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Editorial

Dear Colleagues,

This issue of the Turkish Journal of Family Practice offers rich scientific content with 7 research articles, 1 case report, 1 review and 2 letters to the editor.

This issue includes studies addressing different aspects of primary health care, from autism screenings performed at family health centers in Aydın to the experiences of smoking cessation clinics within family medicine. As you review the articles, you will see a common theme stand out: The family physician is the first and often the most decisive point of contact in an individual's health journey. Whether it is a parent bringing their child for an M-CHAT screening, a college student presenting with premenstrual symptoms, or a 95-year-old home care patient evaluated with purple bladder syndrome, in all these examples, family medicine; It undertakes the task of detecting problems early, providing appropriate guidance and reassuring patients.

We are also pleased to include studies on how digital transformation is reshaping daily family medicine practices in this issue. The study, which evaluates Türkiye's "Digital Transformation and Integration System", draws attention to the transformation process that aims to reduce unnecessary hospital admissions by providing family physicians with broader diagnostic competencies and more powerful digital tools.

Finally, the two letters to the editor in this issue offer different perspectives to our readers. Evaluations on the EYFDM Bridge Project and the Turkish adaptation of the updated WONCA Tree appear as important contents that contribute to the educational and conceptual development of family medicine.

We hope that this issue will provide new perspectives on the scientific, clinical and professional aspects of family medicine practice and be inspiring for all our readers.

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

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Research Article

Investigation of risk factors of autism spectrum disorders in primary care: Aydın City Center sample

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ABSTRACT

Objective: Autism Spectrum Disorder (ASD) is the second most common developmental disability after intellectual disability. The study aimed to determine the prevalence of ASD risk in children aged 18-36 months admitted to Family Health Centers (FHCs) in Aydın city center, considering the role of FHCs as the first point of contact, and to identify the factors increasing ASD risk.

Methods: Descriptive and cross-sectional study. Assuming 1% prevalence based on DSM-5 data and a sampling error of 0.05, the sampling size of the study planned with a descriptive cross-sectional design was calculated as 392 using the G*Power program. 431 participants were targeted with a 10% margin of error. The data collection form prepared through a literature review and the Modified Checklist for Autism in Toddlers (M-CHAT) scale were administered to all participants who applied to the 8 FHCs (6 urban and 2 rural) selected through cluster sampling method and agreed to participate in the study. Descriptive analyses for non-categorical variables and chi-square analyses for categorical variables were used. $p<0.05$ was considered to be statistically significant. Additionally, in order to eliminate its confounding effect, logistic regression analysis was applied to all variables considered to be associated with ASD.

Results: In the sampling with a mean age of 27.5±6.5 months, ASD risk was found to be 5.8%, and ASD diagnosis prevalence was found to be 0.92%. Sociodemographic features, such as male gender, having a low-income family, maternal use of medication during pregnancy, low birth weight, being born before 35th week of gestation and not being vaccinated in accordance with the vaccination calendar were found statistically significant associated risk factors for ASD.

Conclusion: Continuous follow-up is crucial for individuals identified as being at risk for autism spectrum disorder (ASD) but who do not yet meet the diagnostic criteria. Given the role of early diagnosis in treatment, raising awareness of ASD is a priority in the fight against autism. Furthermore, more research is needed to assess the knowledge levels of both healthcare personnel working at Family Health Centers (often the first point of contact for children aged 18-36 months) and families with children under 36 months.

Keywords: autism spectrum disorders, risk factors, primary health care

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Introduction

Autism Spectrum Disorder (ASD) is a neuro-developmental disorder characterized both by deficits in social and communicational areas and also by repetitive and restricted behaviours. The symptoms appear in the early periods of life.[1] According to the Republic of Türkiye Ministry of Health's autism guidelines, the risk of autism in our country has increased 200-fold in the last 20 years.[2] Although the exact cause is still unknown, genetic, epigenetic and environmental factors are considered to play a part in its etiology.[3]

An increase has been observed in ASD prevalence since the first epidemiological studies conducted.[4-6] In the first studies, the prevalence in United Kingdom was found to be 4.1 per 10.000.[4] In recent studies, an approximate prevalence of 1% has been observed, which was sometimes as high as 2.6%. The prevalence in males is considered to be 4-5 times higher.[5,6]

Development of strategies for early diagnosis is quite challenging because ASD has clinical diversity and varying patterns of onset.[7] Despite the challenges in its early diagnosis, application of cognitive and behavioral therapies through the early identification of ASD has a positive effect on the prognosis.[8] An increase in capabilities such as reading, working and living independently and, a decrease in conditions such as being abused and criminal acts, have been observed in cases receiving early diagnosis and education.[9] Accordingly, the American Academy of Pediatrics (AAP) recommends the screening of children at 18 and 24 months of age for autistic symptoms.[10]

"National Action Plan II for Individuals with Autism Spectrum Disorder" has been developed with the slogan "Differences are our Wealth" for the years 2023-2030 in Türkiye. This action plan was developed with the goals of increasing social acceptance and awareness, providing data-driven monitoring through statistical production, strengthening early diagnosis, monitoring and intervention programs, and empowering individuals and families through effective social service models., In addition, it had the aims of supporting scientific research and development studies, strengthening special and supportive education services, creating an open, inclusive and accessible labor market and working environments to ensure the implementation of the right to work, supporting participation in sporting, artistic and cultural activities and developing a monitoring system based on cooperation and coordination.[11] Early diagnosis and screening of ASD are very important due its increasing prevalence, chronic nature, the proven social and cognitive gains in case of early diagnosis, reduction of annual costs in case of early diagnosis and late detection by families and educators in the absence of screening.[8,12] Due to these reasons, the American Academy of Pediatrics (AAP) recommends evaluating the children at 18 and 24 months of age.[10,12] Similarly, the screening of all children at 18 and 24 months is also recommended in Türkiye.[13]

Although it has symptoms in early months, the average age of diagnosis for ASD cases has been found to be 40 months.[14] However, no definitive diagnosis method exists for the identification of ASD at an early stage. There are only certain screening methods available to assist the monitoring of development and diagnosis.[15] Modified Checklist for Autism in Toddlers (M-CHAT) is one of the tests used for screening and monitoring Autism Spectrum Disorder. The Turkish validity and reliability study of the mentioned test was conducted between June 2011 and June 2012 with children aged 18-30 months registered in 14 FHCs in Kayseri. The sensitivity of the M-CHAT test was calculated as 100%, specificity as 76%, positive predictive value as 12%, negative predictive value as 100%, and correct discrimination rate as 77%. The Cronbach's alpha value for the 23-item M-CHAT screening test was found to be 0.69,

interpreting the scale as highly reliable ($0.60 < \alpha < 0.80$). The Cronbach's alpha value for the 6 critical items was 0.67, also indicating high reliability ($0.60 < \alpha < 0.80$).[16]

The importance of ASD screening is better understood when the increasing prevalence of the disorder and the positive outcomes of early diagnosis are considered. Family Health Centers (FHCs), which are often the first first point of contact for infants and children, have a significant role in ASD screening which should not be underestimated. Based on this fact, the present study aimed to determine the prevalence of ASD risk and identify the factors increasing this risk among children aged 18-36 months who were admitted to Family Health Centers (FHCs) in the city center of Aydın.

Materials and Methods

Type of research

The objective of the descriptive and cross-sectional study was to determine the prevalence of ASD risk and the factors influencing the in children aged 18-36 months who were admitted to Family Health Centers in the Efeler district of Aydın.

Research location

The FHCs included in our study were selected through cluster sampling method. Through a 25% representation rate, it was calculated that 8 out of 32 FHCs were going to be included. In order to determine which FHCs to be included, Efeler district was divided into clusters, and one FHC was selected from each, including six urban and two rural districts (FHCs No 1, 3, 4, 9, 14, 24 and Çeştepe and Kuyulu Family Health Centers).

Research population and sampling

The research population covered 5600 children aged 18-36 months who were registered at 32 FHCs in the Efeler district of Aydın. Assuming a prevalence rate of 1% according to DSM-5 data and calculating a sampling error of 0.05, the sampling size was determined as 392 and by adding 10% to this value, it was determined as 431.

Study inclusion criteria

All adults who visited the designated FHCs with children aged 18-36 months for any reason during the study period were included.

Study exclusion criteria

Having any known physical or mental diseases, neurodevelopmental disorders or being followed-up due to any developmental disorder and having hearing loss (data was collected based on declaration).

Children taken to the interview by someone other than their primary caregivers (The answers to the M-CHAT test must be provided by the individual monitoring the child' development).

Incomplete or incorrect completion of the data collection form.

Data collection

Data were collected face-to-face by the researcher after taking written consents of the participants. In the data collection form prepared based on a review of literature and in line with the objective of our study, and included questions on the sociodemographic characteristics, perinatal story, breast-feeding situation, presence of ASD in siblings and additional diseases of the child, alcohol use-smoking, medicine, supporting treatment, infection story of the mother during pregnancy and parental consanguinity. Then, the M-CHAT scale was administered to all participants.

M-CHAT scale consists of 23 questions which are answered by the parents as "yes" or "no". For questions 11, 18, 20 and 22, "Yes" response was considered negative while "No" indicated a negative answer for all the other questions.[17]

Diagnostic strength of questions 5, 10, 17, 19 and 21 in the Turkish version of the test was found to be high – similar to that of questions 2, 7, 9, 14 and 15 in the English original. However, the diagnostic strength of question 13 was found to be lower than the original format. Based on these data, the mentioned questions were designated as "Critical Questions".[17] If the negative response was selected for least two of these questions or at least for three of the 23 questions, the child was considered to be at a high autism spectrum disorder risk and was referred to Child and Adolescent Psychiatry and Neurology Outpatient Clinics for autism evaluation.

Data analysis

Statistical analyses were performed using IBM SPSS Statistics version 21.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was evaluated using the Kolmogorov–Smirnov and Shapiro–Wilk tests, as well as graphical methods including histograms. Although normality tests indicated slight deviations from normal distribution, the sample size was sufficiently large (n=431). According to the Central Limit Theorem, parametric tests are considered robust to moderate deviations from normality in large samples. Therefore, parametric methods were used for the comparisons.

Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as number and percentage (%). Comparisons between categorical variables were performed using the Chi-square test or Fisher's exact test, as appropriate.

To determine independent factors associated with the dependent variable, multivariable regression analysis was performed to control for potential confounding effects. A two-tailed p-value < 0.05 was considered statistically significant.

Permissions

Ethical approval required for the study was obtained from Aydın Adnan Menderes University Faculty of Medicine Non-Interventional Researches Ethics Board (approval no:2019/124, Dated: 29.08.2019). As the study was conducted in Family Health Centers, the required administrative permission was taken from Aydın Provincial Directorate of Health.

Results

Sociodemographic characteristics of the participants

The mean age of the 431 children participating in the study was found to be 27.5±6.5 months. Among the participants, 50.8% (n=219) were female. Some of the sociodemographic characteristics of the children are presented in Table 1.

The ASD risk of the participants was evaluated using the M-CHAT scale. According to the results, 5.8% of the children (n=25) were in the high-risk group for ASD. Children in the risky group were evaluated by a child and adolescent psychiatrist, and four of them (16%) received clinical diagnosis of ASD.

The ASD risk was higher among boys (8.5%) compared to girls (3.2%), and among children from families with low economic status (12.5%) compared to those with high economic status (2.0%) (p=0.019 and p=0.014 respectively). The comparison of ASD risks of participating children based on their prenatal characteristics is presented in Table 2.

ASD risks of children were evaluated based on their prenatal characteristics. Accordingly, children whose mothers used medication during pregnancy (8.5%) had a higher risk for ASD compared to those whose mothers did not use any medication (4.2%) (p=0.047). 43.9% of

Table 1. Sociodemographic characteristics of the children

Sociodemographic Variables		**Mean±SD**	
Age (months)		27.50±6.50	
		n	**%**
Gender	Female	219	50.8
	Male	212	49.2
Mother's Education Level (years)	≤8	160	37.1
	9-12	96	22.3
	≥13	175	40.6
Father's Education Level (years)	≤8	123	28.5
	9-12	127	29.5
	≥13	181	42.0
Place of residence	Rural Area	83	19.3
	Urban Area	348	80.7
Health insurance	No	24	5.6
	Yes	407	94.4
Mother's Employment Status	Unemployed	273	63.3
	Public Sector Employee	95	22.0
	Private Sector Employee	51	11.8
	Self-employed	12	2.8
Father's Employment Status	Unemployed	28	6.5
	Public Sector Employee	126	29.2
	Private Sector Employee	163	37.8
	Self-employed	114	28.5
Economic condition	Low	48	11.1
	Medium	281	65.2
	High	102	23.7
TOTAL		431	100.0

the mothers with reported use of medication during pregnancy (n=72) stated that they used paracetamol, 17.1% (n=28) used phosphomycine and 12.8% (n=21) used levothyroxine. However, there was no statistically significant difference in ASD risk between different medication groups (p>0.05). Comparison of ASD risks of participating children based on their prenatal characteristics is presented in Table 3.

ASD risks in children were evaluated based on their postnatal characteristics. According to the results, the risk of ASD was significantly higher in children born before the 35th week of pregnancy (24.0%) compared to those born at or after the 35th week (4.7%). Likewise, children with a birth weight of less than 2500 grams (15.4%) had a higher risk compared to those weighing 2500 grams or more (4.8%). Additionally, children who were not vaccinated according to the recommended schedule (33.3%) had a significantly higher risk of ASD compared to those who were vaccinated as scheduled (5.4%) ($p = 0.002$, $p = 0.018$, and $p = 0.042$, respectively). Comparison of ASD risks of children based on their postnatal characteristics is presented in Table 4.

Logistic regression analysis

Regression analysis was performed to eliminate the confounding effect and determine the effect size. Variables that were statistically significantly

Table 2. Comparison of ASD risk based on the sociodemographic characteristics ofchildren , n=431

Sociodemographical variants		**Non-risky group**	**Risky group**	**Total**	**p-value**
Age (months), Mean±SD		27.5±6.5	27.5±7.1	27.5±6.5	p>0.05*
		n (%)	n (%)	n (%)	
Gender	Female	212 (96.8)	7 (3.2)	219 (100)	0.019**
	Male	194 (91.5)	18 (8.5)	212 (100)	
Mother's Education Level	≤8 years	149 (93.1)	11 (6.9)	160 (100)	p=0.41**
	9-12 years	89 (92.7)	7 (7.3)	96 (100)	
	≥13 years	168 (96.0)	7 (4.0)	175 (100)	
Father's Education Level	≤8 years	114 (92.7)	9 (7.3)	123 (100)	p=0.34**
	9-12 years	118 (92.9)	9 (7.1)	127 (100)	
	≥13 years	174 (96.1)	7 (3.9)	181 (100)	
Place of residence	Rural Area	78 (94.0)	5 (6.0)	83 (100)	p=0.92**
	Urban Area	328 (94.3)	20 (5.7)	348 (100)	
Health insurance	No	22 (91.7)	2 (8.3)	24 (100)	p=0.58**
	Yes	384 (94.3)	23 (5.7)	407 (100)	
Mother's Employment Status	Not working	255 (93.4)	18 (6.6)	273 (100)	p=0.44**
	Public Sector Employee	92 (96.8)	3 (3.2)	95 (100)	
	Private Sector Employee	47 (92.2)	4 (7.8)	51 (100)	
	Self-employed	12 (100)	0 (0.0)	12 (100)	
Father's Employment Status	Not working	25 (89.3)	3 (10.7)	28 (100)	p=0.50**
	Public Sector Employee	121 (96.0)	5 (4.0)	126 (100)	
	Private Sector Employee	152 (93.3)	11 (6.7)	163 (100)	
	Self-employed	108 (94.7)	6 (5.3)	114 (100)	
Economic Status	Low	42 (87.5)	6 (12.5)	48 (100)	p=0.035**
	Medium	264 (94.0)	17 (6.0)	281 (100)	
	High	100 (98.0)	2 (2.0)	102 (100)	
TOTAL		406 (94.2)	25 (5.8)	431 (100)	

Values are presented as **n (%) unless otherwise indicated**.
SD: Standard deviation.
ASD: Autism spectrum disorder.
*Student's t-test, **Chi square test, ***Fishers exact test

associated with ASD risk in the binary analyses (gender, economic condition, birth week, birth weight, mother's medication use during pregnancy, and vaccination status according to the schedule) as well as variables that were considered to be potentially related to ASD risk based on literature, but showed no relationship in the binary analyses conducted in our study (child's age, mother's pregnancy age, father's pregnancy age, parental consanguinity, and mother's smoking status) were included in the multiple logistic regression analysis. The resulting five-variable model explained 19.9% of the variance (r^2=0.199, p=0.007). Accordingly, ASD risk increased 3.0 times in boys compared to girls, 7.6 times in children from families with low economic status, 5.6 times in children born before the 35th week compared to those born after the 37th week, 2.7 times higher in children whose mothers used medication during pregnancy and 7.7 times higher in children not properly vaccinated compared to those vaccinated according to the schedule (Table 5).

Table 3. Comparison of ASD risks of the children according to their prenatal characteristics, n=431

Prenatal characteristics		Non-risky group n (%)	Risky group n (%)	Total n (%)	p-value
Maternal Age During Pregnancy (years)	<35	370 (93.9)	24 (6.1)	394 (100)	p=0.66**
	35-39	30 (96.8)	1 (3.2)	31 (100)	
	≥40	6 (100.0)	0 (0.0)	6 (100)	
Paternal Age During Pregnancy (years)	<40	384 (94.1)	24 (5.9)	408 (100)	p=0.75**
	≥40	22 (95.7)	1 (4.3)	23 (100)	
Parental Consanguinity	No	384 (94.3)	23 (5.7)	407 (100)	p=0.58**
	Yes	22 (91.7)	2 (8.3)	24 (100)	
Alcohol comsumption status of the mother during pregnancy	No	403 (94.2)	25 (5.8)	428 (100)	p=0.66***
	Yes	3 (100.0)	0 (0.0)	3 (100)	
Smoking status of the mother during pregnancy	No	349 (94.6)	20 (5.4)	369 (100)	p=0.68**
	Pre-pregnancy	31 (91.2)	3 (8.8)	34 (100)	
	Yes	26 (92.9)	2 (7.1)	28 (100)	
Medication usage status of the mother during pregnancy	No	256 (95.9)	11 (4.1)	267 (100)	p=0.047**
	Yes	150 (91.5)	14 (8.5)	164 (100)	
Taking medical assistance for pregnancy	No	388 (94.6)	22 (5.4)	410 (100)	p=0.08***
	Yes	18 (85.7)	3 (14.3)	21 (100)	
Supportive treatment using condition of the mother during pregnancy	No	25 (96.1)	1 (3.9)	26 (100)	p=0.088***
	Yes	381 (94.1)	24 (5.9)	405 (100)	
Infection condition of the mother during pregnancy	No	215 (93.1)	16 (6.9)	231 (100)	p=0.38**
	Yes	191 (95.5)	9 (4.5)	200 (100)	
TOTAL		406 (94.2)	25 (5.8)	431 (100.0)	

Values are presented as **n (%) unless otherwise indicated**.
SD: Standard deviation.
ASD: Autism spectrum disorder.
**Chi square test, ***Fishers exact test

Discussion

25 among the 431 children included in our study were identified to be at risk according to M-CHAT scale and were referred to Child and Adolescent Mental Health and Diseases polyclinics. a. Upon detailed evaluation by Child and Adolescent Mental Health and Diseases specialist 4 out of the 25 children (16%) were diagnosed with ASD.

The results of our study presented an ASD risk of 5.8% and a ASD diagnosis prevalence of 0.92% in the Efeler District of Aydın.

International studies on ASD diagnosis prevalence in the literature reported a range of prevalence at 0.07%-3%.[6,18-23] or instance, in the United States, a study conducted by the Center for Disease Control and Prevention (CDC) on ASD screening showed that the prevalence, which was 1 in 150 in 2002, increased to 1 in 110 in 2006, and 1 in 88 in 2012. 2016 report of the study showed that one in every 68 children had ASD. It is still unknown whether this increase throughout the years represents a real increase or whether it is related to the increasing of awareness of the disease, the clarification of diagnosis criteria and easier access to health services.[19]

In the study conducted by Robins et al. in 2001, the M-CHAT scale was administered to 1293 children aged 18-30 months and 132 of them (10%) were

Table 4. Comparison of ASD risks of the children compared to their postnatal characteristics, n=431

Postnatal characteristics		Non-risky group n (%)	Risky group n (%)	Total n (%)	p-value
Birth week of the child (weeks)	<35	19 (76.0)	6 (24.0)	25 (100)	p=0.002**
	≥35	387 (95.3)	19 (4.7)	406 (100)	
Birth weight of the child (grams)	<2500	33 (84.6)	6 (15.4)	39 (100)	p=0.018***
	≥2500	373 (95.2)	19 (4.8)	392 (100)	
Intensive care unit treatment condition of the child	No	352 (94.9)	19 (5.1)	371 (100)	p=0.13**
	Yes	54 (90.0)	6 (10.0)	60 (100)	
Presence of chronic disease in the child	No	381 (94.3)	23 (5.7)	404 (100)	p=0.71**
	Yes	25 (92.6)	2 (7.4)	27 (100)	
Feeding with nutrients other than breast milk during the first six months	No	279 (94.6)	16 (5.4)	295 (100)	p=0.62**
	Yes	127 (93.4)	9 (6.6)	136 (100)	
Proper vaccination condition of the child	No	4 (66.7)	2 (33.3)	6 (100)	p=0.042***
	Yes	402 (94.6)	23 (5.4)	425 (100)	
TOTAL		406 (94.2)	25 (5.8)	431 (100.0)	

Values are presented as **n (%) unless otherwise indicated**.
SD: Standard deviation.
ASD: Autism spectrum disorder.
**Chi square test, ***Fishers exact test

Table 5. Factors affecting ASD risk in binary and multiple logistic regression analyses, n=431

Dependent variable: high autism spectrum disorder risk						
Independent variables	**Binary logistic regression analysis**			**Multiple logistic regression analysis (enter*)**		
	OR*	**95% CI***	**p**	**OR**	**95% CI**	**p**
Child's Age	-	-	AD	-	-	AD
Male (Ref: Female)	2.810	1.149-6.874	0.024	3.025	1.127-8.118	0.029
Low economical condition (Ref: High economical condition)	7.143	1.385-36.837	0.019	7.624	1.204-48.259	0.031
Birth week <35 Weeks (Ref: >37 weeks)	6.372	2.254-18.009	<0.001	5.552	1.096-28.128	0.038
Birth weight <2500 gr (Ref: >2500 gr)	3.569	1.334-9.533	0.011	-	-	AD
Medicine using condition of the mother during pregnancy (Ref: Mother not using medicine during pregnancy)	-	-	AD	2.689	1.071-6.754	0.035
Proper vaccination (Ref: Improper vaccination)	8.739	1.521-50.221	0.015	7.715	1.044-56.982	0.045
Pregnancy Age of the Mother	-	-	AD	-	-	AD
Father's Age	-	-	AD	-	-	AD
Parental consanguinity	-	-	AD	-	-	AD
Maternal Smoking Condition	-	-	AD	-	-	AD

found to be at risk for ASD. Children found to be at risk at the second stage of the study were re-evaluated through phone and the number of children at risk decreased to 58 as the result of this evaluation. In the further evaluations of these children, 39 (3%) were diagnosed with ASD.[18] The

study conducted by Yama et al, using the M-CHAT scale, showed an ASD risk of 2.8% in children aged between 20 and 32 months.[24]

The validity study of M-CHAT scale was conducted in 2005 in Türkiye.[17] Despite the high false positive rate of the test, the study concluded that it is easy to administer the test, it has a high positive predictive value and can be used as a screening test for ASD.[17,25] The first large-scale study evaluating the ASD in Türkiye was conducted by Türkiye Autism Early Diagnosis and Education Foundation (TOHUM). After removing the missing data from the analysis, 41290 children were included in the evaluation. 4605 of the children included in the analysis (11.2%) were found to be at risk for ASD.[26] In national studies conducted through similar methods, the prevalence of ASD was reported to be between 0.1% and 11.2%.[16,27,28] The ASD risk found as 5.8% in our study was similar to other studies in our country and the world.

The 0.92% diagnosis prevalence found in our study was consistent with the studies in our country, but was close to the lower end of the spectrum when compared to the data of recent studies from other countries.[6,19-23,29] This condition may be due to the appliance of M-CHAT scale to a wider age range in literature, although it is especially suited for children under three years of age.[13,18,25,27] On the other hand, there are also studies showing that usage of M-CHAT scale alone may not be sufficient to diagnose ASD. As we used only M-CHAT in our study, it is an expected condition that the ASD prevalence is lower than what is reported in international studies.[27,30]

The average age of the four children diagnosed with ASD in our study was 33 months. The average diagnosis age of children with ASD was reported as 40 months in literature.[14] The lower average age of children diagnosed in our study compared to the literature can be explained by the fact that the children in our sample were between 18 and 36 months of age.

49.2% of the participants in our study were male. 8.5% of the boys and 3.2% of the girls were in the ASD risky group and this difference between genders was statistically significant. Three out of four children diagnosed with ASD were male and being male increased the ASD risk three times based on the advanced analysis conducted. ASD risk in males was reported to be 2-6 times higher in literature, which was consistent with our study.[10,19]

No statistically significant difference was detected in terms of ASD risk based on parental education conditions, place of residence, employment status or presence of health insurance. This condition is in line with the literature.[16,28,31,32] Similarly, no statistically significant relationship was found between consanguineous marriage and ASD risk. Although the literature suggests that consanguineous marriage does not constitute a direct risk for ASD, it may lead to the transfer of defective DNA.[33]

When the effect of income level on ASD risk was evaluated in our study, it was observed more in families with a low-income compared to those with a high-income and this risk was detected to be six times higher in those with low-income. Similarly, studies in literature show a significantly higher ASD risk in countries and families with low income.[34-36]

A statistically significant relationship was not detected between maternal smoking and ASD risk in our study but there are some studies reporting such a relationship in literature.[37,38] Although no statistically significant relationship was found between maternal smoking and ASD in our study, some studies reporting such as relationship in literature may be caused by the lower maternal smoking rate in our sample compared to the general population.

No relationship was found between maternal alcohol use and ASD risk in our study as supported also by data provided in literature.[39,40]

All participants reporting the use of medication during pregnancy stated a usage of medication known to be safe during pregnancy (eg. paracetamol, phosphomycine and PPI) and a statistically significant relationship was found between this medication usage and ASD risk. Similarly, literature suggests an increasing risk of ASD in case of maternal medication use during pregnancy.[41,42] Therefore, the relationship between maternal drug use and the risk of ASD is not clear and may depend on underlying diseases or similar contributing factors.

Since almost all mothers of the children participating in the study used supplements during pregnancy, this situation was not found to have a statistically significant effect on the risk of ASD. However, literature provides evidence that maternal supplementation with folic acid, iron and vitamin D support pregnancy reduces the risk of ASD.[43-45]

Contrary to the claims blaming vaccines for Autism Spectrum Risk, many studies in the literature have provided evidence that vaccination does not constitute risk for ASD.[46,47] However, our study showed that children who were not vaccinated according to the vaccination schedule had a statistically significantly higher risk of ASD. Further analyses showed that the risk of ASD was 7.7 times higher in unvaccinated children compared to the vaccinated ones. No previous study evaluated the relationship between being unvaccinated and ASD risk.

Some studies have shown an increasing ASD risk in conditions such as low birth weight, preterm birth before 37 weeks and neonatal treatment in intensive care unit.[33,48] Our study presented a statistically significant difference between low birth weight, delivery week of the child and ASD risk. However, advanced analyses showed the significance of this relationship only with birth weight variable and detected a 5.6 times increase in ASD risk in case of birth before 35th week. This condition is consistent with the literature.

A meta-analysis identified "advanced maternal and paternal age" as risk factors for ASD.[49] Our study detected no statistically significant relationship between the age of parents at the beginning of pregnancy and ASD risk. There are studies both supporting and contradicting our finding in literature.[32,50] The mentioned differences in literature may be related to the average ages of the parents across the samples.

