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Editorial

Dear Readers,

It is with great pleasure that we present the September 2025 issue of the Turkish Journal of Family Practice. This issue brings together diverse and timely research reflecting the evolving scope of family medicine, from clinical challenges such as hypertension, anemia, and diabetes management, to broader perspectives on prevention, patient education, and health behaviors. The studies published here not only highlight the importance of evidence-based practice but also underscore the role of family physicians in addressing complex biopsychosocial needs.

We are also happy to share that our journal has recently been indexed in the Directory of Open Access Journals (DOAJ). This achievement increases our visibility worldwide and shows our ongoing dedication to open science and accessible, high-quality publishing.

We sincerely thank our authors, reviewers, and readers for their commitment and contributions.

Sincerely,
Prof. Dr. Yasemin ÇAYIR
Editor-in-Chief
Turkish Journal of Family Practice

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Research Article

Are YouTube videos on how to use nasal corticosteroid sprays helpful?

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ABSTRACT

Background: People can create video content on any topic they want via the internet and social media applications. Our aim is to determine the quality, reliability, understandability and actionability levels of YouTube videos on nasal corticosteroid usage and to evaluate the nasal corticosteroid application steps.

Methods: The first 200 videos were evaluated and recorded on YouTube (http://www.youtube.com) with the search term "use of nasal corticosteroid spray" on March 23, 2024. Videos regarding nasal corticosteroid use were evaluated by relevant clinicians using the Global Quality Scale (GQS), modified DISCERN (mDISCERN) and the Patient Education Materials Assessment Tool for Audiovisual Materials (PEMAT-A/V) scales, respectively. And the nasal corticosteroid application steps were recorded one by one.

Results: The median duration of 113 (56.5%) videos included in the study was 146 (min-max: 39-3582) seconds. The median GQS score of the videos was 3 (min-max: 1-5) and the median mDISCERN score was 3 (min-max: 0-5). When we evaluated the PEMAT-A/V scores of the videos, 35 were found to be understandable and 69 were actionable. The Global Quality Scala scores were found to be significantly higher in videos that were considered understandable and actionable (p=0.012, p<0.001, respectively). Modified DISCERN scores were found to be significantly higher in videos that were considered understandable and actionable (p=0.007, p=0.005, respectively). The steps for applying nasal corticosteroid spray were not adequately stated in the videos.

Conclusion: Increasing the number of actionable and quality content prepared using everyday language, far from medical terms, in the light of scientific data on social media, especially on the YouTube platform, can help larger audiences access accurate information on medical issues.

Keywords: Allergy, nasal spray, glucocorticoids, social media, digital health

Introduction

Allergic rhinitis occurs when disruption of the epithelial barrier allows allergens to penetrate the mucosal epithelium of the nasal passages. Patients apply to the hospital with complaints of nasal congestion, runny nose, postnasal drip, sneezing, and itching in the eyes, nose, and throat. Nasal corticosteroids play a role in the treatment of allergic rhinitis. It is even used to treat persistent moderate-to-severe allergic rhinitis, either as a standalone intranasal

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corticosteroid or in combination with an intranasal antihistamine.[1] Intranasal corticosteroid sprays also form the mainstay of medical treatment of inflammatory nasal conditions, including chronic rhinosinusitis.[2] To maximize the effectiveness of all medications, they must be used with appropriate techniques and all recommended application steps must be followed.[3] Additionally, the technique used to administer steroid nasal spray affects patient compliance and may cause side effects.[2]

Increasing access to the internet and mobile phone connections allows more people to access public health information faster and more directly than ever before.[4] Therefore, the internet is an important source of health information for the public, and social media platforms are a popular way to share health information with the public.[5] YouTube, one of the most well-known social media platforms, has an average of over two billion daily views, a new video is uploaded on average every minute, and the average user spends at least 15 minutes on the site per day.[6] Additionally, YouTube can be accessed freely, videos can be uploaded by individuals, and all videos can be viewed publicly.[7] Social media can be a powerful tool for the public health sector in this digital age, but its drawbacks, such as misinformation, must be considered.[4]

Using nasal corticosteroids with appropriate techniques can increase compliance with the drug by increasing the effect of the drug and reducing its side effects. YouTube, which reaches large audiences, is also a powerful source of access to health information. Therefore, we aimed to assess the quality, reliability, understandability, and actionability of YouTube videos on nasal corticosteroid use. We also evaluated which steps of nasal corticosteroid use were mentioned in the videos.

Materials and Methods

Study design

The search term 'use of nasal corticosteroid spray' was searched on YouTube™ (http://www.youtube.com) on March 23, 2024. A new YouTube account was created before searching to clear the search history and prevent previous search results from influencing the current search. Results were sorted by relevance using the search term in an incognito tab, and the first 200 videos viewed were saved for later evaluation. One duplicate video, 19 non-English videos, 63 irrelevant videos, and 4 videos shorter than 30 seconds were excluded from the study. The screening process for the study is shown in Figure 1.

The remaining 113 videos were evaluated by an allergy immunologist (M.E.) and a public health specialist (Y.S.) in terms of the target audience of videos (public education, academic education), video source (physician, non-physician health worker, independent user, organization, drug company, hospital/university, news agency), number of likes, video duration, number of comments, and video content (how to use a nasal

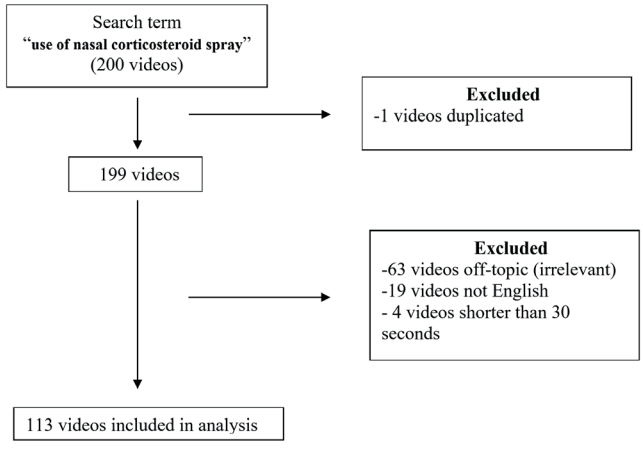

Figure 1. Flowchart of the video selection process.

steroid spray, what does nasal steroid spray do). The videos that prompted disagreement among the researchers underwent reassessment by another allergy immunologist (G.T.V.S), and the final decision was reached based on their evaluation.

The number of daily views of the videos was calculated based on the time elapsed from the day the video was uploaded, and the number of likes and comments per 1000 views was calculated. Videos were evaluated with the Global Quality Scale (GQS)[8], modified DISCERN (mDISCERN)[9], and the Patient Education Materials Assessment Tool for Audiovisual Materials (PEMAT-A/V).[10]

Recommended steps for administering corticosteroid nasal spray are: (1) shaking before use, (2) spraying into the air before first use, (3) gently blowing nose, (4) leaning forward with the nasal spray aiming nearly vertical, (5) using the hand opposite the nostril being treated, aim the nozzle slightly up and outward (lateral and cephalad) toward the tear duct or medial canthus, (6) spray without sniffing or while sniffing very gently, (7) cleaning the spray head.[11,12]

Scoring system

The authors reviewed the video evaluation guidelines and then the videos were rated. The GQS, a five-point scale, was used to assess the overall quality of the content. This score was graded using 5 criteria:

1 (Poor): Inadequate, lacking important content, confusing or misleading.

2 (Generally Poor): Some relevant information is present but significantly flawed.

3 (Moderate): Adequate quality with some useful content, although limited in scope or clarity.

4 (Good): Informative and mostly accurate, with good clarity and structure.

5 (Excellent): Highly informative, comprehensive, and clearly presented.[8] Those that were 'poor' and 'generally poor' were categorized as low quality, while those that were 'good' and 'excellent' were classified as high quality. The moderate group was called 'intermadiate.'

The mDISCERN scale consists of five questions, each of which targets an important aspect of content reliability. One point is given for each positive response, resulting in a total score between 0 and 5, with higher scores indicating greater reliability. The five questions assess:

1. Are the objectives of the content clearly stated and achieved?
2. Are reliable sources of information cited?
3. Is the information presented in a balanced and unbiased manner?
4. Are additional sources of information provided for further reading?
5. Are areas of ambiguity or controversy discussed?[9]

The version of PEMAT-A/V that evaluates audiovisual materials was used and this version has two main categories: understandability and actionability.

1.Understandability Score

This measures how easy it is for a person to understand the content. The 13 items here focus on clarity of language, structure, and use of visual and audio aids. Each item is scored on an Agree or Disagree scale to calculate a score.

2. Actionability Score

This measures how well the content enables the viewer to take specific, actionable steps. Four items are assessed, with each item being scored as Agree or Disagree to calculate a final score.[10] According to the PEMAT-A/V score, videos are classified as understandable or actionable if the mean scores on each scale exceed 70%.[10]

Ethical considerations

The study analyzed publicly available content on YouTube, an open-access platform, and did not involve any interaction with human or animal subjects. Additionally, no personally identifiable or sensitive information was collected or processed during the evaluation of the videos. As with previous studies in the literature that evaluated online medical content on platforms such as YouTube without requiring ethical approval[13,14] our study did not require ethical approval.

Statistical analysis

The data were analyzed using the SPSS (Statistical Package for the Social Sciences) 20.0 software package, with $p<0.05$ was considered statistically significant. In descriptive statistics, categorical variables are expressed as frequency and percentage. The conformity of the data to normal distribution was assessed with the Kolmogorov-Smirnov test. Metric variables that did not show normal distribution were given as median (minimum-maximum). Chi-Square test was used to compare independent groups in terms of categorical variables. Mann-Whitney U test was used to compare metric variables that do not show normal distribution.

Results

The duration of the videos included in the study varies between 39 and 3582 seconds, and the median duration is 146.0 seconds. The time elapsed after the videos were uploaded varies between 25 and 5991 days, with the median time being 1778 days. The number of likes the videos receive from the audience varies between 0 and 20000, and the median duration is 32.5 likes. While there were 22 videos (19.5%) that were closed to comments by the uploader, the number of comments on the videos that could be commented on ranged from 0 to 1432, and the median number of comments was 2.0. While the videos we reviewed had a number of views between 2 and 2146567, the median number of views was found to be 5420. While 72.6% (n=82) of the videos are about how to use nasal steroids, 27.4% (n=31) are videos about what nasal steroids are used for. While 97% (n=110) of the videos were videos for the public, 3% (n=3) were videos prepared for academic education purposes. Information including video sources and the countries where the videos were uploaded are included in Table 1.

Table 1. Source and country of publication of the videos

Variable name	n (%)
Video Source	
Physician	40 (35.4)
Non-physician Health Worker	11 (9.7)
Organization/Administration	22 (19.5)
Independent User	21 (18.6)
Drug Company	7 (6.2)
Hospital/University	11 (9.7)
News Agency	1 (0.9)
Country of publication	
USA	62 (54.9)
Australia	13 (11.5)
United Kingdom	9 (8.0)
Canada	7 (6.2)
India	7 (6.2)
Ireland	6 (5.3)
Malaysia	2 (1.8)
Philippine	2 (1.8)
Other	5 (4.5)

When the GQS scores of the videos were examined, it was determined that the GQS scores varied between 1 and 5 points and the median score was 3.0, 3 videos were poor, 20 videos were generally poor, 35 videos were moderate, 47 videos were good and 8 videos were excellent. When we grouped the GQS scores into three groups, it was determined that 23 videos were low quality, 35 videos were intermediate and 55 videos (48.7%) were high quality. The scores of the videos according to the mDISCERN scale vary between 0 and 5 points, and the median score is 3.0.

When we evaluated the PEMAT-A/V scores of the videos, 35 videos were found to be understandable and 69 videos were found to be actionable. While the average understandability score of the videos evaluated as understandable was found to be 82.0 (70.0-92.0), the average score of the non-understandable videos 55.0 (27-67.0). While the minimum, maximum and median values of actionability scores of actionable videos were determined as 100 points, the actionability scores of non-actionable videos ranged between 0 and 67 and the median value was determined as 0.0 (Table 2).

The duration of understandable videos was found to be significantly longer than non-understandable videos (p=0.001), and although the duration of actionable videos was found to be longer than non-actionable videos, the difference was not significant (p=0.906). While the understandable rates of videos uploaded by health professionals were found to be significantly lower at 19.6% than those of other video uploaders (40.3%) (p=0.014), no significant relationship with actionability was detected. No significant relationship was found between the videos explaining 'what nasal steroids are for' and 'how to use nasal corticosteroids' and being understandable, and the non-actionable rate was found to be significantly higher in videos about 'what nasal steroids are for' (p<0.001). While there was no significant relationship between the number of views of the videos and their understandability, the number of views of actionable videos was found to be significantly higher (p=0.002). While there is no significant relationship between the number of daily views and understandable status of the videos since the date they were uploaded, it was found to be significantly higher in actionable videos (p<0.001). No significant relationship was found between the number of likes per 1000 views and whether the videos were understandable or actionable. Modified DISCERN scores of the videos were found to be significantly higher in understandable videos than in non-understandable videos (p=0.007). When mDISCERN scores and actionable situations were compared, the median (min-max) values of actionable videos were found to be significantly higher with 3.0 (2.0-5.0) points (p=0.005). GQS scores were found to be significantly higher in understandable videos with a median (min-max) score of 4.0 (3.0-5.0) (p=0.012). GQS scores of actionable videos were found to be significantly higher than non-actionable videos, with a median (min-max) score of 4.0 (2.0-5.0) (p<0.001) (Table 3, Table 4).

All steps on how to use nasal corticosteroid were explained in 4 videos. Step-by-step evaluation of nasal corticosteroid usage is shown in Table 5.

Table 2. The characteristics scores of understandable vs. non understandable and actionable vs. non- actionable

Scores		Overall n (%)	Median (Min-Max)	p
Understandability	Understandable	35 (31.0)	82.0 (70.0-92.0)	p<0.001
	Non- Understandable	78 (69.0)	55.0 (27.0-67.0)	
	All	113	60.0 (27-92.0)	
Actionability	Actionable	69 (61.1)	100.0 (100.0-100.0)	p<0.001
	Non- Actionable	44 (38.9)	0.0 (0.0-67.0)	
	All	113	100.0 (0.0-100.0)	

Min: minimum, max: maximum.

Table 3. Factors associated with understandability

Video Characteristic	Overall n (%)	Understandable n (%)	Non-Understandable n (%)	p
Video Content				
What nasal steroids are for	31 (27.4)	11 (35.5)	20 (64.5)	0.524
How to use nasal steroids	82 (72.6)	24 (29.3)	58 (70.7)	
Video Source				
Health worker*	51 (45.1)	10 (19.6)	41 (80.4)	**0.014**
Others	62 (54.9)	25 (40.3)	37 (59.7)	
	Median (Min-Max)			**p**
Video Length (seconds)	146 (39- 3582)	210 (39 - 3582)	131 (40-560)	**0.001**
View	5420 (2-2146567)	5948 (44-1228331)	4749.5 (2-2146567)	0.747
View per Day	4.7 (0.0-2838.4)	10.5 (0.06-2838.4)	2.93 (0.0-623.88)	0.355
Like per 1000 view	6.3 (0.0 – 1000)	6.98 (0.0 – 68.1)	6.36 (0.0 – 1000)	0.756
Comment per 1000 view	0.33 (0.0-45.45)	0.25 (0.0-10.9)	0.4 (0.0-45.45)	0.674
Modified DISCERN	3.0 (0-5.0)	3.0 (2.0-5.0)	3.0 (0.0-5.0)	**0.007**
GQS	3.0 (1.0-5.0)	4.0 (3.0-5.0)	3.0 (1.0-5.0)	**0.012**

*Health worker: (Physician and non-physician), min: minimum, max: maximum, GQS: The Global Quality Scale.

Table 4. Factors associated with actionability

Video Characteristic	Overall n (%)	Actionable n (%)	Non-Actionable n (%)	p
Video Content				
What nasal steroids are for	31 (27.4)	0 (0.0)	31 (100.0)	**<0.001**
How to use nasal steroids	82 (72.6)	13 (15.9)	69 (84.1)	
Video Source				
Health worker*	51 (45.1)	28 (54.9)	23 (45.1)	0.153
Others	62 (54.9)	41 (66.1)	21 (33.9)	
	Median (Min-Max)			**p**
Video Length (seconds)	146 (39- 3582)	146.0 (39 - 571)	132.5 (40-3582)	0.906
View	5420 (2-2146567)	15992.0 (2-2146567)	2527.5 (22-580494)	**0.002**
View per Day	4.7 (0.0-2838.4)	11.03 (0.00-2838.43)	1.33 (0.06-509.65)	**<0.001**
Like per 1000 view	6.3 (0.0 – 1000)	5.7 (0.0- 1000)	7.11 (0.0-90.91)	0.136
Comment per 1000 view	0.33 (0.0-45.45)	0.36 (0.0-16.81)	0.27 (0.0-45.45)	0.637
Modified DISCERN	3.0 (0-5.0)	3.0 (2.0-5.0)	3.0 (0.0-5.0)	**0.005**
GQS	3.0 (1.0-5.0)	4.0 (2.0-5.0)	3.0 (1.0-4.0)	**<0.001**

*Health worker: (Physician and non-physician), min: minimum, max: maximum, GQS: The Global Quality Scale.

Table 5. Step-by-step evaluation of nasal corticosteroid usage

Nasal corticosteroid usage steps	Presented n (%)
Step-1: Shaking before use	39 (34.5)
Step-2: Spraying into the air before first use	46 (40.7)
Step-3: Blowing slowly through the nose	38 (33.6)
Step-4: Leaning forward so that the nasal spray is almost vertical	50 (44.2)
Step-5: Aim the nozzle slightly up and outward toward the tear duct or medial canthus	62 (54.9)
Step-6: Spray without sniffing or by sniffing very gently	54 (47.8)
Step-7: Cleaning the spray head	20 (17.7)

Discussion

We observed that the quality, reliability, actionability, and understandability levels of the 113 videos we watched by searching on YouTube with the term 'use of nasal corticosteroid spray' were low. We also found that the instructions for applying nasal corticosteroid spray in the videos were inadequate.

Allergy practices increasingly utilize a variety of social networks to educate current and potential patients.[15] In the study, which included 86 videos, it was found that the usefulness of YouTube videos on allergic rhinitis varied and less than half of the videos provided useful information.[16] In another study where 130 videos related to details about asthma were evaluated, more than half of the videos were found to be useful, but a non-negligible portion of the videos were evaluated as misleading.[17] In a study conducted in Türkiye using GQS, PEMAT-A/V, and DISCERN tools, it was stated that YouTube was an effective platform for visual learning on the use of adrenaline auto-injector.[18] In the study in which YouTube videos on immunology were evaluated with GQS, it was concluded that YouTube can provide some useful information on immunology to medical students, but cannot replace textbooks and academic courses in terms of content.[19] Research indicates that videos on YouTube vary in their usefulness for medical information. The reason for this difference may be related to who the target audience is watching the video, who the video uploader is, and the extent of the medical issue.

When the videos were evaluated in terms of video duration, it was determined that understandable videos were significantly longer than non-understandable videos. This situation creates the idea that for the videos to be understandable, sufficient time should be allocated to explaining the subject. The number of video views and daily views since the date the videos were uploaded was significantly higher for actionable videos than for non-actionable videos. This situation makes us think that the demand for actionable videos is higher.

In the study conducted with the adrenaline auto-injector, it was observed that the understandability rates were higher in the health-related group, although it was not statistically significant.[18] In our study, we found that the understandable rates of the videos uploaded by healthcare professionals were significantly lower than those of other video uploaders. Different results in terms of understandability may be related to differences in categorization and content. In our study, the low understandability rate of the videos uploaded by healthcare professionals suggests that this is due to the healthcare professionals' use of medical terms in the videos.

In a study evaluating GQS, mDISCERN, PEMAT-A/V and epinephrine auto-injector, it was stated that there were serious problems in the quality, reliability, understandability and actionability of the videos.[20] In a study evaluating YouTube videos for adrenaline auto-injectors, it was concluded that videos recorded by medical professionals provide the highest quality and reliable information.[18] In the study where videos about inhaler use were examined, the average Journal of American Medical Association (JAMA) Benchmark criteria and GQS scores of the videos narrated by nurses and doctors were found to be significantly higher than the others.[21] The high quality and reliability of videos prepared by health professionals supports the idea that videos containing medical information should be uploaded with the contribution of health professionals. When healthcare professionals upload videos, explaining medical terms using everyday language contributes to increasing the understandability rate.

In the study where videos about inhaler use were evaluated, it was determined that some process

steps were skipped, and significantly more process steps were skipped in individually uploaded videos compared to professional organizations.[21] A study of 33 YouTube videos found that the most readily available instructional videos did not provide patients with accurate instructions for administering nasal sprays.[12] In another study where 26 videos were evaluated, 7.7% of the videos explained all the steps of correct nasal spray use.[22] Similarly, in our study, the nasal corticosteroid spray application steps were not adequately stated in the videos. All steps on how to use nasal corticosteroids were explained in only 4 videos. An incomplete explanation of the instructions for the use of drugs in the videos may cause patients to use the drugs incorrectly and even reduce the effectiveness of some drugs.

In one study, a statistically significant positive relationship was observed between the modified PEMAT score and both GQS and mDISCERN.[23] In our study, GQS and mDISCERN scores were found to be high in both understandable videos and actionable videos, and this was statistically significant. These findings suggest that users who produce quality and reliable video content produce more understandable and actionable videos.

Our study has some limitations, the first of which is that the study covers a short period considering the dynamic development of YouTube. The results may vary depending on the evaluation of videos on YouTube in different periods. The second limitation is that other social media platforms other than YouTube, which is widely used, were not evaluated. The third limitation is that although we created a new YouTube account by deleting the search history, we may have evaluated certain content due to country-specific internet providers. This may limit the universality of the study.

In conclusion, social media is becoming increasingly popular as a source of information on immunology and allergy diseases, and patients are turning to YouTube videos to learn about their diseases and how to use their medications. However, there are some problems with the quality, reliability, understandability, and actionability of YouTube videos. In addition, the steps of medication use is not explained well enough in the videos. We believe that creating videos, especially by healthcare professionals who are experts in their field, will increase the quality and reliability of the content. However, we think that to create understandable videos, everyday language should be used, away from medical terms. As healthcare professionals, we believe that we need to increase our role on social media, including the popular platform YouTube, to provide accurate information to a wide audience.

Ethical approval

YouTube is a free platform accessible to everyone. Since no humans or participants were included in our study, ethics committee approval was not required.

