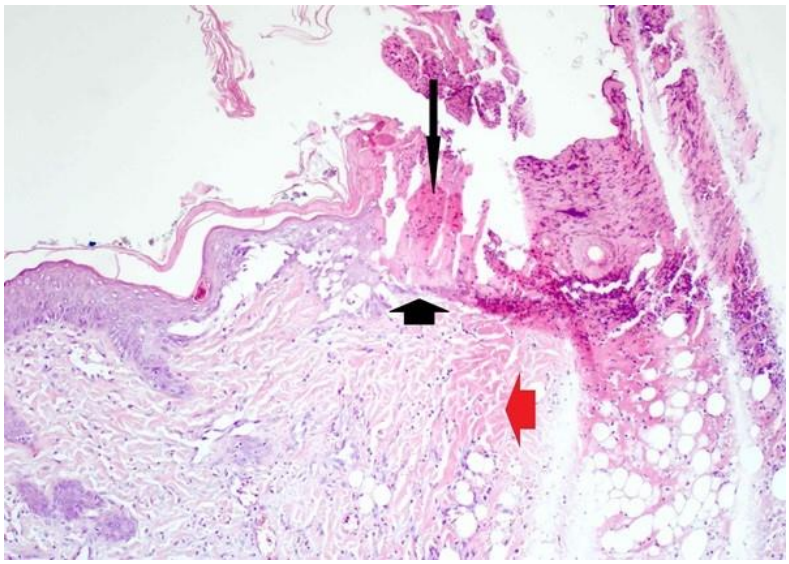

Figure 3. Sham group rat 7th-day histopathologic view (Hematoxylin-eosin staining, x 100 magnification, long black arrow: epidermal loss, short black arrow: slight epithelization, short red arrow: inflammation and unorganized collagen fibers).

Marked granulation tissue was seen in IR group rats (Figure 4).

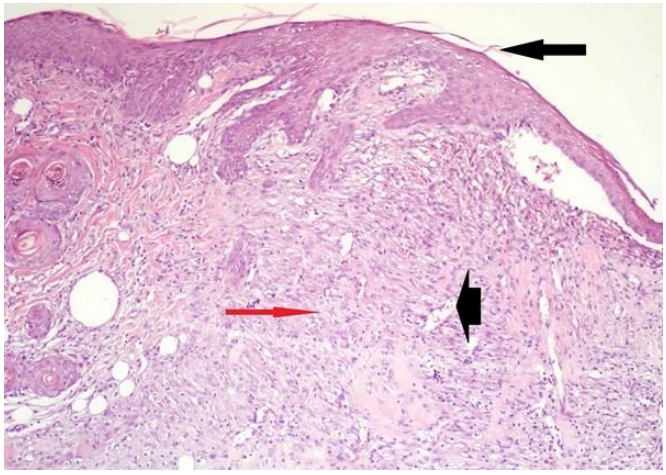

Figure 4. IR group rat 7th-day histopathologic view (Hematoxylin-eosin staining, x 100 magnification. Long black arrow: keratinized epidermis, short black arrow: vascular proliferation in the dermis, long red arrow: fibroblast proliferation).

On the other hand, keratinized epidermis and organized collagen fibers were seen in IR+Pirf group rats (Figure 5).