Strengths and limitations

This is the first study investigating ASD risk in Aydın City center using M-CHAT scale. strength is that the research was conducted in a primary healthcare unit which is generally the first point of contact for healthy infant and child follow-ups and reflects a realistic reflection of disease prevalence. Also, the sampling of the study was selected to represent both the rural and urban populations in Aydın City Center. The M-CHAT test was applied face-to-face by the researcher in our study.

Cross-sectional nature of the study is one of the limitation. The fact that our study was conducted on minimum calculated sampling size due to the time constraints while investigating ASD with a low prevalence is an aspect of our study which should be strengthened. Also the use of M-CHAT scale alone can also be considered as a limitation of our study.

Ethical approval

This study has been approved by the Aydın Adnan Menderes University Faculty of Medicine Non Interventional Researches Ethics Board (approval no:2019/124, Dated: 29.08.2019).

Author contribution

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

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The authors declare that there is no conflict of interest to disclose.

Generative AI Statement

No generative artificial intelligence (AI) tools were used in the preparation of this manuscript.

Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to privacy and ethical restrictions but are available from the corresponding author on reasonable request.

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Research Article

The effects of mindfulness levels on menstrual symptoms and irritability in university students

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ABSTRACT

Objective: This study aims to determine the effects of mindfulness levels on menstrual symptoms and irritability among university students.

Methods: This descriptive cross-sectional study was conducted between February and March 2025 with 274 female university students aged 18–49 years residing in a women's dormitory in Ankara. Data were collected using a Personal Information Form, the Five Facet Mindfulness Questionnaire (FFMQ), the Menstrual Symptom Questionnaire (MSQ), and the Born–Steiner Irritability Scale (BSIS). Descriptive statistics and Pearson correlation analysis were employed for data analysis.

Results: The participants' mean age was 20.82 ± 2.12 years. The mean total scores were 126.25 ± 14.47 for FFMQ, 73.24 ± 18.18 for MSQ, and 26.25 ± 8.23 for BSIS. A moderate positive correlation was identified between menstrual symptoms and irritability.

Conclusion: Different subdimensions of mindfulness exert varying effects on menstrual symptoms and irritability. Notably, the Acting with Awareness skill emerged as the most effective factor in reducing both menstrual symptoms and irritability. These findings suggest that mindfulness-based intervention programs can be integrated into primary care services for female patients in family medicine practice, and family physicians can utilize holistic approaches in menstrual symptom management.

Keywords: mindfulness, menstruation, premenstrual syndrome, primary health care

Introduction

The menstrual cycle, a natural and physiological process that reflects a woman's reproductive capacity, begins after puberty and continues at regular intervals until menopause.[1] Due to the cyclical changes occurring throughout menstrual cycles, women may encounter various problems either during menstruation or in the premenstrual period.[2]

The most commonly reported issues during this process include dysmenorrhea, amenorrhea, menorrhagia, abnormal uterine bleeding, and premenstrual syndrome (PMS).[3]

Premenstrual syndrome (PMS) is a condition that manifests in the late luteal phase of the

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menstrual cycle, emerging roughly one week before the onset of menstruation and subsiding in the days following its onset, accompanied by physical, emotional, and psychological symptoms.[4,5] Although the precise etiology of PMS has not been fully elucidated, factors such as genetic predisposition, ovarian activity, levels of hormones such as estradiol and progesterone, imbalance in the renin–angiotensin system, various psychological and sociodemographic factors (e.g., age, place of residence, marital status), cigarette and alcohol consumption, intake of caffeinated beverages, engagement in physical exercise, dietary habits high in fat, sexual activity, prolonged menstrual cycles, and age at menarche are considered to play a role.[6-8]

According to the American College of Obstetricians and Gynecologists (ACOG), PMS symptoms are classified into two categories: affective and somatic. Affective symptoms include depression, anger episodes, confusion, irritability, anxiety and social isolation, whereas somatic symptoms encompass breast swelling and sensitivity, abdominal distension, headaches, and swelling of the extremities.[2,9] Among these symptoms, irritability has been reported as one of the most prominent and long-lasting manifestations of PMS.[10,11]

Irritability is defined as an emotional response that emerges when an individual's ability to regulate mood is diminished and typically presents as verbal or behavioral outbursts of anger.[12] A reduction in estrogen and progesterone levels is thought to be a major factor contributing to the onset of irritability.[13] In a study conducted by Schmelzer et al.[14], irritability and depressed mood were reported among the most common symptoms associated with PMS.

The literature indicates that while approximately 75% of women experience PMS, between 3% and 8% suffer from severe PMS.[15] The prevalence of PMS has been shown to vary across countries, with studies reporting rates of 34% in China, 71% in Türkiye, 80% in Pakistan, and 92% in Jordan.[6] In India, the prevalence has been reported to range between 14.3% and 74.4%.[16] These symptoms have been found to adversely affect women's and particularly female university students'social and family relationships, physical activities, emotional well-being, academic performance, and overall quality of life.[17,18] In Türkiye, various studies have reported PMS prevalence among university students ranging from 36.4% to 76.2%.[19,20] Despite its high prevalence, many individuals remain unaware of PMS.[21]

When considered in the context of women's health, mindfulness may have a significant impact on physiological processes such as the menstrual cycle. Individuals with high levels of mindfulness—characterized by acceptance of oneself, finding meaning in life, openness to growth, and the ability to establish sound social relationships are regarded as psychologically more balanced.[22] These qualities may exert a protective or symptom-alleviating effect, particularly on the emotional manifestations accompanying PMS, such as irritability. Although numerous studies have investigated the physical symptoms of the menstrual cycle and methods to alleviate them, research on the relationship between mindfulness and irritability remains limited.

This study aims to determine the effect of mindfulness levels on the severity of menstrual symptoms and irritability among university students, thereby addressing a gap in the existing literature.

Materials and Methods

Study setting and design

This research was designed as a cross-sectional descriptive study and was conducted between February and March 2025 among female residents aged 18-49 in a Higher Education Women's

Dormitory in Ankara. The lower age limit was set at 18 years to ensure autonomous informed consent in accordance with ethical regulations and institutional review board requirements. The upper age limit of 49 years was determined based on the World Health Organization's definition of reproductive age (15-49 years) and to capture the full range of women residing in dormitory facilities. Although reproductive health surveillance typically covers ages 15-49, participants under 18 were excluded due to the requirement for parental/guardian consent, which would have introduced significant practical and logistical challenges in the dormitory setting where residents are predominantly adults. The study was reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.

Participants and data collection

The study population consisted of female residents aged 18–49 living in a women's dormitory in Ankara (N = 700). The sample size was calculated using a single population proportion formula with a 5% margin of error and 95% confidence level, yielding a minimum required sample of n = 249. To account for potential non-response and data loss, the sample was increased by 10% to n = 274. The study was completed with a total of 274 participants. During the data collection process, participants were provided with an informed consent form**. After obtaining written informed consent,** questionnaires were administered face-to-face by the researcher in a private setting to ensure confidentiality.

Inclusion Criteria: Participants were included if they were aged between 18 and 49 years, resided in the women's dormitory, volunteered to participate in the research, and were literate in Turkish.

Exclusion Criteria: Those who did not volunteer to participate, were younger than 18 or older than 49 years, or failed to complete the questionnaires in full were excluded from the study.

Ethics Committee Approval: The study was approved by the Ankara Medipol University Ethics Committee. Written informed consent was obtained from all participants.

Data collection instruments

No clinical, surgical, or laboratory examinations were performed in this study; all data were collected through questionnaires.

Personal Information Form: A 12-item form developed by the researchers based on a literature review.

Five Facet Mindfulness Questionnaire (FFMQ): Developed by Baer et al.[23] and adapted into Turkish by Kınay et al.[24] The 39-item, 5-point Likert-type scale comprises five subdimensions: Observing, Describing, Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience. In the present study, the Cronbach's alpha coefficient was found to be .792.

Menstrual Symptom Questionnaire (MSQ): Developed by Chesney and Tasto[25] in 1975, updated by Negriff et al.[26] in 2009, and adapted into Turkish by Güvenç et al.[27] The 22-item, 5-point Likert-type scale consists of three subdimensions: Negative Effects/Somatic Complaints, Menstrual Pain Symptoms, and Coping Methods. In the present study, the Cronbach's alpha coefficient was .933.

Born–Steiner Irritability Scale: Self-Report Form (BSIS): This scale, specifically developed for women, consists of two parts: the first 14 items assess situational irritability levels, while the visual analog section containing 7 items evaluates functionality levels. In the present study, the Cronbach's alpha coefficient was .912.

Statistical analysis

Data were analyzed using the SPSS 25.0 software package. Descriptive statistics (frequency, percentage, mean, and standard deviation) were

used for data summarization. The normality of the data distribution was assessed using the Kolmogorov–Smirnov test. Pearson correlation analysis was used to examine relationships between variables. The reliability of the scales was evaluated using Cronbach's alpha coefficients. A significance level of $p < 0.05$ was adopted. Correlation coefficients were interpreted as follows: values below 0.30 were considered low, between 0.30 and 0.70 moderate, and above 0.70 high.

Results

This section presents the findings of the study in three main parts:[1] descriptive characteristics of the participating university students (sociodemographic and reproductive health-related variables),[2] descriptive statistics of the measurement instruments used in the study (means, standard deviations, minimum and maximum scores for each scale), and[3] correlation analyses examining the relationships between the main study variables. Statistical significance was evaluated at an alpha level of $p < 0.05$ for all analyses

Descriptive statistics

A total of 274 female university students participated in the study. The mean age of participants was 20.82 ± 2.12 years. Of the students, 36.1% (n = 99) were in their second year, and 30.3% (n = 83) were in their first year. In terms of faculty distribution, the highest participation was from the Faculty of Health Sciences (42.0%, n = 115). Regarding parental education levels, 34.7% (n = 95) of mothers and 57.7% (n = 158) of fathers were graduates of college or university. A majority of participants (84.3%, n = 231) lived in a nuclear family structure, and 75.6% (n = 207) reported having regular menstruation (Table 1).

Descriptive statistics of scale scores

The mean total score of the Five Facet Mindfulness Questionnaire was 126.25 ± 14.47. Among its subdimensions, Acting with Awareness had the highest mean score (27.11 ± 6.15), while Nonreactivity to Inner Experience had the lowest (17.42 ± 3.98). The other subdimension scores were as follows: Describing 26.97 ± 5.54, Observing 25.66 ± 6.81, and Nonjudging of Inner Experience 19.94 ± 5.63. The mean total score of the Menstrual Symptom Questionnaire was 73.24 ± 18.18. Among its subdimensions, Negative Effects/Somatic Complaints had the highest mean score (42.74 ± 11.45), while Coping Methods had the lowest (8.85 ± 3.55). The mean score for Menstrual Pain Symptoms was 21.64 ± 5.60. The mean score of the Born–Steiner Irritability Scale was 26.25 ± 8.23 (Table 2).

Relationships between mindfulness and menstrual symptoms

Pearson correlation analysis was conducted to examine the relationships between mindfulness subdimensions and menstrual symptoms. The results indicated several significant associations between different mindfulness subdimensions and menstrual symptoms. The Observing subdimension showed positive and significant correlations with menstrual symptoms: Menstrual Pain Symptoms ($r = .280$, $p < .001$), Negative Effects/Somatic Complaints ($r = .188$, $p = .002$), and the MSQ total score ($r = .221$, $p < .001$). No significant relationship was found with Coping Methods ($r = .081$, $p = .182$). The Acting with Awareness subdimension demonstrated negative and significant correlations with menstrual symptoms: MSQ total score ($r = –.270$, $p < .001$), Negative Effects/Somatic Complaints ($r = –.282$, $p < .001$), Menstrual Pain Symptoms ($r = –.187$, $p = .002$), and Coping Methods ($r = –.180$, $p = .003$). The Nonjudging of Inner Experience subdimension showed negative and significant correlations with menstrual symptoms: Menstrual Pain Symptoms

Table 1. Findings on students' descriptive characteristics

Variable		
Age (Mean ± SD)	20.82±2.12	
	n	**%**
Mother's Educational Status		
Illiterate	3	1.1
Literate / Elementary school graduate	59	21
Middle school graduate	40	14.6
High school graduate	77	28.1
College/University graduate	95	34.7
Father's Educational Status		
Illiterate	1	0.4
Literate / Elementary school graduate	28	10.2
Middle school graduate	31	11.3
High school graduate	56	20.4
College/University graduate	158	57.7
Family Income Status		
Low	7	2.6
Medium	182	66.4
Good	85	31.0
Family Type		
Nuclear	231	84.3
Traditional	39	14.2
Fragmented	4	1.5
Menstrual Cycle		
Regular	207	75.6
Irregular	67	24.4

n=number of participants, %=percentage

(r = –.289, p < .001), MSQ total score (r = –.277, p < .001), Negative Effects/Somatic Complaints (r = –.245, p < .001), and Coping Methods (r = –.170, p = .005). The Nonreactivity to Inner Experience subdimension displayed positive and significant correlations with menstrual symptoms: MSQ total score (r = .138, p = .022), Menstrual Pain Symptoms (r = .134, p = .026), and Coping Methods (r = .128, p = .034). No significant relationship was observed with Negative Effects/Somatic Complaints (r = .144, p = .059). The Describing subdimension was not significantly associated with any menstrual symptom variable (p> .05) (Table 3).

Table 2. Descriptive statistics for scales

Scale / Subscale	**Mean**	**SD**	**Min**	**Max**
Five Facet Mindfulness Questionnaire	126.25	14.47	85	165
- Observation	25.66	6.81	9.00	40.00
- Description	26.97	5.54	8.00	40.00
- Mindful Behavior	27.11	6.15	8.00	40.00
- Non-judgmental attitude toward internal experiences	19.94	5.63	7.00	35.00
- Indifference	17.42	3.98	6.00	30.00
Menstrual Symptom Questionnaire (MSQ	73.24	18.18	22.00	110.00
- Negative Effects / Somatic Complaints	42.74	11.45	1.00	65.00
- Menstrual Pain Symptoms	21.64	5.60	6.00	30.00
- Coping Methods	8.85	3.55	3.00	15.00
Born-Steiner Irritability (BSIS)	26.25	8.23	13.00	52.00

SD = Standard Deviation; Min = Minimum value; Max = Maximum

Relationships between mindfulness and irritability

Pearson correlation analysis was conducted to determine the relationships between mindfulness subdimensions and irritability levels (Table 4).

The Acting with Awareness subdimension demonstrated a modarate and significant negative correlation with irritability (r =–.441, p <.001), indicating that higher acting-with-awareness skills are associated with lower irritability levels. The Describing subdimension exhibited a significant negative correlation with irritability (r =–.164, p = .007), suggesting that the ability to label emotional experiences contributes to reducing irritability. The total FFMQ score had a moderate and significant negative correlation with irritability (r = –.310, p <.001), showing that higher overall mindfulness levels are associated with lower irritability. No significant relationships were found between irritability and the Observing (r = –.035, p = .567), Nonjudging of Inner Experience (r = –.076, p = .208), or Nonreactivity to Inner Experience (r = –.041, p = .501) subdimensions.

These findings indicate that the behavioral and cognitive dimensions of mindfulness are more effective in reducing irritability.

Table 3. Correlation between mindful awareness and menstrual symptoms

Mindfulness Subscale	Negative Effects (r/p)	Menstrual Pain (r/p)	Coping methods (r/p)	MSQ Total (r/p)
Observation	r = .188** p = .002	r = .280** p = .000	r = .081 p = .182	r = .221** p = .000
Description	r = .041 p =.499	r = .083 p = .170	r = .003 p =.959	r = .052 p =.391
Mindful Behavior	r = -.282** p = .000	r = -.187** p = .002	r = -.180** p = .003	r = -.270** p = .000
Non-judgmental attitude toward internal experiences	r = -.245** p = .000	r = -.289** p = .000	r =-.170** p =.005	r = -.277** p =.000
Indifference to Internal Experiences	r = .144 p = .059	r = .134* p = .026	r = .128* p = .034	r = .138* p = .022
FFMQ Total	r = -0.099 p = .101	r = -0.022 p = .711	r = -0.080 p =.189	r = -0.085 p = .160

*p < .05, **p < .01; FFMQ=Five Facet Mindfulness Questionnaire Scale; MSQ= Menstrual Symptom Questionnaire

Overall relationships between mindfulness, menstrual symptoms, and irritability

To illustrate the relationships among all variables examined in the study, a correlation matrix was constructed (Table 5).

Among mindfulness subdimensions, moderate positive correlations were found between Observing and Describing (r = .572, p < .001), and between Observing and Nonreactivity to Inner Experience (r = .566, p < .001). A moderate negative correlation was observed between Observing and Nonjudging of Inner Experience (r = –.582, p < .001). The Describing subdimension demonstrated a moderate positive correlation with Nonreactivity to Inner Experience (r = .392, p < .001), a weak positive correlation with Acting with Awareness (r = .238, p < .001), and a moderate negative correlation with Nonjudging of Inner Experience (r = –.326, p < .001). Acting with Awareness exhibited a weak positive correlation with Nonjudging of Inner Experience (r = .287, p < .001) and a weak negative correlation with Nonreactivity to Inner Experience (r = –.199, p < .001).

A moderate negative correlation was found between Nonjudging of Inner Experience and Nonreactivity to Inner Experience (r = –.479, p < .001). A moderate and significant positive correlation was observed between menstrual symptoms and irritability (r = .433, p < .001), indicating that as menstrual symptoms increase, irritability levels also rise.

Table 4. Correlations between mindfulness and born-steiner irritability

Mindfulness subscale	BSIS total (r/p)
Observation	r = -.035 p =.567
Description	r = -.164** p =.007
Mindful Behavior	r = -.441** p =.000
Non-judgment of Internal Experiences	r = -.076 p =.208
Indifference to Internal Experiences	r = -.041 p = .501
FFMQ Total	r = -.310** p =.000

*p < .05, **p < .01; FFMQ=Five Facet Mindfulness Questionnaire; BSIS= Born-Steiner Irritability Scale

Table 5. Correlation matrix between mindfulness, menstrual symptoms, and irritability

Variables	1	2	3	4	5	6	7
FFMQ_Observation	1						
FFMQ_Identification	.572	1					
FFMQ_Mindful Behavior	–.061	.238	1				
FFMQ_Nonjudgmental	–.582	–.326	.287	1			
FFMQ_Indifference	.566	.392	–.199	–.479	1		
MSQ total	.221	.052	–.270	–.277	.138	1	
BSIS Total	–.035	–.164	–.441	–.076	–.041	.433	1

*p < .05, **p < .01
FFMQ=Five Facet Mindfulness Questionnaire; MSQ= Menstrual Symptom Questionnaire; BSIS=Born-Steiner Irritability Scale

Discussion

The critical findings of this study demonstrate that different subdimensions of mindfulness exert distinct effects on menstrual symptoms and irritability, offering important new insights in this field. When compared with the existing literature, the primary results of our research are both supportive of previous findings and innovative in certain respects.

A key finding of the present study is the moderate positive correlation between menstrual symptoms and irritability. This result aligns with recent research examining the effect of them menstrual cycle upon psychiatric symptoms.[28] In a longitudinal study conducted in the United States, it was observed that women's suicidal ideation increased and irritability levels markedly rose in the luteal stage of the menstrual cycle.[28] Similarly, in a study by Aba et al.[29] involving Turkish university students, the prevalence of irritability among individuals experiencing premenstrual syndrome was found to be 79.2%, and this condition was reported to negatively affect quality of life. These results provide strong support for the main hypothesis of our study.

In our research, the Acting with Awareness subdimension demonstrated moderate negative correlations with both menstrual symptoms and irritability, revealing its dual protective effect. This finding is consistent with systematic reviews examining the effects of mindfulness interventions on women's health.

A comprehensive meta-analysis published in 2024 reported that mindfulness-based interventions significantly reduced symptoms of irritability, depression, and anxiety in menopausal women.[30] Similarly, in a 2019 study conducted at the Mayo Clinic by Sood et al.[31], it was found that middle-aged women with higher mindfulness scores had significantly lower levels of irritability, depression, and anxiety. A particularly noteworthy result in our study is that the Observing subdimension was positively correlated with menstrual symptoms but not significantly associated with irritability. This finding highlights the complex effects of the observing dimension of mindfulness.

In a pioneering research exploring the connection between premenstrual symptoms and mindfulness, the observing dimension was positively correlated with the reporting of premenstrual symptom severity; however, it was suggested that this relationship may not reflect an actual increase in symptoms but rather an enhanced awareness of them.[32] This interpretation aligns perfectly with our own results. In our study, the Nonjudging of Inner Experience subdimension was strongly negatively correlated with menstrual symptoms but showed no significant association with irritability. This suggests that nonjudgmental

attitudes are particularly effective in shaping the experience of physical symptoms.

In a study conducted by Keng et al.[33], the nonjudging dimension of mindfulness was found to increase happiness levels in women while reducing symptoms of anxiety and depression. This supports the regulatory role of nonjudgmental attitudes on both emotional and physical experiences. The Describing subdimension demonstrated no significant association with menstrual symptoms but was negatively correlated with irritability, indicating that it may be more influential in emotional regulation processes. A large-scale meta-analysis by Galante et al.[34], using individual participant data, showed that the describing dimension of mindfulness was particularly effective in reducing psychological distress. This finding is in agreement with the results of our study.

The Nonreactivity to Inner Experience subdimension exhibited a positive correlation with menstrual symptoms and no significant association with irritability, revealing an unexpected effect profile in the context of menstrual symptoms.

Clinical and practical implications

Our findings suggest that the differential effects of mindfulness subdimensions should be taken into account when designing mindfulness-based interventions. In particular, programs focusing on the development of Acting with Awareness skills may be effective in reducing both menstrual symptoms and irritability. To our knowledge, this is the first study to identify Acting with Awareness as the specific mindfulness facet that uniquely predicts menstrual symptom reduction in dormitory-dwelling young women, a population previously underrepresented in mindfulness and reproductive health research. This specificity offers practical advantages over broad mindfulness programs by enabling more targeted, efficient, and cost-effective interventions tailored to menstrual health needs. In a randomized controlled trial conducted by Economides et al.[35] using a smartphone application, even brief mindfulness training was shown to produce significant improvements in stress, negative affect, and irritability levels. Our study extends these findings by identifying which specific mindfulness component drives these effects in the context of menstrual health, thereby bridging a critical gap between general mindfulness research and reproductive health applications.

Conclusion

The findings of this study indicate that mindfulness plays a significant role in the management of menstrual symptoms and irritability. In particular, the skill of Acting with Awareness emerged as the most influential factor in reducing both menstrual symptoms and irritability levels, underscoring the importance of developing intervention programs that specifically target this dimension. When considered alongside existing literature, mindfulness based approaches may be proposed as viable alternatives to traditional coping strategies for managing menstrual-related challenges. Specifically, we recommend:[1] developing brief (10-15 minute) smartphone-based programs focusing on Acting with Awareness exercises such as mindful walking and body scans[2], integrating these programs into university health services and dormitory wellness initiatives, and[3] prioritizing Acting with Awareness training over comprehensive mindfulness programs to enhance time-efficiency and student acceptability.

Strengths and limitations

The methodological strength of this study lies in its separate examination of the effects of different mindfulness subdimensions on menstrual symptoms and irritability. However, several limitations warrant consideration. First, the cross-sectional design precludes causal inferences and

cannot rule out reverse causality. Second, self-report measures may introduce recall and social desirability biases. Third, important confounding variables were not controlled, including hormonal contraceptive use, sleep quality, stress levels, caffeine/alcohol consumption, exercise habits, BMI, and gynecological history—all of which could independently affect both mindfulness and menstrual symptoms. Fourth, the single-site dormitory sample limits generalizability to other populations and settings. Fifth, exclusion of participants under 18 years restricts generalizability to the full WHO-defined reproductive age range (15-49 years). Finally, mindfulness practice duration and consistency were not assessed, which may moderate observed relationships. Future research employing longitudinal designs and intervention studies with adequate control for confounding factors will help to expand the knowledge base in this area. Randomized controlled trials directly comparing Acting with Awareness-focused interventions to standard programs would strengthen causal evidence.In light of these findings, it is recommended that mindfulness-based intervention programs for women experiencing menstrual symptoms be developed, with particular emphasis on strengthening Acting with Awareness skills.

Ethical approval

The study was approved by Ankara Medipol University Ethics Committee (date: 13.03.2025, number: 41). Written informed consent was obtained from all participants.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: S.C., R.C.B., A.M.S.; data collection: R.C.B., A.M.S.; analysis and interpretation of results: S.C., R.C.B.; draft manuscript preparation: R.C.B., A.M.S. 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 in the study.

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Research Article

Demographic and clinical characteristics of patients applying to a smoking cessation clinic affiliated with a university hospital and factors affecting their smoking cessation status

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ABSTRACT

Objective: Smoking addiction is a serious public health problem that ranks among the leading preventable causes of death and affects all age groups. Our study aimed to examine the demographic and clinical characteristics of patients attending a smoking cessation clinic affiliated with a university hospital and the factors influencing their cessation status.

Methods: This is a retrospective, cross-sectional study. Age, gender, occupation, chronic disease status, treatments given, smoking histories, and Fagerstrom scores of patients who applied to the smoking cessation clinic affiliated to Samsun Training and Research Hospital between August 01, 2020 and August 31, 2024 were obtained using the hospital automation system without sharing their personal information. The data were analyzed using the SPSS package program.

Results: A total of 399 patients were included in the study. 63.66% (n=275) of the patients were male. The average Fagerstrom score of the patients was calculated as 5.66±2.43. The patients were interviewed an average of 2.21±1.28 times per person. The average smoking duration of the patients was calculated as 27.38±16.57 pack-years. Combined treatment was initiated in 35.19% of the patients (n=141). As combined treatment, 88.15% of the patients (n=134) were started on a combination of Bupropion and Nicotine Replacement Therapy (NRT). As a result of treatment, 34.09% of patients (n=136) quit smoking. Monotherapy with Bupropion was found to be the least effective drug for smoking cessation (p=0.01). The smoking cessation rate among patients receiving combination therapy was found to be higher than that of other treatment options (p<0.001). Patients who quit smoking had a significantly lower Fagerstrom score (p=0.024) than those who did not quit, while the number of individual consultations per patient (p<0.001) was significantly higher. The proportion of patients who quit smoking and had other smokers in their household was lower than those who did not quit (p=0.003).

Conclusion: It was observed that approximately one third of the patients quit smoking. The smoking cessation rate of patients who used combined treatment was found to be higher than other treatment options.

Keywords: bupropion, nicotine replesman therapy, smoking cessation, cytisine, varenicline

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Introduction

Tobacco addiction is a major public health problem affecting all age groups and remains one of the leading preventable causes of death worldwide.[1] It accounts for nearly 80% of premature deaths in low- and middle-income countries.[2,3] According to the Global Adult Tobacco Survey Turkey 2016, the prevalence of smoking is 44.1% among men and 19.2% among women.[4]

The individual's decision, attitudes, and behaviors play a decisive role in smoking cessation. Structured treatment greatly enhances the chances of quitting when professional help is necessary.[5] However, providing smoking cessation counseling is as complex and challenging as nicotine addiction itself. In Turkey, more than 500 smoking cessation clinics are providing services, and over 2.5 million individuals have applied to receive smoking cessation counseling.[6] The quit rates of individuals applying to smoking cessation clinics in Turkey range between 20% and 50%.[7]

In Turkey, many factors influence smoking cessation success, including low nicotine dependence, regular follow-up by healthcare professionals, adherence to pharmacological treatment, and strong social support.[8,9]

Treatment strategies consist of both behavioral approaches and pharmacotherapy. The Health Belief Model, Health Locus of Control, Diffusion of Innovations Model, Pender's Health Promotion Model, and the Transtheoretical Model are among the commonly applied behavior change models.[10,11] Pharmacotherapy primarily consists of nicotine replacement therapy (NRT – transdermal patches, gum, nasal spray, inhaler, sublingual tablets, and lozenges), bupropion, and varenicline. Cytisine has recently been introduced as an additional option for pharmacotherapy.[12] When administering pharmacotherapy, it should ideally be supported by behavioral interventions, and combination therapies should be considered when necessary.[5]

In this study, we aimed to evaluate the impact of combined therapy and close follow-up on smoking cessation success among individuals attending a university hospital smoking cessation clinic. By analyzing the characteristics of these patients and the factors affecting cessation outcomes, we aim to provide evidence that can guide treatment decisions for future applicants

Materials and Methods

Study design and population

This study was designed as a cross-sectional, retrospective analysis. The study population consisted of 432 patients aged ≥18 years who smoked and voluntarily presented to the Smoking Cessation Outpatient Clinic of Samsun Training and Research Hospital between August 1, 2020, and August 31, 2024. As all available patient records were included, no sample size calculation was performed.