Author contribution

Study conception and design: ME, GTVS, YS; data collection: ME, GTVS, YS; analysis and interpretation of results: ME, GTVS, YS; draft manuscript preparation: ME, GTVS, YS; all authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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Research Article

Night eating syndrome negatively affects the physical and mental quality of life of female university students

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ABSTRACT

Background: Night eating syndrome (NES) is a clinical syndrome, which is related to sleep disturbance and depression. NES may be associated with obesity and may negatively affect quality of life of university students. The aim of this study was to examine the relationship between NES with obesity and health related quality of life in female university students.

Methods: A total of 293 female university students aged 18-29 were recruited to study. The demographic characteristics of students were questioned. Students filled out the Night Eating Questionnaire and an instrument determining health related quality of life (SF-36). Anthropometric measurements (height, weight and waist circumference) of participants were taken by professionals. Correlation and linear regression analysis were run to analyze collected data.

Results: About 57% of students' mothers were illiterate or had primary school degrees. The NES prevalence was 6.8% in students. There was no significant relationship between anthropometric measurements (body mass index, waist circumference) and the presence of NES and quality of life scores ($p>0.05$). However, higher NES scores were associated with lower quality of life sub-scores (physical function, role limitations due to emotional problems, vitality, emotional well-being, social functioning, pain, general health perception) ($p<0.05$). Simple linear regression analysis results also showed that NES scores were related to lower physical and mental health related quality of life scores ($p<0.05$).

Conclusions: Although night eating syndrome was not associated with obesity in female university students, it directly affects the physical and mental quality of life of students, adversely. Strategies to cope with night eating syndrome should be developed for university students.

Keywords: Anthropometry, night eating syndrome, quality of life, university students

Introduction

Night eating syndrome (NES) is a clinical syndrome characterized by evening hyperphagia, nocturnal eating, and associated sleep and mood symptoms.[1] The descriptive characteristics of the NES are morning anorexia or skipping breakfast ≥ 4 mornings per week, tending to eat after dinner or during the night, difficulty in sleep onset or maintenance ≥4 times a week, believing that eating

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is necessary to fall or return to sleep and depressed mood in the evening.[2] The NES prevalence ranges between 1.5% and 4.6% in general population.[3,4]

University students are a high-risk group for developing NES. Insufficient and irregular sleep in university students is present at alarming levels.[5] Skipping breakfast, evening snacks, and eating late at night are also commonly observed poor eating habits among university students.[6,7] It is reported that disturbed eating behaviour is more prevalent in university students particularly females than in the general population.[8,9] University students especially females are vulnerable to developing anxiety and depressive symptoms, as well.[10,11] Being away from family, facing psychological distress due to trials of everyday academic life, class schedules, the double burden of both work and study and disorganization of daily routine may be the reasons for developing poor eating habits in university students.[12]

NES is seen as one of the main eating behaviors causing obesity. It is known that overweight and obesity prevalence is rising among university students.[13] While some studies suggest that NES triggers obesity, others report conflicting results.[14,15] Studies declared that NES prevalence is higher in psychiatric outpatients and NES is related to depression and low self-esteem among obese people.[16,17]

Health-related quality of life (HRQL) has been surveyed for many years to support healthcare in general and disease-specific populations. Measuring health-related quality of life can be helpful to predict and indicate morbidity and mortality in a large population. Studies reported that obesity is negatively associated with HRQL in adults and children.[18,19] HRQL was also proved to be lower among female university students.[20] Due to disrupting sleep and causing daytime fatigue, NES may also be harmful to HRQL.[21] The relationship between NES and HRQL is scarce among university students. Female university students were at risk of obesity, NES and low HRQL more than males. Therefore, the aim of the study was to examine the relationship between NES with HRQL and obesity among female university students.

Material and Methods

Study design

A cross-sectional study was conducted on 300 volunteer female university students aged 18-29 years at Karamanoğlu Mehmetbey University in Karaman in October 2024. Participants were selected by incidental sampling. Students who were younger than 18 years or older than 29 years, declined to participate and did not allow their weight and height to be measured were excluded from the study. Before the study, the minimum sample size was determined between 74 and 305 from various studies according to the calculation by taking the alpha value of 0.05, and the theoretical power of 0.80 and 0.95.[22,23]

A total of 300 female students were surveyed, however, 7 participants were excluded from the study due to incomplete data and being younger than 18 years. Therefore, 293 students completed the study. Written informed consent was obtained from students. The research adhered to the declarations of Helsinki.

The demographic characteristics such as age, gender, mother and father education and sibling numbers were questioned. Night Eating Questionnaire and Short Form Health Survey (SF-

36) were applied with face to face interviews by professionals. The anthropometric measurements were taken by professionals who were not involved in the study.

Ethical approval

The study was approved by Karamanoğlu Mehmetbey University Ethics Committee (Ethical code: 02-2024/22. Approval date:02.10.2024)

Anthropometric measurements

The body weights of female students were measured to the nearest 0.1 kg with a portable scale. Height to the nearest 0.1 cm was measured with a tape. Body mass index was calculated by dividing weight (in kilograms) by the square of height (in meters) for each subject. Students were classified as underweight, normal, overweight and obese according to World Health Organization.[24]

Night Eating Questionnaire (NEQ)

NEQ was developed to determine NES and consists of 14 items, each item is scored between 0-4 with a likert-type measurement, and only the 13th question is not included in total score. Therefore, the total score is between 0-52. In addition, questions 1, 4 and 14 are reverse scored. The cut-off score was determined as ≥25 to identify NES.[25] Turkish validation was performed by Atasoy et al.[26] in 2014.

SF-36

SF-36 is an instrument that was developed to determine HRQL and consists of 36 questions. The questionnaire is simple and brief. SF-36 has eight subgroups, namely physical function, role limitations due to emotional problems, vitality, role limitations due to physical health, emotional wellbeing, social functioning, pain, general health perception. Each subgroup has distinct scores (0-100) and higher scores indicate better quality of life within that subgroup.[27] Turkish validation was performed by Bilir Kaya and İçağasıoğlu.[28] Physical component score (PCS) and mental component score (MCS) were calculated by obtaining Z-scores of subscores, using respective factor coefficients of each subscore and finally T-scores (mean=50, SD=10).[29] To reduce inconsistent results between the SF-36 subscores with PCS and MCS, it was suggested that uncorrelated (orthogonal) summary scores should be used along with the correlated (obliquely derived) summary scores. Therefore, we used both uncorrelated PCS, MCS (PCS_{uc}, MCS_{uc}) and correlated PCS, MCS (PCS_c, MCS_c).[30,31]

Statistical analysis

All statistical analyses were carried out with Statistical Package for Social Sciences (IBM SPSS 21.0). Numeric variables such as anthropometric data, NEQ score, SF-36 subscores were reported as means and standard deviations (SD)s. Since variables were parametric, Pearson's correlation test was used to determine relationships between the anthropometric measurements, NEQ score, SF-36 subscores, PCS_{uc}, MCS_{uc}, PCS_c, MCS_c. We ran two simple linear regression analyses to examine the effect of NEQ on PCS_c, MCS_c. The independent variable was NEQ in both models. In the first model, PCSc was the dependent variable and in the second model, MCSc was the dependent variable. After simple linear regression analysis, multiple linear regression models were tried. However, they did not meet the regression criteria and perform well. Therefore simple regression models were shown in this study. Statistical significance was defined as $p<0.05$

Results

A total of 293 female students completed the study. The mean age of the female students was 20.9±1.7 years (18-29). The mean NEQ score was 16±5 among students and 6.8 % of them had NES. About 57% of students' mothers were illiterate or had primary school degrees. Most of the students (61.1%) had three or more siblings. The mean BMI of the students was 21.5±3 (16.0-35.3). Only 13.3% of them were overweight and obese (Table 1).

The mean physical functioning, vitality and social functioning scores were 83.98±13.42, 55.07±18.94, 68.89±22.54 among university students, respectively (Table 2).

No correlation was found between BMI, waist circumference with SF-36 subgroup scores, physical and mental component scores and NEQ score (Table 3).

NEQ score was negatively correlated with physical functioning ($p<0.015$), role limitations due to emotional problems, vitality, emotional wellbeing, social functioning, pain, general health perception subscores among university students ($p<0.001$). Higher NEQ score was also related to lower physical and mental health related quality of life scores ($p<0.001$) (Table 4).

According to regression analysis, the NEQ score was directly related to lower physical and mental component scores ($p<0.001$). NEQ score was significantly associated with a 38% decrease in PCS_c and 27% decrease in MCS_c. The models with NEQ scores explained 8% and 19% of the variances in PCS_c and MCS_c, respectively (Table 5).

Table 1. Demographic and anthropometric characteristics and NES prevalence of university students (N=293)

	Mean±SD (Min-Max)
Age (years)	20.9±1.7 (18-29)
Age groups *	
18-19	49 (16.8)
20	72 (24.6)
21	78 (26.6)
22	54 (18.4)
23-29	40 (13.6)
Mother Education*	
Illiterate	19 (6.5)
Literate	23 (7.8)
Primary	127 (43.3)
Secondary	43 (14.7)
High school	51 (17.4)
University	30 (10.3)
Paternal Education*	
Illiterate	4 (1.4)
Literate	6 (2)
Primary	92 (31.4)
Secondary	58 (19.8)
High school	66 (22.5)
University	67 (22.9)
Siblings*	
≤ 1	17 (5.8)
2	100 (34.1)
≥3	176 (61.1)
BMI*	
Below 18.5 (underweight)	53 (18.1)
18.5-24.9 (normal)	201 (68.6)
25.0-29.9 (overweight)	36 (12.3)
30 and above (obese)	3 (1)
BMI (kg/m^2)	21.5±3.0 (16.0-35.3)
Weight (kg)	57.9±8.8 (40.0-86.0)
Waist Circumference (cm)	74.3±8.1 (54.0-98.0)
NES presence (N=293)*	
Yes	20 (6.8)
No	273 (93.2)

* N (%)

Table 2. SF-36 subgroup scores of female university students

SF-36 Subgroup Scores (N= 293)	Mean±SD (Min-Max)
Physical functioning	83.98±13.42 (30-100)
Role limitations due to emotional problems	45.85±40.58 (0-100)
Vitality	55.07±18.94 (0-90)
Role limitations due to physical health	79.18±32.01 (0-100)
Emotional wellbeing	65.73±16.48 (0-100)
Social functioning	68.89±22.54 (0-100)
Pain	73.69±18.67 (12.5-100)
General health perception	59.47±16.02 (0-100)

Table 3. The correlation coefficients between anthropometric measurements with SF-36 subgroup scores and NEQ score (r)

	Weight (kg)	BMI (kg/m^2)	Waist Circumference (cm)
Physical functioning	-0.072	-0.055	-0.069
Role limitations due to emotional problems	0.097	0.108	0.112
Vitality	-0.019	0.006	0.037
Role limitations due to physical health	-0.031	0.031	-0.064
Emotional wellbeing	-0.079	-0.087	-0.080
Social functioning	0.075	0.075	0.038
Pain	0.038	0.015	0.028
General health perception	0.029	0.059	0.078
PCS_{uc}	-0.027	0.006	-0.029
MCS_{uc}	0.034	0.032	0.047
PCS_c	0.002	0.038	0.004
MCS_c	-0.001	0.009	0.015
NEQ score	0.040	0.067	0.058

Pearson correlation

Table 4. The correlation coefficients between SF-36 subgroup scores and NEQ score (r)

	NEQ Score	p
Physical functioning	-0.142*	0.015
Role limitations due to emotional problems	-0.200**	<0.001
Vitality	-0.327**	<0.001
Role limitations due to physical health	-0.085	0.146
Emotional wellbeing	-0.384**	<0.001
Social functioning	-0.262**	<0.001
Pain	-0.170**	<0.001
General health perception	-0.201**	<0.001
PCS_{uc}	-0.089	0.127
MCS_{uc}	-0.356**	<0.001
PCS_c	-0.266**	<0.001
MCS_c	-0.405**	<0.001

Pearson correlation, *p<0.05, **0.001

Table 5. Simple linear regression analysis for physical and mental component scores with NEQ score

Dependent variable	**PCS_c (N= 289)**				
	B	**95% CI for B**		**p**	**R^2**
		Lower	**Upper**		
Independent variable					
NEQ score	-0.382	-0.536	-0.228	<0.001	0.077
Dependent variable	**MCS_c (N=290)**				
	B	**95% CI for B**		**p**	**R^2**
		Lower	**Upper**		
Independent variable					
NEQ score	-0.272	-0.338	-0.207	<0.001	0.188

Unstandardized coefficient (B) with 95% confidence interval (CI), coefficient of determination (R^2) for overall model fit. PCS: physical component score; MCS: mental component score.

Discussion

This study aimed to examine the relationship between NES with obesity and HRQL among female university students.

NES prevalence was 6.8% in this study. Although Rand et al.[3] reported prevalence of NES is 1.5% in the general population, there is no precise prevalence for university students. The studies conducted on university students reported different results. While Yahia et al.[32], Ahmad et al.[33] and Tekin and Öner[34] reported high prevalences of NES (11.46%, 33.9% and 67%); Runfola et al.[35] and Özgür and Uçar[15] reported low prevalence of NES (4.6%, 1.4%) among female university students. Some departments where students studied such as health science, medicine and biology may increase the nutritional knowledge of the students due to being directly related to health. This may affect the food choice of the students and can cause bias in the results. Because it has been known that nutritional knowledge causes healthy eating attitudes and practices.[36] Therefore, the lower prevalence of NES in some studies may be due to the nutrition education of the participants. Besides, ethnic and cultural differences may be another factor affecting the results.

In this study, no relationship was found between BMI and waist circumference with NEQ score among female university students similar to other studies.[15,32,35,37] Most of the researchers came to the conclusion that the BMI-increasing and obesity-causing effect of NES may occur in later life not in young ages.[15,32,37]

Regarding health-related quality of life, physical functioning, role limitations due to physical health had highest subscores and role limitations due to emotional problems, vitality had lowest subscores in this study. Sabbah et al.[38] reported similar findings. On the other hand, all subscores of the present study were higher than Oztasan et al.[39] but lower than Latas et al.[40] The different results may be due to conducting the studies on different samples, for instance, the departments where students study such as medicine or nursing and also having different sample sizes.[39]

No relationship was found between BMI with SF-36 subscores, PCS, similarly Sabbah et al.[38], in this study. However, other studies reported that a higher BMI or obesity is associated with

lower physical component scores in HRQL, in university students.[41-43] Gender factors may be one of the reasons for the different results. This study and the study of Sabbah et al.[38] were based on female students. However, those studies reported conflicted results were conducted on both male and female students. Besides, in this study and the study of Sabbah et al.[38] the obese and overweight students were relatively less than others, which may be another confounding factor while comparing the results. MCS was not related to BMI, as well, similar to other studies.[38,44]

It was determined that high NEQ score is associated with lower HRQL (SF-36) subscores except for role limitations due to the physical health component, in this study. In addition, high NEQ score was associated with low physical and mental component scores. It has been declared that night eating syndrome is closely related to low sleep quality, therefore excessive daytime sleepiness and low subjective well-being (happiness, life satisfaction).[32,37,45] Studies stated that NES is associated with low MCS but not PCS in bariatric surgery candidates.[46,47] Having uncontrolled eating in response to emotional cues can promote poorer psychological states in these patients, which can cause low MCS.[46] Runfola et al.[35] stated people having NES have more mental health problems and less quality of life. Likewise, NES was found to be related to depression, anxiety and higher psychological distress.[48-50] However, in this study, NES was associated with low physical health, as well. Higher NEQ score is related to lower physical function, general health perceptions and higher pain. People having NES are expected to have insomnia at least four to five times per week.[51] Insomnia co-occurs with chronic pain, has an impact on physical function and is associated with reduced health perception.[52-54]

This study is important in terms of observing the relationship between NEQ and physical and mental health quality among young people. However, there are many limitations. The first one was gender. It was both a limitation and a strength, in this study. The results for female students cannot be generalized for male students and gave us limited knowledge. On the other hand, this particular demographic group provided to develop a better model. Second, the sample size was relatively small. Third, the study was limited to a specific small university. Fourth, some factors such as sleep hours, physical exercise, and emotional eating could be questioned along with SF-36 to explain better the relationship between NEQ with PCS and MCS. Fifth, the accommodation type was important to access food. For example, some dormitories may be so restrictive for sleep hours and food access. This could be questioned, as well.

Conclusion

In conclusion, NES negatively affects the quality of life of university students both physically and mentally. The direct and detrimental effect of NES on physical and mental quality of life was observed in young people, regardless of important confounding factors such as obesity. Strategies such as educational programs and dietary interventions should be developed to cope with night eating syndrome among university students. Universities may provide some educational programs to increase awareness on this issue. Healthcare professionals may organize occasional trainings to inform the public. Dietary interventions may be applied to university students suffering from NES. Governments may create a public service announcement to inform the public.

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Ethical approval

This study has been approved by the Karamanoğlu Mehmetbey University Ethics Committee (approval date 02.10.2024, number 02-2024/22). Informed consent was obtained from the participants.

Author contribution

The author declare contribution to the paper as follows: Study conception and design: MEÖ; data collection: MEÖ; analysis and interpretation of results: MEÖ; draft manuscript preparation: MEÖ. The author reviewed the results and approved the final version of the article.

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Conflict of interest

The author declare that there is no conflict of interest.

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Research Article

Evaluation of sleep quality and general health conditions in hypertension patients who apply to the family medicine outpatient clinic in Ordu

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ABSTRACT

Objective: Our study aims to evaluate sleep quality in individuals aged 18 and older with and without hypertension, and to examine the relationship between sleep quality and the General Health Questionnaire-12 (GHQ-12), which is used to assess mental health status.

Materials and Methods: This cross-sectional study included a total of 190 participants, consisting of 95 hypertensive patients and 95 controls without hypertension, who applied to the Family Medicine outpatient clinic at Ordu Training and Research Hospital between February and July 2024. The Pittsburgh Sleep Quality Index (PSQI) and GHQ-12 questionnaires were used in the study. Data were analyzed using IBM SPSS v23 and R software, with a significance level set at $p<0.050$.

Results: Significant differences were observed between the hypertension group and the control group in the PSQI components of subjective sleep quality, sleep latency, habitual sleep efficiency, and sleep disturbances. A statistically significant relationship was found between hypertension, the control group, and GHQ-12 scores ($p=0.001$). In the hypertension group, 56.8% of participants exhibited poor mental health, compared to 33.7% in the control group. Among individuals in the hypertension group with GHQ-12 scores of 2 or higher, notable differences were detected in the components of subjective sleep quality, sleep latency, sleep disturbances, and daytime dysfunction.

Conclusion: The findings of the study reveal interactions between hypertension, mental state and sleep quality. The study shows that these factors are in a cycle that feeds each other. As primary care physicians, considering the prevalence, chronicization rates, possible complications and consequences of these diseases in the society, preventing the emergence of many related new clinics or managing the complications that may occur in related conditions when they cannot be prevented is in line with the philosophy of Family Medicine Specialization.

Keywords: Hypertension, sleep quality, sleep wake disorders, mental health, primary health care

Introduction

Sleep is a critical part of human life and has been widely studied. Research shows that sleep duration and quality significantly impact memory, learning, performance, metabolism, and the endocrine system. Additionally, reduced sleep duration has been found to disrupt neurohormonal balance, potentially leading to weight gain, obesity, and hypertension (HT).[1]

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Humans are a whole, encompassing physical, mental, and social aspects. Therefore, mental health should be evaluated in inseparable connection with physical health. This holistic approach is a vital part of primary healthcare, and mental health services hold great significance in this context. The holistic approach implemented in primary healthcare can contribute to preventing mental disorders and, consequently, reducing their prevalence.[2]

Hypertension is one of the most prevalent chronic diseases in our country.[3] Disruptions in sleep rhythm can lead to various problems within a biopsychosocial framework. For this reason, the impact of sleep on health and its relationship with hypertension has become a significant area of research in the healthcare field. This study aims to evaluate sleep quality in HT patients aged 18 years and older, and to examine the relationship between sleep quality and GHQ-12, which is used for screening mental health, in order to guide the diagnosis and treatment of HT patients within a biopsychosocial framework.

Material and Methods

In this cross-sectional study, participants were recruited using a consecutive sampling method from individuals aged 18 and over who visited the Family Medicine Clinic of Ordu Training and Research Hospital between February and July 2024. A total of 3,300 patients were informed about the study and volunteered to participate, and eligible individuals were selected. The study included a total of 190 participants, comprising 95 hypertensive patients aged 18 and above and a control group of 95 individuals without a diagnosis of hypertension.

This study was prepared as a Family Medicine residency thesis. Ethical approval for the study was obtained from the Clinical Research Ethics Committee of Ordu University on December 8, 2023, under decision number 317. Following this approval, data were collected from individuals who met the research criteria and provided both written and verbal informed consent. Data were gathered through face-to-face interviews. The questionnaire included items regarding the participants' sociodemographic characteristics, and the Pittsburgh Sleep Quality Index (PSQI) and the 12-Item General Health Questionnaire (GHQ-12) scales were utilized.

PSQI asks individuals to evaluate their past month by answering 24 questions. Of these, 19 are self-reported by the individual, while the remaining 5 are directed to their bed or room partner. The questions aim to determine sleep duration, sleep latency, and the frequency and severity of sleep-related problems. However, only the responses provided by the individual themselves are included in the evaluation; answers given by the bed or room partner are not considered in the analysis.[4]

The GHQ-12 is a 12-question form used to assess the mental state of individuals over the last few weeks. Each question asks about the frequency of symptoms and offers four options: "not at all," "as often as usual," "more often than usual," and "very often." These options are scored by the subject as 0, 1, 2, and 3, or the answers are coded by the practitioner reading them aloud. A common scoring method is to give 0 points to the first two options and 1 point to the last two options to calculate the total score. This method was named GHQ-type scoring by David Goldberg. An alternative scoring method is Likert-type scoring. In validity studies using GHQ-type scoring, it was determined that the most appropriate cut-off point was between 1 and 2 points.[5] In our study, patients with GHQ-12 scores of 2 and above were accepted as "cases requiring psychiatric evaluation."

In our study, the sample size was calculated using the G*Power V.3.1.9.7 program. The power analysis indicated that, for two independent groups, a total

of 86 participants per group would be required to achieve 90% power with an effect size of 0.5 and a 5% margin of error. Anticipating a 10% data loss, it was planned to include 95 participants in each group.[6]

HT group was composed of individuals with a hypertension diagnosis recorded by a physician in the electronic health records and/or those using antihypertensive medications. The control group consisted of individuals without a prior history of physician-diagnosed hypertension and not using antihypertensive drugs. Additionally, only those with an office blood pressure of <140/90 mmHg at the index visit were accepted as controls; individuals with measurements ≥140/90 mmHg were excluded from the control group. The same inclusion and exclusion criteria were applied to both groups. Exclusion criteria included being under 18 years of age, being unable to complete the questionnaire, and having a diagnosis of primary sleep disorder.