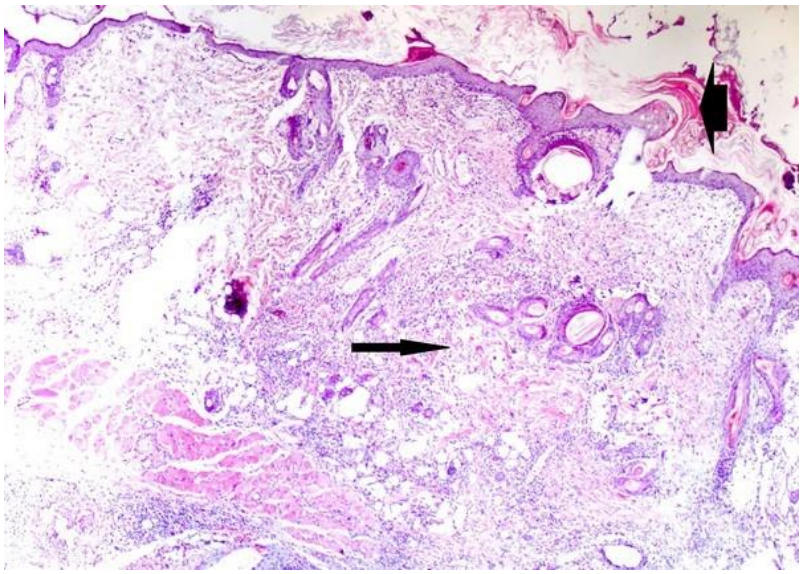

Figure 5. IR+Pirf group rat 7th-day histopathologic view (Hematoxylin-eosin staining, x 100 magnification. Long black arrow: organized collagen fibers, no granulation, continued inflammation, short black arrow: keratinized epidermis).

Flap Survival Ratios

Statistical analysis of flap survival areas showed no significant difference between groups (p=0.194). However, IR+Pirf group flaps survived completely. Table 4 summarizes these results.

Table 4. Flap survival results.

	Group	Mean±SD	Min-Max	P value
Flap Survival Ratio (%)	1	82.06±27.53	33.10-100.00	**0.194**
	2	75.41±41.54	0.00-100.00	
	3	100.00±0.00	100.00-100.00	

P<0.05 is considered significant. (Group 1=Sham, Group 2=IR, Group 3=IR+Pirf)

Discussion

We investigated the effects of Pirfenidone on rat epigastric island flap in an ischemia-reperfusion injury model. Our findings showed that the IR+Pirf group had higher MDA and MPO levels, higher reepithelization ratio and higher lymphocyte count. Although Pirfenidone group rats had no flap necrosis, this result was not statistically significant.

Many studies investigated the effects of pirfenidone on experimental ischemia-reperfusion models in different tissues. Kolukcu et al. investigated the effects of Pirfenidone on ischemia-reperfusion injury in testicular torsion-induced rat models.[1] They administered Pirfenidone 325 mg/kg via oral route immediately after ischemia and analyzed the biochemical levels in blood samples that were taken from the inferior vena cava. They found that SOD and GPx levels were higher, and MDA levels were lower in the Pirfenidone group than in the control group. Our results were not correlated with these results; we think that this can be caused by the sample obtaining difference or acting mechanism. They obtained vena cava blood for biochemical analysis; we obtained tissue specimens. We think that our results indicate the local effects of Pirfenidone in the skin flap. For the acting mechanism, one study pointed out that Pirfenidone alleviates the recovery of nitric oxide production by endothelial nitric oxide synthase; this effect could explain the protective effect in ischemic acute kidney injury in rats.[3] In addition, this study argued that Pirfenidone could have antioxidant activity that is responsible for its own chemical structure. Accordingly, they found liver tissue SOD and GPx levels were the same in IR and IR+Pirf groups. Thus, Pirfenidone could modulate ischemia-reperfusion injury in the skin flap via different mechanisms in our study.

Some studies focused on the anti-inflammatory effect of Pirfenidone in different animal models. Kaibori et al. investigated endotoxin-induced liver injury after hepatic ischemia in rats and found that the number of neutrophile counts was significantly lower in orally single-dose Pirfenidone (300mg/kg) treated rats.[5] Saito et al. carried out a study on the lung ischemia-reperfusion model in rats and found that a single dose of Pirfenidone (300 mg/kg) was effective in declining neutrophile infiltration significantly at two hours after reperfusion.[6] On the other hand, Arumugam et al. found that Pirfenidone treatment was ineffective in preventing circulating neutrophile count fall in rat small intestine ischemia-reperfusion model.[7] We did not see any anti-inflammatory effect of Pirfenidone on the 7th day. This could be caused by single-dose Pirfenidone treatment. Repeated doses can be effective in augmenting the long-standing anti-inflammatory effect of Pirfenidone.