Data collection

Demographic and clinical data, including age, sex, occupation, alcohol use, presence of chronic diseases, treatment modalities, and smoking history (pack-years), were extracted from patients' medical records. Each patient had an individual file documenting data from the first consultation and subsequent follow- up sessions. Smoking cessation counseling was provided by physicians certified in smoking cessation therapy and by trained resident physicians.

At the first visit, nicotine dependence was assessed using the Fagerström Test for Nicotine Dependence (FTND). Scores of 0–2 were classified as low dependence, 3–7 as moderate dependence, and 8–10 as high dependence.[13] The Turkish validity and reliability study of the FTND was conducted by Uysal et al. in 2004, with a reported Cronbach's alpha of 0.56.[14]

Treatment strategies were individualized according to FTND scores, chronic disease status, concurrent medications, contraindications for pharmacotherapy, and patient adherence. Patients received either behavioral therapy alone, monotherapy (varenicline, bupropion, cytisine, nicotine replacement therapy [NRT]), or combination therapy (bupropion+NRT, varenicline+NRT, cytisine+NRT, or triple therapy). In accordance with Ministry of Health policies, NRT and cytisine were provided free of charge during certain periods. Follow-up visits were recorded in patient files.

Although 432 patient files were available, complete data were accessible for 399 patients and included in the final analysis. Patients who had not completed at least one year of follow-up as of August 31, 2024, and those who failed to quit smoking were excluded from the analysis. For patients who missed their annual control visits, follow-up information was obtained via remote consultations conducted by resident physicians.

Ethical considerations

Ethics Committee approval for the study protocol was obtained from the Faculty of Medicine of Samsun University (Approval No: 2023/18/10, date: October 4, 2023). Written informed consent was obtained from all patients at their initial presentation.

Statistical analysis

Statistical analyses were performed using SPSS version 25.0. Normality of distribution was assessed using histogram plots and the Kolmogorov–Smirnov test. Descriptive statistics were presented as mean ± standard deviation, median, and minimum–maximum values. Categorical variables were compared using the chi-square test. Non-normally distributed continuous variables were analyzed using the Mann–Whitney U test for two-group comparisons and the Kruskal–Wallis test for comparisons of more than two groups. A p-value <0.05 was considered statistically significant. Post-hoc pairwise comparisons for significant results were performed using Duncan's test. Binary logistic regression analysis was conducted to assess the impact of treatment modalities on smoking cessation outcomes, with Bonferroni correction applied (adjusted significance level: $p<0.003$).

Results

A total of 399 patients were included in the analysis. The mean age of participants was 44.69 ± 12.05 years, with a median age of 44 years (range: 18–74). The sociodemographic characteristics of the study population are presented in Table 1. Comparisons between sociodemographic characteristics and smoking cessation status are shown in Table 2. The presence of another smoker in the household was significantly associated with a lower likelihood of successful cessation ($p = 0.003$). Similarly, participants reporting smoking-related complaints had lower quit rates ($p = 0.026$).

According to the Fagerström Test for Nicotine Dependence (FTND) scores, 13.19% (n = 57) had low, 61.34% (n = 265) had moderate, and 25.46% (n = 110) had high nicotine dependence. The majority of participants (75.69%, n = 327) had previously attempted to quit smoking, and 49.85% of them (n = 163) had received professional support during these attempts. A total of 7.19% of patients (n = 31) reported using tobacco products other than cigarettes; these included e-cigarettes (3.70%, n = 16), hookah (3.94%, n = 17), cigars (1.39%, n = 6), and other tobacco products.

The distribution of treatment methods applied at the smoking cessation clinic is presented in Table 3. The number of face-to-face consultations per patient ranged from 1 to 8. Patients who failed to quit smoking attended significantly fewer sessions compared with those who successfully quit ($p < 0.001$) and had significantly higher FTND

Table 1. Sociodemographic characteristics of participants

Characteristic	Category	n	%
Gender	Female	145	(36.34)
	Male	254	(63.66)
Age Group (years)	<25	20	(5.01)
	26-44	182	(45.61)
	45-60	147	(36.84)
	61-75	50	(12.54)
Marital Status	Married	327	(81.96)
	Single/Never Married	51	(12.78)
	Widowed	21	(5.26)
Educational Status	Primary Education	95	(23.81)
	Secondary Education	131	(32.83)
	Higher Education	173	(43.36)
Place of Residence	City Center	343	(85.96)
	Rural/Out-of-city	56	(14.04)
Employment Status	Civil Servant	135	(33.83)
	Unemployed/Homemaker/Retired/Student	137	(34.34)
	Laborer	50	(12.53)
	Private Sector	77	(19.30)
Presence of Other Smokers in the Household	Yes	158	(39.60)
	No	241	(60.40)
Total		399	100.00

scores (p = 0.024). Detailed comparisons between smoking

characteristics, treatment approaches, and cessation outcomes are presented in Table 4.

Combination therapy was associated with the highest quit rates, significantly outperforming all other treatment options (p < 0.001). The comparison of treatment types and smoking cessation outcomes is presented in Table 5, with monotherapy bupropion used as the reference category. Although the likelihood of quitting among patients who did not receive pharmacological treatment was 2.76 times higher compared to those treated with bupropion, this difference was not statistically significant (p = 0.075). Logistic regression analysis revealed that the presence of another smoker in the household significantly reduced the odds of quitting (p = 0.003), with absence of household smoking nearly doubling the likelihood of cessation (Exp(B)= 1.953). FTND score was a significant negative predictor of cessation success (B = −0.022, p = 0.023), indicating that higher nicotine dependence was associated with lower quit rates. The absence of smoking-related complaints was positively associated with cessation success (B = 0.489, p = 0.026), corresponding to a 1.63-fold higher likelihood of quitting compared with those who reported complaints. Advanced analyses are presented in Table 6.

Discussion

In this study, we analyzed the characteristics of individuals presenting to a smoking cessation clinic and investigated factors influencing cessation success. Our findings demonstrate that varenicline, cytisine, nicotine replacement therapy (NRT), and combination therapies significantly improved quit

Table 2. Comparison of smoking cessation outcomes by patients' sociodemographic characteristics

	Unsuccessful n (%)	Successful n (%)	p
Gender			0.331
Female	100 (68.97)	45 (31.03)	
Male	163 (64.18)	91 (35.82)	
Age Group			0.587
<25	15 (75.00)	5 (25.00)	
26–44	115 (63.20)	67 (36.80)	
45–60	101 (68.70)	46 (31.30)	
61–75	32 (64.00)	18 (36.00)	
Marital Status			0.614
Married	219 (67.20)	107 (32.80)	
Single/Never Married	31 (60.78)	20 (39.22)	
Widowed	13 (61.90)	8 (38.10)	
Educational Status			0.632
Primary Education	66 (69.47)	29 (30.53)	
Secondary Education	83 (63.36)	48 (36.64)	
Higher Education	114 (65.93)	59 (34.07)	
Place of Residence			0.169
City Center	220 (64.17)	123 (35.83)	
Rural/Out-of-city	43 (76.79)	13 (23.21)	
Employment Status			0.719
Civil Servant	87 (64.44)	48 (35.56)	
Unemployed/Homemaker/Retired/Student	88 (64.23)	49 (35.77)	
Laborer	33 (66.00)	17 (34.00)	
Private Sector	55 (71.43)	22 (28.57)	
Other Smokers in Household			0.003
No	145 (60.16)	96 (39.84)	
Yes	118 (74.68)	40 (25.32)	
Alcohol Consumption			0.273

rates compared to bupropion monotherapy, which was the least effective option. Lower FTND scores and the absence of smokers in the household were associated with greater cessation success.

Specifically, varenicline monotherapy was found to increase the likelihood of smoking cessation approximately fourfold compared to bupropion ($p = 0.010$). This finding is consistent with large-scale meta-analyses and randomized controlled trials (RCTs) in the literature demonstrating the superior efficacy of varenicline over bupropion and single-agent NRT.[15] It is thought that varenicline's partial agonist activity at the α4β2 nicotinic acetylcholine receptor reduces nicotine craving and withdrawal symptoms while simultaneously attenuating the rewarding effects of nicotine, thereby increasing cessation rates.[16]

Similarly, cytisine and NRT monotherapy increased the likelihood of cessation approximately threefold compared with bupropion. Cytisine, a cost-effective partial agonist with a mechanism of action similar to varenicline, is widely used in Eastern and Central Europe. Evidence from clinical trials has confirmed cytisine’s superiority over

Table 3. Treatment options used by participants			
Treatment category	**Specific treatment**	**n**	**%**
Monotherapy	Varenicline Monotherapy	18	(4.51)
	Bupropion Monotherapy	109	(27.32)
	Cytisine Monotherapy	34	(8.52)
	NRT Monotherapy	80	(20.05)
Pharmacological	Combined Therapy	141	(35.34)
Non-Pharmacological	Non-Pharmacological Treatment	17	(4.26)
Total Participants		399	(100.00)
Specific Combined Treatment Options (Total n=141)		**n**	**%**
	Bupropion + NRT	125	(88.65)
	Varenicline + NRT	14	(9.93)
	Cytisine + NRT	1	(0.71)
	Varenicline + Bupropion + NRT	1	(0.71)

Table 4. Comparison of specific smoking and treatment parameters with smoking cessation status				
Characteristic	**Cessation status**	**Mean ± SD**	**Median (Min-Max)**	**p-value**
Number of Interviews	Unsuccessful	1.96±1.17	2 (1–6)	<0.001
	Successful	2.83±1.33	3 (1–8)	
FTND Score	Unsuccessful	5.85±2.40	6 (0–10)	24
	Successful	5.26±2.52	5 (0–10)	
Smoking Consumption (Pack-Years)	Unsuccessful	28.12±17.43	26.5 (1.5–100)	550
	Successful	26.66±15.25	24 (1–72)	

Table 5. Comparison of treatment modalities with smoking cessation status				
Treatment modality	**Cessation status**	**Unsuccessful n (%)**	**Successful n (%)**	**p-value**
Monotherapy	Varenicline	10 (55.55)	8 (44.45)	<0.001
	Bupropion	91 (83.48)	18 (16.52)	
	Cytisine	22 (64.70)	12 (35.30)	
	NRT	50 (62.50)	30 (37.50)	
Combined Therapy	Combined Treatment	79 (56.02)	62 (43.98)	
No Pharmacological Treatment	Non-Pharmacological Treatment Only	11 (64.70)	6 (35.30)	

*Chi-Square Test was used for comparison across all treatment groups.

placebo and comparable efficacy to NRT.[17] Our findings support cytisine as a viable alternative to bupropion. The highest quit rates were observed among patients receiving combination therapy, whose likelihood of cessation was nearly fourfold higher than that of the bupropion group. This finding reinforces current clinical guidelines recommending combination regimens—such as long-acting NRT (patch) plus short- acting NRT (gum or lozenge) or varenicline in combination with bupropion—when monotherapy fails or dependence is severe.[18-20] Combination approaches act through complementary mechanisms, maintain more stable nicotine levels, and help manage acute cravings more effectively. Our results are in agreement with Benli et al., who reported that patients receiving varenicline had higher quit rates than those receiving bupropion

Table 6. Advanced analysis of treatment modalities and associated features predicting smoking cessation status (logistic regression)

Variable	Category	B (Coefficient)	S.E. (Standard error)	Wald $\chi 2$	p-value	Exp(B) (Odds ratio)
Treatment Modality (Reference: Bupropion Monotherapy)						
	Varenicline Monotherapy	1.397	540	6.697	0,010	4.044
	Cytisine Monotherapy	1.014	442	5.267	0,022	2.758
	NRT Monotherapy	1.110	346	10.272	0,001	3.033
	Combined Therapy	1.378	309	19.924	<0.001	3.968
	No Pharmacological Treatment	1.014	569	3.174	0,075	2.758
Other Smokers in Household (Reference: Yes)						
	No other smoker in household	669	225	8.823	0,003	1.953
Smoking-Related Complaint (Reference: Presence)						
	No smoking-related complaint	489	220	4.932	0,026	1.630

at weeks 1 and 2 and at months 1, 3, and 6, although no significant difference was observed at 12 months.[21] Recent large-scale Australian studies have compared cytisine and varenicline and reported that cytisine demonstrates similar efficacy while offering a lower incidence of side effects and lower cost; this makes cytisine a suitable option in resource-limited settings.[22] Rigotti and colleagues demonstrated in their randomized clinical trial of 810 participants that cytisine provided significantly higher cessation rates compared to placebo.[23]

Another important finding is the effect of behavioral support. The number of face-to-face counseling sessions was found to be significantly associated with cessation success, with patients attending more sessions achieving higher cessation rates ($p < 0.001$). This observation is consistent with previous studies showing that more frequent follow-up visits improve outcomes.[24,25] In our cohort, the mean number of counseling sessions per patient was 2.21 ± 1.28, a finding that supports the view that intensive behavioral support is critically important for sustainable cessation.

A particularly noteworthy observation was that the presence of another smoker in the household significantly reduced cessation success, while the absence of smokers in the household nearly doubled the likelihood of cessation. This finding emphasizes the importance of social and environmental factors in the cessation process. The literature demonstrates that smoking by a spouse or household members functions both as a trigger and as a barrier to motivation, thereby reducing cessation success rates.[26]

The severity of nicotine dependence as measured by FTND was also a significant predictor of cessation outcomes, consistent with previous studies reporting an average score of approximately 5 among treatment-seeking smokers.[27] In our cohort, the mean FTND score was 5.66 ± 2.43, and higher scores were negatively

associated with cessation success; this highlights the need for more intensive pharmacological and behavioral interventions for highly dependent individuals.[28-30]

Interestingly, participants without smoking-related complaints were found to have a 1.63 times greater likelihood of cessation compared to those with symptoms. While this may appear counterintuitive given that health concerns are often cited as the primary source of motivation for cessation, a possible explanation is that asymptomatic individuals may have a more proactive, intrinsic cessation motivation driven by long-term health protection rather than immediate reactive fear. Autonomous motivation has been shown to result in more sustainable behavior change compared to externally motivated attempts.[31] Another possible explanation is that individuals with chronic illness or symptoms may use smoking as a coping mechanism, which could make cessation more difficult.

Finally, although our study did not examine the results in detail according to whether medications were provided free of charge, previous research has shown that providing pharmacotherapy free of charge increases treatment adherence and smoking cessation success.[32] The absence of cost-related data in our analysis may represent a potential confounding factor.

Limitations

Several limitations should be considered when interpreting these findings. First, interruptions in patient compliance may have occurred due to the turnover of resident physicians conducting patient interviews—a necessity resulting from rotations between training programs—and this situation may have affected the accuracy of self-reported smoking cessation status for some participants. Second, reliance on telephone interviews and patient self-reporting to record missing data in addition to the standard filing system constitutes a limitation in terms of data completeness and objectivity. Finally, the unavailability of varenicline (due to its withdrawal from the market) and the subsequent introduction of cytisine significantly influenced the therapeutic medication selection process during the study period.

Strengths

This study presents a noteworthy strength as it is, to our knowledge, the first accessible thesis study addressing smoking cessation treatment using cytisine. Furthermore, its comprehensive structure, encompassing results obtained from various treatment modalities including bupropion, varenicline, cytisine, and Nicotine Replacement Therapy (NRT), makes this study a valuable contribution to the field.

Conclusion and Recommendations

Smoking cessation rates were found to be higher in patients receiving combination therapy compared to those using monotherapy or other treatment options. A positive correlation was observed between increased treatment adherence and higher cessation rates. In this regard, it is recommended that efforts be intensified to enhance patients' smoking cessation motivation during treatment sessions.

Ethical approval

The study protocol was approved by the Ethics Committee of Samsun University Faculty of Medicine (Approval No: 2023/18/10, dated October 4, 2023). Written informed consent was obtained from all patients at their initial visit.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: OÖ, Data collection: EC, analiysis and interpretation of

results: EC, draft manuscript prepation: AG, OÖ, EC. 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 to disclose.

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Research Article

A descriptive study of cytisine treatment in a family medicine smoking cessation clinic: short-term outcomes and experiences

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ABSTRACT

Objective: The aim of this study was to investigate patients' use of cytisine prescribed as a smoking cessation medication, the frequency of observed side effects, and smoking cessation rates at the Marmara University Family Medicine Smoking Cessation Clinic, thereby laying the groundwork for future research on cytisine use in Turkey.

Methods: The descriptive study included 256 participants who applied to the Marmara University Department of Family Medicine's Smoking Cessation Clinic between May 2024 and March 2025 and underwent cytisine treatment. Participants' sociodemographic characteristics, smoking status, cytisine use, and treatment processes were retrospectively collected via a questionnaire administered through telephone interviews. Tobacco dependence level was assessed using the Fagerström nicotine dependence test (FNDT). The dependent variable of the study is smoking cessation status; the independent variables are age, gender, education level, smoking burden, medication completion, and attendance at follow-up appointments. Data were analyzed using SPSS 25.0 software, and $p<0.05$ was considered statistically significant.

Results: The average age of participants was 40.7±0.9 years, the average FNDT score was 6.3±2.2, and the average smoking burden (pack/year) was 24.9±1.3. In our study, 31% of individuals who initiated cytisine treatment were not smoking at follow-up. The proportion of participants who remained non-smoking status at assessment was significantly higher among those with lower smoking burden, those who attended follow-up appointments, those with higher perceived income, and those who completed the medication ($p=0.027$, $p=0.035$, $p\leq0.001$, $p=0.020$). In multivariable analysis, higher perceived income independently predicted non-smoking status at follow-up (aOR=1.91, $p=0.004$), whereas treatment completion showed borderline significance.

At least one side effect was observed in 31.5% (n=79) of participants; the most commonly reported were nausea (10.2%), palpitations (3.9%), dizziness (3.5%), and mood changes (3.5%).

Conclusion: In this real-world clinical setting, 31% of patients receiving cytisine were classified as non-smokers at follow-up. In the context of limited national data, these results offer exploratory evidence to guide the design of future randomized controlled trials.

Keywords: cytisine, smoking cessation, nicotine addiction

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Introduction

Tobacco use is a major public health threat worldwide, causing more than 8 million deaths each year. More than 7 million of these deaths are directly related to diseases caused by tobacco consumption, such as lung cancer, ischemic heart disease, stroke, and chronic obstructive pulmonary disease. Approximately 1.3 million people die each year from exposure to secondhand smoke without ever having smoked themselves.[1,2] Today, nicotine replacement therapy (NRT), varenicline, and bupropion are considered the most effective methods for quitting smoking.[3] A lesser-known drug is cytisine, a plant-based alkaloid derived from the seeds of Cytisus laburnum (golden rain acacia), which was approved as a smoking cessation treatment in Bulgaria in 1964.[4] Although the popularity of cytisine has fluctuated over time, its use has increased markedly in recent years.[3] Recent clinical studies have demonstrated cytisine's effectiveness in smoking cessation, and this drug has been included in the World Health Organization's Clinical Practice Guideline on Smoking Cessation in Adults.[5] Cytisine has a strong affinity for the α4β2 subtype receptor and acts as a partial agonist of the acetylcholine nicotinic cholinergic receptor.[6] Studies have shown that cytisine has a relatively short elimination half-life of about 4.8 hours, and nearly all of the compound (around 95%) is eliminated unchanged through the urine. A notable feature of its pharmacokinetic profile is that it undergoes virtually no hepatic metabolism.[7] It may help alleviate nicotine withdrawal symptoms. These characteristics make cytisine a cost-effective treatment for smoking cessation.[8]

The recommended dosage regimen for cytisine used in our country is a 25-day tapering regimen, starting with six tablets daily at 2-hour intervals, followed by gradual dose reduction throughout treatment.[9]

The most commonly reported side effects are nausea, vomiting, insomnia, taste changes, dry mouth and throat, loss of appetite, and a slight increase in blood pressure. It has also been noted that high doses of cytisine may cause dizziness and muscle weakness.[3,5] However, it has been shown that reducing the dose alleviates these side effects, and symptoms resolve after discontinuation of the drug. Cytisine does not cause psychophysical changes and is therefore considered a safe option for people who drive or operate machinery.[8]

In a randomized controlled trial comparing cytisine with placebo, cytisine was found to have higher smoking cessation rates compared to placebo. In follow-ups lasting longer than 6 months, cytisine was found to promote longer smoking cessation and showed no significant difference from placebo in terms of serious side effects.[6]

In a study conducted in Australia, cytisine treatment administered for 25 days was compared with 84-day varenicline treatment in smokers motivated to quit. Cytisine was reported to show smoking cessation outcomes comparable to varenicline and was associated with fewer reported adverse effects and lower treatment discontinuation rates.[10,11] Some systematic reviews and indirect comparisons have also suggested that cytisine may have a more favorable adverse effect profile compared with bupropion; however, these findings should be interpreted cautiously because of the indirect nature of the comparisons, heterogeneity between studies, and varying levels of evidence certainty.[12,13]

In another study conducted among individuals motivated to quit smoking, cytisine was associated with higher smoking cessation rates than NRT. Participants in the cytisine group reported fewer withdrawal symptoms, reduced cigarette consumption, and a longer time to relapse. However, self-reported adverse effects during the 6-month follow-up period were approximately

twice as common in the cytisine group compared with the NRT group.[14,15]

Based on research and clinical practice results, cytisine can be considered a promising option for smoking cessation treatment, as it is less expensive than other treatment options and effective in alleviating nicotine withdrawal symptoms.[16] A systematic review also indicated that new studies are needed to explore the balance between the advantages of accessibility and affordability in low- and middle-income economies and the modest efficacy demonstrated for cytisine to date.[17]

It is available as a generic or prescription drug in at least 18 countries. In Canada, it was licensed as an over-the-counter natural health product in 2017 and began to be sold by prescription in the UK in January 2024.[7,18] In Turkey, since 2024, it has been provided by the Ministry of Health and distributed to patients with appropriate indications free of charge and without a prescription through the Tobacco Addiction Treatment Monitoring System (TUBATİS).[19] Since then, cytisine has been used in patients who have applied to quit smoking to the Department of Family Medicine's Smoking Cessation Clinic of Marmara Pendik Education and Research Hospital.

There is limited national data regarding cytisine, which has only recently been introduced for smoking cessation treatment in our country. The aim of this study was to investigate patients' use of cytisine prescribed as a smoking cessation medication, the frequency of observed side effects, and smoking cessation rates. Furthermore, due to the limited availability of national data on cytisine use, this study is expected to contribute to the literature.

Materials and Methods

This research is a descriptive study conducted between April 2025 and July 2025.

Setting and sample size

The study population consists of all patients who applied to the Marmara University Department of Family Medicine's Smoking Cessation Clinic between May 2024 and March 2025 and received cytisine treatment. It was aimed to reach the entire population without sampling.

Inclusion and exclusion criteria

Participants aged 18–65 years who initiated cytisine treatment were included in the study, as cytisine is approved for use within this age range. Patients who obtained the medication but did not use it were excluded from the study. In addition, patients receiving additional pharmacological treatments that could affect smoking cessation outcomes, including antidepressants and other smoking cessation medications, were not included in the study. No participants reported electronic cigarette use at the time of admission.

Design of study

Researchers contacted 347 patients who applied to the Marmara University Department of Family Medicine's Smoking Cessation Clinic between May 2024 and March 2025 and underwent cytisine treatment via the contact numbers registered in the system. During the study period, 642 patients attended the smoking cessation clinic; 347 received cytisine, 22 bupropion, 218 nicotine replacement therapy (NRT), and 55 did not receive any medication/NRT.

Participants were read the voluntary information and consent form, and those who verbally agreed to participate in the study were included in the research. Those who did not answer the call were called at least three times on consecutive days. Seventy-seven participants did not answer the calls, and two did not wish to participate in the study. Twelve participants were excluded from the study because they had never used cytisine treatment. The study was completed with 256

participants. A schematic representation of the sample obtained at the end of the study is shown in Figure 1.

Researchers administered a 15-question survey to participants during a telephone interview, which included questions about their sociodemographic characteristics, smoking cessation status, development of side effects, medication completion status, and attendance at follow-up appointments. Smoking status was assessed based on participants' self-reports. At follow-up, participants were asked directly whether they were still smoking or had quit smoking, and smoking cessation status was classified accordingly. No biochemical verification was performed. The questions were read aloud by the researcher during the interview. The patient's level of dependence was assessed using the Fagerström nicotine dependence test (FNDT) score available in the system. The Turkish validity and reliability of the FNDT have previously been demonstrated.[20] The scores were classified as '0-4 points' for low dependence, '5 points' for moderate dependence, and '6-10 points' for very high dependence.[1,16]

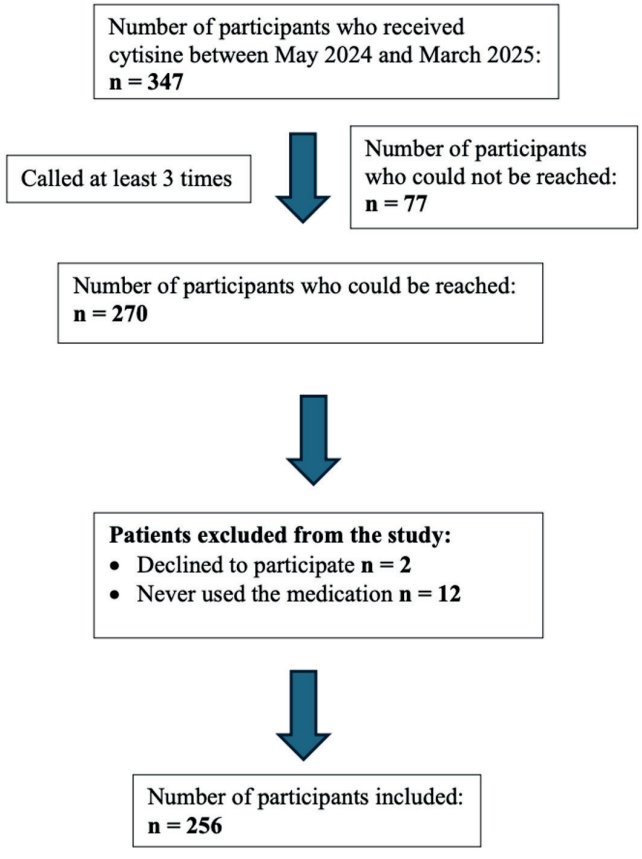

Figure 1. Sample schematic representation of the study

The dependent variable of the study is the patients' current smoking status. The independent variables are the patients' age, gender, education level, smoking burden (pack/year), medication completion status, and status of attendance at follow-up visit.

Data analysis

SPSS for Windows 25.0 software was used for statistical analysis and data recording. Data showing a normal distribution are presented as mean ± standard deviation (SD), while data not showing a normal distribution are presented as median (minimum–maximum) values. Categorical data are presented as number (n) and percentage (%). Perceived income was initially recorded in three categories; however, for regression analysis, it was recategorized into two groups due to the limited number of participants in some categories and to improve model stability. Normal distribution was assessed using visual (graphs) and analytical methods (Kolmogorov–Smirnov/Shapiro–Wilk tests). The Mann–Whitney U test was used to compare two independent groups in non-normally distributed data, while the independent samples t-test was used for normally distributed data. The chi-square test was applied to compare categorical data. To identify factors associated with smoking cessation, multivariable logistic regression analysis was performed. Missing data for perceived income and FNDT score were handled using multiple imputation with fully conditional specification. Five imputed datasets were generated, and pooled regression estimates were calculated according to Rubin's rules. Adjusted odds ratios (ORs) with 95%

confidence intervals (CIs) were reported. p<0.05 was accepted as the level of statistical significance. The manuscript was prepared in accordance with the relevant STROBE recommendations for observational studies.