The data were analyzed using IBM SPSS v23 and R software. Normal distribution was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. For comparing normally distributed data with two categorical independent variables, an Independent Samples t-test was used, while the Mann-Whitney U test was applied for non-normally distributed data. For comparing data with three or more groups that did not follow a normal distribution, the Kruskal-Wallis H test was used, and multiple comparisons were examined with the Dunn test. To investigate the relationship between categorical variables, Pearson's chi-square, Yates correction, Fisher's Exact Test, and Fisher-Freeman-Halton Test were used. For comparing the association between categorical variables, the Bonferroni-corrected z-test was applied. The relationship between non-normally distributed quantitative data was assessed using Spearman's rho correlation. The results were presented as n (%), mean ± standard deviation, or median (minimum–maximum) for categorical and quantitative variables. A p-value of <0.05 was considered statistically significant.

Results

The study included 190 participants, consisting of 95 HT patients and 95 individuals without HT, all of whom met the inclusion criteria and sought care for various reasons at the Family Medicine Clinic of Ordu University.

The mean total GHQ-12 score in the hypertension group was 2.65 ± 2.64, while in the control group it was 1.83 ± 2.73. A statistically significant difference was observed between the GHQ-12 scores of the groups (p=0.001). It was determined that having hypertension negatively impacted mental health.

An analysis of GHQ-12 scores revealed that 56.8% (n=54) of individuals in the hypertension group scored 2 or above, whereas this rate was 33.7% (n=32) in the control group. A statistically significant association was found between the groups (hypertension vs. control) and the GHQ-12 score categories (p=0.001). The proportion of individuals scoring 2 or above was notably higher in the hypertension group compared to the control group. These findings indicate that more than half of the patients may require mental health screening and further evaluation.

A statistically significant difference was observed between the groups in terms of sleep latency and subjective sleep quality component scores (p=0.046, p=0.014). The mean rank score for subjective sleep quality was 102.23 in the HT group, compared to 88.77 in the control group. When examining the PSQI scores for sleep latency and subjective sleep quality, higher scores were noted in the HT group. A statistically significant difference was also identified between the groups for habitual sleep efficiency component scores (p=0.049). The mean rank score for habitual sleep efficiency was 101.78 in the HT group, while it

was 89.22 in the control group. Higher PSQI scores for habitual sleep efficiency were observed in the HT group. Moreover, a statistically significant difference was found between the groups in terms of sleep disorder component scores (p=0.001). The mean rank score for sleep disorders was 107.04 in the HT group, compared to 83.96 in the control group. Higher PSQI scores for sleep disorders were observed in the HT group compared to the control group. No statistically significant differences were found in the other component scores between the groups (p>0.050). A detailed comparison of PSQI component scores by group is presented in Table 1.

The total PSQI score was found to be 6.57 ± 3.37 in the hypertension group and 5.53 ± 3.49 in the control group. A statistically significant difference was found between the total PSQI scores of the groups (p = 0.008). Higher total PSQI scores were observed in the hypertension group. It was determined that the sleep quality of the hypertension group began to deteriorate compared to the control group.

There was no statistically significant correlation between the groups and PSQI sleep status (p=0.053). The analysis of the relationship between the groups and PSQI sleep status is shown in Table 2.

In the HT group, a statistically significant difference was observed in the median values of the Subjective Sleep Quality score based on GHQ-12 groups (p=0.006). Since the median values were equal, the mean ranks were analyzed, revealing scores of 40.33 for participants with a GHQ-12 score of less than 2 and 53.82 for those with a GHQ-12 score of 2 or higher. Participants with a GHQ-12 score of 2 or above had higher PSQI scores for subjective sleep quality. A statistically significant difference was also identified in the median values of the Sleep Latency score according to GHQ-12 groups (p=0.008), with those scoring 2 or above on GHQ-12 having higher sleep latency scores. Additionally, significant differences were found in the median values of the Sleep Disorder score between GHQ-12 groups (p=0.036). When examining the sleep disturbance component, higher PSQI scores were noted among those with a GHQ-12 score of 2 or above. Significant differences were also observed in the median values of the daytime dysfunction score according to GHQ-12 groups (p=0.005). Finally, a statistically significant difference was found in the median values of the total PSQI score based on GHQ-12 groups (p=0.001).

Table 1. Comparison of values of PSQI components according to groups

PSQI components	HT group	Control group	Test statistic	p*
Subjective Sleep Quality	1.28 ± 0.74	1.08 ± 0.69	3873.000	**0.046**
Sleep Latency	1.42 ± 1.04	1.05 ± 0.87	3616.500	**0.014**
Sleep Duration	0.89 ± 0.84	0.92 ± 0.79	4401.500	0.748
Habitual sleep efficiency	0.62 ± 0.98	0.37 ± 0.76	3915.500	**0.049**
Sleep disorder	1.47 ± 0.62	1.17 ± 0.6	3416.500	**0.001**
Sleep medication use	0.19 ± 0.69	0.19 ± 0.67	4511.500	0.996
Daytime Dysfunction	0.68 ± 0.91	0.75 ± 0.91	4286.500	0.510

*Mann Whitney U test; Mean±standart deviation; HT: Hypertension; PSQI: Pitssburg Sleep Quality Index.

Table 2. Examining the connection between groups and PSQI sleep states

	HT group	Control group	Test Statistic	p
Good Sleep (PSQI <5)	30 (31.6)	43 (45.3)	3.760	0.053
Poor sleep (PSQI ≥5)	65 (68.4)	52 (54.7)		

In the control group, a statistically significant difference was found in the median values of Subjective Sleep Quality scores based on GHQ-12 groups (p=0.001). Since the median values were equal, the mean ranks were analyzed, showing scores of 42.21 for those with a GHQ-12 score of less than 2 and 59.41 for those with a score of 2 or higher. Participants with a GHQ-12 score of 2 or above had higher subjective sleep quality component scores. A statistically significant difference was also noted in the median values of Sleep Latency scores according to GHQ-12 groups (p=0), with higher sleep latency scores observed in participants with a GHQ-12 score of 2 or above. Additionally, a significant difference was identified in the median values of Sleep Medication Use scores between GHQ-12 groups (p=0.011). Since the median values were equal, the mean ranks were evaluated, revealing scores of 45.52 for participants with a GHQ-12 score of less than 2 and 52.88 for those with a score of 2 or above. The sleep medication use component scores were higher in individuals with a GHQ-12 score of 2 or above. Furthermore, a statistically significant difference was observed in the median values of Daytime Dysfunction scores based on GHQ-12 groups (p=0.001). Lastly, a significant difference was found in the median values of the total PSQI score according to GHQ-12 groups (p=0). The relationship between GHQ-12 groups, PSQI components, and the total score is detailed in Table 3.

Discussion

Sleep regulates blood pressure (BP). Short sleep duration at night can increase sympathetic nervous system activity the next day, which may

Table 3. Comparison of PSQI components and total score according to GHQ-12 groups

	GHQ-12 Score			
	<2	2 and above	Test Statistic	p*
	Mean± s.deviation	Mean± s.deviation		
HT Group				
Subjective Sleep Quality	1.05 ± 0.55	1.46 ± 0.82	792.500	**0.006**
Sleep Latency	1.1 ± 1	1.67 ± 1.01	767.500	**0.008**
Sleep Duration	0.93 ± 0.82	0.87 ± 0.87	1053.500	0.663
Habitual sleep efficiency	0.56 ± 1.03	0.67 ± 0.95	999.000	0.341
Sleep disorder	1.34 ± 0.57	1.57 ± 0.63	862.000	**0.036**
Sleep medication use	0.1 ± 0.49	0.26 ± 0.81	1037.000	0.275
Daytime Dysfunction	0.41 ± 0.81	0.89 ± 0.95	775.500	**0.005**
Total PSQI score	5.49 ± 3.21	7.39 ± 3.28	682.500	**0.001**
Control Group				
Subjective Sleep Quality	0.9 ± 0.59	1.44 ± 0.76	643.000	**0.001**
Sleep Latency	0.76 ± 0.78	1.63 ± 0.75	444.000	**<0.001**
Sleep Duration	0.83 ± 0.66	1.09 ± 1	900.000	0.342
Habitual sleep efficiency	0.24 ± 0.53	0.63 ± 1.04	853.500	0.099
Sleep disorder	1.08 ± 0.55	1.34 ± 0.65	821.500	0.073
Sleep medication use	0.08 ± 0.45	0.41 ± 0.95	852.000	**0.011**
Daytime Dysfunction	0.51 ± 0.74	1.22 ± 1.04	604.000	**0.001**
Total PSQI score	4.4 ± 2.64	7.75 ± 3.93	398.500	**<0.001**

*Mann Whitney U test, HT: Hypertension; PSQI: Pittsburg Sleep Quality Index; GHQ: General Health Questionnaire.

lead to an elevation in BP. Recent studies in the literature have shown that sleep disturbances disrupt the physiological decline of BP at night and could be associated with the development of HT.[7] Cappuccio et al. reported that shorter sleep duration (≤ 5 hours per night) is associated with a higher risk of HT.[8]

The significantly higher GHQ-12 scores observed in the hypertension group indicate poorer mental health among these individuals. This finding is consistent with the study conducted by Hamer et al. which emphasized the coexistence of hypertension and common mental disorders[9] Similarly, a cohort study by Roohafza et al. reported that individuals with high stress levels had a 38% increased risk of developing hypertension.[10] However, a study conducted in Nigeria by Oshodi et al. (2012) did not find a significant association between hypertension and mental health status.[11] These discrepancies may be explained by differences in sample characteristics, assessment tools, and cultural factors. Taken together, these findings highlight the critical importance of addressing mental health in the management of hypertension. Primary care physicians play a key role in controlling hypertension by adopting a holistic approach that encompasses both physical and mental health, ensuring early intervention and regular follow-up. Our study underscores the importance of evaluating mental health status in hypertensive individuals at the primary care level.

The relationship between sleep quality and hypertension has been demonstrated in various ways across different populations. A study conducted in China reported that hypertensive women had poorer subjective sleep quality compared to normotensive women, while in men, five components of the PSQI were found to be significantly associated with hypertension.[12] In another study conducted in Türkiye, only daytime dysfunction was found to be significantly associated with hypertension.[1] A study from Nigeria revealed that certain PSQI components were associated with both systolic and diastolic blood pressure,[13] whereas a study conducted in Germany demonstrated that hypertension was associated with poor sleep quality, increased sleep latency, and reduced sleep efficiency.[14] Similarly, in our study, significant differences were found between the hypertension and control groups in the PSQI subcomponents of subjective sleep quality, sleep latency, sleep disturbances, and habitual sleep efficiency. In this regard, our findings are consistent with those of Lu et al.[12] These results support the negative impact of hypertension on sleep quality. Overall, the findings emphasize that sleep quality assessment should not be overlooked in the management of hypertension.

Studies conducted in different countries have shown that sleep quality is often impaired in individuals with hypertension. In a study conducted in Nigeria, Alebiosu et al. reported a mean PSQI score of 5.03 ± 3.28 in the hypertensive group, compared to 3.10 ± 0.83 in the control group, with 42.4% of hypertensive individuals identified as having poor sleep quality.[13] Similarly, a study from the Eastern Black Sea region of Türkiye found a mean PSQI score of 5.63 ± 3.69, with 43.3% of hypertensive participants reporting poor sleep quality.[15] Another study conducted in Ethiopia reported this rate as 37.7%.[16] A study from China also showed a significant difference between groups, with the hypertensive group having a mean PSQI score of 5.01 ± 0.04 compared to 3.59 ± 0.04 in the control group.[17] In our study, the mean PSQI score was 6.57 ± 3.37 in the hypertensive group and 5.53 ± 3.49 in the control group, with a statistically significant difference between the groups. Although the proportion of individuals with poor sleep quality did not differ significantly between the groups, 68.4% of hypertensive individuals and 54.7% of the control group were found to have poor sleep quality (PSQI ≥ 5). This suggests a trend toward deteriorating sleep quality in the hypertensive

group. Although some studies in the literature have not established a direct relationship between sleep duration and hypertension, poor subjective sleep quality has been identified as a potential risk factor for hypertension.[18] Overall, the findings suggest that the prevalence of hypertension may be more closely associated with deteriorations in sleep quality than with sleep duration alone. This highlights the potential role of quality sleep in the prevention and management of hypertension. However, due to the multifactorial and complex nature of the relationship between sleep and hypertension, more large-scale and controlled studies are needed to clarify this connection.

In our study, individuals with higher GHQ-12 scores had significantly higher total PSQI scores in both the hypertension and control groups. This finding suggests a close association between sleep quality and mental health. Similarly, studies by Zhu et al. and Günaydın et al. reported a significant relationship between poor sleep quality and impaired mental well-being.[19],[20] Furthermore, Zhang et al. indicated that improvements in sleep quality were positively associated with better mental health outcomes.[21] In this regard, our findings are consistent with the existing literature and emphasize that sleep screening is as important as mental health evaluation.

In a study conducted with 1,000 individuals in Iran, sleep duration, sleep latency, sleep disturbances, daytime dysfunction, and sleep efficiency subcomponents were found to correlate with GHQ-12 scores.[22] Similarly, Liu, Y. and colleagues identified a significant link between depression and daytime dysfunction.[23] Research from Japan revealed that PSQI scores were associated with various conditions: in patients with primary insomnia, sleep delay and the use of sleep medication; in those with major depression, subjective sleep quality and habitual sleep efficiency; in individuals with generalized anxiety disorder, sleep duration, subjective sleep quality, and habitual sleep efficiency; and in patients with schizophrenia, subjective sleep quality and sleep latency.[24] In our study, significant relationships were observed between GHQ-12 groups and the subcomponents of subjective sleep quality, sleep disturbances, sleep latency, and daytime dysfunction in the HT group. Similarly, in the control group, notable associations were found between GHQ-12 groups and the subcomponents of subjective sleep quality, sleep medication use, sleep latency, and daytime dysfunction. Furthermore, higher PSQI scores were recorded for subjective sleep quality and sleep latency subcomponents in both groups, highlighting a strong connection with patients' mental health. Poor sleep quality may exacerbate psychiatric disorder symptoms, and these conditions can further lead to disruptions in sleep patterns. Primary care physicians should consider referring patients to sleep specialists for detailed assessments when necessary and take an active role in facilitating appropriate treatment strategies for managing psychiatric conditions. Such an approach may enhance the regulation of treatment processes and contribute to the improvement of patients' mental health. Our study makes a significant contribution to the literature as one of the few primary care-based investigations that simultaneously examines the relationship between sleep quality and mental health in individuals with hypertension. The findings highlight the importance of considering the psychosocial dimension in the management of chronic diseases and support the need for a holistic approach by family physicians in this process.

In our study, it was found that more than half of both groups had poor sleep quality. Additionally, more than half of the HT group had a GHQ-12 score of 2 or higher, identifying them as cases that required mental health screening and assessment. From this, it was determined that the relationship between HT and mental health status may be directly linked to sleep problems. HT is not only a physical health issue but can also negatively affect

mental health. Similarly, impairments in sleep quality can worsen both mental health and HT-related clinical outcomes. Our study emphasizes that these factors are part of a mutually reinforcing cycle.

In conclusion, understanding the cause-and-effect relationship between these three factors and evaluating patients with these diseases within this framework is an important parameter for us, Family Medicine Specialists, who provide holistic services at all levels of the healthcare system. Considering the prevalence of these diseases in society, their chronicity rates, possible complications, and outcomes, preventing the emergence of many related new clinical conditions or, in cases where prevention is not possible, managing the potential complications related to these conditions aligns with the philosophy of Family Medicine specialization.

Ethical approval

This study has been approved by the Ordu University Clinical Research Ethics Committee (approval date 08.12.2023, number 317).

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: SK, BÇA; data collection: SK; analysis and interpretation of results: SK; draft manuscript preparation: SK, BÇA. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

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Research Article

The effect of the presence of anemia during and after pregnancy on the development of postpartum depression symptoms

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ABSTRACT

Objective: Postpartum depression is a significant mental health issue that affects mothers in the postpartum period and can be influenced by various biological and environmental factors. This study aims to examine the impact of during pregnancy and the postpartum period on the occurrence of postpartum depression symptoms.

Methods: This cross-sectional observational study was conducted at Prof. Dr. Cemil Tascioglu City Hospital Training family health care center. A total of 104 patients within the first 6 months postpartum period were included in the study between September 5 and October 5, 2023. Data were collected through face-to-face interviews using questionnaires and analyzed using SPSS v.25 software. Symptoms of depression were assessed using the Edinburgh Postnatal Depression Scale (EPDS), and the results were evaluated based on this scale. Data obtained from the study were analyzed using IBM SPSS v.25 software, and $p < 0.05$ was considered statistically significant.

Results: A total of 104 postpartum women participated in the study. The mean age was 27.1±4.1 years; 50% of participants were university graduates, 53.8% were unemployed, and 94.2% were living with their spouses. Cesarean delivery was reported in 59.6% of cases. Prepartum anemia was observed in 14.4% of participants, while postpartum anemia was present in 43.3%. According to the Edinburgh Postnatal Depression Scale, the prevalence of postpartum depression symptoms was 14.4%. Low postpartum hemoglobin levels, living separately from the spouse, and the presence of postpartum anemia were found to be statistically significantly associated with depressive symptoms ($p<0.05$).

Conclusion: This study suggests that anemia and certain sociodemographic factors may be associated with depressive symptoms in the postpartum period. In primary care settings, conducting not only physical but also psychosocial assessments during postpartum follow-up is crucial for early identification and timely provision of appropriate support services.

Keywords: Anemia, postpartum depression, pregnancy

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Introduction

Anemia is a condition characterized by a lower-than-normal concentration of hemoglobin (Hgb) or a reduced number of red blood cells (RBCs).[1] Erythropoietin, which is primarily produced in the kidneys, is known to be the most potent substance for stimulating RBC production. The production of erythropoietin is generally triggered by tissue hypoxia and is inversely proportional to Hgb concentration.[2] Anemias are typically classified into three categories: production deficiencies, increased destruction, and hemorrhagic anemias. These anemias can further be categorized based on red blood cell size (MCV values) as microcytic, normocytic, and macrocytic. For instance, iron deficiency anemia typically results in microcytic anemia, whereas deficiencies in folate and vitamin B12 are more commonly associated with macrocytic anemia. During pregnancy, a process initiated by a reduction in iron stores increases the need for iron. Approximately 1000 mg of iron is required throughout pregnancy. Some of this iron is needed for the fetus, some for blood loss during delivery, and some for increased erythrocyte production.[3]

Pregnancy and the postpartum period are times when both joy and stress are experienced. Psychological problems such as depression and anxiety are frequently observed during this time. In particular, postpartum depression (PPD) is a condition that often occurs in the first few months or even longer after giving birth. A study analysing data from 80 different countries found a PPD rate of 17.22%, while studies conducted in Türkiye reported rates of around 20%. The main symptoms of PPD include disinterest, fatigue, sadness and sleep disturbances.[4]

According to the DSM-5 diagnostic criteria, postpartum depression is defined as a major depressive episode that begins within the first four weeks following childbirth, making this period crucial for diagnostic evaluation.[5] However, in clinical practice and public health research, assessments extending beyond this period are often preferred. For instance, in several studies, including those by Mori and colleagues, depression symptoms in the postpartum period have been evaluated at different time points extending up to six months postpartum, and it has been shown that these symptoms have significant associations with physical and psychosocial variables throughout this period.[6,7]

Anemia during pregnancy and the postpartum period significantly increases the risk of postpartum depression. Possible causes of this include factors such as the reduction in Hgb levels affecting neurotransmitter function and the decrease in cytokine levels. Therefore, addressing anemia during pregnancy and implementing appropriate treatment and nutritional measures may play a crucial role in reducing the risk of postpartum depression.[8]

The objective of this study is to investigate the impact of anemia during pregnancy and the postpartum period on the likelihood of postpartum depression during the first six months following childbirth.

Materials and Methods

This research, which is a cross-sectional descriptive survey, included 104 patients who met the inclusion criteria, were within the first six months postpartum, and presented to Prof. Dr. Cemil Tascioglu City Hospital Training Family Health Center between September 5 and October 5, 2023. 12 individuals who did not meet the inclusion criteria and 2 who declined participation were excluded from the study. After the clinical examination, written informed consent was obtained, and a 20-question face-to-face survey was administered to each participant for 10 minutes in a separate clinic room. The

study was concluded once the target sample size was reached. In line with this, the sample size was calculated to ensure the validity of the study. There were 196 patients registered at Prof. Dr. Cemil Tascioglu City Hospital Training Family Health Center who have given birth in the past year. A study conducted by Shefaly Shorey found the prevalence of postpartum depression (PPD) to be 17% in the literature.[9] Considering this rate, with a 95% confidence interval, a 5% margin of error, and a study power of 80%, the required minimum sample size was calculated to be 104 participants.

Between 5 September and 5 October 2023, postpartum patients within the first six months who presented at the Prof. Dr. Cemil Tascioglu City Hospital Training Family Health Centre and agreed to participate were enrolled in the study. The first six months postpartum is a frequently used period in the literature for monitoring depressive symptoms. Therefore, the sample of our study was limited to this period.[6,7] Patients who were more than six months postpartum, had previously been diagnosed with major depression, had a diagnosis of hemoglobinopathy, had delivered a baby with syndromic or mental-motor retardation, had experienced infant mortality, or declined to participate were excluded from the study.

A 20-question survey developed by the researchers was administered verbally to the participants and completed in the study room, which took approximately 10 minutes without disrupting clinic activities. The first 10 questions of the questionnaire were related to the sociodemographic characteristics of the participants, number of children, education level, history of smoking and alcohol consumption, education level, cohabitation with spouse, history of previous depression, employment status, income and expenditure status, mode of delivery, and history of iron treatment during pregnancy. Hemogram values used in the diagnosis of anaemia during pregnancy and postnatal care were from the Department of Turkish Ministry of Health guidelines for antenatal and postnatal care.[10,11] In addition to the 10-item survey, the Edinburgh Postnatal Depression Scale (EPDS) was used.[12] The content and methodology of the survey were explained to the women participating in the study, and their consent was obtained prior to the commencement of the study.

