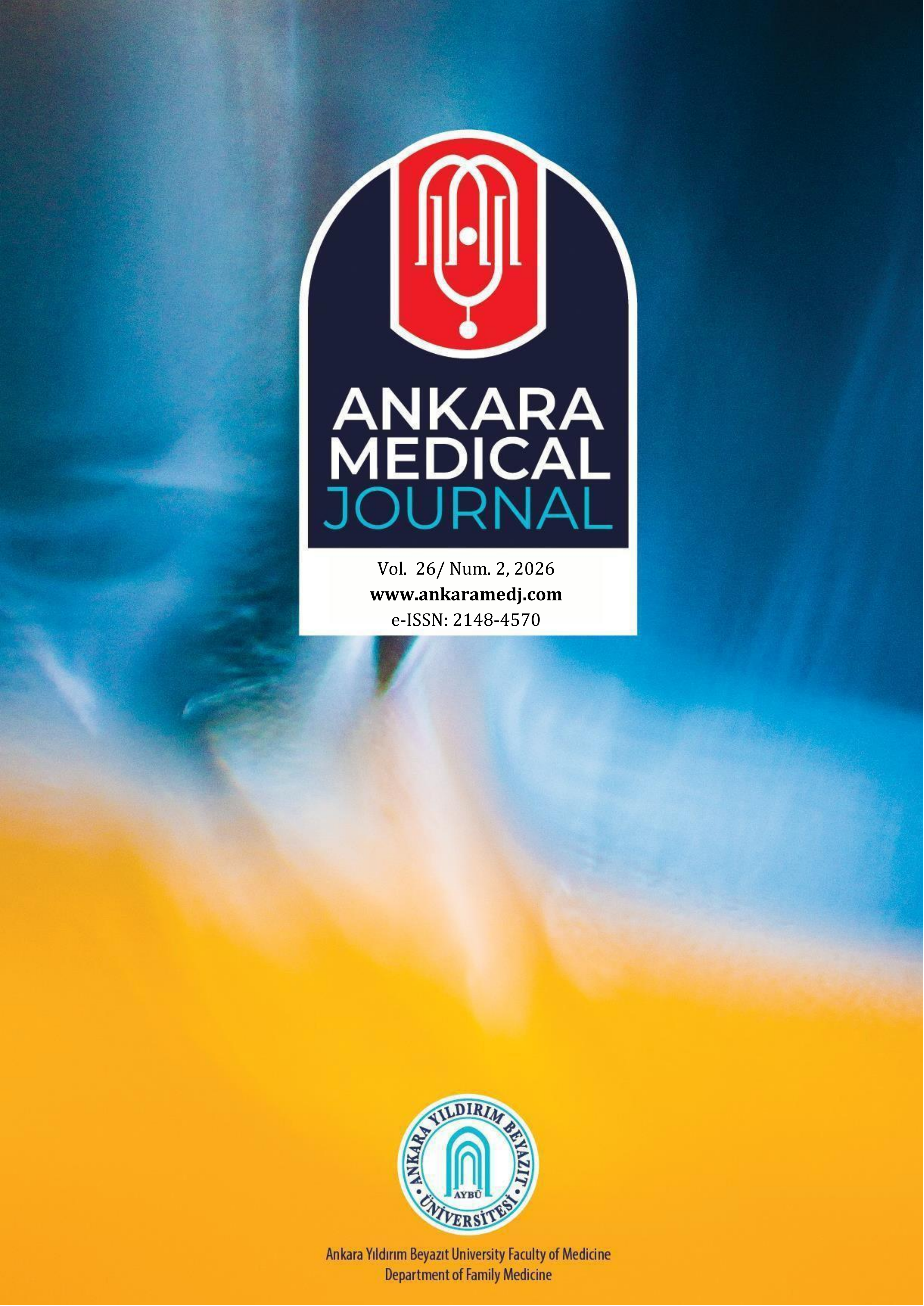

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ANKARA MEDICAL JOURNAL

From the Editor

Dear Readers,

It is our great pleasure to present the second issue of 2026, which brings together a rich selection of scholarly contributions prepared with the needs and interests of healthcare professionals in mind, especially those serving in primary care. In this issue, we are pleased to feature 9 original research articles and 1 review article, each addressing current topics and developments relevant to clinical practice and healthcare delivery.