Research ethics committee application and required permissions

Approval for the study was obtained from Marmara University Faculty of Medicine Clinical Research Ethics Committee (Protocol code: 09.2025.25-0320)

Results

In the study, 36.3% (n=93) of participants were female, and 63.7% (n=163) were male. The average age of participants was 40.7 ± 0.9. According to the FNDT, 19.8% (n=47) of participants are low level, 13.9% (n=33) are medium level, and 66.2% (n=157) are high level dependent. The mean FNDT score is 6.3 ± 2.2. The mean smoking burden (pack/year) of participants is 24.9 ± 1.3. Following medication use, 31% (n=79) of participants had quit smoking, while 69% (n=177) continued to smoke. The characteristics of all participants in the study, including smoking cessation status and characteristics related to cytisine use, are shown in Table 1.

Participants with a lower average smoking burden (pack-years) and those who attended follow-up examinations were more likely to report not currently smoking at the time of contact compared to others (p=0.027 and p=0.035, respectively). Furthermore, individuals with a high perceived income were more likely to report not currently smoking than those with a balanced or low perceived income (p<0.001). Factors that may affect participants' smoking status when using cytisine are presented in Table 2.

The multivariable logistic regression model was statistically significant (Omnibus test $\chi^2(5)=15.03$, p=0.010). Model fit was acceptable according to the Hosmer–Lemeshow test ($\chi^2=14.24$, p=0.076). The model explained approximately 11% of the variance in non-smoking status (Nagelkerke $R^2=0.112$). In the multivariable logistic regression model, higher perceived income (aOR=1.91, 95% CI 1.23–2.96, p=0.004) remained independently associated with non-smoking status at follow-up, whereas treatment completion (aOR=1.93, 95% CI 0.98-3.83, p=0.059) showed a borderline association and other variables were not independently associated (Table 3).

Among the participants, 44.2% completed the medication, while 55.8% did not. A higher proportion of those who completed the medication reported not currently smoking compared to those who did not complete the treatment (p=0.020). Among participants who did not complete the treatment, the median duration of medication use was 7 days (range: 1–24 days). Participants who stated that they “did not have difficulty following the medication doses”, attended more follow-ups, and experienced fewer side effects were statistically significantly more likely to complete the medication (p=0.028, p<0.001, p<0.001, respectively). The median duration of use among non-completers was 7 days (min: 1 day, max: 24 days). The reasons for discontinuing the medication among participants who did not complete the treatment were as follows; 34.9% stated “No reduction in the urge to smoke”, 27.9% stated ‘Side effects’, 22.7% stated “A reduction in the urge to smoke, did not need the medication”, 4.7% stated “The medication was left at another home/city/location and I could not access it”, and 4.6% stated “I had difficulty following the medication dosage.” Factors that could affect participants' completion of the drug are listed in Table 4.

Following medication use, 31.5% of participants (n=79) experienced at least one side effect, at least once. The most commonly observed side effects were nausea 10.2% (n=26), palpitations 3.9%

Table 1. Sociodemographic characteristics, smoking cessation status, and treatment-related characteristics of the participants

Variable	Category	n	%*
Marital Status [a]	Single/Divorced/Widowed	53	20.7
	Married	196	76.6
Education [b]	Middle school or below	90	36.6
	High school or above	156	63.4
Employment Status [c**]	Unemployed	67	27.3
	Employed	178	72.7
Perceived Income [d]	Income < Expenses	81	39.5
	Income = Expenses	88	42.9
	Income > Expenses	36	17.6
Living Arrangement [e]	Alone	25	10.1
	With spouse / children / others	222	89.9
Alcohol Consumption [f]	Yes	70	29.3
	No	169	70.7
Physical Activity [g]	Yes	124	53.0
	No	110	47.0
Chronic Disease [h]	Absent	152	60.8
	Present	98	39.2
Smoking cessation status	Non-smoking	79	31.0
	Smoking	177	69.0
Side effect [i]	Yes	79	31.5
	No	172	68.5
Cytisine completion status [j]	Yes	111	44.2
	No	140	55.8

Numbers of the participants did not provide a response = a:7 b:10 c:11 d:51 e:21 f:17 g:22 h:6 ı:5 j:5
*Valid percentage is used** Employment status was recategorized as employed/not employed for analysis due to small cell counts; the not employed group included unemployed participants, students, retirees, and homemakers.

(n=10), dizziness 3.5% (n=9), and mood changes 3.5% (n=9).While nausea was the most frequent adverse effect, chest pain resulted in the highest rate of drug discontinuation when it occurred (n =4, 80%).The incidence of side effects and discontinuation of medication due to side effects among participants is shown in Table 5. Among participants who did not complete the treatment, the most common reason for medication discontinuation was “lack of reduction in the urge to smoke” (34.9%). This was followed by “adverse effects” (27.9%) and “unwillingness to continue the medication once a reduction in the urge to smoke was achieved” (22.7%) (Figure 2).

Discussion

In our study, 31% of individuals who initiated cytisine treatment reported abstinence from smoking. Among the participants, 44.2% completed the full drug dosage regimen. The most frequently reported side effect was nausea; however, chest pain was the symptom most commonly leading to treatment discontinuation. The present study demonstrated a significant association between smoking abstinence and higher perceived income level, treatment completion, attendance at follow-up visits, and smoking burden. In the multivariable logistic regression model, higher

Table 2. Categorical and continuous factors associated with non-smoking status

Factor	Smoking n (%)*	Non-smoking n (%)*	p value
Attending follow-up visits			0.035
Yes	59 (34.5)	37 (48.7)	
No	112 (65.5)	39 (52.7)	
Completion of treatment			0.020
Yes	69 (39.4)	42 (55.3)	
No	106 (60.6)	34 (44.7)	
Difficulty following medication doses			0.562
Disagree	124 (76.5)	56 (80.0)	
Agree	38 (23.5)	14 (20.0)	
Previous quit attempts			0.683
Yes	138 (80.7)	63 (82.9)	
No	33 (19.3)	13 (17.1)	
Side effects			0.510
Yes	57 (32.8)	22 (28.6)	
No	117 (67.2)	55 (71.4)	
Education level [a]			0.096
Middle school or below	68 (40.0)	22 (28.9)	
High school or above	102 (60.0)	54 (71.1)	
Perceived income status [b]			<0.001
Income ≤ expenses	126 (88.1)	43 (69.4)	
Income > expenses	17 (11.9)	19 (30.6)	
Alcohol use [c]			0.052
Yes	42 (25.5)	28 (37.8)	
No	123 (74.5)	46 (62.2)	
Chronic disease history [d]			0.590
Yes	70 (40.0)	28 (36.8)	
No	103 (59.5)	48 (63.2)	
	Mean ± SD	**Mean ± SD**	
Age	41.0 ± 10.6	40.7 ± 11.1	0.873
FNDT** score	6.4 ± 2.1	6.0 ± 2.3	0.191
Smoking load (pack-years)	26.6±16,5	21.7±16,1	0.027

*Valid percentage is used **FNDT: Fagerström Nicotine Dependence
Numbers of the participants did not provide a response a:10, b: 51, c:17, d:7.
Independent Samples t-test and Pearson Chi-Square Test was used.
Perceived income was recategorized for analysis.

perceived income (aOR=1.91, p=0.004) remained independently associated with non-smoking status at follow-up, whereas treatment completion (aOR=1.93, p=0.059) showed borderline statistical significance, and the other variables were not independently associated with the outcome. This association may reflect differences in psychosocial resources, treatment adherence, health literacy, or access to supportive environments.

In the literature, smoking cessation rates associated with cytisine are generally similar to those observed in our study, although lower

Table 3. Multivariable logistic regression analysis of factors associated with non-smoking status (multiple imputation, pooled results, n=256)

Variable	B	Standard error	Adjusted OR (95% CI)	p value
Treatment completion	0.659	0.349	1.93 (0.98–3.83)	0.059
Perceived income	0.648	0.224	1.91 (1.23–2.96)	0.004
FNDT score	-0.161	0.209	0.85 (0.57–1.28)	0.440
Smoking load(pack-years)	-0.013	0.010	0.99 (0.97–1.01)	0.225
Follow-up attendance	0.188	0.356	1.21 (0.60–2.43)	0.597

Model statistics: Omnibus test of model coefficients: $p < 0.05$, Hosmer–Lemeshow test: $p > 0.05$ across imputations, Nagelkerke $R2 \approx 0.11$
Multiple imputation: Fully conditional specification, 5 imputations; missingness: perceived income 19.9%, FNDT 7.8%; pooled according to Rubin's rules.B: Regression Coefficient
SE: Standard Error
OR: Odds Ratio
Perceived income was recategorized for regression analysis.

Table 4. Factors Associated with Completion of Cytisine Treatment

Factor	Completed treatment n (%)*	Did not complete treatment n (%)*	p value
"I had difficulty following the medication doses" [a]			0.028
Disagree	85 (84.2)	92 (71.9)	
Agree	16 (15.8)	36 (28.1)	
Attending follow-up visits [b]			<0.001
Did not attend	45 (41.7)	103 (76.3)	
Attended	63 (58.3)	32 (23.7)	
Side effects during cytisine use [c]			<0.001
Yes	19 (17.3)	59 (42.8)	
No	92 (82.7)	79 (57.2)	
Chronic disease history [d]			0.130
Yes	37 (34.3)	60 (43.8)	
No	71 (65.7)	77 (56.2)	
Alcohol use [e]			0.590
Yes	24 (23.1)	45 (34.4)	
No	80 (76.9)	86 (65.6)	

Pearson Chi-Square Test was used
Numbers of the participants did not provide a response= a: 27, b:13, c:7, d:11, e:21
*Valid percentage is used

rates have also been reported. Walker et al. reported 6-month smoking cessation rates of 22% for cytisine and 15% for NRT.[4] In another study by the same authors, comparing cytisine with varenicline, cessation rates were 22.9% and 17.5%, respectively.[15] A review reported successful smoking cessation in approximately 18–23% of individuals using cytisine.[17] In a study evaluating biochemically verified abstinence at 6 months, smoking cessation rates were reported as 50.5% for cytisine, 55.9% for varenicline, and 51.0% for NRT.[11] The higher cessation rates observed in that study may be related to differences in treatment duration, behavioral support, and study design.

A retrospective study from Türkiye reported that 61.5% of patients receiving cytisine achieved smoking cessation during the early treatment period.[21] Differences in study design, follow-up

Table 5. Side effect and treatment discontinuation due to side effect among participant

Side effect	Total n(%)	Discontinued due to side effect	
		Yes n/N (%)	No n/N (%)
Nausea	26(10.2)	15/26(57.6)	11/26(42.3)
Palpitations	10(3.9)	5/10(50.0)	5/10(50.0)
Dizziness	9(3.5)	4/9(44.4)	5/9(55.6)
Mood changes	9(3.5)	4/9(44.4)	5/9(55.6)
Heartburn / epigastric pain	8(3.1)	2/8(25.0)	6/8(75.0)
Sleep disturbances	7(2.7)	2/7 (%28.5)	5/7 (%71.5)
Dry mouth	5(2.0)	2/5 (%40.0)	3/5 (%60.0)
Chest pain	5(2.0)	4/5(80.0)	1/5(20.0)
Fatigue	5(2.0)	3/5(60.0)	2/5(40.0)
Other(diarrhea,itching eg.)	19(7.4)	9/19(47.3)	10/19(52.7)

Some participants experienced more than one side effect.

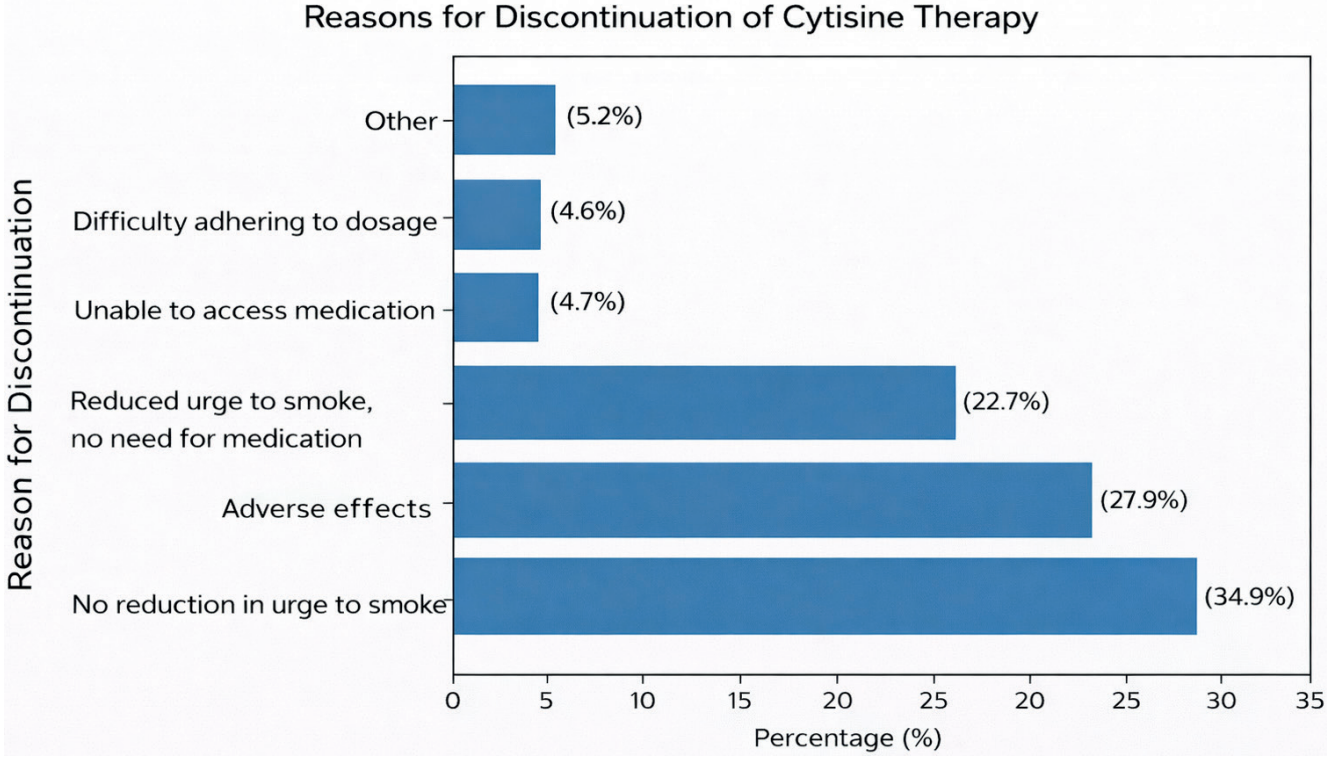

Figure 2. Reasons for discontinuation of cytisine therapy among participants who did not complete treatment

duration, and outcome assessment methods may explain the higher cessation rates compared with our findings. Since our study had a descriptive and cross-sectional design, smoking cessation status and follow-up periods varied among participants. Therefore, comparisons with long-term outcomes from randomized controlled trials should be interpreted cautiously.

In our study, 31.5% of participants experienced at least one side effect during cytisine treatment. Walker et al. reported that comparing varenicline with cytisine, the proportion of participants experiencing the most common adverse effects was 32%, which is similar to our study.[4] The most common side effect in our study was nausea, occurring in 10.2% (n=26) of participants. Gastrointestinal adverse effects, particularly nausea, were among the most commonly reported side effects associated with cytisine treatment in previous studies and systematic reviews.[17] In the study by Vinnikov et al.; dyspepsia, nausea, and headache were the most common side effects in the cytisine group.[22] In the study by West et al. comparing cytisine with placebo, gastrointestinal complaints were more common in the cytisine group than in the placebo group.[6] In the study by Walker et al., side effects such as nausea, vomiting, and sleep disturbances were significantly more common in the cytisine group compared to the NRT group (4.6% vs. 0.03%; p=0.0002).[15] In the study by Rigotti et al., adverse events were reported in 4.4% of patients in the cytisine group, with gastric complaints, headache, and sleep disturbances being the most common. (1.4%, 0.9%, and 0.5%, respectively).[23]

In our study, palpitations were observed in 3.9% (n = 10) of participants, making it the second most common side effect. In one study included in a meta-analysis, tachycardia was reported in 62 of 388 patients (16%), while in another, mild tachycardia was reported in 3 of 70 patients (4%).[24] In our study, 50% of participants who experienced palpitations discontinued the drug because of this side effect; no similar information was found in the literature. Drug-related side effects may reduce treatment adherence and may be associated with lower smoking cessation rates. Therefore, careful monitoring and patient counselling regarding potential adverse effects may be important during treatment. Differences in adverse event rates across studies may also reflect variations in study populations, adverse event reporting methods, and treatment protocols.

Limitations and strengths: Due to the single-center, descriptive, and cross-sectional design of the study, causal relationships could not be established and no control group was included. This limits the comparative interpretation and generalizability of the findings, as well as the ability to clearly demonstrate the effect of the intervention. Additionally, the retrospective nature of data collection may have introduced recall bias and resulted in incomplete responses to some questions. The absence of biochemical verification and reliance solely on self-reported smoking status represent additional limitations. Furthermore, only short-term smoking status at follow-up was assessed; therefore, no conclusions can be drawn regarding the long-term effectiveness of cytisine in maintaining smoking abstinence. Because the interval between treatment initiation and telephone assessment varied among participants, follow-up duration was not uniform across the study population.

While most studies in the literature focus on patients who completed the full treatment protocol—typically defined as using the medication for at least 25 days—our study included individuals who attended the smoking cessation clinic and used cytisine for at least one day (1 tablet every 2 hours, 6 tablets per day). Although this approach does not allow conclusions regarding the full treatment regimen, it provides real-world information about patients who discontinued treatment early.

Of the 347 patients who initiated cytisine treatment, 256 were included in the final analysis. Missing data from the remaining participants may have influenced the observed smoking cessation rates. If all non-respondents had continued smoking, the proportion of non-smoking participants would decrease from 31% to 22.8%. Therefore, the true proportion of non-smoking likely lies between 22.8% and 31%, depending on the smoking

status of non-respondents. Because baseline demographic and dependence characteristics of non-respondents were unavailable, formal comparisons could not be performed. If non-respondents had higher nicotine dependence, lower adherence, or lower motivation, the observed smoking cessation proportion may represent an overestimate. Therefore, the findings should be interpreted cautiously in light of potential selection bias.

Only variables measured in this study were included in the regression model. However, unmeasured factors such as motivation to quit smoking, psychiatric comorbidities, and counseling or social support may also have influenced treatment adherence and smoking cessation outcomes. Therefore, the results should be interpreted with possible residual confounding in mind.

Conclusion

This study provides real-world data regarding the short-term smoking status and tolerability of cytisine treatment in a family medicine smoking cessation clinic. Approximately one-third of participants reported non-smoking status at follow-up. These findings suggest that cytisine may represent a feasible and accessible smoking cessation option in primary care settings.

Further studies with larger sample sizes, randomized controlled designs, and longer follow-up periods are needed to better evaluate the long-term effectiveness of cytisine in smoking cessation clinics in our country. In addition, future studies evaluating cytisine together with counseling support in primary care settings may provide further insight into treatment adherence and sustained smoking cessation outcomes.

Ethical approval

Approval for the study was obtained from Marmara University Faculty of Medicine Clinical Research Ethics Committee with the protocol code 09.2025.25-0320 dated 18.04.2025.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: HV, MA, GPCU; data collection: HV; analysis and interpretation of results: HV, BUK, MA, GPCU; draft manuscript preparation: HV, BUK, GPCU. 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 to disclose.

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Declaration of generative AI and AI-assisted technologies in the writing process

During the revision of this manuscript in May 2026, the artificial intelligence program ChatGPT was used only to assist with language editing, grammar correction, and improving clarity of expression. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Research Article

Reflections of digital transformation and integration systems in healthcare: family medicine a cross-sectional study

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ABSTRACT

Objective: Primary healthcare services constitute the initial point of contact within the healthcare system and play a fundamental role in terms of efficiency, evidence-based decision-making, and sustainability. Within the scope of the "Digital Transformation and Integration System in Healthcare," developed to enhance the effectiveness of the family medicine system in Türkiye and ensure service integration, a contact registration desk and a Family Medicine Convenience Polyclinic have been established at our center. This study aims to evaluate the demographic and clinical characteristics, reasons for presentation, and patient satisfaction levels of individuals presenting to the registration desk located in the Family Medicine Convenience Polyclinic.

Methods: This cross-sectional study included 312 patients who presented to the registration desk at the Family Medicine Convenience Polyclinic of Gülhane Training and Research Hospital between January 1, 2025, and June 30, 2025. Data were obtained from the hospital information management system and a questionnaire form prepared in accordance with the literature. The Patient Satisfaction Assessment Short Form (PSASF) consists of seven items on a 5-point Likert scale, with higher scores indicating greater levels of dissatisfaction. Chi-square, Fisher's exact, and Mann-Whitney U tests were used in the data analysis; significant variables were included in multivariate logistic regression analysis. Based on G*Power analysis (80% power, α=0.05), a minimum of 250 participants was deemed sufficient; 312 patients found suitable during the study period were included in the analyses.

Results: The median age of participants was 45 years, and 79.8% were female; 40.7% were university graduates, 44.2% had at least one chronic disease, and 76.6% of applications were for radiological examination purposes. The overall satisfaction rate is 92.6%, with the highest satisfaction related to the respectful attitude of the healthcare staff (66.0%) and the lowest satisfaction related to the time spent with the doctor (33.0%). When comparing satisfied and dissatisfied groups, female gender (p=0.019), advanced age (p<0.001), low education level (p=0.050), and the presence of chronic disease (p=0.024) were found to be significantly related to satisfaction, while no significant difference was found in terms of the reason for referral (p=0.064). In the univariate model of the logistic regression analysis, age (p=0.001), gender (p=0.023), education level (p=0.052), comorbidities (p=0.031), and reason for referral (p=0.070) were found to be associated with satisfaction; while in the multivariate analysis, only being in the ≥45 age group was shown to be independently associated with satisfaction (OR=9.77; 95% CI: 1.80–53.06; p=0.008).

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Conclusion: The "Digital Transformation and Integration System in Healthcare" model has been demonstrated to increase efficiency in the healthcare system and strengthen patient satisfaction. The findings indicate that expanding digital integration may provide significant contributions to improving accessibility, service quality, and inclusivity in primary healthcare services.

Keywords: family medicine, patient satisfaction, digital integration, primary healthcare services

Introduction

Primary healthcare services constitute the initial point of contact for individuals within the healthcare system and represent a fundamental component of an effective, accessible, and sustainable healthcare framework. The robust delivery of these services is critically important for preserving public health, supporting evidence-based decision-making processes, and ensuring the efficient utilization of healthcare resources. The World Health Organization (WHO) emphasizes that strong primary healthcare services are indispensable for the continuity and effectiveness of healthcare systems.[1,2] In Türkiye, the Family Medicine System (FMS), implemented in 2010, aims to provide integrated, continuous, and patient-centered primary healthcare services. The system ensures easy access for every citizen to preventive, curative, and rehabilitative health services through an assigned family physician.[3] In conjunction with the Health Transformation Program, the restructuring of primary healthcare services has enabled the holistic delivery of preventive and curative services. The widespread adoption of the Family Medicine model has contributed to increased patient satisfaction, improved access to services, and strengthened physician-patient communication.[4]

Various studies have reported that some individuals utilize family medicine services to a limited extent or prefer to apply directly to hospitals. The restricted availability of laboratory and imaging facilities within Family Health Centers (FHCs) leads to delays in diagnostic and treatment processes, necessitating referrals to secondary or tertiary healthcare institutions.[5] This situation is associated with a lack of awareness regarding service access, inadequacies in referral processes, and deficiencies in intra-system coordination.[5,6] Consequently, unnecessary referrals may result in both time loss and wastage of workforce and resources within the healthcare system.[7] To mitigate these issues and ensure comprehensive integration in healthcare services, the Ministry of Health of the Republic of Türkiye has implemented the "Digital Transformation and Integration System." This system has facilitated digital data flow between primary healthcare institutions and secondary and tertiary hospitals; additionally, a new initiative named "Family Medicine Convenience Polyclinics" has been developed. These polyclinics are structures where family physicians can refer patients for advanced examinations and evaluations while also providing access to laboratory and imaging services.[8] Thus, direct applications by patients to secondary or tertiary institutions are prevented; the service capacity of family physicians is enhanced, and efficiency within the healthcare system is achieved. This model has the potential to increase efficiency in administrative and clinical decision-making processes by accelerating transitions between primary care and hospital services.

International literature demonstrates that enhancing the competencies of primary care physicians reduces unnecessary referrals, improves service quality, and contributes to the overall cost-effectiveness of the healthcare system.[9,10] In this context, evaluating the field applicability and impact on patient satisfaction

of innovative models such as Family Medicine Convenience Polyclinics becomes increasingly important. The aim of this study is to analyze the sociodemographic characteristics, reasons for presentation, referral sources, and performed examinations of patients presenting to the registration desk of the Family Medicine Convenience Polyclinic established under the "Digital Transformation and Integration System," and to elucidate the contributions of this new system to access to healthcare services and referral processes. The findings are expected to contribute to the development of primary healthcare services and to the more efficient utilization of resources within the system.

Materials and Methods

This study encompasses patients who presented to the registration desk of the Family Medicine Convenience Polyclinic at Gülhane Training and Research Hospital between January 1, 2025, and June 30, 2025. Using the hospital information management system, a list of patients who presented to the polyclinic during the specified period was generated, and individuals on the list were contacted by telephone to be informed about the study. Written informed consent was obtained from participants who agreed to participate; those unable to provide written consent were included upon verbal consent.

Using the G*Power 3.1 program for sample size analysis, it was calculated that at least 250 participants should be included in the study under the assumptions of 80% power (1-β=0.80), 5% significance level (α=0.05), and a medium effect size. Considering possible data loss and non-participation, the target sample size was planned to be 350 individuals. A total of 323 patients who visited the outpatient clinic during the specified time period were evaluated; after excluding individuals who could not be reached or who refused to participate, 312 patients were included in the study, and the analyses were performed on this sample (Figure 1)

Data collection process

Data were collected from clinical information obtained through the hospital information management system and a questionnaire form prepared by the researchers in accordance with the literature. The questionnaire consists of two sections:

1. The first section comprises questions assessing sociodemographic (age, gender, education level, marital status, presence of chronic disease, etc.) and clinical characteristics.
2. The second section includes the Patient Satisfaction Assessment Short Form (PSASF).

Patient satisfaction was measured using the 7-item, 5-point Likert-type PSASF. The total score of the scale ranges from 0 to 28, with higher scores indicating greater levels of dissatisfaction. The sixth item of the scale is reverse-coded. According to the original classification, scores of 0–10 are rated as "very satisfied," 11–18 as "satisfied," 19–26 as "dissatisfied," and 27–28 as "very dissatisfied."

The PSASF was developed by Hawthorne et al.[11] and adapted into Turkish by Temeloğlu Şen and Sertel Berk.[12] It has been reported that the scale has a single-factor structure and an internal consistency coefficient of Cronbach's alpha = .87.

In this study, due to the low number of patients in subgroups, the scoring was reclassified into two categories: 0–18 as "satisfied" and >18 as "dissatisfied." The questionnaire was administered either face-to-face or by telephone based on participant preference; the same standardized form was used in both methods.