Edinburgh Postnatal Depression Scale (EPDS)[12]: This scale was developed for screening purposes to identify the risk of depression in women during the postpartum period. In the validity and reliability study conducted by Engindeniz, the internal consistency coefficient of the EPDS was found to be 0.79, and the split-half reliability was 0.80. When the cutoff point of the scale was set at 12/13, its sensitivity was found to be 0.84, specificity 0.88, positive predictive value 0.69, and negative predictive value 0.94. The Turkish adaptation of the EPDS is a self-report scale in a four-option Likert format. Responses are scored from 0 to 3; items 1, 2, and 4 are scored 0, 1, 2, and 3, while items 3, 5, 6, 7, 8, 9, and 10 are scored inversely as 3, 2, 1, and 0. The scale has a cutoff point of 13, and women with scores of 13 or higher were included in the risk group. The correlation coefficient between the EPDS and the General Health Questionnaire (GHQ) was found to be r: 0.7 ($p<0.001$), supporting the validity of the scale.[13]

Data analysis was performed using IBM SPSS v.25 software. The normality of continuous variables was assessed using the Kolmogorov-Smirnov test. For continuous variables, those with normal distribution were expressed as mean ± standard deviation, and those without normal distribution were expressed as median (minimum-maximum). Categorical variables were presented as frequency and percentage. For comparing two groups of continuous variables, either the independent t-test or the Mann-Whitney U test was used, and for comparing three groups, either ANOVA or the Kruskal-Wallis test was applied, depending on

the distribution. Post-hoc analysis for intergroup significance was performed using the appropriate test, either the Games-Howell or LSD test. Since the conditions for parametric tests were not met, relationships were examined using Spearman correlation analysis. For comparing prenatal and postnatal glucose values, since the data were non-parametric, the Wilcoxon test was used. Binary logistic regression with the Enter method was applied to examine the factors affecting postpartum depression (PPD). Variables with $p<0.25$ in univariate analysis and those considered clinically relevant to the dependent variable were included in the model. The model's goodness-of-fit was evaluated using the Hosmer-Lemeshow test, and its explanatory power was assessed using Nagelkerke R^2. A p-value of <0.05 was considered statistically significant.

Results

A total of 104 participants were included in our study. Upon examining the educational background of the participants, 50% were university graduates, 34.6% had completed high school, and 15.4% had finished primary school. Regarding family structure, the vast majority of participants (94.2%) were found to live with their spouses. The rates of smoking and alcohol use were 12.5% and 8.7%, respectively. The mean age of the participants was 27.12 ± 4.14 years. The number of births and depression scale scores are presented in Table 1.

Among the participants, 16.3% (n=17) did not receive iron treatment during pregnancy, while 83.7% (n=87) received iron treatment. A history of treatment for major depression was reported by 15.4% (n=16) of the participants. Regarding the mode of delivery, cesarean section was more common (59.6%, n=62) compared to vaginal delivery (40.4%, n=42). When evaluating the presence of postpartum depression (PPD) symptoms, 14.4% of participants (n=15) were found to have PPD symptoms, while 85.6% (n=89) showed no symptoms. The rate of anemia before delivery was 14.4% (n=15), while the rate of anemia after delivery was 43.3% (n=45).

The total score of the Edinburgh Postnatal Depression Scale (EPDS) was examined among the pregnant women, and the median scores and statistical significance levels of the groups were evaluated based on education level, employment status, income level, smoking and alcohol use, depression treatment history, iron supplementation during pregnancy, mode of delivery, presence of anemia before pregnancy, and presence of postpartum anemia. No significant relationship was found between the EPDS score and education level, employment status, income level, smoking and alcohol use, depression treatment history, iron supplementation during pregnancy, or the presence of anemia before pregnancy. However, statistically significant differences in the total EPDS score were found between the groups based on family status (living with spouse vs. living separately) and mode of

Table 1. Participants' birth ınformation, depression scale scores, and hemoglobin values

Variable	Mean ± SD	Median (Min-Max)
Age (years)	27.12 ± 4.14	27 (19-38)
Number of births	1.73 ± 0.81	2 (1-4)
Number of children	1.75 ± 0.84	2 (1-4)
Total Edinburgh Postnatal Depression Scale score	7.62 ± 4.91	7 (0-21)
Prepartum hemoglobin	11.84 ± 0.88	11.9 (9.6-14.2)
Postpartum hemoglobin	11.13 ± 0.84	11.2 (9.6-12.9)

delivery (normal delivery vs. cesarean section). For instance, the median depression score of pregnant women living with their spouse (6.5) was significantly lower than those living separately (p<0.001). Similarly, the median depression score of women who had a normal delivery (4.5) was significantly lower than those who had a cesarean section (p=0.011) (Table 2).

Table 2. Edinburgh Postnatal Depression Scale total scores by various variables

Variable	Median (Min-Max)	p-value
Education level		
Primary school	6 (1-13)	0.163[a]
High school	6 (0-17)	
University	7.5 (0-21)	
Employment status		
Employed	8 (1-21)	0.248[a]
Not employed	6 (0-21)	
Quit work	6 (0-12)	
Income level		
Income less than expenses	6 (1-21)	0.839[a]
Balanced income and expenses	7 (0-21)	
Income greater than expenses	7 (0-18)	
Family status		
Lives with spouse	6.5 (0-18)	**<0.001**[b]
Lives separately from spouse	17 (11-21)	
Smoking status		
Smokes	10 (3-17)	0.079[b]
Does not smoke	7 (0-21)	
Alcohol use		
Uses alcohol	8 (1-17)	0.528[b]
Does not use alcohol	7 (0-21)	
Depression treatment history		
Did not receive depression treatment	6.5 (0-21)	0.177[b]
Received depression treatment	8 (1-20)	
Iron supplementation during pregnancy		
Did not receive iron treatment	6 (1-17)	0.644[b]
Received iron treatment	7 (0-21)	
Mode of delivery		
Normal spontaneous delivery (NSD)	4.5 (0-14)	**0.011**[b]
Cesarean section (C/S)	8 (0-21)	
Prepartum anemia status		
No anemia	7 (0-21)	0.889[b]
Anemia present	7 (0-20)	
Postpartum anemia status		
No anemia	5 (0-21)	**0.007**[b]
Anemia present	8 (0-21)	

a: Kruskal-Wallis Test, b: Mann-Whitney U Test.

Correlation analysis was conducted to examine the relationship between the total score of the Edinburgh Postnatal Depression Scale (EPDS) and variables such as age, number of births, number of children, prepartum Hgb levels, and postpartum Hgb levels. A weak positive correlation was identified between age and the total EPDS score (r=0.204, p=0.038), suggesting that as age increases, the depression score tends to rise. No significant association was found between the number of births or the number of children and the depression score (r=0.144, p=0.146 and r=0.123, p=0.215, respectively). Additionally, no significant relationship was observed between prepartum Hgb levels and depression score (r=-0.062, p=0.531). However, a moderate negative correlation was found between postpartum Hgb levels and depression score (r=-0.230, p=0.019), indicating that higher postpartum Hgb levels are associated with a reduction in depression scores (Table 3). A statistically significant positive relationship was observed between the difference in Hgb levels before and after delivery and the postpartum depression scale score (p=0.003).

A statistically significant difference was observed between prepartum Hgb levels and employment status (p=0.025) (Table 4). Post-hoc analysis showed that working women had significantly higher prepartum Hgb levels compared to their non-working counterparts (p=0.012). However, no significant difference was found between postpartum Hgb levels and employment status (p=0.248). A significant difference was also found between prepartum Hgb levels and income level (p=0.025). Post-hoc analysis indicated that women with balanced income and expenses had significantly higher prepartum Hgb levels than those with lower income than expenses (p=0.014). No significant difference was found between postpartum Hgb levels and income level (p=0.474).

No significant relationship was found between prepartum and postpartum Hgb levels and family status, smoking and alcohol use, depression treatment history, iron supplementation, and mode of delivery. Pregnant women with prepartum anemia were found to have significantly lower postpartum Hgb levels (p<0.001). Similarly, women with postpartum anemia had significantly lower prepartum Hgb levels (p<0.001). A comparison of prepartum and postpartum Hgb levels revealed a statistically significant decrease in postpartum Hgb levels (p<0.001).

Table 3. Correlation analysis between Edinburgh Postnatal Depression Scale total score, prepartum Hgb, and postpartum Hgb

Variable	Edinburgh Postnatal Depression Scale Total Score	Prepartum Hgb	Postpartum Hgb
Age	r = 0.204	r = -0.188	r = -0.169
	p = **0.038**[a]	p = 0.055[a]	p = 0.087[a]
Number of births	r = 0.144	r = -0.103	r = -0.189
	p = 0.146[a]	p = 0.299[a]	p = 0.055[a]
Number of children	r = 0.123	r = -0.105	r = -0.184
	p = 0.215[a]	p = 0.288[a]	p = 0.062[a]
Prepartum Hgb	r = -0.062		**r = 0.727**
	p = 0.531[a]		**p < 0.001**[a]
Postpartum Hgb	r = -0.230	**r = 0.727**	
	p = 0.019[a]	**p < 0.001**[a]	
Difference in Hgb values (prepartum Hgb - postpartum Hgb)	**r = 0.292**	**r = 0.303**	**r = -0.342**
	p = 0.003	**p = 0.002**	**p < 0.001**

a: Spearman's correlation test, Hgb: hemoglobin.

Table 4. Prepartum and postpartum Hgb levels by various variables

Variable	Prepartum Hgb Mean ± SD	p-value	Post-hoc	Postpartum Hgb Median (Min-Max)	p-value	Post-hoc
Education Level						
Primary school	11.91 ± 0.64	0.895[b]	-	11.40 (10.00-12.60)	0.474[e]	-
High school	11.87 ± 0.89			11.10 (9.80-12.70)		
University	11.80 ± 0.95			10.95 (9.60-12.90)		
Employment Status						
Employed	12.11 ± 0.93	**0.025**[b]	**(a-b) 0.012**[c]	11.20 (10.00-12.90)	**0.011**[e]	**(b-c) 0.016**[f]
Not employed	11.63 ± 0.81			11.00 (9.60-12.40)		
Quit work	12.07 ± 0.87			11.80 (10.20-12.70)		
Income Level						
Income less than expenses	11.46 ± 0.97	**0.039**[b]	**(a-b) 0.014**[c]	11.20 (9.60-12.40)	0.407[e]	-
Balanced income and expenses	12.01 ± 0.84			11.20 (9.80-12.90)		
Income greater than expenses	11.73 ± 0.81			10.80 (9.80-12.70)		
Family Status						
Lives with spouse	11.85 ± 0.86	0.857[a]	-	10.65 (9.80-12.20)	0.288[d]	-
Lives separately from spouse	11.78 ± 1.26			11.20 (9.60-12.90)		
Smoking Status						
Smokes	11.86 ± 0.85	0.924[a]	-	11.00 (10.10-12.40)	0.844[d]	-
Does not smoke	11.84 ± 0.89			11.20 (9.60-12.90)		
Alcohol Use						
Uses alcohol	12.20 ± 0.86	0.213[a]	-	11.60 (10.20-12.90)	0.129[d]	-
Does not use alcohol	11.81 ± 0.88			11.00 (9.60-12.70)		
Depression Treatment History						
Did not receive depression treatment	11.87 ± 0.89	0.531[a]	-	11.20 (9.60-12.90)	0.735[d]	-
Received depression treatment	11.71 ± 0.87			11.10 (10.10-12.70)		
Iron Supplementation during Pregnancy						
Did not receive iron treatment	11.77 ± 1.03	0.721[a]	-	10.90 (9.60-12.70)	0.860[d]	-
Received iron treatment	11.86 ± 0.85			11.20 (9.60-12.90)		
Mode of Delivery						
Normal spontaneous delivery (NSD)	11.77 ± 0.83	0.476[a]	-	11.10 (9.60-12.70)	0.513[d]	-
Cesarean section (C/S)	11.89 ± 0.92			11.20 (9.80-12.90)		
Prepartum Anemia Status						
No anemia	12.07 ± 0.73	**<0.001**[a]	-	11.20 (9.80-12.90)	**<0.001**[d]	-
Anemia present	10.50 ± 0.36			10.20 (9.60-11.20)		
Postpartum Anemia Status						
No anemia	12.27 ± 0.65	**<0.001**[a]	-	11.80 (1.00-12.90)	**<0.001**[d]	-
Anemia present	11.28 ± 0.84			10.30 (9.60-10.90)		

a: Independent Samples Test, b: One-Way Anova Test, c: LSD Test, d: Mann-Whitney U Test, e: Kruskal-Wallis Test, f: Games-Howell Test.

Table 5. Factors affecting postpartum depression risk - logistic regression analysis

Variable	n (%)	OR (95% CI)	p-value
Education Level (High school graduate vs others)	36 (34.6)	1.61 (0.12-21.40)	0.716
Education Level (University graduate vs others)	52 (50.0)	1.87 (0.19-18.17)	0.589
Family Status (Ref: Living with spouse)	6 (5.8)	46.13 (3.51-605.71)	**0.004**
Employment Status (Employed vs others)	33 (31.7)	1.53 (0.37-6.28)	0.553
Employment Status (Quit work vs others)	15 (14.4)	0.00 (0.00-0.00)	0.999
Mode of Delivery (Ref: Normal spontaneous delivery - NSD)	62 (59.6)	3.28 (0.57-18.73)	0.180
Postpartum Anemia	15 (14.4)	2.10 (0.49-8.93)	0.312
Postpartum Hgb Drop	-	1.25 (0.48-3.26)	0.643
R= 0,37, -2 loglikelihood= 61,20, Omnibus test: 0,002, Hosmer ve Lemeshow test: 0,736			

Ref: Reference, Hgb: Hemoglobin.

Variables influencing postpartum depression (PPD) scores were initially evaluated through univariate logistic regression analysis. Variables with a p-value of <0.25, including education level, family status, employment status, the change in postpartum Hgb levels compared to prepartum levels, mode of delivery, and the presence of postpartum anemia, were subsequently incorporated into a multivariate logistic regression model, which was constructed using the Enter method. The analysis revealed that education level, employment status, mode of delivery, and presence of postpartum anemia did not have a significant impact on the occurrence of PPD symptoms. However, it was found that living separately from one's spouse significantly increased the likelihood of PPD, with an odds ratio of 46.13 (95% CI: 3.51-605.71) (Table 5).

Discussion

This study investigated the relationship between anemia and depressive symptoms during the first six months postpartum. According to our findings, postpartum depression (PPD) risk was identified in 14.4% of the participants. Notably, a decline in postpartum hemoglobin levels, the presence of anemia, and living separately from a spouse were found to be significantly associated with depression. In the multivariate analysis, it was determined that living separately from a spouse increased the risk of PPD by 46 times, making it one of the most striking results of the study. Additionally, individuals with a significant decrease in hemoglobin levels were observed to have higher depression scores.

In our study, the mean EPDS score was 7.62 ± 4.91. This rate was reported as 5.61 ± 4.51 in the study by Özşahin et al., 10.06 ± 5.54 in Çınar et al., and 8.77 ± 5.40 in Erkal Eksoy et al.[14-16] These discrepancies in EPDS scores may be attributed to sociocultural differences between regions and variations in sample characteristics. While the probability of PPD based on EPDS was 14% in our study, Demir et al. reported 34.8%, and Tan et al. found 15.8%.[17,18] A global study involving 133,313 postpartum women reported an average PPD prevalence of 14%, with higher rates observed in developing countries (e.g., China).[16] Similarly, a comprehensive meta-analysis of 565 studies from 80 countries estimated the worldwide PPD prevalence at 17.22%, while the rate was 21.87% across 26 studies from Türkiye.[19] The PPD risk prevalence identified in our study aligns with rates reported in Türkiye and European countries.

In our study, no significant association was found between EPDS scores and education level, employment status, income level, or tobacco/alcohol use. However, Babacan Gümüş et al. reported a negative correlation between

education level and PPD.[20] Similarly, a study of 324 postpartum women in Türkiye found higher depression rates among those with secondary education or lower compared to those with high school or higher education.[17] In contrast to these national findings, our study observed a non-significant trend toward higher EPDS scores with increasing education levels. This discrepancy may stem from our smaller sample size, as a meta-analysis of 33 global studies demonstrated that lower education levels are consistently associated with higher depression risk.[19] In the literature, it is observed that the rate of postpartum depression (PPD) increases as education level decreases. The lack of this association in our study may be attributed to the small sample size.

Existing literature consistently demonstrates an inverse relationship between socioeconomic status and postpartum depression (PPD), with lower income levels being associated with a higher likelihood of depressive symptoms.[19,21,22] Similarly, numerous studies have identified smoking as a significant risk factor for PPD.[20,23,24] Furthermore, a large-scale study (n=50,377) revealed that maternal alcohol consumption was positively associated with increased PPD risk.[25] Contrary to these established findings, our study failed to demonstrate a statistically significant association between smoking, alcohol use, and PPD risk. This discrepancy may be attributable to the limited number of participants reporting tobacco or alcohol use in our sample, potentially resulting in insufficient statistical power to detect existing associations.

In our study, we examined whether a history of depression treatment was associated with an increased risk of postpartum depression (PPD), but found no significant relationship. This contrasts with numerous studies in the literature, which demonstrate that a history of depression significantly elevates the risk of PPD.[21,26,27] While the increased PPD risk among individuals with prior depression episodes is an expected outcome — and indeed, 15.4% of our participants reported previous depression treatment, with correspondingly higher EPDS scores — the magnitude of this difference was not statistically significant in our study population.

In our study, when evaluating prepartum anemia status, 85.6% (n=89) of the participants were found to be without anemia, while 14.4% had anemia. Postpartum anemia was detected in 43.3% of the participants. In the literature, a study conducted by Karbancıoğlu Cantürk et al.[28] with 2169 pregnant women in Türkiye found the prepartum anemia rate to be 14%. Another study conducted in 2024 in Ankara examined 567 pregnant women, with anemia detected in 12.3% of them.[29] A study conducted in Elazığ, Türkiye, found the anemia rate among pregnant women to be 27.9%.[30] According to the World Health Organization's 2019 data, the anemia rate among pregnant women in Türkiye is 29.8%.[31] Studies conducted in Türkiye have shown that the prevalence of anemia in pregnant women varies by region, and our study's findings are similar to those of studies conducted in metropolitan areas, although they are lower compared to the national average. A global study on anemia in pregnant women conducted between 2000 and 2019 reported an anemia rate of 32.3% (5.2–65.3) worldwide, and 22.0% (6.3–48.2) in Europe.[32] The prevalence of anemia is highly influenced by various factors, including income level, geographical location, and dietary habits, which contribute to the significant variation in anemia rates.

In our study, no relationship was found between iron supplementation during pregnancy, prepartum anemia, and the likelihood of PPD. However, it was observed that postpartum anemia increased the likelihood of PPD, and the risk of PPD rose as Hgb levels decreased. A study conducted in Bursa, Türkiye, with 140 postpartum women found a correlation between hemoglobin

levels measured upon hospital admission and fatigue and depression. It was observed that as the mothers' hemoglobin levels increased, their fatigue levels decreased, energy levels increased, and depression levels decreased.[33]

In a literature review conducted by Wassef et al., eight out of ten studies examined showed that the risk of PPD was higher in anemic women.[34] In a double-blind, placebo-controlled study conducted in the first week postpartum, which involved 70 women with PPD, iron supplementation was provided, and the EPDS score was assessed after the supplementation. It was found that the group receiving iron supplementation had a significantly lower EPDS score compared to the group that did not receive supplementation.[35] A prospective study conducted with Japanese pregnant women, involving 1128 participants, found no significant relationship between anemia in the second and third trimesters and PPD; however, postpartum anemia was found to increase the risk of PPD.[36]

According to the 2013 WHO data, the prevalence of cesarean section by continent was reported as 36% in America, 23% in Europe, 9% in Asia, and 4% in Africa. This variation may be attributed to factors such as access to healthcare services, differences in medical practices, and cultural influences across geographical regions.[37] In Türkiye, the cesarean rate was 52.4% according to 2014 data, and it increased to 60.9% in 2021. In our study, the cesarean rate was found to be 59.6%.[38,39] Over the years, cesarean birth rates have increased in many countries worldwide.[37]

In a study conducted by Erkal Aksoy et al. with 324 postpartum women, no significant effect of mode of delivery on the likelihood of PPD was observed.[16] Although a higher rate of PPD was found among mothers who delivered via cesarean section in the study by Gülnar et al., the result was not statistically significant.[40] A meta-analysis conducted by Sun et al. found no difference in the risk of depression between cesarean and vaginal deliveries.[41] Similarly, in our study, the likelihood of PPD did not differ according to the mode of delivery.

In a study by Malus et al., it was found that married women exhibited fewer postpartum depression symptoms.[42] Another study reported that the prevalence of PPD was significantly lower in married women compared to those who were not married.[43] A study conducted by Aydın et al. found a significant relationship between increased perceived spousal support and a reduction in PPD symptoms.[44] Similarly, in our study, it was determined that living separately from the spouse increased the risk of PPD by 46.13 times (95% CI: 3.51-605.71).

This study has several limitations that should be considered when interpreting the findings. First, the relatively small sample size may have reduced statistical power to detect significant associations. Second, data collection was restricted to the first six months postpartum, potentially overlooking later-onset cases of postpartum depression. Third, depression assessment relied solely on the Edinburgh Postnatal Depression Scale (EPDS) rather than clinical diagnosis, which may affect the accuracy and generalizability of our findings. These methodological constraints suggest caution when extrapolating our results to broader populations or clinical settings.

This study was designed to investigate the prevalence of postpartum depression (PPD) and evaluate its associated risk factors among postpartum women. Our analysis identified several statistically significant predictors of PPD, including marital status (living without a partner), postpartum hemoglobin (Hgb) decline, and the presence of postpartum anemia. Notably, women who were not cohabiting with their partners demonstrated a substantially elevated risk of developing PPD symptoms. These findings underscore the critical importance of comprehensive postpartum care that integrates

both biological parameters (e.g., Hgb levels) and psychosocial assessment in primary healthcare settings. Family physicians conducting postpartum follow-ups should be particularly attentive to these biopsychosocial risk factors to ensure early identification and intervention for at-risk mothers.

Ethical approval

This study has been approved by the Health Science University Istanbul Prof. Dr. Cemil Tascioglu City Hospital Clinical Research Ethics Committee (approval date 28.08.2023, number 146). Written informed consent was obtained from the participants.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: SA; data collection: AK, FE; analysis and interpretation of results: AK; draft manuscript preparation: AK, NCA. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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Research Article

Awareness of quaternary prevention and defensive attitudes among family physicians

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ABSTRACT

Objective: The aim of this study was to assess family physicians awareness of the concept of quaternary prevention and their attitudes towards defensive medicine.

Materials and Methods: The populations of this descriptive study were family medicine residents and family physicians working in primary care. The authors developed a "Quaternary Prevention Awareness Form" based on the literature. A questionnaire consisting of socio-demographic questions and the Defensive Medicine Practices Attitude Scale was administered online and face-to-face.

Results: The mean age of the 312 physicians was 39.22±9.55 years. Quaternary prevention had been heard of by 63.8% (n=199) of the physicians, but only 6.4% (n=20) had detailed knowledge of the concept. Although male physicians were more aware of "disease mongering" (p=0.003), females were more aware of "overtreatment" and "medical treatment management" (p=0.040; p=0.013, respectively). The results showed that males (p=0.007), residents (p=0.039) and those who had been sued for malpractice (p=0.004) had higher defensive medicine attitudes.