In our study, we found that the re-epithelization rate and lymphocyte count were significantly higher in the IR+Pirf group. In addition, histopathologic slices showed organized collagen fibers and no granulation.

Accordingly, Mecott et al. conducted a pilot study in patients with second-degree burns, and they found that Pirfenidone treatment caused a decrease in wound healing time by enhancing wound re-epithelization.[17]

Our study has some limitations. First, a relatively small sample size could be obtained because of ethical issues. Second, single-dose treatment was planned. Different results can be obtained with a study with a larger sample size and repeated Pirfenidone doses.

In conclusion, single-dose treatment of Pirfenidone in rat skin flap ischemia-reperfusion model:

- Significantly enhanced re-epithelization
- Improves skin flap survival. However, this effect was not significant,
- Has no significant effect on inflammatory infiltration, collagen count/organization and fibroblast count on the 7th day.

Ethical Considerations: All animals have received humane care in compliance with the "Guide for the Care and Use of Laboratory Animals," and ethical consent was obtained from Gazi University Laboratory Animal Local Ethic Committee (Date:28/12/2023, Approval Number: E-66332047-604.01.02-546170).

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

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Letter to the Editor

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EVALUATION OF THE RELATIONSHIP BETWEEN FRAILTY, POLYPHARMACY, AND DEPRESSION IN PEOPLE 65 YEARS OF AGE AND OLDER

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ANKARA MEDICAL JOURNAL

Dear Editor,

I am writing to you regarding the recent publication of the article titled "Evaluation of the Relationship between Frailty, Polypharmacy, and Depression in People 65 Years of Age and Older" in Ankara Medical Journal.1

I would like to begin by commending the authors for their valuable contribution to the field. As a geriatrician, I am pleased to observe an increasing recognition among family medicine doctors of the importance of frailty and its adverse impacts on the health and well-being of older adults. Additionally, geriatricians frequently assess older adults attending geriatric outpatient clinics at tertiary hospitals, such as university hospitals or training and education hospitals. Therefore, this article is also valuable for understanding the characteristics of older adults seeking care from family medicine healthcare providers.

However, the study lacks data on the prevalence of frailty and depression within the cohort, which is crucial for understanding the extent of these geriatric syndromes and comparing them with other studies. Although Table 1 of the article mentions that 13 out of 135 individuals with comorbidities were diagnosed with depression, it fails to provide the depression rate determined by the Geriatric Depression Scale (GDS). Additionally, the absence of cut-off values for the Edmonton Frailty Scale (for example, 0-5 points, 6-7 points, and 8-17 points indicate fit, vulnerable, and frail adults, respectively) and Yesavage GDS (<5 and ≥5 points indicate no depression and the possibility of depression, respectively) in the methods section may pose challenges for interpreting the results, especially for readers unfamiliar with these scales.2,3 Moreover, detailing participants' functionality, malnutrition, cognition, and continence, as these factors are closely linked to frailty, would have been beneficial. The authors already had the results of these parameters via the Edmonton Frailty Scale, which includes the clock drawing test, timed-up-and-go-test, and questions about weight loss, functional dependence, and incontinence. If the authors had shared this data, it would have allowed for a more comprehensive understanding of the cohort's structure and aided in accurately interpreting the study's findings. Implementing these recommendations in future studies involving older adults can enhance the results and contribute to identifying factors associated with geriatric syndromes.

In conclusion, it's important to recognise the vital role of family doctors, alongside geriatricians, in the care of older adults. First, their long-term relationships with patients enable them to provide personalised and comprehensive care tailored to individual needs. Second, they prioritise preventive care, including health screening, immunisation, lifestyle counselling, and chronic disease management, to promote health and independence in older people. Third, they act as central care coordinators, ensuring seamless integration and management of all aspects of healthcare. Finally, their accessibility provides valuable support and guidance to older adults and their families throughout the ageing process. Collaboration between primary care physicians and geriatricians is essential to provide the highest quality of care for older adults.

Thank you for the opportunity to provide feedback.

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