Statistical analysis

Statistical analysis of the data was performed using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA). The distribution

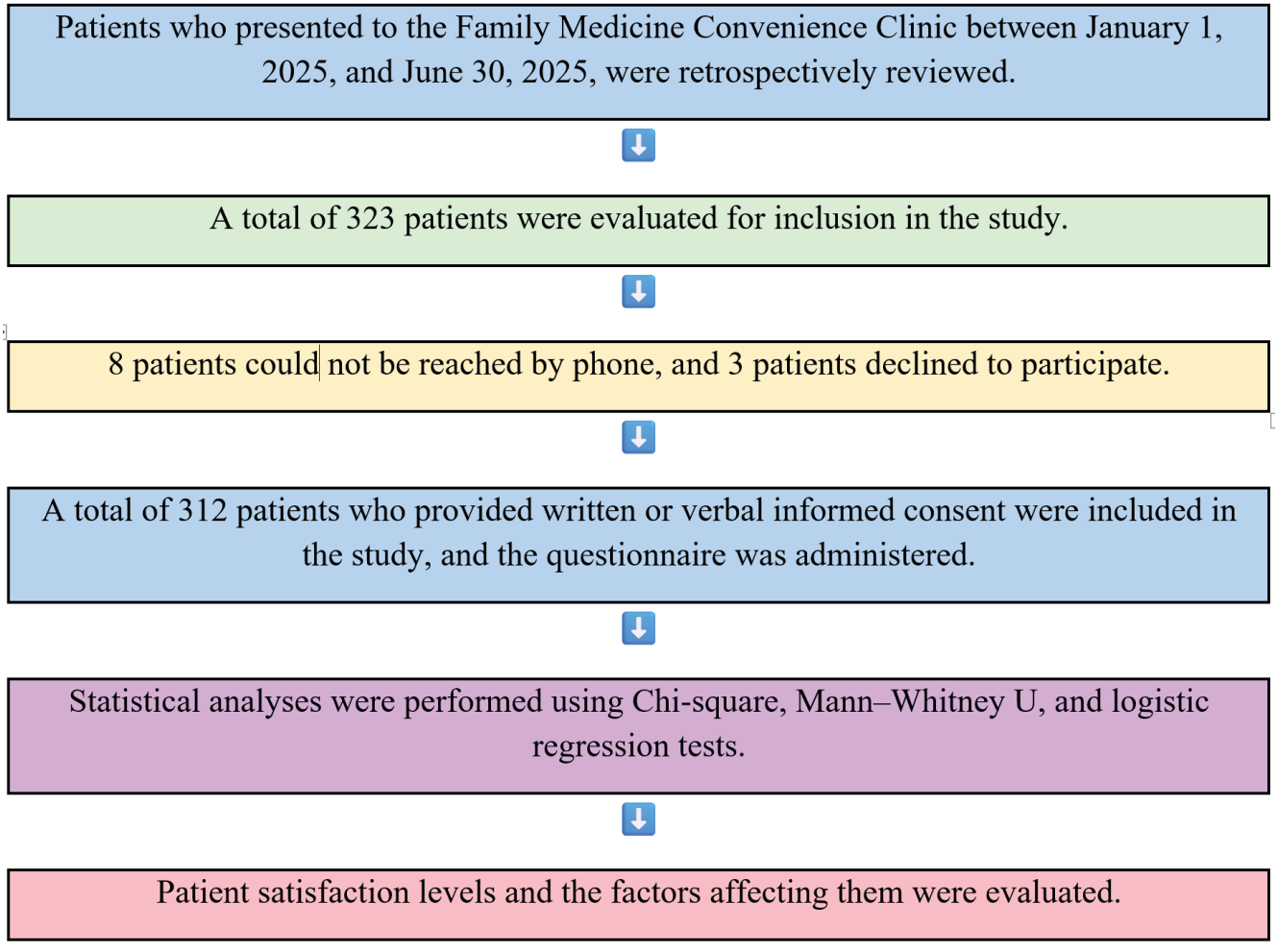

Figure 1. Workflow diagram

of continuous variables was assessed with the Kolmogorov–Smirnov test; data not following a normal distribution were presented as median (minimum–maximum). Categorical variables were expressed as frequency (percentage). For intergroup comparisons, the chi-square test or Fisher's exact test (when appropriate) was used for categorical variables, and the Mann–Whitney U test was used for continuous variables. Statistical significance was accepted at $p<0.05$ in all analyses.

Results

The median age of the 312 patients included in the study was 45 (min: 0, max: 70). Of the participants, 79.8% were female and 20.2% were male. Regarding educational attainment, the highest proportion was observed among university graduates (40.7%). At least one chronic disease was present in 44.2% of the patients. Examination of the reasons for presentation revealed that 76.6% of the patients presented to the convenience polyclinic for radiological examinations, while 23.4% applied for laboratory tests. The demographic and clinical characteristics of the participants are summarized in Table 1.

When satisfaction levels of patients presenting to the polyclinic were evaluated, 59.6% reported being very satisfied with treatment or care outcomes, 62.5% with explanations provided by physicians or other healthcare professionals, 62.2%

with attentive behavior during the examination process, and 60.3% with their involvement in health-related decisions. A total of 66.0% of patients indicated being very satisfied with the respectful attitude of healthcare personnel, representing the highest level of satisfaction. The lowest satisfaction rate, at 33.0%, was reported regarding the time spent with the physician. The detailed distribution of these findings is presented in Table 2.

Examination of parameters reflecting patient satisfaction revealed an overall satisfaction rate of 92.6% (n = 289). When stratified by age group, the satisfaction level among individuals in the advanced age group (98.7%) was significantly higher compared to the younger age group ($p < 0.001$). Furthermore, statistically significant associations were identified between satisfaction level and female gender ($p = 0.019$), lower education level ($p = 0.050$), and the presence of chronic disease ($p = 0.024$). Accordingly, satisfaction rates were higher among female patients, those with lower educational attainment, and individuals with chronic conditions. In contrast, no significant difference was observed between the reason for application (radiological or laboratory examination) and satisfaction level ($p = 0.064$) (Table 3).

Table 1. Demographic and clinical characteristics of patients admitted to the family medicine convenience clinic (n = 312)

Variable	n	%
Age (years)	Median = 45 (Min = 0, Max = 70)	
Gender		
Female	249	79.8
Male	63	20.2
Education level		
Primary school	109	34.9
High school	76	24.4
University	127	40.7
Accompanying illness		
Yes	138	44.2
No	174	55.8
Reason for application		
Radiology examination	239	76.6
Laboratory examination	73	23.4

Factors associated with patient satisfaction among patients visiting the Convenience Clinic were initially examined using univariate logistic regression analysis. In the univariate analysis, age ($p=0.001$), gender ($p=0.023$), education level (overall $p=0.052$), comorbidities ($p=0.031$), and reason for visit ($p=0.070$) were found to be statistically related to patient satisfaction. Variables showing significance at the $p<0.10$ level in univariate analysis were included in the multivariate logistic regression model. Multivariate analysis revealed that only the age variable remained independently associated with patient satisfaction (OR=9.77; 95% CI: 1.80–53.06; $p=0.008$). The variables of gender ($p=0.684$), education level (overall $p=0.442$), presence of comorbidities ($p=0.595$), and reason for referral ($p=0.919$) lost their statistical significance in the multivariate model (Table 4).

Discussion

This study evaluated the real-world effects of digital integration between primary healthcare services and hospital services. The patient satisfaction evaluated in this study reflects the perception of the services provided within the scope of the Family Medicine Convenience Clinic and covers the participants' experiences regarding the examination approval and referral process they received through the clinic. In this context, the findings obtained should not be directly compared with satisfaction levels regarding general hospital services or other clinics and should only be interpreted within the framework of the Convenience Clinic application. The Convenience Polyclinic model has been shown to facilitate access to healthcare services, improve the patient experience, and increase overall satisfaction levels.

Table 2. Patient satisfaction levels according to the short form of patient satisfaction evaluation (n, %)

Survey Question	Very satisfied n (%)	Satisfied n (%)	Neither satisfied nor dissatisfied n (%)	Dissatisfied n (%)	Very dissatisfied n (%)
How satisfied are you with the treatment or care outcomes?	186 (59.6)	60 (19.2)	20 (6.4)	29 (9.4)	17 (5.4)
How satisfied are you with the explanations provided by the doctor or other healthcare professional regarding the treatment/care outcomes?	195 (62.5)	45 (14.4)	38 (12.2)	24 (7.7)	10 (3.2)
How attentive was the doctor or other healthcare professional during the examination?	194 (62.2)	44 (14.1)	40 (12.8)	24 (7.7)	10 (3.2)
How satisfied are you with your level of participation in decisions regarding the healthcare you received?	188 (60.2)	58 (18.6)	42 (13.5)	14 (4.5)	10 (3.2)
How satisfied are you with the respect shown to you by the doctor or other healthcare professional?	206 (66.0)	47 (15.2)	35 (11.2)	12 (3.8)	12 (3.8)
Do you find the time spent with the doctor sufficient?	103 (33.0)	63 (20.2)	60 (19.2)	51 (16.4)	35 (11.2)
How satisfied are you with the general care shown to you at the hospital or clinic?	190 (60.9)	47 (15.1)	35 (11.2)	23 (7.4)	17 (5.4)

Table 3. Relationship between patient satisfaction level and demographic and clinical characteristics

Variable	Satisfied n (%)	Dissatisfied n (%)	p value
Age group (Median 45)			<0,001
Young age (<45)	137 (86.7)	21 (13.3)	
Old age (≥45)	152 (98.7)	2 (1.3)	
Gender			0.019
Female	235 (94.4)	14 (5.6)	
Male	54 (85.7)	9 (14.3)	
Education level			0.050
Primary school and below	70 (97.2)	2 (2.8)	
Middle school	37 (100)	0 (0)	
High school	68 (89.5)	8 (10.5)	
University and above	114 (89.8)	13 (10.2)	
Comorbidities			0.024
Present	133 (96.4)	5 (3.6)	
Absent	156 (89.7)	18 (10.3)	
Reason for referral			0.064
Radiology examination	225 (94.1)	14 (5.9)	
Laboratory examination	64 (87.7)	9 (12.3)	

Note: Data are presented as numbers (percentages). Differences between groups were assessed using the chi-square test or Fisher's exact test. p< 0.05 was considered statistically significant.

Table 4. Univariable and multivariable logistic regression analysis of factors associated with patient satisfaction

Variable	Univariable OR (95% CI)	p value	Multivariable OR (95% CI)	p value
Age ≥45 (vs <45)	11.65 (2.68–50.60)	0.001	9.77 (1.80–53.06)	0.008
Male (vs Female)	0.357 (0.147–0.869)	0.023	0.812 (0.297–2.217)	0.684
Education (overall)	—	0.052	—	0.442
High school (vs Primary)	0.159 (0.033–0.771)	0.022	0.337 (0.063–1.808)	0.204
University (vs Primary)	0.164 (0.036–0.743)	0.019	0.436 (0.080–2.365)	0.336
No comorbidity (vs Yes)	0.326 (0.118–0.901)	0.031	1.410 (0.397–5.013)	0.595

Reference categories: Age <45 years, Female gender, Primary education, Presence of comorbidity.
OR: Odds Ratio; CI: Confidence Interval.

This study evaluated only individuals who received services from the Family Medicine Convenience Clinic; no comparative analysis was conducted with individuals who did not receive services. Therefore, the findings do not include comparative conclusions and should be interpreted within the context of the impact of the Convenience Clinic program on patient satisfaction.

Review of the literature indicates that the primary factors influencing patient satisfaction are the quality of medical care, physician-patient communication, and waiting time. It has been emphasized that waiting time is particularly critical for satisfaction; while short durations may go unnoticed, prolonged waiting significantly increases dissatisfaction. The same studies report that age, education level, and perceived health status also affect satisfaction, with older individuals and those with lower educational attainment generally exhibiting higher satisfaction.[13-15]

Previous studies demonstrated that satisfaction in primary healthcare services is generally high, with communication quality, respect, and privacy being among the most satisfying aspects; however, appointment scheduling and waiting times negatively impact satisfaction.[16] These findings from the literature were also observed in our study. The overall satisfaction rate obtained in our study was higher than those reported in both referenced studies. Higher satisfaction levels among females, older adults, and individuals with lower education levels support the influence of sociodemographic characteristics on satisfaction. This may be explained by the relatively lower expectations of healthcare services among older and less-educated individuals, as well as their more frequent contact with healthcare facilities. Studies evaluating the effectiveness of family medicine have reported that strengthening primary healthcare services reduces unnecessary hospital visits and enhances efficiency within the healthcare system.[17-19] In our study, the majority of patients applied for examination approval, enabling them to complete their procedures without directly visiting hospital outpatient clinics. Although examinations in the Convenience Polyclinic are conducted within the hospital, patients are directed to the relevant units without requiring a separate consultation appointment or prolonged waiting. This structure allows patients to access radiology or laboratory units solely through the examination approval process, thereby preventing time loss and reducing hospital congestion. In this regard, the system, even in its current form, provides significant convenience and increased satisfaction in healthcare delivery. Hedayatipour et al. stated that evidence-based administrative decision-making processes enhance the efficiency, equity, and sustainability of healthcare services; however, limitations in time, resources, and access to information may restrict these processes.[5] In the Convenience Polyclinic model, the provision of digital integration contributes to overcoming such structural limitations, enabling process acceleration and the applicability of data-driven

decisions. Another study reported that delays in the follow-up of abnormal mammography results at the primary care level are primarily due to communication deficiencies and inadequate coordination. In the Convenience Polyclinic model, digital integration allows direct access to examination results, thereby minimizing such communication delays and strengthening service continuity. Previous studies identified communication quality, waiting time, and ease of access as the strongest determinants of patient satisfaction.[15] In our study, it was observed that these three factors were simultaneously improved within the Convenience Polyclinic model. This finding explains the high overall satisfaction rates and is consistent with studies in the literature. In particular, short wait times and ease of referral have positively influenced the patient experience. The international literature has shown that the public financing and social protection-based approach of the Seguro Popular system implemented in Mexico has reduced catastrophic out-of-pocket expenditures and decreased inequalities in access to services.[20] Similarly, it has been reported that progress toward universal health coverage has reduced infant, child, and maternal mortality rates, and that public financing and system integration have played a decisive role in this process.[21] The high satisfaction rate obtained in our study indicates that digital integration practices in Türkiye, particularly through the Convenience Polyclinic model, strengthen coordination between primary care and hospital services and reduce access inequalities.

The digital integration program implemented by the Turkish Ministry of Health also covers referral processes from family health centers to hospitals. Thanks to this system, individuals assessed at the primary care level can be referred to hospital services in a more organized and efficient manner. It is believed that the Convenience Clinic model plays an important bridging role within this digital integration structure and positively impacts the service access experience of individuals seeking care. Our study has certain limitations. It should be noted that some individuals who apply to the Convenience Clinic may be healthy individuals without active disease complaints who are applying for screening or examination approval. As the research was conducted at a single center over a six-month period (January 1, 2025–June 30, 2025), the results may not fully reflect seasonal variations and have limited generalizability. Additionally, due to the low number of specific imaging procedures such as ultrasonography and radiography, imaging examinations were grouped under a single category, which restricted the analysis of differences between subgroups. The cross-sectional design is inadequate for establishing causality, and self-reported data on patient satisfaction may be influenced by subjective response biases. Furthermore, Patient Satisfaction Assessment Short Form (PSASF) scores were dichotomized into 0–18 as “satisfied” and >18 as “dissatisfied” due to the low number of patients in subgroups, which may have partially reduced the sensitivity of the scale. This study is pioneering and original, as it represents the first evaluation of Convenience Polyclinic practices in Türkiye from the perspective of patient satisfaction.

Conclusion

In conclusion, the “Convenience Polyclinic” model stands out as an innovative application that, in alignment with digital transformation policies, enhances accessibility and efficiency in healthcare services while strengthening patient satisfaction. This model optimizes referral and referral processes by creating functional integration between primary care and hospital services; it is thought that this could contribute to reducing unnecessary tertiary care referrals. The findings indicate that expanding digital integration could make significant contributions to universal inclusivity and service quality in primary healthcare services in Türkiye.

Ethical approval

This study was approved by the Ethics Committee of Gülhane Training and Research Hospital (Approval date: May 08, 2025; Decision No: 2025/97).

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: TEY, SKÇK; data collection: ZÖ; analysis and interpretation of results: SKÇK; draft manuscript preparation: TEY, SKÇK. 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 to disclose.

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Research Article

Bibliometric analysis of publications related to primary health care from Türkiye: 2015–2024

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ABSTRACT

Objective: Primary healthcare is a fundamental component of robust health systems and plays a key role in advancing universal health coverage (UHC) and the Sustainable Development Goals (SDGs). Family physicians and other primary care doctors require current and trustworthy evidence and therefore depend on systematic reviews of the literature. Although the number of primary healthcare–related papers has grown, information on the overall characteristics of this body of work remains limited. Bibliometric analysis combined with visualization techniques is a useful approach for mapping research trends and identifying gaps in knowledge. This study aimed to examine primary health care publications indexed in WoS that had at least one author affiliation in Türkiye (2015–2024) and to describe Türkiye's contribution in the global context.

Methods: Scientific documents indexed in the Web of Science (WoS) under the category "Primary Health Care" and affiliated with Türkiye were retrieved for the years 2015–2024. Descriptive quantitative and qualitative analyses were carried out using standard bibliometric indicators, including publication counts, language of publication, institutional affiliations, most cited articles, authors, and journals. VOSviewer software was employed to generate a keyword co-occurrence network in order to explore research themes and their interrelations.

Results: There were 267 scientific publications produced from Türkiye between 2015 and 2024. The highest number of studies was conducted in 2023 (n: 49, 18.35%). All of the publications were in the English language, 22.47% were published in the Primary Care Diabetes, and most publications were in article form (n: 227, 85.02%). "Primary care" was the most frequently used word in the map created with the network analysis of the keywords.

Conclusion: The literature review has shown that our study is the first bibliometric study presenting publications related to primary health care from Türkiye. Overall, Türkiye's contribution to the global PHC literature remains limited. Strengthening research capacity through targeted funding, multicenter collaborations, and diversified study designs is essential to increase both the volume and impact of PHC research from Türkiye.

Keywords: bibliometric, database, primary health care, research trends, VOSviewer

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Introduction

Primary health care is conceptualized as the initial point of contact between individuals, communities, and the health system to deliver comprehensive, accessible, continuous, and well-coordinated health services.[1] As the cornerstone of a health system that treats illness, sustains well-being, and addresses health inequities rooted in social determinants, primary health care relies on family physicians as its principal providers. Monitoring current performance and developmental trajectories through scientific data informs clinical practice and contributes to health systems' sustainability.[2,3]

Bibliometric analysis is a methodological approach commonly employed to examine and interpret extensive bodies of scientific literature. It is frequently used by researchers to identify trends in journal and article performance, patterns of scientific collaboration, and the thematic composition of research, as well as to track how the structure of a given field evolves over time within the published literature. By doing so, bibliometric analysis helps to elucidate the developmental trajectory of a specific scientific topic and, at the same time, to identify newly emerging subfields and areas of inquiry related to that topic.[4,5]

In addition, visualization analyses (e.g., keyword network analysis) help identify subthemes and research gaps within a field.[6] VOSviewer converts mined bibliometric data into network maps, enabling clear visualization of keyword relationships and collaboration patterns. Combined bibliometric and network mapping analyses thus reveal key research themes, partnership dynamics, temporal trends, and existing knowledge gaps. Regularly repeating bibliometric evaluations together with keyword co-occurrence analyses is expected to support both the quantitative expansion and the qualitative improvement of overall scientific output.[7]

Although there are many studies in the primary health care category in the literature, the bibliometric characteristics of these studies have not been revealed much. It is important to conduct such studies in order to determine research areas and deficiencies. No bibliometric study has been found on this subject before, including publications from our country. In our study, we aimed to conduct a bibliometric analysis of publications on primary health care from Türkiye in the last 10 years and to determine research themes through visualization analysis.

Material and Methods

A range of electronic databases may be utilized to retrieve data for the conduct of bibliometric analyses. Web of Science (WOS) was chosen as the database because it has the “Primary Health Care” category and provides easy scanning and clear data. Scientific publications from Türkiye in the “Primary Health Care” category in the WOS database were analyzed, covering the last ten years (2015–2024). Publications were included if they had at least one author address in Türkiye (WoS Countries/Regions filter). Therefore, internationally co-authored papers were retained, and collaborating institutions from countries other than Türkiye may appear in the affiliation analysis.

The search query in WOS was:

‘WC = (Primary Health Care) AND (2024 OR 2023 OR 2022 OR 2021 OR 2020 OR 2019 OR 2018 OR 2017 OR 2016 OR 2015) AND (Countries/Regions: Turkey OR Türkiye).’

Data scanning was performed on April 18, 2025. Due to continuous updating, all data were retrieved from the database on the same day. Data were saved in an Excel worksheet for analysis. The quantitative and qualitative characteristics of the retrieved data were assessed using appropriate bibliometric indicators, including annual

publication counts, document types, languages, publication venues, countries of origin, authors, affiliated institutions, and funding bodies.

For the visualization analysis, the VOSviewer software was employed; this tool compiles all keywords within the dataset and represents them by constructing a co-occurrence network of terms. Keyword co-occurrence networks were generated using VOSviewer (Leiden University, The Netherlands). The analysis type was set to co-occurrence and the unit of analysis was all keywords (as exported from the database). The counting method was full counting, and similarity normalization was performed using the association strength method (VOSviewer default). To reduce noise, a minimum occurrence threshold of 5 was applied; under this criterion, 65 keywords met the threshold and were included in the final map. Clustering and map layout were produced using VOSviewer's default layout and clustering settings (default resolution and minimum cluster size). The visualization was generated using the program's default randomization and iteration settings. No additional thesaurus file or external cleaning rules were applied; keywords were analyzed as exported (i.e., without manual synonym merging beyond the software's standard handling) The keywords obtained by the bibliometric method were analyzed with the VOSviewer program, and research interests and relationships were determined.[5]

In the analysis of the collected data, frequency, percentage, and arithmetic mean values were calculated. Microsoft Excel (Microsoft 365) was used for statistical analysis. As this is a descriptive bibliometric analysis, no experimental intervention or control group was applicable.

As this investigation was based solely on document review, approval from an ethics committee was not deemed necessary. The study was carried out in accordance with the principles of the Declaration of Helsinki, as revised in 2013. No human participants or identifiable patient-level data were involved; therefore, informed consent was not applicable.

Results

In the study, 267 scientific publications from Türkiye were identified in the Web of Science (WoS) database for the period 2015–2024 using the specified search strategy. From the Web of Science database, 109,631 records were initially retrieved; restricting the time span to the last decade reduced this set to 43,421 documents (2015–2024), and subsequent exclusion of countries other than Türkiye yielded 267 records for the bibliometric analysis. Annual publication output by year was as follows: 2015 (n=14; 5.24%), 2016 (n=13; 4.87%), 2017 (n=16; 5.99%), 2018 (n=11; 4.12%), 2019 (n=23; 8.61%), 2020 (n=21; 7.87%), 2021 (n=41; 15.36%), 2022 (n=46; 17.23%), 2023 (n=49; 18.35%), and 2024 (n=33; 12.36%), with a marked increase after 2020 and a peak in 2023. The average annual growth rate of publications (AAGRP) fluctuated across the period (2016: −0.07; 2017: 0.23; 2018: −0.31; 2019: 1.09; 2020: −0.09; 2021: 0.95; 2022: 0.12; 2023: 0.07; 2024: −0.33). The temporal trend of publications and citations is shown in Figure 1. All publications were published in English. The top ten journals publishing the most publications and their Category Quartiles are given in Table 1. 22.47% (n: 60) of the publications were published in the "Primary Care Diabetes". The publications were published as articles (n: 227, 85.02%), letters to the editor (n: 15, 5.62%) and reviews (n: 14, 5.24%). The institution that contributed the most to the scientific literature was Marmara University with 33 articles (12.36%), followed by University of Health Sciences Turkey (n: 29, 10.86%) and Ankara University (n: 20, 7.49%). The list of institutions/organizations producing the most publications and their countries is given in Table 2. Because the dataset includes internationally co-authored publications with at least one Türkiye-based affiliation, Table 2 also reflects major collaborating

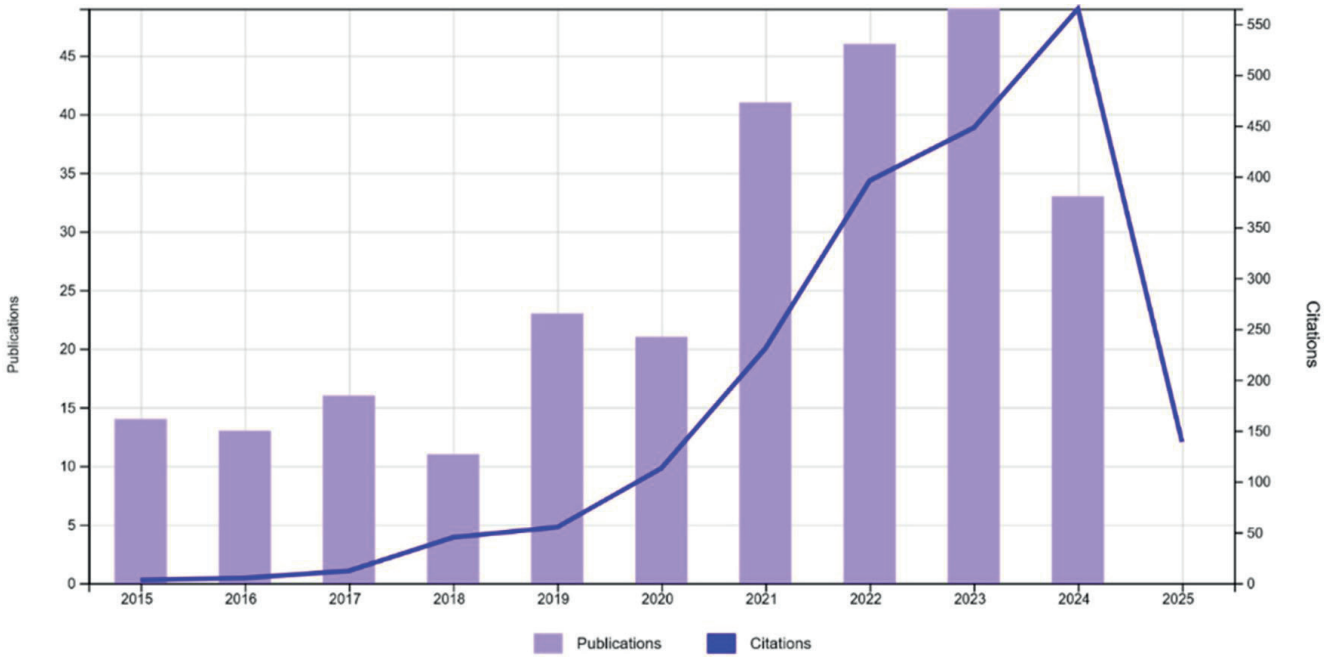

Figure 1. Times cited and publications over time

Table 1. The top ten journals publishing the most publications

Publication Titles	Number of publications	%	Category quartile
Primary Care Diabetes	60	22.47	Q1
Primary Health Care Research and Development	33	12.36	Q1
Family Medicine and Primary Care Review	27	10.11	Q4
European Journal of General Practice	26	9.74	Q2
Physician and Sportsmedicine	24	8.99	Q3
Family Practice	15	5.62	Q2
Journal of Family Medicine and Primary Care	14	5.24	Q4
Korean Journal of Family Medicine	10	3.75	Q4
Primary Health Care Research Development	9	3.37	Q3
Bmc Primary Care	6	2.25	Q2

Primary Health Care Research & Development appears in two separate rows because it is associated with different JCR/WoS quartile assignments. As quartile rankings may vary across JCR years and WoS subject categories, the Q1/Q3 discrepancy reflects indexing/classification differences rather than an inconsistency in our analysis.

institutions outside Türkiye. Vinker, Shlomo (n: 13, 4.87%) from Ariel University in Israel, Ungan, Mehmet (n: 12, 4.49%) from Ankara University in Türkiye, and Akman, Mehmet (n: 9, 3.37%) from Marmara University in Türkiye were the top three contributing authors.