Conclusion: This study shows the importance of physicians' awareness and knowledge, which have been enhanced by specialisation, urban practice and training in quaternary prevention. In order to protect society from the harms of excessive medical practices, medical education needs to be reviewed to remind us of "primum non nocere".

Keywords: Family medicine, quaternary prevention, defensive medicine, awareness

Introduction

Family physicians are the first point of contact for patients within the healthcare system and provide a continuous healthcare service to the people under their care, from birth to death. This health service includes not only the treatment of illnesses that occur in people, but also the identification of risks and the protection of people against illness.[1]

In the last century, the increase in infectious diseases and the prolongation of human life have brought chronic diseases and the fight against them to the fore. This has highlighted the importance of preventive health services in the fight against these diseases, which require more comprehensive treatments and lifelong practices.[2] Leavell and Clark, who first contributed to the literature on prevention methods in the late 1940s, included

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the concepts of primary, secondary and tertiary prevention in their models of prevention.[3,4] The concept of quaternary prevention was first defined in 1986 by the Belgian general practitioner Marc Jamoulle and presented in 1995 as a new version of the "first do no harm" concept.[5-7] Although this model of prevention, which brings a critical perspective to the physicians' own professional attitudes and practices and can vary according to person, time and situation, did not receive sufficient attention in the first years of its introduction, its importance and awareness are now gradually increasing. [4,6,8-12]

Defensive medicine, another important factor in quaternary prevention, is generally defined as deviation from standard medical practice due to fear of malpractice liability.[13] Deviation from medical practice can involve two types of behaviour: first, ordering more tests and procedures than medically indicated to reassure oneself and reduce the chance of missing something; second, avoiding high-risk procedures and/or patients because of malpractice liability.[14]

Awareness of quaternary prevention practices among family physicians, who are responsible for providing both preventive and curative health care, is extremely important for public health and efficient use of resources.[15] Unfortunately, there are not enough academic studies in the literature to assess the attitudes and awareness of family physicians on this issue. Therefore, the aim of this study was to determine the awareness of the concept of quaternary prevention and their attitudes towards defensive medicine practice among family physicians working in primary care, and to provide data for future studies on education and practice.

Materials and Methods

The universe of this descriptive and cross-sectional study consists of general practitioners and family physicians working in primary health care services. There were approximately 900 family physicians working in the region where the study was conducted during the specified date range. According to the sample calculation where the number of people in the universe is known, it was planned to include 269 physicians in the study with a 5% margin of error and 95% power. "The Quaternary Prevention Awareness Form, developed by the authors based on the literature, the Defensive Medicine Practices Attitude Scale and socio-demographic questions created a questionnaire form. It was distributed online to media groups of family physicians, residents and, if possible, face-to-face from 1 February to 31 May 2021. For the online questionnaire, the link to the survey was reminded a total of four times, two weeks apart. Approximately one-third of the data collected during the administration of the questionnaire was collected online, and the remaining two-thirds was collected face-to-face by visiting the physicians' places of work. The questionnaire was left to the physicians, whose verbal consent was obtained by informing them prior to the questionnaire, to complete at their convenience, and the questionnaire was collected a few days later. The questionnaire took approximately 8-10 minutes to complete.

Exclusion criteria: The participant must be a native speaker of Turkish, as he/she must have a good command of Turkish to understand the scales and answer the questions, others were excluded.

The study was approved by the ethics committee of Necmettin Erbakan University Medical Faculty with the date 08.01.2021 and number 2021/3013.

Data collection instruments

The questionnaire used in the study consists of three parts: 1- Sociodemographic information form, 2- Quaternary prevention awareness form, which was inspired by previously published surveys on quaternary prevention and the

literature on the subject, 3- Defensive Medicine Behaviour Scale (DMBS).[16]

1. Sociodemographic information form: It contains 18 descriptive questions such as age, sex, marital status, place of birth, level of academic education, time spent in the profession, institution of employment, satisfaction with professional career. There are also questions about education and knowledge of the concept of quaternary prevention.

2. Quaternary Prevention Awareness Form (QPA): This form, developed by the researchers, contains statements on quaternary prevention, which are examined under 11 subheadings in the literature.[8] These subheadings are 1. Information overload (1-4), 2. Overdiagnosis (5,6), 3. Medically unexplained symptoms (7-9), 4. Overmedicalisation (10,11), 5. Incidental findings (12,13), 6. Overscreening (14-19), 7. Overtreatment (20-27), 8. Shared decision-making (28-30), 9. Management of medical treatment (31-34), 10. Disease awareness (35,36) and 11. Evidence-based practice (37-42). These statements are answered as 'strongly agree=5; agree=4; neutral=3; disagree=2; strongly disagree=1'. Some statements are reverse coded (8, 9, 13, 16, 20, 21, 22, 24, 25, 30, 40, 41, 42). An overall score for awareness of quaternary prevention and scores for the sub-headings were calculated. Higher scores on the quaternary prevention awareness form were scored as higher participant awareness of the quaternary prevention approach (Cronbach alpha=0.756).

3. Defensive Medicine Behavior Scale (DMBS): This scale, developed by Baser et al., has 18 statements in three subscales.[16] The first nine statements are designed to measure 'attitudes towards positive defensive medicine practices', the next five statements are designed to measure 'attitudes towards negative defensive medicine practices' and the last four statements are designed to measure knowledge about defensive medicine. The first two subscale statements have five-point Likert type responses, but the last part was prepared for 'yes' and 'no'. In the reliability analysis, the internal consistency of the scale was found to be high (Cronbach alpha=0.853).[16]

Statistical analysis

The Statistical Package for Social Sciences (IBM SPSS) for Windows 26.0 was used for statistical analyses. Descriptive statistics for continuous variables were expressed as mean and standard deviation, while categorical data were expressed as frequencies and percentages. Normal distribution was tested by Kolmogorov-Smirnov. Independent samples t-test was used for paired groups and one-way analysis of variance (one-way ANOVA) for multiple groups to compare quantitative data. The difference between groups was assessed by post hoc Tukey test. A P value <0.05 was considered statistically significant. The relationship between variables was determined by Pearson correlation analysis. Correlation coefficient (r); 0.00-0.24 was considered as weak, 0.25-0.49 as moderate, 0.50-0.74 as strong, 0.75-1.00 as very strong relationship.

Results

The mean age of the 312 physicians was 39.22±9.55 (min: 23 max: 63) years. When the age of the participants was divided into three groups, 46.2% (n=144) were aged between 31 and 45 years. Of the participants, 53.8% (n=168) were female, 82.1% (n=256) were married, and 88.5% (n=276) lived in a nuclear family. Family medicine residents accounted for 33.7% (n=105) of all participants. 66.3% of participants (n=207) were actively practicing family medicine in a family health centre (FHC), 74.7% (n=233) were working in an urban area, and 48.4% (n=151) were satisfied with their career. They saw a median of 40 patients per day (min: 0, max: 100) and 43.9% (n=137) reported having enough time to spend with their patients. The concept of quaternary prevention was new to 36.2% (n=113) of the participants. Most (76.3%;

n=238) had received no training in quaternary prevention and 67.9% (n=212) said they would like to receive training. The socio-demographic characteristics of the participants are shown in Table 1.

The internal consistency coefficient of the questionnaire was 0.726. The mean quaternary prevention awareness score of the participants was 149.74±11.15.

Family medicine residents had higher QPA scores (152.83±8.93) than general practitioners (148.16±11.83) (p<0.001). The QPA scores of family physicians working in urban areas (152.01±9.39) were also higher than those working in rural areas (143.02±13.14) (p<0.001). Physicians who had received detailed information about quaternary prevention (162.90±8.955) had higher QPA scores than those who had never heard about it (149.72±11.436) (p<0.001). The QPA scores of the participants according to socio-demographic data are shown in Table 2.

In the study, 9% (n=28) of physicians had experienced malpractice litigation during their medical career and 91% (n=284) believed that malpractice litigation had an impact on their medical performance. Although 71.2% (n=222) of physicians said they had heard of the concept of defensive medicine, 62.8% (n=196) said they did not know enough about it. The mean DMBS score of the participants was 45.86±8.63. Scale scores

Table 1. Sociodemographic characteristics of the participants

N=312	**n**	**(%)**
Gender		
Male	144	46.2
Female	168	53.8
Age (year)		
30 years and below	77	24.7
31-45 years old	144	46.1
46 years and older	91	29.2
Professional Position		
Resident	105	33.7
Family Physician	207	66.3
Duration in the profession		
10 years and below	133	42.6
More than 10 years	179	57.4
Location of the Workplace		
Urban area	233	74.7
Rural area	79	25.3
Patients cared for per day		
20 and below	83	26.6
21-50	122	39.1
Over 50	107	34.3
Have you ever heard of the concept of “Quaternary Prevention”?		
No, never heard of it	113	36.2
Yes, but I don't know the content of the concept	88	28.2
Yes, I have moderate knowledge	91	29.2
Yes, I have detailed information on the subject	20	6.4

Table 2. Distribution of participants according to sociodemographic data in terms of DMBS and QPA scores

	DMBS		QPA	
N=312	**Mean±SD**	**p**	**Mean±SD**	**p**
Gender				
Male	47.28±9.11		149.04±12.32	0.314
Female	44.64±8.03	**0.007**	150.33±10.05	
Age (year)				
30 years and below	46.21±7.08		148.93±9.53	0.344
31-45 years old	46.85±9.17	**0.036**	149.27±11.55	
46 years and older	44.00±8.74		151.16±11.76	
Professional Position				
Resident	47.28±8.75	**0.039**	152.83±8.93	**<0.001**
Family Physician	45.14±8.51		148.16±11.83	
Duration in the profession				
10 years and below	46.92±7.79	0.062	149.75±9.48	0.987
Over 10 years	45.07±9.15		149.73±12.28	
Location of the Workplace				
Urban area	45.58±9.10	0.268	152.01±9.39	**<0.001**
Rural area	46.68±7.05		143.02±13.14	
Patients cared for per day				
20 and below	47.13±7.46		149.43±9.33	
21-50	44.96±8.16	0.209	149.33±12.62	0.726
Over 50	45.90±9.87		150.43±10.72	
Have you ever heard of the concept of "Quaternary Prevention"?				
No, never heard of it[a]	47.25±9.32	0.184	149.72±11.43	**0.045**[ab]
Yes, but I don't know the content of the concept[b]	44.73±7.75		145.81±10.78	**<0.001**[ad]
Yes, I have moderate knowledge[c]	45.37±8.42		150.65±9.14	**0.012**[bc]
Yes, I have detailed information on the subject[d]	45.20±8.85		162.90±8.95	**<0.001**[bd]
				<0.001[cd]

QPA: Quaternary Prevention Awareness DMBS: Defensive Medicine Behavior Scale
One way ANOVA—Posthoc-Tukey test

were categorised as very high (70-56), high (55-42), medium (41-28) and low (14-27). It was found that 70.6% (n=220) of the physicians in the study had very high (13.5%; n=42) and high (57.1%; n=178) levels of defensiveness. The internal consistency of the scale in this study was high (Cronbach's alpha=0.830). The participants' attitudes towards defensive medicine are shown in Figure 1.

The mean DMBS score of male physicians was significantly higher (47.28±9.11) than that of female physicians (44.64±8.03) (p=0.007). Participants aged 46 years and older had lower DMBS scores (45.14±8.51) than those aged 31-45 years (46.85±9.17) (p=0.036). Residents also had

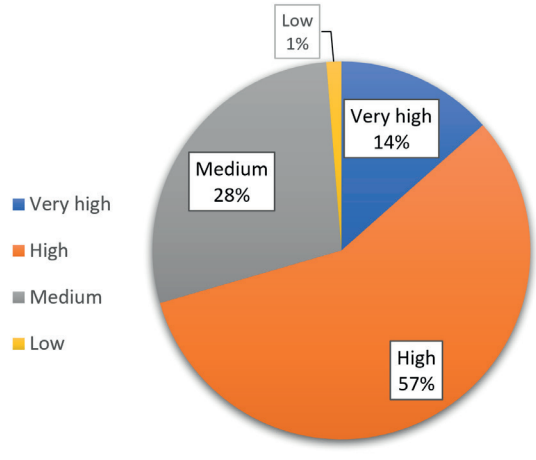

Figure 1. Defensive medicine attitudes of participants

significantly higher DMBS scores (47.28±8.75) than general practitioners (45.14±8.51) (p=0.039). Those who had been sued for malpractice during their medical career had significantly higher DMBS scores (50.29±7.94) than those who had not (45.42±8.59) (p=0.004). Table 2 shows the mean DMBS scores of the participants according to socio-demographic data.

At the end of the socio-demographic form, participants were asked the open-ended question "What do you think are the reasons for unnecessary medical procedures? According to the participating physicians, the most common reasons for unnecessary medical procedures were patient will and coercion (25%), lack of knowledge and experience (16%), and fear of not being preferred by patients (13%).

Table 3. Evaluation of the participants' scores in the sub-dimensions of the QPA* according to their sociodemographic characteristics-1

N=312	Overinformation	Overdiagnosis	MUS**	Overmedicalisation	Overscreening	Incidentaloma
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Gender						
Male	16.70±2.19	7.65±1.39	9.03±1.62	7.78±1.41	21.62±2.77	5.69±1.76
Female	17.06±2.10	7.65±1.41	8.85±1.59	7.65±1.19	21.98±2.41	5.79±1.55
p	0.142	0.985	0.335	0.380	0.223	0.601
Age (year)						
30 years and below[a]	17.31±1.79	7.78±1.30	8.47±1.63	7.56±1.07	21.31±2.60	6.10±1.44
31-45 years old[b]	16.83±2.25	7.62±1.40	9.03±1.50	7.61±1.30	21.72±2.44	5.86±1.58
46 years and older[c]	16.64±2.22	7.58±1.47	9.16±1.68	8.01±1.42	22.37±2.71	5.24±1.80
p	0.115	0.627	**0.032[ab] 0.014[ac]**	**0.034**	**0.021[ac]**	**0.002[ac] 0.013[bc]**
Professional Position						
Resident	17.61±1.66	8.07±1.19	9.05±1.68	7.84±1.11	21.83±2.54	5.93±1.60
Family Physician	16.53±2.27	7.43±1.45	8.87±1.56	7.65±1.38	21.80±2.61	5.64±1.67
p	**<0.001**	**<0.001**	0.370	0.201	0.932	0.142
Duration in the profession						
10 years and below	17.19±1.98	7.84±1.24	8.80±1.63	7.61±1.12	21.53±2.37	5.91±1.50
Over 10 years	16.68±2.24	7.50±1.49	9.03±1.58	7.79±1.41	22.02±2.72	5.61±1.74
p	**0.037**	**0.030**	0.200	0.216	0.094	0.110
Location of the Workplace						
Urban area	17.25±2.02	7.77±1.37	9.03±1.57	7.84±1.20	22.11±2.44	5.60±1.58
Rural area	15.85±2.16	7.29±1.43	8.66±1.70	7.34±1.49	20.94±2.79	6.15±1.76
p	**<0.001**	**0.009**	**0.079**	**0.008**	**<0.001**	**0.010**
Have you ever heard of the concept of "Quaternary Prevention"?						
No, never heard of it[d]	17.02±2.31	7.63±1.51	8.96±1.52	7.82±1.33	21.55±2.73	5.25±1.64
Yes, but I don't know the content of the concept[e]	16.67±2.06	7.60±1.25	8.85±1.52	7.41±1.33	21.22±2.56	5.64±1.65
Yes. I have moderate knowledge[f]	16.66±1.97	7.51±1.38	8.76±1.67	7.69±1.18	22.21±2.23	6.22±1.47
Yes, I have detailed information on the subject[g]	18.25±1.83	8.60±1.14	9.90±1.88	8.55±1.09	24.10±1.77	6.80±1.47
p	**0.015[gf] 0.014[df]**	**0.021[gf] 0.020[ge] 0.008[df]**	**0.042[gd] 0.021[ge]**	**0.002[ge] 0.035[gd]**	**<0.[001gd] 0.041 <0.001[ge] 0.013**	**<0.001[dg] <0.001[eg] 0.017[df]**

*QPA: Quaternary Prevention Awareness **MUS: Medically unexplained symptoms. One way ANOVA—Posthoc-Tukey test.

Table 4. Evaluation of the participants' scores in the sub-dimensions of the QPA* according to their sociodemographic characteristics-2

N=312	Overtreatment	Shared decision-making	Management of medical treatment	Disease mongering	EBMP*
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Gender					
Male	26.55±3.50	10.06±1.47	15.35±2.23	8.18±1.40	20.44±2.89
Female	27.37±3.50	9.85±1.27	15.94±1.93	7.74±1.41	20.45±2.22
p	**0.040**	0.189	**0.013**	**0.003**	0.960
Age (year)					
30 years and below[a]	26.87±3.13	9.77±1.09	15.96±1.98	7.70±1.19	20.00±2.45
31-45 years old[b]	26.81±3.80	9.99±1.35	15.53±2.19	7.85±1.35	20.41±2.49
46 years and older[c]	27.30±3.36	10.03±1.57	15.63±2.04	8.31±1.19	20.88±2.67
p	0.576	0.404	0.348	**0.006**[ac] **0.019**[bc]	0.082
Professional Position					
Resident	27.33±3.27	10.10±1.13	16.13±1.69	8.07±1.12	20.88±2.15
Family Physician	26.826±3.63	9.86±1.46	15.43±2.24	7.88±1.36	20.23±2.71
p	0.230	0.112	**0.002**	0.236	**0.022**
Duration in the profession					
10 years and below	26.92±3.45	9.90±1.19	15.92±2.06	7.72±1.24	20.41±2.58
Over 10 years	27.05±3.58	9.98±1.48	15.48±2.11	8.11±1.29	20.47±2.53
p	0.756	0.620	0.069	**0.008**	0.849
Location of the Workplace					
Urban area	27.47±3.21	10.13±1.23	15.99±1.79	8.11±1.21	20.72±2.22
Rural area	25.58±4.01	9.39±1.58	14.72±2.60	7.47±1.37	19.63±3.22
p	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.006**
Have you ever heard of the concept of "Quaternary Prevention"?					
No, never heard of it[d]	27.17±3.47	10.03±1.485	15.58±2.03	8.14±1.40	20.58±2.64
Yes, but I don't know the content of the concept[e]	26.01±3.59	9.73±1.3	15.33±2.13	7.69±1.31	19.67±2.47
Yes, I have moderate knowledge[f]	27.15±2.80	9.91±1.20	15.91±2.18	7.88±1.09	20.76±2.37
Yes, I have detailed information on the subject[g]	29.60±4.82	10.60±1.27	16.55±1.60	8.25±1.11	21.70±2.38
p	**0.020**[gd] **<0.001**[gf] **0.022**[fe]	0.063	0.063	0.060	**0.020**[ge] **0.006**[gd]

*EBMP: Evidence-Based Medical Practices. One way ANOVA—Posthoc-Tukey test.

The overinformation score of residents (17.61±1.66) was higher than that of general practitioners (16.53±2.27) (p<0.001). Those with less than 10 years' experience had an overdiagnosis score of 7.84±1.24, while those with more than 10 years' experience had a score of 7.50±1.49 (p=0.030). The overinformation (17.25±2.02) and overdiagnosis (7.77±1.37) scores of those working in urban areas were higher (p<0.001) than those living in rural areas (15.85±2.16) (7.29±1.43) (p=0.009). The scores of the participants according to their socio-demographic characteristics in the sub-dimensions of the QPA are shown in Table 3 and Table 4.

Discussion

The concept of quaternary prevention, which takes the model of preventive medicine to a new level, is a structure that is constantly being developed and renewed with the contributions of researchers and has an important place in the future of health care systems. The literature shows that there is a lack of studies on physicians' attitudes towards the principles and approaches of quaternary prevention. With the present study, we aimed to contribute to the literature on quaternary prevention and to draw attention to the concept of quaternary prevention, which has not yet received sufficient attention in Türkiye. Because of its subject matter, because it is the first study on this topic, and because of its findings, this study makes important contributions to family medicine in particular. Quaternary prevention refers to a general medical approach. This approach includes attitudes and awareness of concepts such as overdiagnosis, overtreatment, management of medical treatment and stigma associated with quaternary prevention and patient-centred care. According to Jamoulle, person-centred care and the application of quaternary prevention are based on a construction between the perspectives, beliefs, values and experiences of patients and practitioners.[8-10]

For this purpose, subheadings related to quaternary prevention were identified in the questions asked of the participants and their opinions on these issues were asked. In this way, the study participants' awareness of quaternary prevention can be examined from a broader perspective. This study found that the majority of doctors had heard of the concept of quaternary prevention, but very few had detailed knowledge of the subject. A study conducted in Peru found that almost all general practitioners were aware of quaternary prevention and that about two-thirds of them had very good knowledge of the subject. In addition, the majority of doctors who participated in the study emphasised that the concept of quaternary prevention was very important for the current health system.[17] It appears that awareness of quaternary prevention is low in Türkiye. Increasing physicians' awareness of quaternary prevention through in-service training programmes and including it in the curriculum of medical schools will have positive outcomes for both physicians and the health system.

It has been suggested that overinformation can lead to overdiagnosis and overtreatment in two different ways. The first occurs as a result of the pressure that patients put on doctors due to misinformation they receive from environments where there is a lot of misleading information, such as the internet and social media.[18,19] Physicians under pressure from patients to test and treat may engage in off-label practices.[20-23]

The second situation arises from the increasing volume of scientific literature and the difficulty for physicians to keep up with the latest information. Physicians who are bombarded with information become confused about which medical procedures to perform. Physicians who find it difficult to choose the most appropriate medical procedures for the patient's current condition may resort to unnecessary procedures rather than risk incomplete practice.[24] The study presented here explored patients' attitudes to the situation created by the disinformation and misdirection to which they were exposed. The majority of physicians who took part in the study felt that over-information could lead to over-diagnosis and over-treatment.

If we look at the statements on exposure to excessive information, as well as other subgroup scores in the study, we see that residents, specialist family physicians, those working in urban areas, and physicians who have detailed information about quaternary prevention have better attitudes and awareness of the issue. The effect of physicians' level of education on the differences in attitudes can be mentioned here. Physicians

who have undergone or are undergoing specialist training would be expected to have a higher level of knowledge about newer concepts such as quaternary prevention and overinformation. Again, the fact that those with more detailed information about quaternary prevention are more aware of overinformation shows the importance of education on this topic. The reason for the difference between those working in urban and rural areas may be that physicians working in rural areas do not have a professional environment that encourages them to follow the latest scientific literature.