As Türkiye's leading journal in the field of primary care, we remain committed to supporting healthcare professionals by providing reliable, timely, and evidence-based scientific content. This role is both a source of pride and a responsibility that we carry with great care. We are grateful for the continued interest and support of our readers, authors, reviewers, and all contributors who help strengthen the academic value of our journal.

We hope that the articles included in this issue will offer meaningful insights, encourage reflection, and contribute to the ongoing improvement of primary care practices. Your engagement continues to inspire our efforts to promote scientific exchange, professional development, and innovation in healthcare.

We look forward to welcoming you again in our next issue with another carefully prepared collection of articles.

Prof. Dr. Ahmet Keskin

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PREDICTORS OF MATERNAL MENTAL WELL-BEING AND FEEDING ATTITUDES IN THE COMPLEMENTARY FEEDING PRACTICES: A CROSS-SECTIONAL STUDY IN KARABÜK PROVINCE

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Abstract

Objectives: This study aimed to investigate the relationship between mothers' complementary feeding practices, mental well-being, and attitudes toward the feeding process during the complementary feeding period.

Materials and Methods: In this cross-sectional, descriptive study, data were collected from 369 mothers and their infants aged 12–24 months. The "Mother's Attitudes Towards the Feeding Process Scale (MATFPS)" and the "Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)" were utilized for data collection. Demographic characteristics of the mothers and infants, breastfeeding behaviors, and complementary feeding practices were assessed.

Results: The mean exclusive breastfeeding duration was 17.99 ± 7.07 weeks, and complementary feeding began at 5.52 ± 0.79 months. Overall, 56.4% of infants were exclusively breastfed for six months. Weak negative correlations were found between MATFPS and WEMWBS scores ($p < 0.001$) and between maternal age and WEMWBS scores ($p = 0.01$). WEMWBS score, feeding activities, complementary feeding method, and timing predicted MATFPS scores ($R^2 = 0.21$), while maternal age, number of children, and feeding activities predicted WEMWBS scores ($R^2 = 0.13$) ($p < 0.001$).

Conclusion: The study showed that better maternal mental well-being positively influenced attitudes toward complementary feeding. Midwives, nurses, and nutritionists in primary health care can play an important role in improving complementary feeding practices. Increased health literacy among people with chronic diseases positively affects rational medicine use. Expanding education and counselling services in primary care is recommended to promote rational medicine use, support treatment adherence, and reduce preventable medication-related problems.

Keywords: Chronic disease, health literacy, primary healthcare.

Introduction

According to the “Convention on the Rights of the Child,” every infant and child has the right to proper nutrition. The World Health Organization (WHO) and the United Nations International Children’s Emergency Fund (UNICEF) recommend exclusive breastfeeding for infants up to six months of age and the continuation of breastfeeding with complementary foods for at least two years.[1] Feeding during infancy is a process in which both the parent and the child actively participate and interact reciprocally.[2] This period is crucial for establishing eating behaviors that form the foundation of good nutrition and healthy growth.[3]

Numerous studies have reported that breastfeeding characteristics influence eating habits in later life. One study observed that children who were breastfed consumed more vegetables and enjoyed eating vegetables at 15 months compared to those fed with formula.[4] Breastfeeding characteristics are closely linked to maternal mental well-being. Oxytocin release during breastfeeding is known to reduce anxiety and promote physiological changes and psychological adaptations.[5] The relationship between maternal mental well-being and breastfeeding is bidirectional; mental health disorders can impair breastfeeding success, while challenges or the absence of breastfeeding have been associated with postpartum depression and anxiety.[6] Significantly, the literature reports that mothers’ anxiety levels, personality traits, and mental well-being influence the feeding practices of infants aged 6–12 months[7] and that maternal depressive symptoms are correlated with the eating behaviors of school-aged children.[8]

From six months onward, breast milk alone cannot meet an infant’s nutritional needs, making complementary feeding essential. Delayed or inappropriate introduction may negatively impact growth and development.[3] The complementary feeding period is critical for both physical and cognitive development. During this time, the brain grows at a rapid rate. Therefore, the timing, amount, and duration of certain nutrients can have positive and negative effects. Complementary feeding entails more than ensuring adequate nutrient intake; it is also significant to consider how a child is fed, not just what they are fed.[9] The family system in which a child is raised plays an active role in forming behavior patterns that persist throughout life. Parents' eating habits and feeding strategies are dominant determinants of a child's eating behavior.[10] A study conducted with school-aged children reported that feeding and parenting styles influenced their consumption of unhealthy snacks.[11]

Considering the impact of feeding habits and parental attitudes acquired during infancy on adulthood, this study aimed to examine the relationship between mothers' complementary feeding practices, mental well-being, and attitudes toward the feeding process during the complementary feeding period.