A total of 1948 citations were made to the obtained publications. When citations were analyzed by citing year, the peak occurred in 2019 (n=565; 29%). When citations were summarized by publication year, papers published in 2021 received the highest total number of citations (41 papers; 520 citations; 26.69%). The number of publications and citation amounts by year are presented in Figure 1.

The review titled "Key recommendations for primary care from the 2022 Global Initiative

Table 2. Top institutions/organizations by author affiliation in the included publications (including international collaborators)

Affiliations	Number of publications	%	Country
Marmara University	33	12.36	Türkiye
University of Health Sciences Turkey	29	10.86	Türkiye
Ankara University	20	7.49	Türkiye
Hacettepe University	19	7.12	Türkiye
Istanbul University	16	5.99	Türkiye
Tel Aviv University	15	5.62	Israel
Dokuz Eylul University	14	5.24	Türkiye
Ege University	13	4.87	Türkiye
University of Ljubljana	13	4.87	Slovenia
Istanbul Medipol University	12	4.49	Türkiye

for Asthma (GINA) update" published in the journal Nature Partner Journals Primary Care Respiratory Medicine (npj PCRM) was the most cited publication with 165 citations. The top ten most cited publications and their authors, year of publication, journal published, and number of citations are given in Table 3.

As a result of the scan we conducted on the same day with the same search strategy and without any country limitation; it was determined that a total of 43421 scientific publications were published worldwide between 2015-2024. The highest number of publications worldwide was published in 2022 (n: 5317; 12.25%). Articles from more than 176 countries were submitted to the literature worldwide. The United States (USA) ranked first with 11214 (25.83%) publications, followed by the United Kingdom and India, respectively. The top 10 countries by number of publications and the number of publications from Türkiye are shown in Figure 2. It was seen that Türkiye ranked 25th in the ranking made by the number of publications of countries with a rate of 0.61%.

Using the VOSviewer software for keyword analysis, we identified the frequency with which individual keywords were used, the relationships among them, and the thematic structure of the resulting clusters. Figure 3 presents a network map of 65 keywords that occurred at least five times. In this map, larger circles represent more frequently used keywords, and the lines connecting the circles denote the presence of an association between terms. The distance between any two terms reflects the strength of their relationship, such that shorter connecting lines indicate a closer association.[7] In descending order, the top five most frequently used keywords were "primary care", "prevalence", "management", "COVID-19", and "health". In terms of cluster analysis of keywords, each color represents a cluster. Six clusters were formed as a result of the analysis. The six thematic clusters and their themes are: (1) the role of primary care in the COVID-19 pandemic (red); (2) diabetes and primary care (green); (3) cardiovascular diseases (dark blue); (4) surveys assessing knowledge, attitudes, and awareness (yellow); (5) general diabetes surveys (purple); and (6) disease diagnosis and management (blue). The clusters were sorted according to their sizes as red, yellow, purple, green, navy blue, and blue.

Discussion

This bibliometric study represents the first attempt to systematically evaluate the scientific output in the field of primary healthcare (PHC) originating from Türkiye between 2015 and 2024. Our results highlight both quantitative progress and structural limitations in research productivity, particularly when compared with the global landscape.

Table 3. The top 10 cited publications

Authors	Title	Document type	Journal	Year	Times cited
Levy, ML et al.	Key recommendations for primary care from the 2022 Global Initiative for Asthma (GINA) update	Review	Npj Prim Care Resp M	2023	165
Aktas, G et al.	Irritable bowel syndrome is associated with novel inflammatory markers derived from hemogram parameters	Article	Fam Med Prim Care Re	2020	97
Bilgin, S et al.	Does C-reactive protein to serum Albumin Ratio correlate with diabEtic nephropathy in patients with Type 2 dIabetesMEllitus? The CARE TIME study	Article	Prim Care Diabetes	2021	85
Karatas, S et al.	Impact of lockdown COVID-19 on metabolic control in type 2 diabetes mellitus and healthy people	Article	Prim Care Diabetes	2021	78
Senisik, S et al.	The effect of isolation on athletes' mental health during the COVID-19 pandemic	Article	Physician Sportsmed	2021	77
Kendir, C et al.	Cardiovascular disease patients have increased risk for comorbidity: A cross-sectional study in the Netherlands	Article	Eur J Gen Pract	2017	62
Eser, E et al.	Reliability and validity of the Turkish version of the WHO-5, in adults and older adults for its use in primary care settings	Article	Prim Health Care Res	2019	49
Duruturk, N; Özköslü, MA	Effect of tele-rehabilitation on glucose control, exercise capacity, physical fitness, muscle strength and psychosocial status in patients with type 2 diabetes: A double blind randomized controlled trial	Article	Prim Care Diabetes	2019	49
Belviranli, M et al.	The relationship between brain-derived neurotrophic factor, irisin and cognitive skills of endurance athletes	Article	Physician Sportsmed	2016	50
Seidu, S et al.	A disease state approach to the pharmacological management of Type 2 diabetes in primary care: A position statement by Primary Care Diabetes Europe	Review	Prim Care Diabetes	2021	32

Table is presented in a concise "first author et al." format. Eight of the ten most-cited papers are led by Türkiye-affiliated first authors. The remaining two internationally led publications meet the inclusion criterion through Türkiye-based co-authorship, specifically Arzu Yorgancıoğlu (Manisa, Türkiye) in the GINA 2022 update paper and P. Topsever (Istanbul, Türkiye) in the Primary Care Diabetes Europe position statement.

Worldwide, more than 43,000 PHC-related articles were published during the study period, whereas Türkiye contributed only 267 (0.61%), ranking 25th globally. This disparity underscores the underrepresentation of Türkiye in international PHC research, despite the increasing visibility of family medicine as a specialty. Similar challenges have been reported in other middle-income countries. For instance, in Mexico, a bibliometric study revealed methodological weaknesses and uneven research productivity, with significant regional disparities.[8] Likewise, analyses from Thailand reported a growing trend in publications but emphasized the need for stronger health system–oriented and implementation research. Compared to these settings, Türkiye exhibits a relatively modest but steadily increasing output, peaking in 2023.[9]

The scholarly output regarding health system performance is generally intertwined with the system's inherent strength and capacity for reform. This disparity aligns consistently with findings from comparative studies, such as the PHAMEU/QUALICOPC projects, which assess the structural and procedural strength of Türkiye's PHC system as moderate to weak when benchmarked against high-performing European counterparts like the

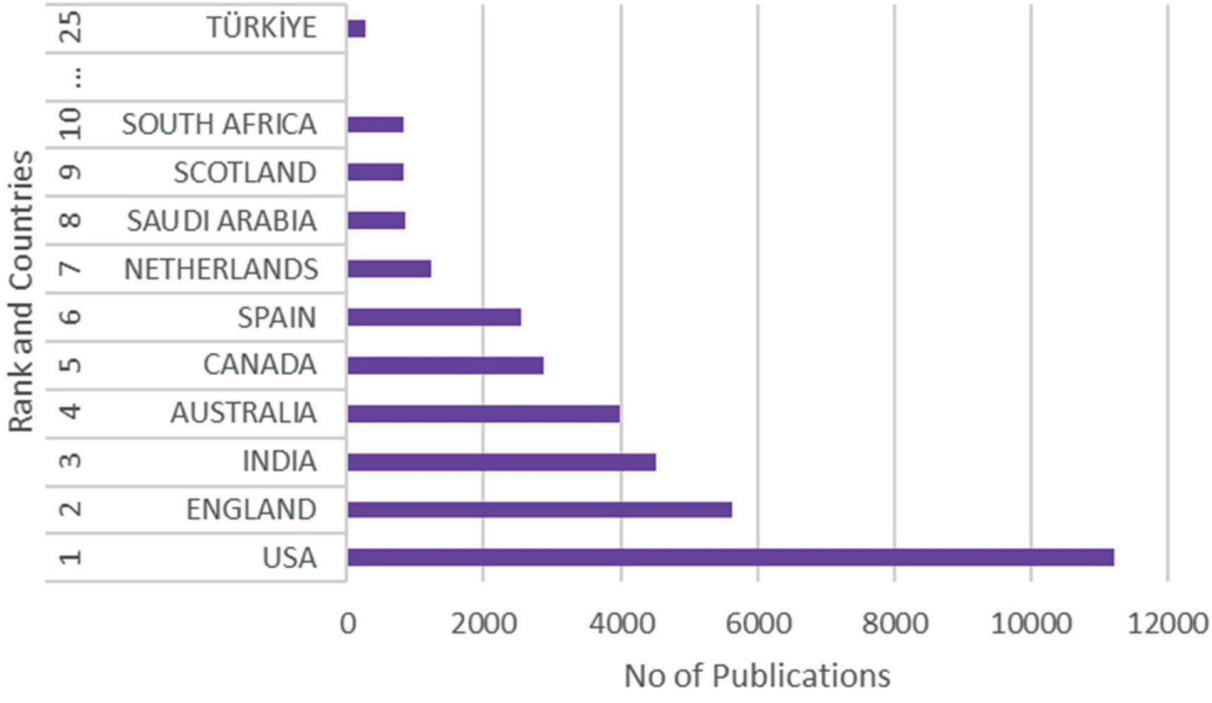

Figure 2. Distribution of scientific publications by country

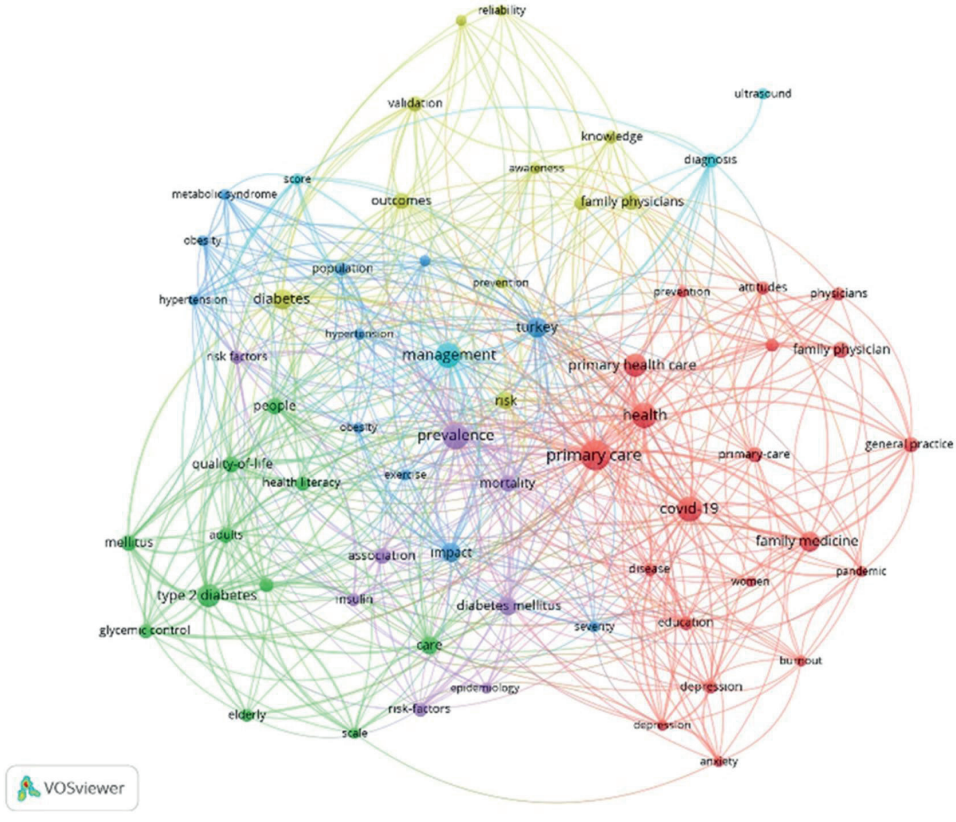

Figure 3. Network map of 65 keywords used more than five times

Netherlands or the United Kingdom. Specifically, these studies reveal suboptimal performance in core PHC functions, including the essential process dimensions of coordination, comprehensiveness, and continuity of care.

Consequently, the limited research output suggests a constrained analytical capacity to generate the evidence necessary for effective, data-driven policymaking, a crucial function for strengthening system performance and driving successful reforms. This calls for a prioritized investment in health system-oriented and implementation research to effectively address structural weaknesses and enhance the system's global visibility.[10-12]

Our findings show that most articles from Türkiye were published in Primary Care Diabetes, a pattern that may reflect the global predominance of chronic disease–related themes within PHC. Moreover, keyword co-occurrence analysis revealed that two major clusters were centered on diabetes-related terms, underscoring its central position in Türkiye's PHC research landscape. This focus aligns with the substantial national burden of diabetes: recent epidemiological estimates indicate that approximately one in seven adults in Türkiye lives with diabetes, and prevalence has nearly doubled since the early 2000s. The increasing research attention to diabetes within PHC may therefore represent a response to its escalating public health significance and its integration into family medicine–based chronic disease management programs.[13]

Marmara University, University of Health Sciences Türkiye, and Ankara University emerged as the leading institutions, consistent with the observation that research capacity tends to be concentrated in a limited number of academic centers. A comparable institutional concentration was also observed in India, where a single journal (Journal of Family Medicine and Primary Care) accounted for a large volume of publications.[14] Moreover, in Switzerland, Sebo et al. found that family medicine journals often attract contributions from less experienced researchers compared to general internal medicine journals, yet still demonstrate comparable ambition in study design and sample size.[15]

Not with standing Türkiye's overall underrepresentation in the global PHC literature, the country's publication performance during the COVID-19 pandemic demands specific attention. The most frequently cited article within the Turkish dataset was the GINA 2022 asthma update, a finding that reflects the drive to integrate guideline-oriented global research into national primary care practice. Interestingly, the peak in citations coincided with the global surge in PHC publications during the pandemic, a phenomenon congruent with international bibliometric analyses that underscored the pioneering role of family physicians in the crisis response, particularly concerning prevention. Furthermore, a dedicated bibliometric analysis of Türkiye's three-year COVID-19 publication performance by Ekenoğlu Merdan and Aydoğan (2024) confirms a substantial volume of scientific work was produced in the country on this subject. The results of this analysis indicate that the Primary Health Care (PHC) field made a significant contribution to this output. Collectively, these findings affirm how global health crises rapidly mobilize the PHC research agenda and underscore the pivotal role of primary care practitioners in responding to widespread public health emergencies.[7]

The keyword network revealed six major clusters, ranging from pandemic response to chronic disease management and knowledge–attitude–practice (KAP) surveys. The predominance of "primary care," "management," and "prevalence" aligns with keyword structures reported in China and Thailand, where non-communicable diseases and health service delivery dominate family medicine research.[14,16] However, the relatively limited

diversification of research themes in Türkiye—compared with countries such as Thailand, which demonstrated a shift from infectious disease to NCD-focused research over time—indicates a narrower research base.

The strength of Turkish PHC research lies in its consistent publication in internationally indexed journals and its focus on high-burden health conditions such as diabetes and cardiovascular disease. Nevertheless, the volume of publications remains disproportionately low compared to global trends. Furthermore, the reliance on article format (85%) with fewer reviews and editorials may limit broader theoretical and policy-level contributions. Similar concerns have been raised in bibliometric studies from Mexico and India, where research activity was quantitatively increasing but often lacked methodological rigor or diversity in article types.[9,14]

Although our study contains useful data covering 10 years of PHC publications, it has some limitations. Although only one database (the WOS database) was used in our analysis, this study nevertheless provides the first bibliometric and thematic data on PHC. It should be noted that journals not indexed in WOS, particularly those published nationally, may have been excluded from the scope of our study. In addition, self-citations were not excluded from the citation counts; therefore, the total citation metrics may be slightly overestimated.

Taken together, these findings emphasize the need for strategic initiatives to strengthen PHC research capacity in Türkiye. Establishing national and international collaborations, diversifying research methodologies, and supporting multi-center studies could improve both the quantity and quality of output. Periodic repetition of bibliometric analyses, as suggested in previous studies, will be essential to monitor progress.[13,17] Additionally, expanding research beyond clinical management to include health systems, service delivery, and medical education will ensure a more comprehensive contribution to the global PHC literature.

Despite the limitations of our study, we believe that it has been conducted in a needed area. We believe that it is important in terms of revealing the shortcomings and strengths of scientific productivity in the important field of Primary Health Care, determining the problems and solution suggestions, and guiding future projects and studies.

In conclusion, it has been revealed that our country lags behind the world in terms of research in this category and that we need to produce more publications on the subject. It is believed that periodic repetition of such studies will contribute to the development of scientific productivity in terms of quantity and quality.

Ethical approval

Since this study is a document review, ethics committee approval was not required.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: YK; data collection: YK; analysis and interpretation of results: YK; draft manuscript preparation: YK. 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 to disclose.

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Research Article

The relationship between social media use, eating attitudes, and body mass index in young adult women: a cross-sectional study

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ABSTRACT

Objective: Social media use has become increasingly widespread among young adults and may influence eating-related behaviors and body weight outcomes. However, evidence regarding platform-specific social media use, body mass index (BMI), and eating attitudes among young adult women remains limited. Therefore, this study examined associations between social media platform use, BMI categories, and eating attitudes among women aged 19-32 years.

Methods: This cross-sectional study was conducted between February and March 2025 among voluntarily recruited women aged 19-32 years through face-to-face interviews conducted in university and community settings in Elazığ, Türkiye. A total of 456 participants completed questionnaires covering sociodemographic characteristics, anthropometric measurements, social media use patterns, and the Eating Attitudes Test-26 (EAT-26). Statistical analyses were performed using R (version 4.4.1), IBM SPSS Statistics (version 26), and MedCalc Statistical Software (version 21).

Results: Participants' mean age was 22.67 ± 3.50 years and mean BMI was 22.58 ± 3.73 kg/m²; 66.2% were normal weight and 76.1% had an associate degree level of education. BMI categories differed significantly by use of Facebook, X (Twitter), and TikTok, and by weekly social media visit frequency ($p < 0.05$). EAT-26 scores increased significantly across higher BMI categories ($p < 0.001$). Women in the pre-obese and obese groups had significantly higher EAT-26 scores than those in the underweight and normal-weight groups ($p < 0.001$). Platform-specific differences were also observed: X (Twitter) use was associated with mean BMI ($p = 0.014$), while YouTube ($p = 0.035$) and Snapchat use ($p = 0.013$) were associated with mean EAT-26 scores. Correlation analyses indicated generally weak associations between social media use measures and both BMI and EAT-26 scores ($r = 0.03–0.31$).

Conclusion: Social media use patterns differed across BMI categories, and higher BMI levels were associated with more impaired eating attitudes among young adult women. These findings highlight the importance of considering social media-related factors in strategies aimed at promoting healthy eating behaviors and reducing disordered eating risk in this population.

Keywords: young adult women, social media, body mass index, eating attitudes

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Introduction

Social media is a form of digital communication that enables online interaction and has become increasingly widespread worldwide.[1] According to DataReportal's Digital 2025 reports, there were 5.24 billion active social media user identities worldwide, representing a 4.1% increase compared with the previous year. In Türkiye, 58.5 million social media user identities, corresponding to 66.7% of the population, were reported in January 2025.[2] Platforms such as Instagram, Facebook, X (Twitter), and YouTube are among the most commonly used social media networks, facilitating communication through photos, videos, and shared content.[3]

The widespread use of social media has affected societies in many ways, and both its positive and negative effects have been examined in numerous studies.[4] One important area of interest is its potential influence on eating behaviors.[5] Increasing engagement with social media-based healthy eating communities has raised awareness regarding diet and nutrition.[6,7] However, users are also frequently exposed to diet and health-related information lacking scientific validity.[8,9] In addition, exposure to food-related content, advertisements for unhealthy foods, and idealized body images may contribute to unhealthy dietary behaviors and obesity-related risks.[10,11]

Given the potential influence of social media on eating behavior, its possible relationship with body weight has also attracted attention. Obesity has been shown to cluster within social networks, suggesting that social environments may shape weight-related outcomes.[12] Nevertheless, findings regarding the relationship between social media use and body mass index (BMI) remain inconsistent, with some studies reporting positive associations and others reporting no significant relationship.[12-14]

Previous studies have mainly focused on adolescents and have generally examined social media use in relation to eating behaviors, body image, and weight-related concerns.[15-19] In Türkiye, studies investigating the combined relationship between platform-specific social media use, BMI categories, and eating attitudes among young adult women remain limited.[20-22]

Differences between studies may partly reflect variations in how social media exposure is assessed, including duration, frequency of use, and the platforms evaluated. Social media platforms differ in content structure, interaction patterns, and the type of information shared. Therefore, evaluating social media as a single construct may obscure potential platform-specific associations.

Considering the widespread use of social media among young adults and its possible influence on eating-related behaviors and body weight, examining platform-specific patterns may contribute to a better understanding of these relationships. Therefore, this study aimed to examine whether platform-specific social media use differs across BMI categories and is associated with eating attitudes among young adult women aged 19-32 years.

Materials and Methods

Participants

The study was conducted in Elazığ, Türkiye, between February and March 2025. Participants were recruited using a convenience sampling approach from university campuses and surrounding community settings, including university students and university personnel other young adult women who volunteered to participate in the study. All questionnaires were administered through face-to-face interviews by the researchers, and no online data collection was

performed. Initially, 478 voluntary women aged 19-32 years were recruited for the study. The required minimum sample size was calculated using G*Power software based on a medium effect size, 95% confidence level, and 80% statistical power. Inclusion criteria were being female, aged between 19 and 32 years, and voluntary participation in the study. Participants with incomplete questionnaires, missing anthropometric data, pregnancy, diagnosed eating disorders, or chronic diseases that could affect eating behavior or body weight were excluded from the final analysis. Consequently, 456 participants were included in the final analysis.

As this was an observational cross-sectional study, randomization was not applied. To minimize selection bias, participants were enrolled consecutively during the data collection period, and standardized inclusion and exclusion criteria were applied. However, because the sample was not randomly selected and a large proportion of participants had an associate degree, the sample should not be considered representative of all young adult women in Türkiye.

The questionnaire form consisted of sections on participants' socio-demographic characteristics (e.g., age, educational status), anthropometric measurements, nutritional information, Social media use and Eating Attitudes Test (EAT-26). Participants with psychiatric disorders (e.g., psychotic disorders, bipolar disorder or diagnosed eating disorders), recent pregnancy-related conditions, history of bariatric surgery in the last 6 months, chronic illnesses were excluded from the study. Due to incomplete data and reported chronic disorders history, 22 participants were excluded. As a result, the study was completed with 456 participants.

Demographic and personal characteristics

Participants were asked to report their age, educational status, presence of any illnesses. Anthropometric measurements were performed by trained researchers using standardized procedures. Body weight was measured using a calibrated digital scale with participants wearing light clothing and no shoes. Height was measured using a stadiometer, with participants standing upright, barefoot, and with their head positioned in the Frankfort horizontal plane. All measurements were conducted by the same trained research team using the same equipment under similar conditions to ensure consistency and minimize measurement error. Body Mass Index (BMI) was calculated by dividing weight in kilograms by the square of height in meters (kg/m^2). BMI classification was conducted in accordance with the World Health Organization (WHO) criteria: <18.50 was considered underweight, 18.50-24.99 normal weight, 25.00-29.99 pre-obese, 30.00-34.99 obese class I, and ≥35.00 as obese class II and morbid obesity.[23]

Data collection

Eating attitudes test-26 (EAT-26)

The scale was first developed in 1979 with 40 items and revised in 1982 by Garner et al., resulting in the 26-item version. The EAT-26 has demonstrated high internal consistency in the original development study (Cronbach's $\alpha \approx 0.90$).[24] The Turkish validity and reliability study was conducted by Ergüney Okumuş et al., who reported good internal consistency (Cronbach's $\alpha = 0.84$) and acceptable test–retest reliability ($r = 0.78$).[25]

The EAT-26 consists of 26 items scored on a six-point Likert scale ("always," "usually," "often," "sometimes," "rarely," "never"). Items 1–25 are scored as: always = 3, usually = 2, often = 1, and the remaining options = 0. Item 26 is reverse-scored (never = 3, rarely = 2, sometimes = 1, others = 0). Total scores range from 0 to 78, with ≥20 indicating risk for disordered eating; higher scores reflect more problematic eating attitudes.

Social media use

Participants were asked to self-report the social media platforms they actively used and their average daily duration of use during face-to-face interviews. Self-reported average daily time spent on social media (minutes/day) was categorized as 0-30, 31-60, 61-120, 121-240, 241-360, and >360 minutes. The categorization of daily social media usage was based on commonly used approaches in previous research examining screen time and social media exposure and was intended to reflect meaningful differences in usage patterns rather than equal numerical ranges.[26,27]

Ethical approval

Ethical approval for the study was obtained from the Fırat University Non-Interventional Research Ethics Committee on 30 January 2025 (Decision No: 2025/02-60). Written informed consent was obtained from all participants prior to participation, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical analysis

Descriptive statistics were presented as frequency (N) and percentage (%) for categorical variables, and as mean, standard deviation (SD), median, and interquartile range (IQR) for continuous variables. The normality of continuous variables was assessed using the Shapiro–Wilk test, skewness and kurtosis coefficients, and visual inspection of histograms and Q–Q plots. The Chi-square (χ^2) test of independence was used to examine associations between categorical variables, and Fisher's exact test was applied when expected cell counts were below five. For comparisons across BMI categories, one-way analysis of variance (ANOVA) was used when parametric assumptions were satisfied, and the Kruskal–Wallis test was applied otherwise. When significant differences were detected, post hoc analyses were conducted using the Games–Howell test. Pearson (point-biserial) correlation coefficients were used to assess associations between social media platform use (yes/no) and continuous variables (BMI and EAT-26 scores).

All statistical analyses were performed using R (version 4.4.1), IBM SPSS Statistics (v. 26), and MedCalc Statistical Software (v. 21). A significance level of $p < 0.05$ was adopted.

Results

The demographic and anthropometric characteristics of the participants are presented in Table 1. The sample consisted of young adult women with a mean age in the early twenties and a BMI distribution predominantly within the normal range.