This study found that residents, those who had worked for 10 years or less, and those who worked in urban areas were more aware of overdiagnosis. Studies on the concept of overdiagnosis have increased in recent years and have attracted the attention of more and more physicians. For this reason, it is expected that the attitudes of physicians who have recently completed their medical training, and whose knowledge can be considered more up-to-date, would be high.

Participants under 30 years of age, general practitioners, those working in urban areas and those who had detailed information about quaternary prevention were more aware of 'incidentalomas'. In a review of the literature, one study from the USA stands out, which examined the attitudes of patients and physicians on this issue. In the study, which focuses on overdiagnosis and overtreatment of low-risk thyroid cancer, physicians argue that thyroid imaging performed for unrelated reasons starts the cycle of overdiagnosis and overtreatment. It has been argued that nodules found incidentally on these imaging studies inevitably lead to overtreatment.[25] Incidentalomas sometimes lead to a reduction in mortality as a result of early diagnosis and treatment. However, many people who undergo detailed whole-body imaging may have suspicious findings.[26] Physicians should be sceptical that treating incidentalomas may do more harm than good to the patient. The higher scores for young physicians in this section may be related to their having a more questioning and critical perspective.

This study found that female participants, specialist family physicians, those working in urban areas and those who had detailed information about quaternary prevention had higher overtreatment scores. A study of physician attitudes to overtreatment found that the guidelines were more widely accepted than before, but that it was difficult to deviate from guideline recommendations in practice.[27] In a qualitative study conducted in Switzerland, physician anxiety, excessive caution and defensive attitudes towards overtreatment were attributed to physician factors, while time constraints and pressure from senior physicians were cited as examples of non-physician factors. It has also been suggested that lack of knowledge and clinical experience leads to overtreatment.[28] The literature suggests that as knowledge and experience increase, so does awareness of overtreatment. In line with these conclusions, the present study found that family physicians, who would be expected to have more clinical experience, had higher awareness of overtreatment. Although there was no difference between the sexes in the studies, the reason why female physicians had higher awareness in the present study may be the overriding idea of not causing harm as a result of establishing an empathic relationship with patients.

This study found that around three quarters of physicians had a highly defensive attitude to medical practice. The rate of physician defensiveness was found to be 75% in the United Kingdom[29], 93% in the United States[30], and 60% in Israel.[31] Again, studies have shown that the majority of physicians in Türkiye have defensive attitudes.[32,33] While defensive medicine practices increase the cost of health services, they also lead

to patients being exposed to excessive medical procedures.[34] In order to prevent these situations, it is necessary to understand the reasons that lead physicians to adopt defensive attitudes and to take the necessary measures. In this study, physicians reported that the most common reasons for undertreatment were pressure and demands from patients, lack of knowledge and experience, fear of being disliked by patients, and defensive medicine. Similarly, in a US study, physicians reported that the most common reasons for overtreatment were fear of malpractice, pressure from patients, and difficulty in accessing past medical records.[35] A study of general practitioners concluded that fear of malpractice, clinical performance measures and lack of time led to overuse of medical services.[22] In another study in Germany, family physicians identified situations such as physicians' lack of empathy and communication skills, low self-confidence due to lack of clinical experience, lack of preference for evidence-based medical guidelines, defensive medical practices, economic reasons and lack of a culture of discussion as leading physicians to overuse.[36]

Limitations of the study include the online administration of the questionnaire to participants due to the pandemic, the limited literature and the limited nature of the study. Because the study was conducted in a specific region, reached a limited number of participants, and used a survey method, the results cannot be generalised due to the possibility of individual bias, but may provide important guidance for future research groups. As there is no standardised scale in the study area, a questionnaire form developed by the researchers based on the literature was used. Future studies can develop a scale in this area and obtain more original results. Finally, the self-report design of the study may lead to bias.

Conclusion

The concept of quaternary prevention focuses on minimising the harm that can result from overuse of medical services. In this context, identifying the causes of overuse is of great importance for quaternary prevention. The concepts of overdiagnosis and overtreatment are not fully understood by most of society, including some physicians. Research is needed to identify medical practices that put people at risk of overdiagnosis and overtreatment and to take appropriate action. It is expected that public awareness will increase as the number of studies on the subject increases.

Ethical approval

This study has been approved by the Necmettin Erbakan University Non-Drug Medical Device Research Ethics Committee (approval date 08.01.2021, number 2021/3013). Written informed consent was obtained from the participants.

Author contribution

Study conception and design: MT, NK, ND; data collection: MT, NK, ND; analysis and interpretation of results: MT, NK, ND; draft manuscript preparation: MT, NK, ND. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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Research Article

Attitudes and behaviors of patients with diabetes towards insulin treatment

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ABSTRACT

Objective: Insulin treatment for diabetes helps prevent complications. The views and attitudes of people with diabetes towards insulin have a significant impact on treatment adherence and health outcomes. This study aimed to understand the attitudes of people with diabetes towards insulin treatment and the psychosocial factors associated with them.

Methods: The study included 225 patients who applied to the Diabetes-Obesity Outpatient Clinic of a tertiary hospital, who were diabetic, using insulin and/or oral antidiabetic drugs (OAD), over 18 years of age, not pregnant, and able to self-inject. The patient identification form, the DASS-21, and the ITAS scales were used to collect data.

Results: In our study, the mean positive attitude of the ITAS was 9.51; the mean negative attitude of the ITAS was 41.28; and the mean total score of the ITAS was 50.80. Anxiety was observed in 54.7% of the participants, depression in 44.4%, and stress in 30.7%. There was a positive correlation between age and ITAS total score ($r=0.405$; $p<0.001$). Negative ITAS attitude and ITAS total score were found to be higher in women ($p=0.022$ and $p=0.034$), in patients with type 2 diabetes ($p<0.001$; $p<0.001$), and in patients who had not received diabetes education ($p=0.002$; $p=0.001$). The total and negative attitude scores of patients using only OAD were higher than those using insulin ($p<0.001$).

Conclusion: In our study, we found that being a woman, being older, not having received diabetes education, having a short duration of diabetes, and using only OAD were associated with negative attitudes towards insulin in people with diabetes. We also found that depression, anxiety, and stress levels were significantly higher in women and people with low income.

Keywords: Diabetes mellitus, insulin, attitude, behavior, depression

Introduction

Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by the body's inability to utilize the insulin it produces effectively, or by the pancreas' inability to produce sufficient quantities of insulin.[1] DM is classified into two principal categories. Type 1 diabetes typically manifests during childhood or early adulthood and is characterized by an autoimmune response that results in the destruction of beta cells within the pancreas.[2] Type 2 diabetes, which is caused by

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insulin resistance and a reduction in the pancreas' capacity to produce insulin, is more prevalent in adults.[3] The prevalence of DM is increasing rapidly on a global scale. It is estimated that there are currently approximately 537 million individuals with DM worldwide, with this figure projected to reach 783 million by 2045.[4] However, the prevalence of DM in Türkiye is approximately 14.7%, which represents a significant burden on the country's health system.[5]

DM and its associated complications have a profound impact on patients' quality of life and contribute to the rising costs of healthcare.[6] The fundamental elements of DM treatment are regular monitoring blood sugar levels, regular physical activity, a balanced diet, and medication.[1] Insulin treatment is a requisite component of the management of type 1 diabetes, and it is also commonly indicated for patients with type 2 diabetes.[7] Maintaining optimal blood sugar levels is crucial for preventing acute and long-term complications associated with DM. Insulin treatment plays a pivotal role in this regard. Nevertheless, the attitudes and behaviors of patients undergoing insulin treatment a are strongly linked to the effectiveness of the treatment regimen.[8] The views and attitudes of patients with DM regarding insulin have been demonstrated to exert a significant impact on treatment compliance and health outcomes.[9] For instance, apprehension regarding insulin injections, perceiving the commencement of insulin therapy as an indication of inadequacy, or concerns about social stigma may diminish patients' adherence to treatment regimens.[10] Furthermore, the lifestyle modifications necessitated by insulin therapy may prove challenging for patients to integrate into their daily routines.[11] In multicultural societies, it is of great importance to investigate attitudes and behaviors toward insulin to facilitate treatment adherence and improve patient education programs.[12] Investigating the attitudes and behaviors of diabetic patients in Türkiye concerning insulin treatment will prove invaluable in addressing the current deficit of information in the field of health and in informing the development of health policies.[13]

The objective of this study is to examine the attitudes and behaviors of diabetic patients who have sought treatment at the Diabetes-Obesity Outpatient Clinic concerning insulin treatment. Additionally, the study seeks to ascertain the patients' knowledge levels, apprehensions, and concerns pertaining to their treatment, as well as to investigate the impact of depression, stress, and anxiety on these attitudes and behaviors.

Material and Methods

This study employed a cross-sectional design and was conducted at the Diabetes-Obesity Outpatient Clinic of a tertiary hospital in Istanbul between 15/10/2023 and 15/04/2024.

During the last six-month period before the study period, approximately 750 unique diabetic patients applied to the outpatient clinic. Based on this known population, the required sample size was calculated using a finite population correction with a 95% confidence level and 5% margin of error. Accordingly, the target sample size was determined as 254; however, complete data were obtained from 225 patients. Participants were selected using a simple random sampling method from among those meeting the inclusion criteria. Individuals diagnosed with type 1 or type 2 diabetes, aged 18 or above, who being treated with insulin and/or oral antidiabetic drugs (OADs) and who consented to participate in the study were included in this investigation. Of the participants, 75 were on OADs alone, 75 were on a combination of OADs and insulin therapy, and 75 were on insulin monotherapy.

To be eligible for inclusion in the study, participants were required to demonstrate the cognitive ability to answer the questions posed, to have been diagnosed with DM (either Type 1 or Type 2), to be undergoing DM treatment (with OADs and/or insulin), to have no underlying health conditions that would preclude participation in the interview, to be able to understand and communicate effectively in Turkish, to be at least 18 years of age during the period of the study, and to have given their informed consent to participate in the study.

The exclusion criteria for the study were defined as follows: Those under the age of 18 during the study period, pregnant women, individuals with conditions that impair the ability to self-administer injections (e.g., neurological involvement, vision loss), patients unable to comprehend Turkish and communicate effectively, those unable to respond to 90% of survey items, those who declined to participate, individuals with acute medical emergencies, and those with perceptual or psychiatric disorders that impair communication were not eligible.

Approval from the İstanbul Medeniyet University Göztepe Training and Research Hospital Clinical Research Ethics Committee was obtained on 11 October 2023 (decision number 2023/0690). This study was conducted in accordance with the Declaration of Helsinki and with the approval of the institutional review board. Informed consent was obtained from all patients before their participation.

The Patient Identification Form, the Depression Anxiety Stress Scale-21 (DASS-21), and the Insulin Treatment Appraisal Scale (ITAS) were administered to the volunteer patients in person. The patient identification form inquired about the patients' sociodemographic characteristics, the presence of additional chronic diseases, the type of treatment, the duration of treatment, and the duration of diabetes.

The ITAS is a scale comprising two sub-dimensions and a total of 20 items. Four of the items (items 3, 8, 17 and 19) assess positive attitudes, while the remaining 16 items assess negative attitudes. A high positive assessment score is indicative of a positive attitude towards insulin, whereas a high total score and negative assessment score are indicative of a negative perception of insulin use.[14] The Turkish validity and reliability study was conducted by Arda-Sürücü et al. and the necessary permissions were obtained from them to use the scale in our study.[15]

The DASS-21 was employed to measure symptoms of depression, anxiety and stress in patients. The scale comprises 21 items divided equally into three subscales: depression, anxiety, and stress. A high score on the DASS-21 indicates an increase in the severity of symptoms.[16] The Turkish validity and reliability study of the scale was conducted by Sarıçam[17] The necessary permissions were obtained from them for the scale to be used in the present study.

Data were analyzed using IBM SPSS Statistics (Version 22.0). Descriptive analyses were conducted using the following statistical measures: number (n), percentage (%), mean, standard deviation, and median value. The normality of the distribution was evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The following tests were employed for comparison: Pearson chi-square test, independent groups T-test, Mann-Whitney U-test, one-way ANOVA test, and Kruskal-Wallis test. Tukey's post hoc test was used to identify specific group differences, while the Mann-Whitney U test was used to identify the group(s) that exhibited statistical significance. In the case of post-hoc Mann-Whitney U tests, the Dunn-Bonferroni correction was applied to the p-values. In instances where the data in question did not demonstrate a normal distribution, a Spearman correlation analysis was employed to ascertain the nature of the relationship between

the two numerical variables. The threshold for statistical significance was set at p<0,05 for all tests employed in the course of the research.

Results

The study cohort comprised 225 patients diagnosed with DM who had sought care at the diabetes-obesity outpatient clinic.

Table 1 presents a summary of the sociodemographic and clinical characteristics of all participants. The median age of the participants was 56 years (IQR: 46–64). The sample was predominantly female (66.2%). Regarding educational background, 40.9% of participants had completed primary school, while 23.1% had a university degree. A smaller portion of the sample was literate without formal education (1.8%) or had completed other forms of education (4.9%). Occupationally, nearly half of the participants were housewives (47.1%), followed by retirees (22.7%) and freelance workers (12.4%). In terms of income, 60.0% of participants reported that their income matched their expenses, while 18.2% indicated that their income was insufficient and 21.8% reported a surplus. The clinical profile showed that the vast majority had Type 2 diabetes (80.4%) with a mean disease duration of 15.30 ± 10.01 years. Furthermore, 81,3% of the sample had additional chronic conditions.

Regarding comorbidities, 81.3% of participants reported having other chronic diseases reported having other chronic diseases in addition to DM. Specifically, 14.7% had coronary artery disease, 58.2% had hyperlipidemia, 52.9% had hypertension, 4.9% had chronic lung disease, 6.7% had kidney disease, and 16% had thyroid disease. Additionally, 12% of the participants reported having unspecified chronic conditions.

While 69.8% of participants had received diabetes education, treatment methods varied: one-third used only oral antidiabetic agents, another third used only insulin, and the remaining third used a combination of both. Among insulin users (n=150), the average duration of insulin therapy was 13.81 ± 8.99 years. Most participants used insulin either twice (28.7%) or four times daily (36.7%). Notably, 97.3% of insulin users reported adherence to their insulin therapy regimen.

Table 2 presents the distribution of the ITAS sub-dimensions and total scores of diabetic patients according to their sociodemographic and clinical characteristics. No statistically significant correlation was found between age and the ITAS sub-dimensions; however, a moderate positive correlation was identified between age and total ITAS scores (r=0.405, p<0.001), suggesting that insulin attitudes become more favorable with advancing age. Regarding gender, women had significantly higher negative attitude scores (p=0.022), and total ITAS scores were also significantly higher among women (p=0.034). Educational status showed significant differences in both the negative attitude and total ITAS scores (p<0.001; p=0.004). The difference in the negative attitude sub-dimension was due to secondary school graduates scoring lower than primary and other education groups (p=0.003, p=0.001), while the difference in the ITAS total score was due to university graduates scoring lower than the other group (p=0.023). In terms of occupation, significant differences were found in both negative attitudes (p=0.003), and total scores (p=0.004). The higher negative attitude scores of housewives (p=0.005) and the higher ITAS total scores of housewives and self-employed patients (p=0.008; p=0.040) accounted for the differences. Housewives and freelancers tended to have more negative perceptions compared to those grouped under “Others” (including workers, officers, and unemployed individuals). Although monthly income levels were not significantly associated with ITAS scores, a decreasing trend was observed in negative and total scores as income increased.

Table 1. Sociodemographic and clinical characteristics of the participants

Variables (n=225)	Categories	Results (n (%))
Age (years)		56.00 (46.00-64.00)*
Gender	Female	149 (66.2)
	Male	76 (33.8)
Education	Literate	4 (1.8)
	Primary school	92 (40.9)
	Middle school	23 (10.2)
	High school	43 (19.1)
	University	52 (23.1)
	Others	11 (4.9)
Vocation	Housewife	106 (47.1)
	Retired	51 (22.7)
	Freelance	28 (12.4)
	Officer	5 (2.2)
	Worker	2 (0.9)
	Unemployed	1 (0.4)
	Others	32 (14.2)
Monthly income bracket	Income is less than expenses	41 (18.2)
	Income level equals expense	135 (60.0)
	Income is more than expenses	49 (21.8)
Diabetes type	Type 1 DM	44 (19.6)
	Type 2 DM	181 (80.4)
Diabetes duration (years)		15.30 ± 10.01**
Other chronic diseases	No	42 (18.7)
	Yes	183 (81.3)
Diabetes education	No	68 (30.2)
	Yes	157 (69.8)
Diabetes treatment	Oral Antidiabetic	75 (33.3)
	Insulin	75 (33.3)
	Oral Antidiabetic+Insulin	75 (33.4)
Duration of insulin use (years) (n=150)		13.81 ± 8.99**
Number of insulin uses (n=150)	1	42 (28.0)
	2	43 (28.7)
	3	6 (4.0)
	4	55 (36.7)
	5	4 (2.6)
Does he/she use insulin therapy properly? (n=150)	No	4 (2.7)
	Yes	146 (97.3)

*Median (Minimum-Maximum); **Mean ± Standard Deviation.

Table 2. ITAS scores by sociodemographic and clinical characteristics

Variables (n=22)	Categories	ITAS Positive Attitude Sub-Dimension	p	ITAS Negative Attitude Sub-Dimension	p	ITAS Total	p
Age (years)		r=0.030	0.653*	r=0.081	0.228*	r=0.405	**<0.001***
Gender	Female	10.00 (8.00-11.00)	0.582**	42.49±10.88	**0.022*****	51.98±11.63	**0.034****
	Male	9.00 (7.00-11.00)		38.93±10.96		48.51±11.35	
Education	Literate	10.00 (8.50-10.75)	0.354*****	41.66±9.86	**<0.001******	52.00±9.53	**0.004******
	Primary school	10.00 (8.00-11.00)		43.61±9.78		52.89±10.60	
	Middle school	10.00 (8.00-14.00)		34.47±10.69		46.00±10.61	
	Highschool	9.00 (8.00-12.00)		40.90±11.83		50.60±12.64	
	University	9.00 (7.25-11.00)		38.53±10.43		47.53±11.59	
	Others	10.00 (8.00-10.00)		50.36±11.47		59.36±11.96	
Vocation	Housewife	10.00 (8.00-11.00)	0.306*****	43.59±11.03	**0.003******	52.90±12.02	**0.004******
	Retired	9.00 (7.00-11.00)		39.17±10.42		48.66±10.88	
	Freelance	10.00 (8.25-12.00)		42.85±10.57		53.57±9.27	
	Others (Worker+Officer+ Unemployed+Others)	9.00 (7.25-11.00)		36.82±10.47		46.10±11.45	
Monthly income bracket	Income is less than expenses	9.00 (8.00-12.00)	0.667*****	42.70±11.72	0.411******	54.00 (44.50-59.50)	0.428*****
	Income level equals expense	10.00 (8.00-11.00)		41.44±10.88		50.50 (42.00-60.00)	
	Income is more than expenses	9.00 (7.00-12.00)		39.65±10.77		49.00 (40.50-58.00)	
Diabetes type	Type 1 DM	9.00 (7.00-10.75)	0.128**	33.75±10.41	**<0.001****	42.84±11.92	**<0.001****
	Type 2 DM	10.00 (8.00-11.00)		43.12±10.37		52.75±10.72	
Diabetes duration (years)		r=-0.060	0.369*	r=-0.198	**0.003***	r=–0.198	**0.003***
Other chronic diseases	No	9.00 (6.75-12.00)	0.927**	39.21±12.05	0.177***	48.78±12.58	0.212***
	Yes	9.00 (8.00-11.00)		41.76±10.74		51.27±11.39	
Diabetes education	No	10.00 (8.00-11.00)	0.298**	44.67±11.04	**0.002****	54.58±10.80	**0.001****
	Yes	9.00 (8.00-11.00)		39.80±10.70		49.16±11.62	
Duration of insulin use (years) (n=150)		r=-0.089	0.277**	r=-0.104	0.206**	r=-0.116	0.159**
Number of insulin uses (n=150)		r=0.002	0.979**	r=-0.111	0.176**	r=-0.083	0.313**

Bold values indicate statistical significance.
r= Spearman correlation coefficient
*: Spearman correlation test; **: Mann Whitney U test; ***: Independent Samples T test; ****: Kruskal Wallis test; *****: One Way ANOVA test.

Among clinical variables, individuals with Type 2 diabetes had significantly higher negative attitude and total ITAS scores compared to those with Type 1 diabetes (p<0.001). A negative correlation was found between diabetes duration and both negative attitude and total ITAS scores (r=-0.198; p=0.003). Participants who had received diabetes education had significantly lower negative attitude scores (p=0.002) and lower total ITAS scores (p=0.001). In addition, when other chronic diseases were examined separately, it was observed that the ITAS negative attitude and ITAS total score were higher in patients with hypertension than in patients without hypertension (p=0.015; p=0.041).

No statistically significant associations were observed between ITAS scores and other clinical variables such as the presence of chronic diseases, number of insulin injections per day, or insulin therapy duration.

Table 3 presents the distribution of the DASS-21 depression, anxiety and stress scores according to the sociodemographic and clinical characteristics of the patients. No statistically significant correlation was found between age and the DASS-21 subscale scores. However, females had significantly higher depression (p=0.005) and anxiety (p<0.001) scores, while the difference in stress scores did not reach statistical significance (p=0.091). When educational status was evaluated, a significant difference was found only in anxiety scores (p=0.010), with the highest levels observed among those categorized as “Literate” and “Others”. Occupational status was associated with depression and anxiety scores. Housewives exhibited higher scores compared to other groups, with significant differences in depression (p=0.046), and anxiety (p<0.001) subscales. Monthly income level was significantly associated with all three DASS-21 subscales. Participants with income lower than their expenses reported the highest levels of depression, anxiety, and stress, whereas those with income higher than expenses had the lowest levels across all domains (p<0,05 for all comparisons).

Among clinical variables, there were no significant differences in DASS-21 scores between Type 1 and Type 2 diabetes. However, a weak but statistically significant positive correlation was found between diabetes duration and anxiety scores (r=0.154; p=0.021), indicating that longer diabetes duration may be associated with slightly increased anxiety. No statistically significant associations were found between DASS-21 scores and the presence of other chronic diseases, diabetes education, duration of insulin use, or number of insulin administrations per day.

Table 4 shows the distribution of ITAS and DASS-21 scores according to the treatment method employed for diabetic patients included in the study. Significant differences were found in insulin treatment attitude scores across treatment groups. Participants receiving only OAD had almost significantly higher positive attitude scores compared to those receiving insulin alone or a combination of OAD and insulin (p=0,050). More strikingly, negative attitude and total scores differed significantly between groups (p<0.001), for both with OAD users scoring the highest, followed by combination therapy users, and insulin-only users showing the lowest negativity.

In contrast, DASS-21 scores did not differ significantly by treatment type. Median scores for depression, anxiety, and stress were similar across groups, with no statistically significant differences observed (p>0.05 for all).

After all this, the relationship between the ITAS sub-dimensions, total scores of the ITAS, and the DASS-21 scores has been evaluated, and shown in Table 5. The results indicated a moderate positive relationship between ITAS total scores and each of the DASS-21 subscales. Specifically, higher total ITAS scores were associated with elevated levels

Table 3. DASS-21 scores by sociodemographic and clinical characteristics

Variables (n=22)	Categories	DASS-21 Depression Score	p	DASS-21 Anxiety Score	p	DASS-21 Stress Score	p
Age (years)		r=-0.125	0.061*	r=-0.100	0.133*	r=-0.087	0.193*
Gender	Female	5.00 (1.00-7.50)	**0.005****	5.00 (2.50-8.00)	**<0.001****	6.00 (3.00-8.50)	0.091**
	Male	2.00 (1.00-6.00)		2.00 (1.00-4.00)		5.00 (2.00-8.00)	
Education	Literate	8.50 (1.75-13.75)	0.265***	7.00 (1.75-11.50)	**0.010*****	5.00 (1.25-8.75)	0.257***
	Primary school	3.50 (1.00-7.00)		4.00 (2.00-7.75)		6.00 (3.00-8.00)	
	Middle school	3.00 (0.00-7.00)		2.00 (1.00-5.00)		5.00 (3.00-7.00)	
	Highschool	4.00 (1.00-7.00)		4.00 (2.00-5.00)		5.00 (2.00-8.00)	
	University	3.50 (1.00-8.75)		4.00 (2.00-7.00)		4.50 (3.00-8.00)	
	Others	7.00 (3.00-8.00)		7.00 (6.00-11.00)		7.00 (6.00-11.00)	
Vocation	Housewife	5.00 (2.00-7.00)	**0.046*****	5.50 (3.00-8.00)	**<0.001*****	6.00 (3.00-8.25)	0.178***
	Retired	3.00 (0.00-6.00)		2.00 (2.00-4.00)		5.00 (2.00-8.00)	
	Freelance	3.00 (1.00-7.00)		4.00 (1.00-7.00)		6.00 (3.00-8.00)	
	Others (Worker+Officer+ Unemployed+Others)	3.50 (1.00-7.00)		3.50 (2.00-7.00)		5.00 (3.00-8.00)	
Monthly income bracket	Income is less than expenses	4.00 (2.50-7.00)	**0.025*****	6.00 (2.00-10.00)	**0.005*****	7.00 (3.00-11.00)	**0.039*****
	Income level equals expense	4.00 (1.00-7.00)		4.00 (2.00-7.00)		6.00 (3.00-8.00)	
	Income is more than expenses	2.00 (0.50-5.00)		3.00 (1.00-5.50)		4.00 (2.00-8.00)	
Diabetes type	Type 1 DM	4.00 (1.00-6.75)	0.873**	3.50 (2.00-7.00)	0.430**	5.00 (3.00-8.00)	0.562**
	Type 2 DM	4.00 (1.00-7.00)		4.00 (2.00-7.00)		6.00 (3.00-8.00)	
Diabetes duration (years)		r=0.106	0.114*	r=0.154	**0.021***	r=0.039	0.560*
Other chronic diseases	No	3.50 (1.00-7.00)	0.871**	3.00 (1.00-7.00)	0.252**	6.00 (3.00-8.00)	0.961**
	Yes	4.00 (1.00-7.00)		4.00 (2.00-7.00)		6.00 (3.00-8.00)	
Diabetes education	No	3.00 (1.00-7.00)	0.372**	3.00 (2.00-7.00)	0.106**	6.00 (2.25-8.75)	0.716**
	Yes	4.00 (1.00-7.00)		4.00 (2.00-7.00)		5.00 (3.00-8.00)	
Duration of insulin use (years) (n=150)		r=0.102	0.216*	r=0.074	0.367*	r=-0.074	0.368*
Number of insulin uses (n=150)		r=0.114	0.165*	r=0.014	0.865*	r=0.025	0.757*

Bold values indicate statistical significance.
r= Spearman correlation coefficient
*: Spearman correlation test; **: Mann Whitney U test; ***:Kruskal Wallis test

Table 4. ITAS and DASS-21 scores according to treatment type

Variables	OAD (n=75) (Mean±SD or Median (Minimum-Maximum))	Insulin (n=75) (Mean±SD or Median (Minimum-Maximum))	OAD+Insulin (n=75) (Mean±SD or Median (Minimum-Maximum))	p
ITAS Positive Attitude Sub-Dimension	10.16±2.89	9.30±3.02	9.08±2.54	0.050*
ITAS Negative Attitude Sub-Dimension	45.14±10.93	37.44±10.81	41.21±10.04	**<0.001***
ITAS Total	55.30±10.73	46.77±11.98	50.29±10.66	**<0.001***
DASS-21 Depression Score	4.00 (1.00-8.00)	4.00 (1.00-7.00)	4.00 (1.00-7.00)	0.688**
DASS-21 Anxiety Score	3.00 (2.00-7.00)	4.00 (2.00-8.00)	4.00 (2.00-7.00)	0.235**
DASS-21 Stress Score	6.00 (2.00-8.00)	6.00 (3.00-8.00)	5.00 (3.00-8.00)	0.966**

Bold values indicate statistical significance.
*: One Way ANOVA test; **: Kruskal Wallis Test.

Table 5. Correlations of ITAS and DASS-21 scores

Variables		ITAS Positive Attitude Sub-Dimension	ITAS Negative Attitude Sub-Dimension	ITAS Total	DASS-21 Depression Score	DASS-21 Anxiety Score	DASS-21 Stress Score
ITAS Positive Attitude Sub-Dimension	**r**	-	0.218	0.405	0.037	0.035	-0.039
	p		**<0.001**	**<0.001**	0.580	0.604	0.558
ITAS Negative Attitude Sub-Dimension	**r**	0.218	-	0.975	0.288	0.325	0.254
	p	**<0.001**		**<0.001**	**<0.001**	**<0.001**	**<0.001**
ITAS Total	**r**	0.405	0.975	-	0.283	0.329	0.188
	p	**<0.001**	**<0.001**		**<0.001**	**<0.001**	**0.005**
DASS-21 Depression Score	**r**	0.037	0.288	0.283	-	0.692	0.637
	p	0.580	**<0.001**	**<0.001**		**<0.001**	**<0.001**
DASS-21 Anxiety Score	**r**	0.035	0.325	0.329	0.692	-	0.720
	p	0.604	**<0.001**	**<0.001**	**<0.001**		**<0.001**
DASS-21 Stress Score	**r**	-0.039	0.254	0.188	0.637	0.720	-
	p	0.558	**<0.001**	**0.005**	**<0.001**	**<0.001**	

Bold values indicate statistical significance
*: Spearman correlation test

of depression (r=0.283; p<0.001), anxiety (r=0.188; p=0.005), and stress (r=0.329; p<0.001). The ITAS negative attitude scores were positively and significantly correlated with all DASS-21 domains. Participants with higher negative attitude scores tended to report higher depression (r=0.288; p<0.001), anxiety (r=0.254; p<0.001), and stress scores (r=0.325; p<0.001). Conversely, ITAS positive attitude scores were not significantly associated with any of the DASS-21 subscales.

Discussion

In this study, we examined the attitudes of diabetic patients toward insulin use and the relationship between depression, anxiety, and stress levels. Our findings indicate that several demographic and clinical factors are associated with negative attitudes toward insulin. Specifically, we found that being a woman, being older, not having received DM education, having a low level of education,

having a short duration of DM and using only oral antidiabetic drugs were associated with negative attitudes towards insulin. Additionally, the prevalence of depression was markedly elevated among women and individuals with lower income levels.

In our study, the mean score for the positive attitude sub-dimension of the ITAS was 9.51±2.85; the mean score for the negative attitude sub-dimension of the ITAS was 41.28±1.01; and the mean score for the total ITAS score was 50.80±11.63. Similarly, studies conducted in Türkiye reported higher mean scores than those observed in our study.[11,18,19] In the study conducted by Günay and his team, in which the perceptions of Type 2 diabetic patients receiving intensive care treatment towards insulin were investigated, it was observed that the mean total score of the ITAS was similar to that observed in our study.[20] In studies conducted in other countries, it was observed that the total scores of the ITAS were lower than those reported in our study.[21,22] Furthermore, in another investigation involving 273 Type 2 diabetic patients undergoing insulin treatment, it was observed that the positive attitude scores were higher than those reported in our study.[23]

A comparison of our study with other studies indicates that our patients exhibited a more negative attitude towards insulin. This negative attitude may be attributable to demographic factors, such as the lower proportion of younger patients participating in the study and the majority of participants being female. Furthermore, the higher proportion of patients with a lower level of education in our study compared to those with a higher level of education may have contributed to this negative attitude.

The findings of our study indicated that women with diabetes exhibited a more negative attitude toward insulin treatment compared to men. The results of a study conducted with Type 2 DM patients who did not use insulin to evaluate the emotional and cognitive barriers (psychological insulin resistance) that individuals experience in accepting insulin treatment supported the findings of our study.[24] Furthermore, studies have reported that positive and negative perceptions of insulin treatment are not inherently gender specific. Some studies have found that male and female patients exhibit similar perceptions of insulin treatment, with both positive and negative attitudes reported.[11,18-20,25-28] In light of the aforementioned findings, it can be posited that the higher rates of depression and anxiety observed in female patients in our study may have contributed to their more negative attitudes towards insulin.

It was established that patients with DM who had achieved a basic level of literacy exhibited a more unfavorable attitude toward insulin treatment than those who had attained a higher level of education.[18] In the study conducted by Taylor et al. it was observed that participants who had not completed high school education exhibited a more negative attitude towards insulin than those with a higher level of education.[25] In the study conducted by Saleem, it was established that patients who had received a university education exhibited the highest levels of positive perception towards insulin; conversely, patients who were illiterate or had only received religious education demonstrated significantly lower levels of positive perception.[29] In the study conducted by Tan et al. it was determined that participants with at least a secondary level of education were less likely to decline insulin treatment compared to those who had only completed primary school or were uneducated.[30] In the study conducted by Wong et al. it was observed that patients with a university level of education were more inclined to utilize insulin treatment than those who had completed primary or secondary school.[31]

In line with the aforementioned studies, our study revealed that patients with no formal education exhibited a more negative attitude toward insulin

than those with a university-level education. A lack of education may have resulted in patients having inadequate health literacy, which may have led to a lack of knowledge and the formation of false beliefs about insulin treatment. It can be assumed that patients developed a negative attitude towards insulin treatment as a result of this lack of knowledge and false beliefs.

Our findings also showed that a notable discrepancy between age and attitudes towards insulin treatment. It was observed that there was a correlation between age and attitude towards insulin treatment, with older patients displaying a more negative attitude towards insulin. One of the sources of evidence supporting these findings is a study conducted in Australia. The study examined a small cohort of patients with type 2 diabetes who were not adequately controlled on a non-insulin regimen. The findings indicated that individuals with diabetes over the age of 50 exhibited a more unfavorable attitude toward insulin utilization.[25] Nevertheless, numerous studies published in the scientific literature have not identified a statistically significant correlation between age and attitudes toward insulin treatment.[11,18-20,26] The reason for this significant difference found in our study can be interpreted as individuals developing negative attitudes towards insulin based on the negative processes and experiences they have undergone as they have aged. Several studies that have sought to evaluate the attitude toward insulin in patients with DM have not identified a significant relationship between the duration of DM and this attitude.[18,19,23,26,28,31,32] However, in the study conducted by Tan et al. which investigated insulin treatment refusal using a questionnaire developed for patients with Type 2 DM, it was determined that the rate of refusal of insulin treatment decreased by 9% per year with increasing duration of diabetes.[30]

Similarly, our study revealed that patients exhibited a more favorable attitude towards insulin treatment as the duration of DM diagnosis increased. It is hypothesized that as the number of patients in our study increased, the probability of interaction with healthcare professionals and receipt of regular education also increased. This suggests that the patients may have acquired greater knowledge and experience regarding their diabetes. Furthermore, they may have psychologically adapted to their condition over time, leading to a more positive approach to living with DM and the associated treatment processes. This process of acceptance and adaptation may have reduced the tendency to reject or postpone insulin treatment, thereby developing a more positive attitude toward the treatment in question.

The findings of our study revealed a notable discrepancy between the DM treatment groups and their attitudes toward insulin. It was observed that patients who were receiving only oral antidiabetic drugs exhibited a more negative attitude towards insulin treatment than patients who were receiving only insulin or a combination of oral antidiabetic drugs and insulin. This finding is consistent with the results of numerous studies previously conducted in the literature. A study examining psychological insulin resistance (PIR) in geriatric patients revealed that patients who were not using insulin exhibited a more negative attitude than patients who were using insulin.[13] Similarly, a study conducted on diabetic patients receiving primary health care in Hong Kong revealed that patients not using insulin exhibited higher levels of psychological insulin resistance than those using insulin.[33] In the study conducted by Chen et al. it was stated that patients with type 2 DM who were using the OADs exhibited more negative beliefs and attitudes toward insulin treatment than those who were currently receiving insulin treatment.[27] In the study conducted by Gulam et al. patients receiving insulin treatment exhibited a less negative attitude towards insulin treatment than those using the OADs.[26] Ultimately, the study by Hermanns et al. unequivocally

demonstrated that the obstacles to insulin therapy intensified in patients who continued to adhere to oral treatment regimens, whereas the negative perceptions of insulin therapy diminished in patients who transitioned to insulin therapy.[22]

The studies corroborate the findings of our investigation. It seems plausible to suggest that patients who have undergone insulin treatment tend to exhibit fewer negative attitudes because of having acquired the requisite skills to cope with and adapt to insulin. Conversely, it is postulated that patients solely treated with oral antidiabetic drugs were inadequately informed and educated about insulin treatment, consequently exhibiting a more unfavorable disposition towards insulin therapy.

The findings of this study indicate that patients who did not receive DM education exhibited a more unfavorable attitude toward insulin treatment in comparison to those who received such education. Despite the dearth of studies in the literature that directly address the effect of DM education on attitudes toward insulin treatment, like our study, some studies conducted in recent years have demonstrated that DM education has a positive impact on patients' general health management, adherence to treatment and quality of life. Norris et al. have demonstrated that DM education is an effective strategy for improving glycemic control in both the short and long term, while also enhancing patients' knowledge and skills regarding DM management.[34] Similarly, Gucciardi et al. have stated that DM education increases patients' self-management skills and adherence to treatment and that this education may positively affect patients' attitudes toward insulin treatment.[35] Furthermore, Ahola and Groop have highlighted the pivotal role of education in mitigating psychological resistance among diabetic patients.[36] Their findings indicate that this educational intervention may foster a more constructive outlook by attenuating negative thoughts and concerns about treatment. In this context, the findings of our study offer valuable insights into the potential of DM education to enhance patients' attitudes toward insulin treatment.

Despite the absence of a notable correlation between the prevalence of additional chronic illnesses and attitudes toward insulin, depression, anxiety, and stress in our investigation, our findings indicate that patients with hypertension tend to exhibit a more unfavorable attitude toward insulin. Furthermore, elevated levels of anxiety and stress were observed in this patient cohort. A study including patients with DM and/or hypertension observed a high prevalence of depression and anxiety disorders.[8] Furthermore, another study indicated that type 2 DM was associated with an elevated prevalence of depression and/or anxiety disorders in patients with hypertension.[37] Similarly, a study comparing healthy groups with patients with type 2 DM demonstrated that the presence of hypertension was identified as a risk factor for depression, anxiety, and stress.[38] The results of our study indicate that hypertension may have a detrimental impact on attitudes toward insulin in individuals with DM, potentially leading to an increased psychological burden. Nevertheless, further in-depth analysis is required to provide more detailed commentary.

Many studies have failed to identify a correlation between insulin treatment and the occurrence of depression, anxiety, and stress. In the study conducted by Lee it was concluded that depression was not a significant factor in psychological insulin resistance.[33] In the study conducted by Nefs et al. with type 2 diabetic patients who did not use insulin, no relationship was found between the rate and duration of insulin treatment and depression.[39] In the study by Fisekovic Kremic examining the relationship between the DASS-21 and sociodemographic and clinical characteristics in diabetic patients, no significant

relationship was identified between diabetes treatments and depression, anxiety and stress status.[40] Furthermore, the study by Habtewold et al. investigating the relationship between depression and type 2 diabetic patients revealed no significant correlation between DM treatment regimens and depression.[41] Per the existing literature, our study revealed no statistically significant correlation between DM treatment types and depression, anxiety, and stress. This finding may indicate that depression, anxiety and stress do not exert a direct influence on the management of DM treatment.

Limitations

This study has several limitations. First, its cross-sectional design restricts the ability to draw causal inferences between patients' attitudes toward insulin therapy and psychosocial variables such as depression, anxiety, and stress. Additionally, the study was conducted in a single tertiary hospital in Istanbul, which may limit the generalizability of the findings to broader populations with diverse cultural and socioeconomic backgrounds.

Second, the use of self-reported data may have introduced recall or reporting bias, particularly regarding mental health measures. Although validated tools were used, variables such as fear of hypoglycemia or patient-provider communication—which may significantly influence insulin attitudes—were not assessed. Moreover, as the sample primarily included individuals with Type 2 diabetes, the results may not fully reflect the experiences of those with Type 1 diabetes.

Conclusion

The study found that being a woman, being older, having a low level of education and not having received diabetes education were associated with negative attitudes towards insulin use. Low income, depression, anxiety and stress levels were also found to be higher in women. In this context, providing patients with individualized education programs and psychosocial support can have a positive impact on individuals' attitudes to diabetes management.

Ethical approval

The study was approved by İstanbul Medeniyet University Göztepe Training and Research Hospital Clinical Research Ethics Committee (date: 11.10.2023, number: 2023-0690). This study was conducted by the ethical standards outlined in the Declaration of Helsinki and with the approval of the institutional review board. Informed consent was obtained from all patients before their participation.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: HHM; data collection: MŞ; analysis and interpretation of results: FAE; draft manuscript preparation: MŞ, FAE. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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Research Article

Effectiveness of pharmacological smoking cessation treatments: a retrospective comparison of common methods

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ABSTRACT

Objective: This study aimed to compare the short-term (three-month) effectiveness of three smoking cessation therapies, bupropion, nicotine patch, and cytisine, and to retrospectively evaluate the impact of cytisine therapy on craving reduction and its side effect profile under routine clinical practice conditions.

Methods: A total of 565 individuals who presented to the Smoking Cessation Outpatient Clinic between February 2024 and January 2025 and completed treatment with either cytisine, bupropion, or nicotine patch were included in the study. Demographic characteristics, chronic disease status, Fagerström Test for Nicotine Dependence (FTND) scores, and smoking cessation outcomes were assessed to compare treatment success across the three therapies. Among patients treated with cytisine, early craving reduction and reported side effects during the first week were recorded and analyzed in relation to cessation outcomes. Statistical significance was set at $p<0.05$.

Results: The mean age of participants was 41.28±12.33 years, and the mean FTND score was 6.18±2.32. Of the patients, 252 (44.7%) received cytisine, 135 (23.8%) received bupropion, and 178 (31.5%) received nicotine patch therapy. The smoking cessation rate was 61.5% in the cytisine group, 16.3% in the bupropion group, and 11.8% in the nicotine patch group. The cessation success rate in the cytisine group was significantly higher than in the other treatment groups ($p<0.001$). Among those who received cytisine, 161 patients (82.5%) reported a reduction in craving within the first five days of treatment. The overall side effect rate was 25%, with nausea and vomiting (22.7%) and headache (22.7%) being the most commonly reported adverse effects. Logistic regression analysis revealed a strong association between early craving reduction and successful smoking cessation among cytisine users (OR=25.79, $p<0.001$).

Conclusion: Cytisine was associated with higher cessation rates compared to other treatments. It also appeared to reduce cravings in the early phase and had a relatively low side effect profile. Craving reduction during the first week emerged as an important predictor of success. These findings suggest that cytisine may be an effective and well-tolerated option in primary care. However, further prospective studies are needed to evaluate its comparative effectiveness more comprehensively.

Keywords: Smoking, nicotine, dependency, cytisine, bupropion, nicotine patch

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Introduction

Tobacco use remains one of the leading preventable causes of death worldwide, contributing significantly to morbidity and mortality through its detrimental effects on the cardiovascular, respiratory, and metabolic systems.[1] Cigarette smoking is highly addictive due to the presence of nicotine, which is rapidly absorbed through the oral mucosa and alveoli, reaching the central nervous system and stimulating nicotinic acetylcholine receptors. This stimulation triggers the release of various neurotransmitters, most notably dopamine, forming the biochemical basis of nicotine dependence and withdrawal symptoms.[2]

Among the pharmacological treatment approaches developed for nicotine dependence, nicotine replacement therapies (NRT), varenicline, and bupropion are considered first-line medications, whereas cytisine is classified as a second-line agent. Although the efficacy of cytisine is comparable to that of first-line therapies, it is categorized separately due to its moderate level of evidence, limited number of countries in which it is licensed, and variability in dosing regimens. Nevertheless, all of these medications are supported by strong clinical recommendations and are considered viable options for smoking cessation treatment.[3] In Türkiye, while cytisine is not classified as a first-line agent in most international guidelines, it is widely available and provided free of charge in public smoking cessation clinics, contributing to its frequent use as a practical first-line option in local clinical practice.[4]

Systematic reviews and meta-analyses have demonstrated that cytisine exhibits a similar level of efficacy compared to NRT, bupropion, and varenicline.[5,6] Additionally, its greater cost-effectiveness relative to other pharmacological treatments has made it a valuable smoking cessation aid, particularly in low-resource settings.[7] However, most studies in the literature have been conducted under randomized controlled conditions, and real-world evidence remains limited. In particular, real-world data on cytisine use in Türkiye are scarce, which may limit generalizability. This study aims to address this gap by providing observational data from a Turkish clinical setting.

In this study, the short-term effects of pharmacological treatments on smoking cessation were compared among patients who presented to the smoking cessation outpatient clinic. In particular, the study aimed to retrospectively evaluate the effectiveness and side effect profile of cytisine therapy under routine clinical practice conditions.

Materials and Methods

This study retrospectively analyzed the data of individuals who presented to the smoking cessation outpatient clinic of a public hospital between February 2024 and January 2025.