Table 1. Demographic and anthropometric characteristics of participants

		n	%
Education	Literate	4	.88
	Primary School	2	.44
	Middle School	14	3.07
	High School	71	15.57
	Associate Degree	347	76.10
	Bachelor's Degree	18	3.95
	Total	456	100
BMI (Classification)	UW (Underweight)	53	11.62
	NW (Normal)	302	66.23
	PW (Pre-obese)	79	17.32
	OB (Obese)	22	4.82
	Total	456	100
	Mean±SD		
Age (years)	22.67±3.50		
BMI (kg/m^2)	22.58±3.73		

Table 2. Comparison of social media usage habits according to BMI classification

		BMI classification												p
		UW			NW			PW			OB			
		n	%[a]	%[b]	n	%[a]	%[b]	n	%[a]	%[b]	n	%[a]	%[b]	
Instagram	Yes	49	11.5	92.5	285	67.1	94.4	70	16.5	88.6	21	4.9	95.5	0.320[θ]
	No	4	12.9	7.5	17	54.8	5.6	9	29.0	11.4	1	3.2	4.5	
Facebook	Yes	2	3.5	3.8	40	70.2	13.2	9	15.8	11.4	6	10.5	27.3	0.040[θ]
	No	51	12.8	96.2	262	65.7	86.8	70	17.5	88.6	16	4.0	72.7	
YouTube	Yes	41	11.3	77.4	250	69.1	82.8	56	15.5	70.9	15	4.1	68.2	0.059[θ]
	No	12	12.8	22.6	52	55.3	17.2	23	24.5	29.1	7	7.4	31.8	
X (Twitter)	Yes	30	16.8	56.6	125	69.8	41.4	18	10.1	22.8	6	3.4	27.3	<0.001[θ]
	No	23	8.3	43.4	177	63.9	58.6	61	22.0	77.2	16	5.8	72.7	
TikTok	Yes	9	7.0	17.0	98	76.0	32.5	15	11.6	19.0	7	5.4	31.8	0.024[θ]
	No	44	13.5	83.0	204	62.4	67.5	64	19.6	81.0	15	4.6	68.2	
Whatsapp	Yes	49	11.9	92.5	273	66.1	90.4	71	17.2	89.9	20	4.8	90.9	0.964[θ]
	No	4	9.3	7.5	29	67.4	9.6	8	18.6	10.1	2	4.7	9.1	
Snapchat	Yes	27	12.4	50.9	152	69.7	50.3	30	13.8	38.0	9	4.1	40.9	0.216[θ]
	No	26	10.9	49.1	150	63.0	49.7	49	20.6	62.0	13	5.5	59.1	
Pinterest	Yes	21	12.7	39.6	110	66.3	36.4	30	18.1	38.0	5	3.0	22.7	0.552[θ]
	No	32	11.0	60.4	192	66.2	63.6	49	16.9	62.0	17	5.9	77.3	
Self-reported average daily time spent on social media (minutes/day)	0-30	0	.0	.0	6	60.0	2.0	4	40.0	5.1	0	.0	.0	0.317[θ]
	31-60	4	14.3	7.5	13	46.4	4.3	9	32.1	11.4	2	7.1	9.1	
	61-120	14	14.3	26.4	64	65.3	21.2	16	16.3	20.3	4	4.1	18.2	
	121-240	31	12.0	58.5	176	68.0	58.3	40	15.4	50.6	12	4.6	54.5	
	>360	4	6.6	7.5	43	70.5	14.2	10	16.4	12.7	4	6.6	18.2	
Self-reported frequency of social media use (times/ week)	0-8	2	6.9	3.8	14	48.3	4.6	12	41.4	15.2	1	3.4	4.5	0.012[θ]
	9-30	26	17.3	49.1	98	65.3	32.5	19	12.7	24.1	7	4.7	31.8	
	31-57	16	11.3	30.2	94	66.7	31.1	24	17.0	30.4	7	5.0	31.8	
	>58	9	6.6	17.0	96	70.6	31.8	24	17.6	30.4	7	5.1	31.8	

[θ]: Chi-square test of independence. [a]: Percentage in corresponding row. [b]: Percentage in corresponding column UW:Underweight; NW:Normal; PW: Pre-obese; OB: Obese.

Table 2 presents the results of analyses comparing social media platform preferences, time spent on social media, and frequency of social media visits according to BMI categories. Statistically significant differences were observed among BMI groups in terms of Facebook (p = 0.040), X (Twitter) (p < 0.001), and TikTok use (p = 0.024), as well as weekly social media visit frequency (p = 0.012). Interpretation of these findings should take into account that the obese group included a relatively small number of participants (n = 22), resulting in some expected cell counts below five; therefore, percentage differences across BMI categories should be interpreted with caution. Lower proportions of X (Twitter) use were observed in the higher BMI categories compared with the underweight and normal-weight groups, although the pattern was not strictly monotonic across BMI categories. Facebook use also differed significantly across BMI groups, but the distribution did not indicate a linear increase with BMI. Similarly, TikTok use differed across BMI categories, with higher usage proportions observed in the obese group than in the underweight group.

Regarding weekly social media visit frequency, the proportion of participants reporting ≥58 visits per week was lower in the underweight group than in the normal-weight, pre-obese, and obese groups. No statistically significant differences were found among BMI groups in terms of the use of other social media platforms (Instagram, YouTube, WhatsApp, Snapchat, and Pinterest) or self-reported average daily time spent on social media ($p > 0.05$).

Table 3 presents the comparison of Eating Attitudes Test (EAT-26) scores across BMI categories. A highly statistically significant difference was observed in mean EAT-26 scores among BMI groups ($p < 0.001$). Mean EAT-26 scores were found to increase progressively with higher BMI levels (underweight [UW]: 11.34; normal weight [NW]: 11.69; pre-obese [PW]: 14.63; obese [OB]: 16.27). The Games–Howell post hoc analysis revealed that participants in the PW and OB groups had significantly higher EAT-26 scores compared with those in the UW and NW groups.

Overall, 75 participants (16.4%) had EAT-26 scores ≥20, which is considered the conventional cutoff for disordered eating risk. The prevalence of EAT-26 risk increased across BMI categories: 13.2% (7/53) in the underweight group, 13.9% (42/302) in the normal-weight group, 24.1% (19/79) in the overweight group, and 30.4% (7/23) in the obese group. BMI category was significantly associated with EAT-26 risk status ($\chi^2(3) = 8.44$, $p = 0.03$).

Table 4 summarizes the results of analyses comparing mean BMI and EAT-26 scores according to social media platform use, duration of use, and frequency of use, along with the correlation coefficients between these variables. With respect to mean BMI, a statistically significant difference was observed only for X (Twitter) use ($p = 0.014$); the mean BMI of non-users (22.90) was significantly higher than that of users (22.10). Regarding mean EAT-26 scores, significant differences were identified for YouTube ($p = 0.035$) and Snapchat ($p = 0.013$) use. Participants who did not use these platforms had significantly higher mean EAT-26 scores (YouTube non-users: 13.71; Snapchat non-users: 13.20) compared with users (YouTube users: 12.07; Snapchat users: 11.54). No statistically significant associations were found between other social media platforms, duration of use, or frequency of use and mean BMI or EAT-26 scores ($p > 0.05$). The final column of Table 4 presents Pearson (point-biserial) correlation coefficients between social media platform use (yes/no, coded as 0/1) and continuous variables (BMI and EAT-26 scores). Overall, the observed correlation coefficients were weak in magnitude.

Table 3. Comparison of EAT-26 total scores and disordered-eating risk status by BMI classification

		EAT-26 score	p	EAT-26 score ≥20 (at-risk)	p
		Mean±SD		n (%)	
BMI Classification	UW	11.34[a] ±6.65	<0.001[κ]	7 (13.2)	0.03[β]
	NW	11.69[a] ±6.74		42 (13.9)	
	PW	14.63[b] ±6.70		19 (24.1)	
	OB	16.27[b] ±7.13		7 (30.4)	
	Total	12.93±6.87		75 (16.4)	

[κ]: One-way analysis of variance test with Games-Howell post hoc comparison.

[β] : Pearson chi-square test of independence.

UW:Underweight; NW:Normal; PW: Pre-obese; OB: Obese.

[a, b] Different superscript letters indicate statistically significant differences between BMI groups based on Games-Howell post hoc comparisons.

Table 4. Examining the relationship between social media use, BMI and EAT-26 score

		BMI	p	EAT-26 score	p	r[ω]
		Mean±SD		Mean±SD		
Instagram	Yes	22.6±3.77	0.666[ψ]	12.4±6.91	0.741[ψ]	0.191
	No	22.8±3.87		12.8±6.72		-0.027
Facebook	Yes	23.4±4.21	0.058[ψ]	13.3±7.17	0.310[ψ]	0.238
	No	22.5±3.70		12.3±6.85		0.162
YouTube	Yes	22.5±3.73	0.133[ψ]	12.1±6.76	0.035[ψ]	0.206
	No	23.1±3.95		13.7±7.28		0.053
X (Twitter)	Yes	22.1±3.76	0.014[ψ]	12.4±6.70	0.957[ψ]	0.220
	No	22.9±3.76		12.4±7.03		0.152
TikTok	Yes	22.8±3.56	0.754[ψ]	12.4±7.23	0.881[ψ]	0.263
	No	22.5±3.87		12.4±6.77		0.145
Whatsapp	Yes	22.6±3.80	0.935[ψ]	12.3±6.80	0.171[ψ]	0.174
	No	22.5±3.64		13.7±7.67		0.201
Snapchat	Yes	22.3±3.62	0.180[ψ]	11.5±6.62	0.013[ψ]	0.227
	No	22.8±3.91		13.2±7.05		0.124
Pinterest	Yes	22.5±3.62	0.623[ψ]	12.2±6.83	0.745[ψ]	0.205
	No	22.7±3.87		12.5±6.94		0.161
Self-reported average daily time spent on social media (minutes/day)	0-30	22.9±3.64	0.284[δ]	13.4±7.41	0.619[δ]	0.138
	31-60	4.1±1.74		12.3±7.28		0.311
	61-120	22.3±3.55		11.5±7.08		0.116
	121-240	22.4±3.68		12.6±6.74		0.187
	>360	23.1±3.95		13.1±7.07		0.163
Self-reported frequency of social media use (times/week)	0-8	23.5±3.81	0.072[δ]	12.9±7.04	0.963[δ]	0.041
	9-30	22.1±3.56		12.3±6.99		0.131
	31-57	22.4±3.75		12.2±6.76		0.175
	>58	23.2±3.96		12.6±6.96		0.249

[ψ]: Independent samples t-test, [δ]: One way analysis of variance test, [ω]: Pearson correlation coefficient between social media platform use (coded as 0 = no, 1 = yes) and continuous variables (BMI and EAT-26 scores).

Discussion

This study evaluated platform-specific social media use in relation to BMI categories and eating attitudes among young adult women in Türkiye. The findings indicate that BMI-related differences were present for some platforms, particularly Facebook, X (Twitter), and TikTok, whereas no clear differences were observed for several other widely used platforms. Eating attitudes also varied by BMI category, with higher EAT-26 scores and a higher proportion of disordered-eating risk among women in the pre-obese and obese groups. The observed differences across platforms suggest that social media use may not have a uniform relationship with BMI and eating attitudes. In addition, studies from Türkiye that have examined these variables together remain limited.

Facebook use differed significantly across BMI categories in the present study. Although the cross-sectional nature of the data does not allow conclusions about the direction of this relationship, the finding suggests that patterns of Facebook engagement may vary according to weight status. Facebook remains a platform where users

commonly interact through groups, communities, and shared interests, which may contribute to differences in participation across demographic and behavioral profiles. Similar observations have been reported in some previous studies,[28] whereas others have not identified a significant relationship between social media platform use and BMI.[29] Differences between studies may stem from variations in participant characteristics, cultural settings, and the approaches used to measure social media use.

The clearest difference across BMI categories was observed for X (Twitter) use. Participants in the pre-obese and obese groups reported lower use of this platform compared with those in the underweight and normal-weight groups. A similar pattern has been described previously[28], although not all studies have reached the same conclusion.[29] The present data do not allow an explanation for this pattern. Nevertheless, differences in user profiles and platform preferences may have contributed to the observed distribution. A significant association was also identified for TikTok use. The highest proportion of TikTok users was observed in the obese group, whereas the lowest proportion was found among underweight participants. TikTok differs from many other platforms because of its highly visual content structure and personalized recommendation system. Nevertheless, previous research has reported mixed findings regarding the relationship between TikTok use and weight-related outcomes.[29,30] Further studies are needed to clarify whether these differences reflect platform-specific behaviors or characteristics of the populations being studied.

No significant differences in BMI were observed for Instagram, WhatsApp, or YouTube use. One possible explanation is the widespread popularity of these platforms within the study population, which may have reduced the likelihood of detecting meaningful differences between BMI categories.[31] Similarly, self-reported daily time spent on social media was not associated with BMI. Previous studies examining this relationship have produced inconsistent findings, suggesting that the association between social media exposure and body weight may depend on population characteristics, usage patterns, and other contextual factors.[29] In contrast, social media visit frequency differed across BMI groups. Participants in the higher BMI categories tended to report more frequent platform access than those in the underweight group. Although the magnitude of this difference was modest, it may indicate variations in engagement behavior rather than differences in total time spent on social media. Similar inconsistencies have been reported in the literature, and the mechanisms underlying these associations remain uncertain.[29]

As shown in Table 3, EAT-26 scores differed significantly across BMI categories. Participants in the pre-obese and obese groups had higher mean scores than those in the underweight and normal-weight groups, indicating less favorable eating attitudes among women with higher BMI values. A similar pattern was observed when participants were classified according to the conventional EAT-26 risk threshold (≥20). The proportion of individuals screening positive for disordered-eating risk increased progressively from the underweight group to the obese group (Table 3; $\chi^2(3) = 8.44$, $p = 0.038$).

Women in the higher BMI categories were more likely to report attitudes and behaviors associated with disordered eating. Comparable findings have been reported both internationally and in studies conducted in Türkiye, where elevated EAT-26 scores were observed more frequently among individuals with overweight or obesity.[32,33] This relationship is likely influenced by multiple factors rather than body weight alone. Individuals with higher BMI may experience greater concerns regarding body shape and appearance, and previous research has linked weight-related

stigma to maladaptive eating-related thoughts and behaviors.[34] At the same time, EAT-26 is intended as a screening instrument rather than a diagnostic measure. Therefore, differences in scores across BMI categories should be interpreted with some caution, particularly because individual items may function differently across weight groups.[35]

In the present study, social media use showed only limited associations with BMI. Among the platforms examined, a statistically significant difference was observed only for X (Twitter) use. Previous studies investigating the relationship between social media use and BMI have reported inconsistent results, with some identifying significant associations and others finding little or no relationship.[12-14] These discrepancies may partly reflect differences in study populations, social media habits, and the methods used to measure exposure. Although social media platforms can influence users' perceptions, attitudes, and behaviors, such effects may not always be reflected in BMI, which is determined by a complex combination of biological, behavioral, social, and environmental factors. The relatively weak associations observed in the current study support the view that social media use alone is unlikely to account for substantial differences in body weight.

Significant differences in EAT-26 scores were identified according to YouTube and Snapchat use. Participants who did not use these platforms reported higher EAT-26 scores than users. This finding differs from the common assumption that greater exposure to social media is necessarily associated with more problematic eating attitudes. The association may differ according to what users view on these platforms, why they use them, and their individual characteristics.[20,36-38] Simply classifying participants as users or non-users may not fully reflect the types of social media experiences that are related to eating attitudes. Previous studies have also suggested that patterns of engagement and psychosocial characteristics may differ between users and non-users of specific platforms.[21] Consequently, the observed associations should be interpreted with caution, and future research should consider incorporating content-specific and behavior-specific measures in addition to simple indicators of platform use.

No significant associations were observed between either the duration or frequency of social media use and EAT-26 scores in the present study. This finding differs from several previous reports that have linked greater social media exposure with less favorable eating attitudes and eating-related concerns.[22,39] Differences in study design, participant characteristics, and methods used to assess social media exposure may partly explain these contrasting results. Another consideration is the reliance on self-reported measures of social media use. Participants may have had difficulty accurately estimating the amount of time they spent on social media, which could have reduced the ability to detect associations with eating attitudes. Consequently, the absence of significant relationships in the current study should not be interpreted as evidence that social media exposure has no influence on eating-related behaviors.

Although EAT-26 risk status varied across BMI categories, the association between continuous BMI values and EAT-26 total scores was relatively weak. This suggests that body weight alone accounts for only a limited proportion of the variability in eating attitudes. Similar findings have been reported in previous studies, where the strength of the relationship between BMI and disordered-eating indicators differed considerably across populations and settings.[33,40,41] Such variation is not surprising given the multifactorial nature of eating behaviors. Factors including body dissatisfaction, weight-related experiences, emotional well-being, and social influences may all contribute to eating attitudes independently of BMI.[34,42] Therefore, while higher BMI categories

were associated with greater disordered-eating risk in the present sample, BMI should not be viewed as the sole determinant of eating-related attitudes and behaviors.

Several strengths and limitations should be considered when interpreting the findings of this study. An important strength is the platform-specific assessment of social media use rather than treating social media as a single exposure. In addition, the study included a relatively large sample of young adult women, anthropometric measurements were obtained directly by trained researchers, and eating attitudes were evaluated using the validated EAT-26 instrument.

Despite these strengths, several aspects of the study design should be taken into account when interpreting the findings. Because the study employed a cross-sectional design, the observed associations cannot be interpreted as causal relationships. The sample was restricted to women aged 19-32 years from a single region of Türkiye, and the high proportion of participants with an associate degree may limit the generalizability of the findings to other populations. Although body weight and height were measured directly, information regarding social media use and eating attitudes was based on self-report and may therefore be affected by reporting inaccuracies. In addition, several factors that may influence both BMI and eating attitudes, including physical activity, dietary habits, socioeconomic conditions, and psychological characteristics, were not assessed directly. As a result, some of the observed associations may have been influenced by factors that were not measured directly.

The way social media exposure was assessed also warrants consideration. Participants were classified according to platform use, duration, and frequency; however, no information was collected regarding the specific content viewed, motivations for platform use, or patterns of interaction with social media content. Given the highly individualized nature of social media environments, exposure to nutrition-related information, appearance-focused content, and food-related material may have differed substantially among participants. In addition, a large number of statistical comparisons were performed, which increases the possibility that some significant findings occurred by chance. Replication in longitudinal studies that include more detailed assessments of social media exposure would help clarify these findings.

Conclusion

This study showed that patterns of social media use differed across BMI categories and that higher BMI levels were associated with less favorable eating attitudes among young adult women. The observed relationships were not consistent across all platforms, suggesting that different social media environments may be linked to eating attitudes and body weight in different ways.

The findings support the value of examining individual social media platforms separately rather than treating social media use as a single behavior. As social media continues to play an important role in the daily lives of young adults, a better understanding of platform-specific usage patterns may help inform future research and public health initiatives related to eating behaviors and weight-related outcomes. Further longitudinal studies are needed to clarify the direction and underlying mechanisms of these associations.

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Ethical approval

This study has been approved by the Fırat University Non-Interventional Research Ethics Committee (approval date 30.01.2025, number 2025/02-60). Written informed consent was obtained from the participants.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: ŞGYK, MA, HY; data collection: ŞGYK, MA, HY; analysis and interpretation of results: HY; draft manuscript preparation: ŞGYK, MA, HY. 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 to disclose.

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Case Report

Purple urine bag syndrome: a benign case in an elderly home healthcare patient

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ABSTRACT

Purple Urine Bag Syndrome (PUBS) is a rare but visually striking phenomenon usually seen in elderly, immobile, and chronically catheterized patients. Although it usually follows a benign course, its alarming appearance may trigger excessive diagnostic and therapeutic interventions, leading to unnecessary increases in healthcare utilization. We report the case of a 95-year-old woman with chronic ischemic heart disease, followed through home healthcare services, who developed PUBS without clinical or laboratory evidence of infection. The condition resolved completely after simple catheter and bag replacement, without antibiotic therapy. This case emphasizes that PUBS does not always indicate active infection and highlights the importance of rational management in primary care and home healthcare practice, preventing overdiagnosis, overtreatment, and unnecessary antibiotic use.

Keywords: purple urine bag syndrome, primary health care, home care services, urinary catheters, aged

Introduction

Purple Urine Bag Syndrome (PUBS) is a rare but clinically striking condition characterized by purple discoloration of the urinary catheter and urine collection bag. First described in 1978, the syndrome has been associated with several risk factors, including alkaline urine pH, low fluid intake, immobility, long-term catheterization, chronic constipation, advanced age, and female sex.[1] The fundamental mechanism in the pathogenesis begins with the metabolism of tryptophan by gastrointestinal flora, followed by its absorption into the portal circulation.[2] In the liver, indole undergoes conjugation processes and is converted into indoxyl sulfate, which is excreted in the urine. Indoxyl sulfate is then hydrolyzed to indoxyl by the enzyme indoxyl sulfatase produced by certain bacteria in the urinary tract. In an alkaline urine environment, indoxyl is oxidized to indigo (blue) and indirubin (red) pigments. The interaction of these pigments with the plastic surface of the urine bag results in the characteristic purple discoloration.[2,3]

The microorganisms most frequently implicated include Pseudomonas aeruginosa, Proteus mirabilis, Providencia species, Klebsiella pneumoniae, Escherichia coli, Morganella morganii, Citrobacter species, methicillin-resistant Staphylococcus aureus, group B streptococci, Enterobacter and Enterococcus species.[4,5] However, in some cases, urine cultures reveal

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no bacterial growth, and the clinical course may remain completely asymptomatic.

Although PUBS is generally benign, its striking appearance may cause considerable anxiety for both patients and caregivers. It may be encountered particularly in elderly individuals undergoing long-term catheterization and followed either in primary care settings or within the scope of home healthcare services. Recognition of the syndrome not only helps to alleviate unnecessary concerns but also prevents overdiagnosis, redundant diagnostic procedures, and inappropriate therapeutic interventions, thereby supporting evidence-based and rational patient management.

Case Presentation

A 95-year-old female patient with chronic ischemic heart disease, who had been followed by home healthcare services with a long-term indwelling silicone Foley catheter for approximately six months, was evaluated after purple discoloration of the urine bag was observed during a routine catheter replacement (Figure 1). The catheter was routinely replaced every 28 days as part of her home healthcare follow-up, and the current catheter had been in place for approximately 28 days before replacement. According to her caregivers, the purple discoloration had first appeared two days before the visit, and they planned to report this finding during the scheduled catheter replacement because the routine home healthcare visit was imminent. The patient's general condition was good; she was conscious, oriented, and cooperative, with no urinary system symptoms. Other than her regular medications for chronic ischemic heart disease, there were no recent changes in pharmacological therapy, and caregivers did not report significant constipation.

On physical examination, her temperature was 36 °C, pulse 99/min, and blood pressure 100/65 mmHg. Abdominal examination revealed no

Figure 1. Urine bag of the patient showing characteristic purple discoloration

guarding or rebound tenderness. There were no signs of erythema, discharge, or irritation at the catheter insertion site. The urinary catheter and bag were replaced, and the newly drained urine appeared normal in color. Blood tests, urinalysis, and urine culture were obtained.

Laboratory analysis revealed a urine pH of 7.2, negative nitrite and leukocyte esterase, 4–5 leukocytes/hpf, and 10 erythrocytes/hpf. Blood tests showed a white blood cell count within normal limits, hemoglobin consistent with chronic anemia at 10.2 g/dL, AST 18 U/L, ALT 10 U/L, urea 45 mg/dL, creatinine 1.12 mg/dL, and CRP 0.78 mg/L. In the absence of infection markers and given the normalization of urine color after catheter replacement, antibiotic therapy was not initiated, and the culture result was awaited. The urine culture later revealed growth of Enterobacter cloacae.

After catheter and urine bag replacement, the newly inserted urine bag did not show recurrent purple discoloration. The patient remained clinically stable, afebrile, and asymptomatic, and no urinary tract infection symptoms developed despite the absence of antibiotic therapy. At the one-month follow-up, no recurrence of purple discoloration or urinary tract infection symptoms was observed.

Written informed consent for publication was obtained from the patient's legal guardian.

Discussion

Purple Urine Bag Syndrome (PUBS), although rare, has been reported particularly in elderly patients with long-term catheterization. The literature emphasizes that PUBS is generally benign in nature and is most often detected incidentally.[3] However, the striking appearance of the syndrome may cause considerable anxiety for both patients and caregivers. PUBS can be explained by a triadic interaction between host-related factors such as advanced age and immobility, microbial factors involving indole-producing microorganisms, and device-related factors related to prolonged pigment exposure on plastic catheter and urine bag surfaces. Accordingly, PUBS should be considered not merely an infectious condition but a biochemical phenomenon occurring in susceptible hosts with urinary devices.

Most cases reported in the literature occur in elderly, female, and immobile patients.[2,5] Systematic reviews demonstrate that 61.29% of cases involve women and 38.71% involve men, with a predominance in advanced age groups and frequent coexistence of comorbidities such as diabetes mellitus and hypertension.[6] Similarly, our case developed in an elderly female patient with long-term bladder catheterization. However, the distinctive feature of this case is the complete resolution of the clinical presentation solely with catheter and urine bag replacement, without any systemic signs of infection. Indeed, the literature highlights that antibiotic therapy is not required in asymptomatic PUBS cases and is indicated only in the presence of symptomatic urinary tract infection.[7]

According to guidelines published by the Infectious Diseases Society of America (IDSA), antimicrobial treatment is not recommended when bacteriuria is present in the absence of clinical symptoms[8] As demonstrated in this case, withholding antibiotics in asymptomatic patients not only prevents unnecessary antimicrobial use but also reduces the risk of antimicrobial resistance. Furthermore, it avoids additional morbidities that may arise from antibiotic therapy in elderly and comorbid individuals. This underscores the importance of a rational management approach, particularly in the care of elderly and catheterized patients frequently encountered within home healthcare services. This rational approach additionally helps to reduce the burden of advanced diagnostic testing, thereby improving the effectiveness of patient management in the primary care setting.

In the present case, the urine pH was 7.2, indicating a mildly alkaline environment and remaining lower than the markedly alkaline pH levels classically associated with PUBS. The fact that PUBS cases have also been reported in acidic or near-neutral urine suggests that pigment formation may not depend solely on urinary pH.[9] Additional mechanisms, including local microenvironmental factors, bacterial enzymatic activity, the duration of contact between pigments and the catheter bag surface, and oxidation processes, may also contribute to the development of this condition.

The main contribution of this case is not to present PUBS as a novel clinical condition, but to demonstrate that an asymptomatic PUBS episode developing in an elderly patient with chronic catheterization followed through home healthcare services can be successfully managed

with catheter and urine bag replacement alone, despite a positive urine culture and in the absence of clinical and laboratory findings of urinary tract infection. Home healthcare services represent an important care setting in which patients with major risk factors for PUBS, such as advanced age, immobility, and long-term urinary catheterization, are closely monitored. Therefore, accurate recognition of PUBS by home healthcare teams may contribute to the prevention of unnecessary diagnostic escalation, inappropriate antibiotic use, and avoidable hospital referrals in asymptomatic cases.

Conclusion

This case demonstrates that in asymptomatic Purple Urine Bag Syndrome, catheter replacement alone may be sufficient and that antibiotic therapy is not always required. Awareness of this condition in family medicine and home healthcare practice contributes to patient safety, reduction of antimicrobial resistance, and prevention of unnecessary polypharmacy in vulnerable elderly populations.

Limitations of the case

This case has several limitations. Serum indoxyl sulfate levels, urine pigment characterization, and spectrophotometric analysis were not performed because these tests are not part of routine home healthcare or primary care practice. In addition, detailed microbiological assessment of bacterial enzymatic activity was not available. Nevertheless, the clinical presentation, characteristic discoloration of the urine bag, absence of systemic infection findings, and complete resolution after catheter and bag replacement support the diagnosis of PUBS.

Patient consent

Written informed consent for publication was obtained from the patient's legal guardian.

Ethical approval

Ethics committee approval was not required for this case report. Written informed consent was obtained from the patient for publication.

Author contribution

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

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Review Article

Digitalization of primary health care services in Türkiye and the integration process between levels of care

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ABSTRACT

As part of ongoing efforts to make the healthcare system in Türkiye more effective, accessible and sustainable, the digitalization of primary healthcare services is gaining increasing importance. This study explores the contribution of digital health technologies to service delivery—particularly through family health centers—along with the integration policies developed between different levels of care. The widespread adoption of systems such as electronic health records, e-Nabız, the Central Physician Appointment System (MHRS), and the Public Health Management System (HSYS) has not only improved patient-service alignment but also facilitated better coordination among healthcare professionals. Following the implementation of the Health Transformation Programme, information management systems have enabled a more holistic approach to patient follow-up, guidance, and monitoring. In 2025, the "Integration between Healthcare Levels" initiative was introduced to streamline patient transitions from primary to secondary and tertiary care in a more systematic and efficient manner. Expanding the scope of the authority of family physicians, enhancing their access to laboratory and imaging services, and promoting reciprocal information sharing with specialist physicians are expected to support a more balanced distribution of the healthcare burden and alleviate patient congestion in hospitals. These initiatives aim to shorten the time citizens wait for care, improve referral accuracy, and increase access to preventive health services. In light of these developments, it is envisioned that the future of Türkiye's healthcare system will be built upon a more innovative and integrated model, underpinned by a strengthened digital infrastructure and enhanced digital competencies among physicians.