During the specified period, a total of 1.112 patients presented to the clinic. Among them, 707 patients had attended at least one follow-up visit, had used the prescribed treatment, had known

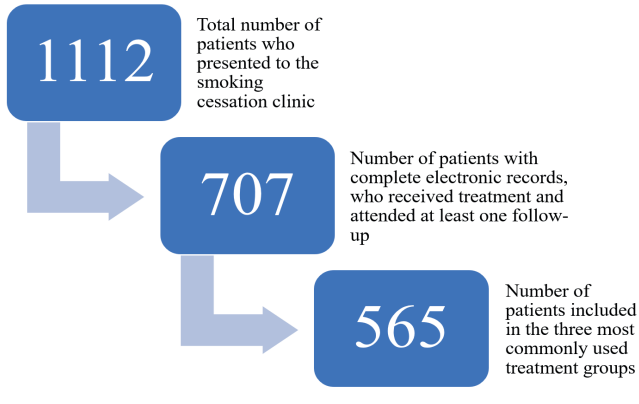

Figure 1. Flowchart of patient inclusion in a retrospective study on smoking cessation pharmacotherapies (Türkiye, February 2024 – January 2025)

smoking cessation outcomes, and had complete electronic medical records. Of these, 565 patients who received one of the three most commonly prescribed pharmacological treatments (cytisine, bupropion, or nicotine patch) were included in the analysis (Figure 1). Specifically, 252 patients treated with cytisine, 135 with bupropion, and 178 with nicotine patch were analyzed. Patients who received combination therapy were excluded from the study. Medication use was confirmed based on patient self-reports during follow-up visits and cross-checked with electronic prescription and treatment adherence notes recorded by clinicians.

Demographic data such as age, sex, and educational level, as well as clinical information including the presence of chronic disease, Fagerström Test for Nicotine Dependence (FTND) scores, type of pharmacological treatment used, and reported medication side effects (for patients treated with cytisine), were obtained from electronic medical records. These data were retrieved from the hospital's electronic medical record system, where detailed reports are routinely documented during patient visits.

Each patient's smoking cessation status within the first three months was assessed through the electronic health records. According to the clinic's standard follow-up protocol, patients were classified based on self-reported outcomes: those who declared abstinence from smoking were considered "successful," those who did not quit at any point during treatment were labeled "unsuccessful," and patients who resumed smoking within 3 months after initial cessation were categorized as having ''relapsed.'' These classifications were based on patient statements recorded during follow-up visits. Objective biochemical verification methods (e.g., exhaled CO or cotinine testing) were not routinely employed due to limitations in clinical practice and resource constraints.

Subsequently, 252 patients who received cytisine and attended at least one follow-up visit were evaluated. This subgroup was examined in greater detail to assess the clinical effectiveness and side effect profile of cytisine therapy.

The standard cytisine regimen used in this study consisted of 1.5 mg tablets administered as follows: six tablets per day (one tablet every two hours) for the first three days (days 1–3); five tablets per day on days 4–12; four tablets per day on days 13–16; three tablets per day on days 17–20; and two tablets per day on days 21–25. The target quit date was set as Day 5 of treatment.[8]

During the initial follow-up visit conducted between Days 5 and 7 following the initiation of treatment, patients were assessed for reductions in craving to smoke, adherence to the treatment regimen, and early-onset side effects. For patients who did not attend the first-week follow-up, adverse effects were inquired about at subsequent appointments and recorded based on patient statements. Smoking cessation status was primarily determined through these self-reports. Additionally, electronic medical records were reviewed to verify prescription issuance, medication use, and attendance.

The study was designed as a cross-sectional, descriptive, single-center, and retrospective analysis. Ethical approval was obtained from the Health Science University Sisli Hamidiye Etfal Training and Research Hospital Ethics Committee on 14.01.2025, with protocol number 4725.

Statistical Analysis: All statistical analyses were performed using IBM SPSS statistical software, version 25.0. Descriptive statistics were presented as frequencies and percentages for categorical variables, and as mean, standard deviation, minimum, and maximum for continuous variables. Differences in proportions between independent groups were assessed using the Chi-square test. For continuous variables with a

normal distribution, the Independent Samples T-test was used for two-group comparisons; for non-normally distributed variables, the Mann-Whitney U test was applied. The Kruskal-Wallis H test was used for comparisons among three independent groups when normality assumptions were not met, and one-way ANOVA was used when those assumptions were satisfied. The Kolmogorov-Smirnov test was employed to assess the normality of distribution. When normality was confirmed, Bonferroni post-hoc analysis was conducted to evaluate differences between groups.

To determine factors associated with smoking cessation, multivariate logistic regression analysis was performed. The bootstrap method was applied to enhance the reliability of the model and support parameter estimation. Odds ratios (ORs) and 95% confidence intervals (CIs) were reported. A p-value of <0.05 was considered statistically significant.

Results

The mean age of the 565 patients included in the analysis was 41.28±12.33 years (range: 18–75). The mean duration of smoking exposure was 18.21±26.32 years (range: 1–150), and the mean FTND score was 6.18±2.32 (range: 0–10). Of the participants, 213 (37.7%) were female, and 326 (57.7%) had a university-level education or higher. A total of 203 participants (35.9%) had at least one chronic disease.

Among the pharmacological treatment groups analyzed, 252 patients (44.7%) were treated with cytisine, 135 (23.8%) with bupropion, and 178 (31.5%) with nicotine patch therapy.

The mean FTND scores were 6.23±2.22 (range: 0–10) in the cytisine group, 6.39±2.36 in the bupropion group, and 5.97±2.42 in the NRT group. No statistically significant differences were found in FTND scores across the treatment groups (p>0.05, H=2.992).

When examining early-phase smoking cessation outcomes among all participants, 274 individuals (48.5%) were classified as unsuccessful, 198 (35.0%) as successful and 93 (16.5%) as relapsed. A statistically significant association was found between cessation outcomes and the type of treatment received (p<0.001). The smoking cessation rates were 61.5% (n=155) in the cytisine group, 16.3% (n=22) in the bupropion group, and 11.8% (n=21) in the nicotine patch group (Table 1).

To determine which treatment groups accounted for the observed statistically significant difference,

Table 1. Association between treatment type and smoking cessation status among all participants

Treatment Type		Unsuccessful	Successful	Relapsed	Total	p-value
Cytisine	n	68	155	29	252	
	% of all treatments	27.0	61.5	11.5	100	
	% within cessation status	24.8	78.3	31.2	44.6	
Bupropion	n	83	22	30	135	
	% of all treatments	61.5	16.3	22.2	100	<0.001
	% within cessation status	30.3	11.1	32.3	23.9	
Nicotine patch	n	123	21	34	178	
	% of all treatments	69.1	11.8	19.1	100	
	% within cessation status	44.9	10.6	36.6	31.5	
Total	n	274	198	93	565	
	% of all treatments	48.5	35.0	16.5	100	
	% within cessation status	100	100	100	100	

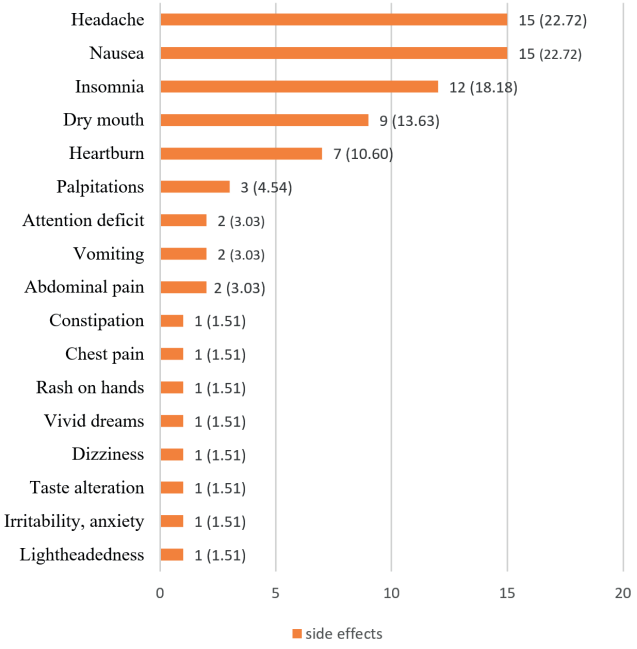

Figure 2. Evaluation of adverse effects in patients receiving cytisine: A retrospective study from a smoking cessation clinic in Türkiye (February 2024 – January 2025) n (%)

pairwise comparisons were performed. To control for the risk of type I error due to multiple comparisons, the Bonferroni correction was applied. Post hoc analysis revealed that the cytisine group differed significantly in terms of cessation success rates when compared to both the bupropion group ($p<0.001$) and the NRT group ($p<0.001$). However, no statistically significant difference was found between the bupropion and NRT groups ($p>0.05$).

Among the 252 patients who received cytisine, the mean age was 36.91±10.15 years (range: 18–64), and the mean FTND score was 6.23±2.22 (range: 0–10). Of these, 79 participants (31.3%) were female, and 114 (45.2%) had an education level of high school or below. A total of 201 individuals (79.8%) were employed, and 44 (17.5%) had at least one chronic disease.

Regarding adverse effects, no side effects were reported in 191 participants (75.8%), while 61 participants (24.2%) reported at least one side effect. The most frequently reported side effects were nausea and vomiting (n=15, 22.7%), headache (n=15, 22.7%), and insomnia (n=12, 18.18%) (Figure 2). Treatment was discontinued in five participants (1.9%) due to side effects: in three cases due to nausea and vomiting, in one case due to nausea alone, and in one case due to severe insomnia lasting for three days in conjunction with nausea.

Among the 252 patients who received cytisine, 155 individuals (61.5%) successfully quit smoking, 68 individuals (27%) continued smoking, and 29 individuals (11.5%) experienced a relapse.

As presented in Table 2, no statistically significant relationship was found between smoking cessation status and age, sex, FTND score, employment status, educational level, presence of chronic disease, or adverse effect status ($p>0.05$). A statistically significant association was identified between smoking cessation status and reduction in craving ($p<0.001$). Further analysis revealed that the proportion of individuals who reported a reduction in craving was significantly higher in the group that successfully quit smoking compared to both those who did not quit and those who relapsed.

No statistically significant relationship was observed between the occurrence of side effects and age, sex, FTND score, educational status, employment, or presence of chronic disease ($p>0.05$). However, a statistically significant association was found between the presence of side effects and reduction in craving ($p=0.007$). The rate of reporting side effects was higher among individuals who experienced a reduction in craving compared to those who did not.

Table 2. Association of smoking cessation status and adverse effects with sociodemographic characteristics, FTND scores, and craving reduction in patients treated with cytisine (n=252)

		Unsuccessful[1]	**Successful[2]**	**Relapsed[3]**	**p**	**No Side Effects**	**Side Effects**	**p-value**
Age (mean±SD, min–max)		37.16±11.05 (18-64)	37.48±9.92 (18-61)	33.72±9.01 (19-54)	0.187[a]	37.06±10.16 (18-64)	36.70±10.35 (18-58)	0.731[b]
FTND (mean±SD, min–max)		6.32±2.20 (0-10)	6.15±2.27 (1-10)	6.38±2.04 (2-10)	0.802[c]	6.28±2.30 (0-10)	6.06±1.96 (1-9)	0.683[d]
Sex, n (%)	Female	22 (32.4)	49 (31.6)	8 (27.6)	0.892	54 (28.3)	25 (41.0)	0.062
	Male	46 (67.6)	106 (68.4)	21 (72.4)		137 (71.7)	36 (59.6)	
Employment Status, n (%)	Unemployed	17 (25.0)	28 (18.1)	6 (20.7)	0.493	34 (17.8)	17 (27.9)	0.088
	Employed	51 (75.0)	127 (81.9)	23 (79.3)		157 (82.2)	44 (72.1)	
Education Level, n (%)	High school or below	39 (57.4)	63 (40.6)	12 (41.4)	0.063	84 (44.0)	30 (49.2)	0.477
	University or above	29 (42.6)	92 (59.4)	17 (58.6)		107 (56.0)	31 (50.8)	
Chronic Disease, n (%)	No	55 (80.9)	126 (81.3)	27 (93.1)	0.280	156 (81.7)	52 (85.2)	0.522
	Yes	13 (19.1)	29 (18.7)	2 (6.9)		35 (18.3)	9 (14.8)	
Side effects, n (%)	No	55 (80.9)	112 (72.3)	24 (82.8)	0.249	-		
	Yes	13 (19.1)	43 (27.7)	5 (17.2)				
Craving Reduction (n=190) n (%)*	No Reduction	25 (83.3)	2 (1.4)	2 (12.5)	**<0.001**	27 (19.1)	2 (4.1)	**0.007**
	Reduction	5 (16.7)	142 (98.6)	14 (87.5)	**[e]2>1, [e]2>3**	114 (80.9)	47 (95.9)	

[a] ANOVA, [b] Mann-Whitney U, [c] Kruskal-Wallis H, [d] Independent t-test, [e] ANOVA post-hoc Bonferroni.

* Craving reduction analysis was limited to 190 patients who attended the first-week follow-up visit. Patients who missed this visit (n=62) were excluded due to incomplete early-phase craving data.

Sixty-two patients who did not attend the first-week follow-up were excluded from the craving reduction analysis. Among the remaining 190 patients, 161 (84.7%) reported a reduction in craving, while 29 (15.3%) did not. No statistically significant associations were found between craving reduction and age, sex, employment status, income level, or presence of chronic disease (p>0.05). However, a statistically significant association was observed between craving reduction and educational level (p=0.030). Among those who did not experience a reduction in craving, 62.1% (n=18) had a high school education or below, whereas among those who did experience a reduction in craving, 59.6% (n=96) completed university or higher education.

As presented in Table 3, a standard logistic regression analysis was conducted to identify the factors associated with smoking cessation in patients treated with cytisine. To enhance the reliability of parameter estimates and support the calculation of confidence intervals, a bootstrap method was applied.

According to the model results, the variable reduction in craving was strongly and significantly associated with smoking cessation (OR=25.79, 95% CI=[13.12–47.02], p<0.001). This finding indicated that individuals who reported a reduction in craving had approximately 26 times higher odds of successfully quitting smoking compared to those who did not report such a reduction. In contrast, the variable adverse effects was not significantly associated with smoking cessation (p=0.492). The overall model fit was acceptable (Nagelkerke R^2=0.508, −2 Log Likelihood=131.377).

Discussion

In this study, higher smoking cessation rates are observed among patients treated with cytisine compared to those receiving other pharmacological options within the same clinical setting. These findings indicate that cytisine may offer a potentially useful option for individuals attempting to quit smoking and could be considered as an alternative in primary care practice. The observed reduction in craving during the early phase of treatment, along with a relatively low rate of reported side effects, may support the tolerability and potential clinical utility of cytisine.Given its wide availability and cost-free access in public smoking cessation clinics in Türkiye, cytisine is frequently used as a first-line treatment in routine clinical practice, despite being considered a second-line agent in international guidelines.[3,4]

In this study, 61.5% of patients who received cytisine are found to have quit smoking in the early phase of treatment. The corresponding rates are 16.3% for bupropion and 11.8% for NRT. The cessation rate observed in the NRT group is consistent with the early-term (within the first six months) success rates reported in the literature, which typically range from 8% to 25%. This broad variability may be influenced by the type of NRT formulation used, patient adherence to treatment, and the quality of behavioral support provided.[9]

Table 3. Multivariate logistic regression analysis of the association between craving reduction, adverse effects, and smoking cessation in patients treated with cytisine

	Successfully Quit Smoking		
Variables	**B Coefficient**	**OR (95% CI)**	**p-value**
Craving reduction	3.58	25.79 (13.12 – 47.02)	<0.001
Adverse effects	0.11	1.12 (0.39 – 3.22)	0.829
Nagelkerke R^2= 0.508 -2 Log likelihood=131.37			

For bupropion, previous studies have reported end-of-treatment (typically 4–10 weeks) cessation rates ranging from 25% to 41% in the general adult population, although lower rates (around 11%) have also been documented in specific subgroups. The 16.3% success rate observed in our study lies near the lower end of this range and may be explained by individual variability, level of nicotine dependence, and adherence to treatment.[10-12]

Although the cessation rates for NRT and bupropion observed in our study fall within the lower end of ranges reported in the literature, several factors may contribute to these modest outcomes. During the study period, NRT and bupropion are not provided free of charge in our setting, except for cytisine, and the financial burden may limit patients' ability to maintain the recommended treatment duration.[13,14] The required minimum treatment periods—three months for NRT and two months for bupropion—may also reduce adherence.[15,16] For both treatments, side effects and perceived effectiveness could discourage continuation. High nicotine dependence and long-term heavy smoking histories, common in our patient group, are known to predict lower quit rates.[17] These factors together may explain the relatively low success rates for NRT and bupropion in our setting.

Recent systematic reviews evaluating the efficacy of cytisine demonstrate that it is significantly more effective than placebo, and that, based on indirect comparisons, its success rates appear to be comparable to or even higher than those achieved with bupropion.[18] Some comparative studies find higher cessation rates in the cytisine group compared to the bupropion group; however, these differences are not statistically significant.[19] The findings of the present study are also consistent with previous data, including a study conducted in Italy that reports a 57.2% cessation rate at one month, and another that reports a rate of 40%.[20,21] Furthermore, a systematic review indicates that short-term (first-month) cessation success rates with cytisine ranged from 40% to 60%, and that cytisine was more effective than both placebo and NRT.[21] In this context, the 61.5% cessation rate observed in our study aligns with previously reported values and provides additional support for the potential efficacy of cytisine.

Cytisine acts as a partial agonist at α4β2 nicotinic acetylcholine receptors, mimicking the effects of nicotine to some extent while simultaneously blocking these receptors. This dual action helps reduce nicotine cravings and suppresses its rewarding effects.[22] This mechanism has been shown to contribute to a marked reduction in the urge to smoke during the initial days of treatment.[8,19] Consistently, in our study, 84.7% of patients assessed within the first week after initiating cytisine therapy report a reduction in craving, which is identified as a strong predictor of cessation success. Previous studies also suggest that initiating cytisine treatment before the designated quit day may alleviate withdrawal symptoms, support motivational processes, and enhance cessation outcomes.[23,24] Therefore, the follow-up visit during the first week of treatment is of critical importance for evaluating adherence and early treatment response.

Although educational levels were not directly associated with smoking cessation success with cytisine in our study, it is noteworthy that the majority of individuals who report craving reduction within the first five days had a university-level education or higher ($p=0.030$). This may suggest a potential indirect association between educational level and cessation success, as craving reduction is found to be the strongest independent predictor of quitting in our sample (OR=25.79, $p<0.001$). Existing literature also indicates that individuals with higher educational attainment tend to achieve greater success in smoking cessation efforts, which may

be attributed to factors such as greater health awareness, stronger motivation, better adherence to treatment, and more effective use of support services.[25-27] However, this relationship is not universally observed. Several studies report no significant link between education and cessation success, which in some cases is attributed to the self-selection of participants in cessation programmes, leading to an overrepresentation of highly educated individuals and a reduced variability in educational attainment, as well as difficulties in standardising education categories across different educational systems.[28,29] In this study, 24.2% of participants who received cytisine report experiencing at least one side effect. The most commonly reported adverse effects are headache (22.7%), nausea (22.7%), and insomnia (18.1%), the majority of which are mild in severity. According to the Turkish product information for cytisine, adverse effects that occur in at least 1 in 10 patients are classified as "very common," while those occurring in 1 to 10 out of 100 patients are considered "common".[30] The listed very common side effects include dry mouth, nausea, abdominal pain, irritability, sleep disturbances (such as insomnia and abnormal dreams), anxiety, dizziness, skin rash, headache, acid reflux, and vomiting. Common side effects include concentration difficulties, burning sensation on the tongue, and bradycardia. The common side effects identified in our study belong to the category of "very common" adverse events as defined in the official product information.

In the literature, an observational study conducted in Italy reports that mild adverse events such as headache, stomach discomfort, and sleep disturbances are frequently observed following a 40-day cytisine treatment regimen.[20] Similarly, a randomized controlled trial (RCT) in New Zealand finds that nausea, vomiting, and sleep disturbances are more frequently reported in the cytisine group compared to the NRT group, although these are generally mild to moderate in intensity.[19]

In our study, treatment discontinuation due to side effects occurrs in 1.9% (n=5) of participants. This rate is comparable to that reported in a 12-week RCT evaluating cytisine, where treatment discontinuation due to adverse events was 2.9%.[3] In another RCT, the rate of serious adverse events was 3.1%, with no significant difference compared to the placebo group.[31] These findings support the conclusion that cytisine has a favorable tolerability profile and that the incidence of serious adverse events is low.

Interestingly, in our study, the rate of side effect reporting was higher among participants who experience a reduction in craving compared to those who did not. While this specific association has not been directly described in the literature, it is plausible that a rapid decrease in craving reflects greater neurobiological sensitivity to cytisine. In such individuals, increased nicotinic receptor responsiveness may underlie both improved craving control and the occurrence of mild side effects such as nausea and headache.[21,32] Further research is needed to better elucidate the underlying mechanisms of this observation. This study has several limitations. The analysis relies on electronic medical records and patient self-reports to assess smoking cessation outcomes and medication adherence. Although electronic data are used to verify prescription and follow-up attendance, these sources may not fully reflect actual medication use or abstinence status. The lack of biochemical verification is a notable limitation and may lead to overestimation of cessation success. Furthermore, it is not possible to objectively confirm whether all patients use the medications fully and as prescribed. Smoking cessation success is evaluated based on patient status during the first three months, regardless of treatment duration. While this approach reflects real-world clinical practice and allows standardized comparison, it may overlook the impact of varying treatment durations and quit date timing across different pharmacological

therapies. Additionally, craving reduction is assessed through patient self-report, which may introduce subjectivity into this outcome.

In this study, the short-term smoking cessation success rates of cytisine, bupropion, and NRT are compared. The cessation rate is found to be higher in the group treated with cytisine. In contrast, the success rates observed in the bupropion and NRT groups are closer to the lower limits of the ranges reported in the literature.

Cytisine stands out not only for its relatively high cessation rate but also for its capacity to significantly reduce the urge to smoke during the early phase of treatment and for its favorable side effect profile. These characteristics suggest that cytisine may be a supportive agent in enhancing treatment adherence and cessation outcomes. The mild nature of the reported adverse effects and the low rate of treatment discontinuation further support its tolerability. Reduction in craving observed during the first week may serve as an important predictor of cessation success and could play a critical role in guiding treatment decisions during this early period.

Cytisine may be considered a strong treatment option in primary care smoking cessation programs due to its efficacy and safety profile. However, to more robustly assess the generalizability of these findings and the long-term outcomes of treatment, further research is needed, particularly well-designed, multicenter, prospective, and comparative studies.

Ethical approval

This study has been approved by the Health Sciences University Sisli Hamidiye Etfal Training and Research Hospital Ethics Committee (approval date 14.01.2025, number 4725).

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: GZÖ, YGA; data collection: EKG; analysis and interpretation of results: YGA, EKG; draft manuscript preparation: YGA, EKG. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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