Keywords: primary health care, health information systems, systemic integration, preventive healthcare, chronic disease management

Introduction

Effective, accessible, and sustainable healthcare services are among the primary objectives of Türkiye's people-centered health system.[1]

The healthcare structure in Türkiye is organized into three levels, each designed to enhance public health. Primary healthcare services encompass both preventive and curative care, delivered through institutions such as family health centers, healthy life centers, and community health

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centers. Secondary healthcare includes services provided by general hospitals, whereas tertiary healthcare refers to advanced inpatient care offered by institutions such as university hospitals and training and research hospitals.[2]

Primary healthcare services, which integrate preventive and promotive care with treatment and rehabilitative services, are critically important as the first point of contact between individuals and the health system. Secondary care encompasses hospital-based services requiring specialist expertise, such as surgery or radiology. Tertiary care involves highly specialized treatments in academic or research institutions, including organ transplants or neurosurgery. As emphasized in the Alma-Ata Declaration, primary healthcare aims to provide continuous, comprehensive, and coordinated services to individuals and families, serving as the foundation of public health.[3] According to the World Health Organization (WHO), one of the main objectives of primary healthcare is to improve the overall health status of the population.[4] Since the introduction of the family medicine system in Türkiye in 2010, primary healthcare services have been significantly strengthened. A wide range of services spanning from preventive care to diagnosis, treatment, and rehabilitation has been provided within this framework. In recent years, the role of primary healthcare has continued to expand. In fact, in 2023, the total number of annual visits to 28,054 family medicine units reached approximately 417 million, accounting for 43.3% of all physician visits across the country.[5] The announcement by the Ministry of Health that 1,000 new Family Health Centers will be opened in 2025 indicates a further commitment to placing these services at the core of the healthcare system.[6] In this context, the adoption of digital technologies for more effective and efficient service delivery offers significant advantages for both healthcare professionals and patients. Digitalization plays a vital role in enhancing the efficiency and accessibility of health systems.[4]

Digitalization in health: conceptual framework

Digitalization is driving radical transformations across nearly every sector today, and the healthcare industry is no exception to this global shift. With advancements in technology, substantial innovations have emerged in the delivery of healthcare services, as well as in diagnosis, treatment, and care processes. This phenomenon, referred to as "digitalization in health," encompasses a range of digital components, such as electronic health records, telehealth applications, mobile health technologies, AI-supported systems, and big data analytics.[7]

These technologies hold significant potential to enhance the efficiency of healthcare services, improve accessibility, reduce costs, increase patient satisfaction, and increase overall health outcomes. Digitalization is increasingly recognized as a strategic instrument in the transformation of healthcare systems.[8] In the near future, the widespread integration of artificial intelligence into healthcare is expected to profoundly influence how physicians engage with patients. These developments are set to fundamentally reshape the delivery of healthcare services and patient treatment processes. Furthermore, leveraging the full potential of digitalization is critically important for improving health literacy within the broader population.

Development of digitalization in health in Türkiye

In recent years, healthcare services in Türkiye have undergone a significant transformation, not only in terms of service delivery but also through the adoption of digital health applications. Announced in 2002, the Emergency Action Plan included e-transformation goals under the "Health for All" initiative. With the launch of the Health Transformation Programme (SDP) in 2003, basic health services and health information systems were integrated.[9]

In this context, applications such as the Core Resource Management System (ÇKYS), Doctor Information Bank (DBB), and Family Medicine Information System (AHBS) were introduced. The Turkish Health Information System Action Plan, published in 2004, aimed to enhance data quality and strengthen knowledge-based management capacity within the healthcare sector. This action plan referenced the Eighth Five-Year Development Plan's Special Expertise Commission Report on Efficiency in Health Services. The report highlighted the absence of an information-based management system in the health sector and noted that existing data were not effectively utilized by administrators because of their low quality.[10]

The Action Plan also outlined the development of several systems, including the Primary Health Statistics Module Section (TSİM), the Primary Health Care Institutions Information System (BBSK-BS), Hospital Information Systems (HBS), and the Document Information System (EBS).[11] These applications were developed over time and subsequently updated with new automation tools. The growing need to deliver and receive modern healthcare services, alongside the demand for quicker access to results and reliable information, has accelerated the development of health information systems. In 2010, the Central Physician Appointment System (MHRS)[12], which is accessible to all citizens, was launched to help physicians and patients use their time more efficiently and to reduce waiting times prior to examinations. That same year, the Pharmaceutical Tracking System (İTS)[13] was introduced to monitor the journey of medicines from production to patient delivery. In 2015, the e-Nabız platform was launched to enable individuals across the country to access their personal health data. e-Nabız is an integrated digital platform that allows individuals to view their health history regardless of the institution. The system enables access to all health-related applications made across Türkiye, including laboratory results, imaging and pathology reports, diagnoses, epicrisis reports, prescriptions, and medication information. Both individuals and authorized physicians can access these data, thereby enhancing continuity in healthcare services and improving the efficiency of diagnosis and treatment processes.[14]

Launched in 2016, the Public Health Management System (HSYS) is a modular system designed to ensure data integrity in primary care services. It includes modules for cancer screenings, physical examinations, select vaccination programs, the National Tuberculosis System (UTS), and the Examination Information Management System (MBYS). In 2017, the e-prescription system was introduced to enable the electronic prescription of medications, adjust dosages, and prevent drug misuse. In 2018, the e-Report system was developed, allowing for the electronic issuance of various reports including birth, disability, driver's license, athlete, psychotechnical, single-physician, and health board reports through the use of e-signatures.[15] In 2019, the Statistics and Causal Analyses in Health (SİNA) application was launched, providing a platform for visualizing and analyzing Ministry of Health data. In 2020, the filiation and isolation tracking system (FİTAS) was implemented as part of efforts to combat the COVID-19 pandemic. Additionally, systems such as the Vaccine Tracking System (ATS)[16], which ensures vaccine safety by monitoring temperature and stock levels and the Disease Management Platform (HYP)[17], an online system in which family physicians actively monitor chronic diseases such as hypertension, diabetes, cardiovascular conditions, and obesity and that includes a comprehensive elderly assessment module were developed. With respect to the integration process between health levels in January 2025, the Ministry of Health publicly announced the "Integration between Health Levels" project. The aim of this initiative is to establish effective integration between family physicians and healthy life centers that provide primary healthcare services and

secondary and tertiary healthcare institutions. The implementation of the family medicine model in Türkiye began in the province of Düzce in 2005. It gradually expanded to other provinces and became nationwide as of 2010.[18]

Family physicians are responsible for providing care to all members of a family—from unborn babies to the elderly—and delivering preventive health services and health counseling and refer patients to specialists when necessary. Within this framework, family health centers (ASMs) carry out many critical tasks, including vaccination tracking, infant and child health monitoring, antenatal and postnatal follow-up, elderly and chronic disease management, and cancer screenings.[19] One of the primary goals of the family medicine system is to ensure that individuals access the healthcare system at the appropriate time and at the correct level, thereby minimizing time loss and reducing the burden on higher-level healthcare institutions.[19] The number of family physicians, which stood at 20,216 in 2011[20], increased to 28,054 by 2023.[5] However, considering that some units still lack assigned physicians, it becomes evident that sufficient emphasis has not been placed on strengthening the family medicine system. Increasing the number of family physicians is critically important for reducing the population-to-physician ratio, which in turn directly enhances the quality of healthcare services. This integration project—designed to improve the effectiveness of preventive health services, establish family health centers as the cornerstone of the healthcare system, alleviate hospital overcrowding, and promote more efficient use of healthy life centers is expected to make significant contributions to the sustainability of the healthcare system, provided that it is implemented in a coordinated and effective manner by both the central and provincial branches of the Ministry of Health. Announced on 26 December 2024 through an official letter issued by the General Directorate of Public Health, the practice of integration between health levels aims to facilitate citizens' access to appropriate healthcare services and to strengthen collaboration among healthcare professionals. This system also serves to support the professional development of general practitioners and family physicians. The referral chain, one of the foundational elements of the family medicine model, was initially piloted in four provinces in 2009. However, the practice was discontinued following public backlash. In the current phase, digital integration is introduced to support the steps that could function as part of a referral chain. This integration is reinforced through health information management systems and appointment quotas specifically allocated to family physicians. By allowing family physicians to schedule appointments for their patients using dedicated quotas through the Central Physician Appointment System (MHRS), patients can be directed to the appropriate specialist at the right time, improving the coordination and organization of healthcare services. Currently, only 10 percent of appointment quotas are allocated for patients who are registered with family physicians. If this ratio is increased supported by monitoring and incentivizing effective use it would enable patients who do not require specialized care to complete their treatment in primary care settings. This would reduce unnecessary referrals to secondary and tertiary healthcare facilities and ease the burden on hospitals. In this framework, the screening of patients for cancer and chronic diseases at the family physician level is also actively encouraged. To encourage the utilization of the 10% hospital appointment quota reserved for patients referred by family physicians, amendments made to the Family Medicine Contract and Payment Regulation in November 2024 propose that patients referred via the Central Physician Appointment System (MHRS) will not be counted toward the total number of hospital admissions a new performance metric. Additionally, an amendment to the Social Security Institution (SGK) Health Implementation Communiqué, published in the Official Gazette

on 25 January 2025, reduced the copayment for specialist consultations performed with a referral from a family physician by 50%. This change is significant in terms of fostering a patient's habit of consulting their family physician first and then, if needed, receiving a formal referral to a hospital. Furthermore, in departments where it is typically difficult to secure appointments, the ability of family physicians to directly schedule appointments for their patients offers considerable convenience. The prioritization of patients referred by family physicians for hospital treatment is expected to make this system more attractive, thus increasing the utilization rate of the allocated quota over time. As demand increases for both patients and family physicians, the current 10% quota is likely to require expansion. Integration also facilitates an efficient flow of information between hospital physicians and family physicians through shared notes on health information management systems. The sharing of data such as preliminary diagnoses and reasons for referral enables specialist physicians to manage their time more effectively. In turn, the ability of specialist physicians to provide digital feedback to family physicians following patient evaluations enhances the continuity of patient monitoring and treatment. With the integration between healthcare levels, family physicians will be able to request certain laboratory and imaging tests in hospital settings without the need for reexamination. For instance, the international normalized ratio (INR) of a patient on anticoagulants can be monitored by a family physician under the guidance of a specialist, and dose adjustments can be managed within the Family Health Centre (ASM). The test results will be transmitted to the family physician via the digital system, allowing timely interventions. Additionally, family physicians will be authorized to request scheduled imaging procedures such as mammography and developmental hip dysplasia screenings through hospital systems. This will contribute to the broader implementation of cancer screenings and help alleviate overcrowding in neonatal outpatient clinics. Expanding the authority of family physicians to order diagnostic tests will increase access to healthcare by eliminating the need for patients to undergo unnecessary hospital visits, make repeated appointments, or endure redundant examinations. This system is expected to save time, lower costs for both patients and healthcare providers, and reduce the burden on secondary and tertiary care services. As part of the integration initiative, it is also intended to broaden preventive healthcare services such as those targeting healthy nutrition, physical activity, mental health, and child development by facilitating referrals from physicians at all levels of the healthcare system to Healthy Life Centers (SHM). Improved communication between physicians and SHM personnel, including responsible physicians, dietitians, psychologists, social workers, physiotherapists, and child development specialists via shared information notes will streamline treatment processes and enhance the quality of preventive services. SHM staff, including responsible physicians and dietitians, will be able to access results from certain tests and analyses performed in other healthcare institutions. This prevents unnecessary test duplication and promotes more efficient use of both time and resources. In turn, citizens will benefit from more effective and targeted counseling services. Furthermore, with the "Communiqué Amending the Social Security Institution Health Implementation Communiqué," published in the Official Gazette dated 25 March 2025 (No.32852), the number of hypertension and cholesterol medications that can be prescribed by family physicians has increased, thereby expanding the scope of primary healthcare services.[21]

The expansion of prescriptive authority should also be extended to medications for chronic diseases such as diabetes, which is highly

prevalent in the population. Current limitations affect family physicians' ability to effectively manage the treatment of their chronically ill patients and often result in increased referrals to hospitals. Allowing family physicians to prescribe antidiabetic medications and insulin under the coverage of the Social Security Institution (SGK) would enhance the effective utilization of their competencies in managing diabetes. Ultimately, early control of diabetes will help prevent long-term complications such as chronic kidney disease, diabetic foot disease, diabetic neuropathy, and cardiomyopathy and contribute to a reduction in overall healthcare expenditures.

Discussion

Integration practices between different levels of healthcare services are strategically important for strengthening primary healthcare and positioning family health centers at the core of Türkiye's health system. This holistic approach presents a valuable opportunity to enhance service quality and facilitate access across all levels of care. In particular, prioritizing family health centers as the foundation of the system represents a critical step for advancing public health.

Innovations implemented within these centers will not only increase service quality but also ensure that all segments of society have access to equitable, comprehensive, and continuous healthcare. These centers enable individuals to monitor their health more effectively while simultaneously reinforcing the preventive and promotive aspects of healthcare delivery. Digital health integration should aim not only to improve existing services but also to guarantee the continuity and sustainability of digital transformation. Strengthening technological infrastructure will streamline patient treatment processes, reduce healthcare professionals' workload, and enhance overall service quality. Empowering family health centers is essential for improving public health outcomes. In this context, it is crucial for family physicians to be equipped with up-to-date knowledge in light of evolving diagnostic and therapeutic approaches, disease patterns, and technological advancements. Identifying the most frequently referred specialties and designing targeted training programs for family physicians in these areas can reduce the prevalence of defensive medical practices and enhance physician–patient communication. For instance, refreshing core knowledge in high-demand specialties such as cardiology, dermatology, and psychiatry will facilitate timely and accurate referrals and enable more effective treatment. Family physicians serving large populations of neonatal, pediatric, elderly, or chronically ill patients could benefit from rotational training—up to two months in internal medicine or pediatrics and one month in other relevant departments—on the basis of their individual needs and institutional capacity. Furthermore, monitoring and screening chronic diseases through family health centers with the Health Management Platform (HYP) offers a holistic perspective and aligns with international best practices. Countries such as Germany (with the German Disease Management Programmes, 2001), the United Kingdom (with the National Service Frameworks, 1997), and the Netherlands (with the Maastricht Project, 2000) have incorporated primary care-led chronic disease management systems.[22] Turkey's HYP platform shares similarities with Germany's disease management programs (DMPs) in terms of chronic disease monitoring but lacks the structured patient education modules of the DMP. The Netherlands Maastricht Project (2000) demonstrates how primary care-led models reduce hospital admissions, a strategy Turkey could adopt. Recognizing chronic disease monitoring as a performance metric in the Family Medicine Contract and Payment Regulation will incentivize increased screening of healthy individuals and effective patient follow-up. This

approach will also promote seamless integration between the secondary and tertiary care levels. A sustainable and cost-effective healthcare system depends on the reliable documentation of HYP data and the continuation of early diagnosis, long-term treatment, and patient follow-up within a primary care-based, integrated framework. As in other chronic disease management programs, data analysis plays a vital role here. Moreover, managing the diagnosis and long-term treatment of chronic illnesses can be conceptualized as an ongoing model of medical education.[23]

In the future, with the anticipated increase in the number of specialist physicians, the scope of integration between care levels could be expanded by establishing formal pairings between family health centers and hospitals, as well as between family physicians and specialists. Such a system would allow specialists to act as consultant physicians, supporting family physicians in diagnostic and therapeutic processes. This model could also serve as a form of interactive, practice-based training. Delivering such training in various formats face-to-face in outpatient settings, interactively through a client-consultant model, and digitally via continuous education platforms would improve the quality of healthcare services and patient satisfaction while significantly enhancing the overall efficiency of the health system. Data privacy concerns and the digital divide must be mitigated to ensure equitable access to e-health platforms such as e-Nabız. Future iterations of Turkey's digital health framework could explore blockchain for secure patient data sharing, aligning with EU standards.

Conclusion

These integration initiatives should be viewed as a significant advancement in Türkiye, where previous efforts to implement referral chains between healthcare service levels have not been successful. The digitalization of primary healthcare services and the integration of various levels of the healthcare system represent pivotal breakthroughs in enhancing accessibility, coordination, and sustainability within the Turkish health system. Through the deployment of digital health systems and integrated information management infrastructures, patients can now access healthcare services more promptly and accurately. Moreover, information exchange among healthcare professionals has become more efficient, and service delivery has been significantly streamlined. Tangible achievements such as strengthening the role of family physicians, expanding preventive health services, and alleviating hospital overcrowding demonstrate the direct impact of this transformation on public health outcomes. To ensure the effective delivery of health services within this evolving digital ecosystem, it is essential to continuously enhance technological infrastructure, improve physicians' digital literacy, and design systems that are user friendly. These ongoing developments not only enable more effective responses to current healthcare demands but also lay the foundation for future innovations in the health sector. These include AI-supported clinical decision-making tools, personalized monitoring and treatment protocols, and data-driven public health applications.

Ethical approval

Since ethical approval is not required for review articles, no ethics committee approval was obtained for this study.

Author contribution

The authors declare contribution to the paper as follows: Review conception and design: ARB; literature review: MC; draft manuscript preparation: HAG. All authors reviewed the results and approved the final version of the manuscript.

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Letter to the Editor

How culture and context shape lifestyle medicine: insights from the EYFDM Bridge Project

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Dear Editor,

This study originated from our experience in the Bridge Project conducted by the European Young Family Doctors' Movement (EYFDM). As part of the Lifestyle Medicine Group, the project explored how cultural and environmental contexts influence approaches to lifestyle medicine through collaboration among young family physicians from different countries. Our findings were presented at the WONCA World 2025 Preconference.

In the project we joined to strengthen international collaboration, the Lifestyle Medicine Group consisted of three physicians from Türkiye. What initially seemed to be a limitation turned into an advantage, as working in different regions and institutions allowed us to observe that lifestyle recommendations are influenced not only by individual factors but also by social and cultural contexts. his realization defined our project focus and inspired us to explore how young family physicians across Europe integrate cultural aspects into lifestyle counseling. An online survey shared through EYFDM channels included five family physicians from Türkiye, France, Greece, Slovakia, and Luxembourg. Each responded to six case scenarios representing diverse age groups, social backgrounds, and clinical situations. Across countries, lifestyle modification was viewed as a natural part of clinical care. In Greece, seaside walks encouraged both physical activity and social connection. In France, family meals, sophrology and breathing exercises reflected an integrated approach to stress management. In Türkiye, visiting local markets and preparing meals together were described as enhancing nutrition, movement, and family cohesion. Slovak participants emphasized "going to the forest to pick mushrooms" as a holistic practice combining exercise, nature, and diet. In Luxembourg, pregnancy support groups and family cooking activities were valued for strengthening social belonging and promoting healthy habits.

A recurring theme was that "like medication doses, lifestyle prescriptions should be delivered step by step." This approach frames behavior change as an ongoing process supported by regular follow-

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up. Transtheoretical Model, gradual and tailored steps enhance engagement and sustainability.[1]

Another notable insight concerned technology's role in reducing loneliness among older adults. Safe and purposeful digital inclusion can maintain social connections, support cognition, and improve healthcare access, enhancing both knowledge and psychosocial well-being.[2,3]

The study further revealed barriers to implementing lifestyle medicine in daily practice. Many physicians were willing to prescribe lifestyle interventions but faced limited access to community resources. Ensuring that walking groups, exercise areas, education programs, and counseling services near primary care centers remain accessible and up to date is therefore essential. The results highlight the importance of tailoring micro prescriptions to each individual's living environment. Setting one attainable goal, planning small measurable steps, and maintaining social support through regular follow up emerge as key factors for sustaining behavior change. Lifestyle medicine integrates with social relationships, cultural context, and daily life. Family physicians who know their patients' stories, families, and environments play a central role in guiding this trust based and gradual process through a holistic biopsychosocial approach.

Through this project, we discovered how sharing experiences across cultures can transform the way we understand and practice care. We sincerely thank the EYFDM team for fostering this inspiring platform that connects and empowers young family physicians worldwide.

Ethical approval

This study has been approved by the İzmir City Hospital Non-Interventional Clinical Research Ethics Committee (approval date August 13, 2025, number 2025/342). Electronic informed consent was obtained from all participants before they completed the online survey.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: YA; draft manuscript preparation: YA, SK, MG, İZ. All authors reviewed the results and approved the final version of the article.

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The authors declare that there is no conflict of interest to disclose.

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Letter to the Editor

The evolving WONCA tree: a conceptual shift toward planetary and sustainable primary care

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Dear Editor,

The WONCA Tree is a visual mnemonic that operationalizes the European Definition of General Practice/Family Medicine. This model, which incorporates the core competencies of family medicine, is among the most fundamental frameworks shaping both clinical practice and the academic structure of the discipline. The trunk symbolizes the core discipline; the main branches reflect its scope and settings; the leaves represent the defining characteristics of General Practice/Family Medicine; and the roots and soil embody the fundamental values and contextual foundations that sustain the discipline across individuals, families, communities, and society at large. For many years, it has served as a guiding framework.

The core competencies of family medicine are as follows:

1. Primary care management: This includes managing initial patient contact, addressing all health problems, coordinating care with other primary care professionals and specialists, ensuring the effective and appropriate use of healthcare resources, facilitating patients' access to necessary services, and advocating for patients.
2. Person-centered care: McWhinney describes the patient-centered approach as the physician's effort to enter the patient's world in order to see the illness through the patient's perspective, while Grol emphasizes that patient-centeredness involves taking responsibility not only for the medical aspects of the problem but also for its non-medical dimensions.[1]
3. The components of person-centered care include:
   (a) assessing the patient holistically;
   (b) exploring and interpreting both the disease and the illness experience;
   (c) finding common ground with the patient regarding the problem and its management;
   (d) incorporating health promotion and prevention into care;
   (e) strengthening the doctor–patient relationship, while respecting patient autonomy;
   (f) being realistic about time, resources, and teamwork.[2]

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4. Specific problem-solving skills: This involves linking decision-making processes to the prevalence and incidence of diseases in the community; being selective in the interpretation of clinical findings, history, and laboratory results; using this information collaboratively with the patient to develop an appropriate management plan; rational use of investigations; efficient time management; tolerance of uncertainty; the ability to act in emergencies; early management of undifferentiated illness; and ensuring effective and efficient use of diagnostic and therapeutic interventions.
5. Comprehensive approach: This includes managing multiple complaints and acute and chronic conditions simultaneously; appropriately integrating disease prevention and health promotion strategies; improving health and well-being; and ensuring the coordination of preventive, curative, palliative, and, when necessary, rehabilitative services.
6. Community orientation: This involves addressing the community's health needs while ensuring the balanced use of available resources.
7. Holistic approach: This refers to applying a biopsychosocial model that considers cultural and existential dimensions.

With the 2023 revision, the model emphasizes three additional components: One Health, Planetary Health, and the Sustainable Development Goals (SDGs) (Figure 1). One Health is an integrated, unifying approach that aims to balance and optimize the health of humans, animals, and the environment.[3] Planetary health refers to the health of human populations and the natural systems upon which they depend, including clean air, water, and soil, as well as food and energy systems.[4] The One Health approach encompasses multisectoral collaboration, policies, legislation, and programs to improve public health.[5] These concepts highlight the necessity of evaluating human, animal, and environmental health as

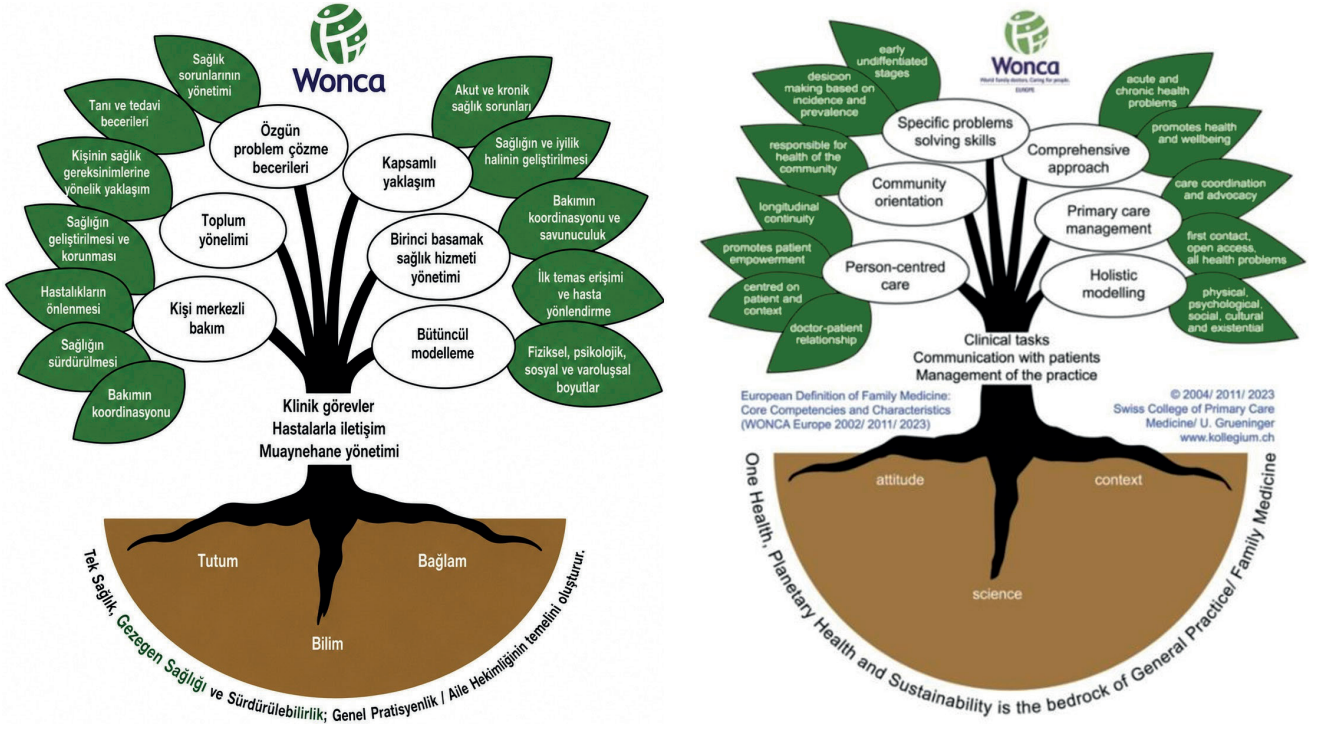

Figure 1. WONCA tree in Turkish and English

an interconnected whole, which justifies their placement at the model's foundational roots.

These three newly emphasized elements underline the need for a holistic, interdisciplinary, and multisectoral approach to both human and planetary health. It is suggested that One Health, Planetary Health, and the SDGs should be integrated across all six core competencies, the twelve defining characteristics, and the three additional features required for their implementation.[6] In this context, One Health and Planetary Health represent comprehensive frameworks encompassing human, animal, and environmental health.

The World Health Organization defines a "sustainable health system" as one that improves, restores, or maintains health while minimizing negative environmental impacts and maximizing opportunities for the benefit of present and future generations.[7] Planetary health, in turn, encompasses both the health of human civilization and the natural systems that support it.

Primary care has the potential to contribute positively to the sustainability of healthcare systems and to address challenges related to climate and environmental change. As highlighted in the 17 Sustainable Development Goals, ending poverty and deprivation must be pursued alongside improvements in health and education, as well as the reduction of inequalities.[8]

This approach emphasizes that human health is inseparable from environmental, animal, and ecosystem-based determinants, thereby extending family physicians' roles beyond individual patient care to include responsibilities for community and planetary health. Furthermore, the updated model enhances visibility of key priorities, such as sustainability in healthcare, reducing health inequalities, and strengthening community-based preventive approaches.

The visual metaphor, translated by TAHUD, clearly demonstrates that family medicine is not merely a set of clinical skills but a discipline grounded in social, cultural, and systemic dimensions. The integrated presentation of key concepts such as person-centered care, shared decision-making, the biopsychosocial approach, continuity, and community orientation reflects the essence of primary care.

In this context, we believe that the WONCA Tree model can make significant contributions if used as a conceptual framework in:

1. undergraduate and postgraduate medical education,
2. training programs for family physicians in clinical practice, and
3. the development of health policies.

In conclusion, we consider that updated visual and conceptual models, such as the WONCA Tree, should be supported, as they strengthen the identity of family medicine and enhance understanding of its multidimensional nature.

Sincerely

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: Gİ, GZÖ; draft manuscript preparation: Gİ. The author(s) reviewed the results and approved the final version of the article.All authors reviewed the results and approved the final version of the article.

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