Materials and Methods

Study Design and Population

This study was designed as a cross-sectional descriptive correlational study. It was conducted between April 15 and September 15, 2023, with mothers of infants aged 12–24 months who visited family health centers and community health centers in the central district of Karabük for well-child follow-up.

Population and Sample Size

The study population comprised mothers residing in Karabük who had infants aged 12–24 months and whose infants had transitioned to complementary feeding. The primary reason for selecting this age group is related to the developmental characteristics of the complementary feeding period. The 6–12-month stage is often considered a transitional period in which infants are introduced to complementary foods and primarily engage in tasting, exploring textures, and gradually adapting to non-milk foods.[12] In contrast, by 12 months of age, most infants have been exposed to a wide variety of foods, have developed more stable eating patterns, and complementary feeding practices become more established and measurable.

According to the 2023 address-based population registration statistics of the Turkish Statistical Institute, there were a total of 2,137 infants aged 12–24 months in Karabük province.[13] The minimum required sample size was calculated as 329 using the sample formula with a 95% confidence interval and a 5% margin of error. Anticipating potential data losses, the researchers planned to include at least 10% more mothers in the study.

The study included literate mothers who lived in Karabük province, had infants aged between 12 and 24 months, and gave informed consent to participate. Mothers of infants with chronic diseases or food allergies were not included. Using a simple random sampling technique, 11 family and community health centers were selected. Mothers who visited these centers during the study period and met the inclusion criteria were recruited. A total of 369 mothers who completed the questionnaire in full were included in the final analysis. A post-hoc power analysis based on the final sample (n=369) and the correlation coefficient (r = -0.255) yielded a power of 0.99, confirming the high statistical sensitivity of the study. The feeding-related characteristics of the infants were detailed in Table 1.

Table 1. Feeding patterns of infants

	0-6 months (n=369)	**6-12 months (n=369)**	**12-18 months (n=286)**	**18-24 months (n=182)**
	n (%)	**n (%)**	**n (%)**	**n (%)**
Exclusive human milk	208 (56.37)	-	-	-
Exclusive formula	4 (1.08)	-	-	-
Human milk + water	12 (3.25)	-	-	-
Human milk + formula	87 (23.58)	12 (3.25)	-	-
Human milk + complementary food	33 (8.94)	241 (65.31)	196 (68.53)	112 (61.54)
Formula + complementary food	1 (0.27)	56 (15.18)	49 (17.13)	19 (10.44)
Human milk + formula + complementary food	24 (6.50)	59 (15.99)	24 (8.39)	13 (7.14)
Only complementary food	-	1 (0.27)	17 (5.94)	38 (20.88)

Data Collection

Data were collected using the "Participant Information Form," the "Mother's Attitudes Towards the Feeding Process Scale," and the "Warwick-Edinburgh Mental Wellbeing Scale." Mothers who visited the selected family and community health centers were provided verbal and written information about the research in line with the "Informed Consent Form (ICF)." Mothers who agreed to participate and signed the ICF were asked to complete the forms without disrupting healthcare services. Completing the forms took approximately 20 minutes.

Mothers' Body Mass Index (BMI) values (kg/m^2) were calculated using standards from the Centers for Disease Control and Prevention.[17] For infants' height and weight percentile values, reference values provided by Neyzi et al. (2008) 14 were used.

The Participant Information form contained a total of 27 questions that inquired about the sociodemographic characteristics of mothers and their infants, as well as complementary feeding behaviors. The form was prepared by the researchers following the literature.[6,15]

The Mother's Attitudes Towards the Feeding Process Scale (MATFPS), originally developed in Turkish by Dilsiz et al. (2018), includes 27 items and is designed for use with mothers of children aged 9 to 72 months.[17] Items are rated on a five-point Likert scale, from 1 (Never) to 5 (Always), yielding a total score between 27 and 135. Higher scores reflect more problematic attitudes related to the feeding process. The original scale demonstrated high internal consistency, with a Cronbach's alpha of 0.91. It encompasses five subdimensions: emotional negativity during meals, concerns about inadequate or unbalanced nutrition, maladaptive feeding behaviors, pressure-based feeding, and sensitivity to external opinions.[17] In the present study, the Cronbach's alpha was calculated as 0.90.

The Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS), originally developed by Tennant et al. (2007) and adapted to Turkish by Keldal (2015), is a unidimensional instrument comprising 14 positively worded items.[18,19] It is intended for use with individuals aged 16 to 70 years. Each item is rated on a five-point Likert scale from 1

(Strongly disagree) to 5 (Strongly agree), resulting in total scores ranging between 14 and 70. Higher total scores reflect better mental well-being. The original version of the scale demonstrated strong internal consistency with a Cronbach's alpha of 0.89.[19] In the current study, the scale's Cronbach's alpha was calculated as 0.93.

Ethical Considerations

This study was carried out in accordance with the ethical principles of the Declaration of Helsinki. Before data collection, approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Karabük University (Protocol No/Date: E-77192459-050.99-232724/2023), followed by institutional permission from the Karabük Provincial Health Directorate (Protocol No/Date: E-86662556-604.01.02-213012244/2023). In addition, authorization to use the relevant measurement tools was secured via email from the original authors. Written informed consent was included on the first page of the questionnaire, clearly outlining the study's purpose, assurance of confidentiality, voluntary nature of participation, and the participants' right to withdraw at any stage.

Statistical Analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) software, version 24. Descriptive statistical methods (number, percentage, mean, standard deviation, median, minimum, maximum) were utilized for data evaluation. The normality of data distribution was assessed using the Kolmogorov-Smirnov test, supplemented by an evaluation of Skewness and Kurtosis coefficients.[19] Variables with Skewness and Kurtosis values within the ±1.5 range were considered to satisfy the normality assumption for parametric procedures. Parametric tests were used for variables with normal distribution, while non-parametric tests were applied to those without normal distribution. All comparative findings were presented with their respective test statistics alongside p-values to provide a comprehensive overview of the analysis. For variables where the ANOVA test showed significance, Bonferroni or Tamhane post-hoc tests were conducted. Linear regression analysis was used to determine the predictors of MATFPS and WEMWBS scores. Additionally, a post-hoc power analysis was performed using the deductive method based on the final sample (n=369) and observed effect sizes to verify the statistical sensitivity of the study. Results were evaluated within a 95% confidence interval, and $p<0.05$ was considered statistically significant. The study adhered to the STROBE guideline for cross-sectional studies.[20]

Results

Data were obtained from 369 mothers and their infants. Descriptive characteristics of mothers and infants are given in Table 2.

It was determined that mothers with university-level education or higher had significantly lower WEMWBS scores than mothers with high school education or less (U=-2.99/p = 0.003/r=0.02). Among mothers, 69.92% were housewives or on maternity leave, and they had significantly higher WEMWBS scores than working mothers (U=-2.14/p = 0.03/r=0.012). Among the participants, 62.87% (n = 232) had income equal to their expenses, and these individuals had significantly higher MATFPS scores compared to those whose income exceeded their expenses (W=4.33/p = 0.01,/η2=0.02). It was found that 77.24% (n=285) of the mothers assessed their infants' development as normal, and mothers who believed their infants' development was behind that of their peers had significantly higher MATFPS scores compared to others (F=7.79/p < 0.001,/η2=0.04). It was determined that 49.32% (n=182) of the participants started complementary feeding upon the recommendation of a doctor, and these individuals had significantly lower MATFPS scores compared to those who started upon the recommendation of elder family members (F=3.07/p=0.04/η2=0.01). It was found that in 87.53% (n=323) of cases, the person feeding the infant with complementary foods was the mother or father. It was found that 68.56% of infants ate complementary meals with family members. Mothers of infants who ate during family mealtimes had significantly lower MATFPS scores than those whose infants ate separately (t=-5.64/p<0.001/d=0.63). In addition to this, 59.35% (n=219) of the infants consumed their complementary meals independently. Mothers of infants whose complementary meals were fed by someone else had significantly higher MATFPS scores compared to those whose infants ate independently ($W=15.39/p<0.001/\eta2=0.08$). It was determined that 52.58% (n=194) of the infants did not engage in any other activity while eating and only ate; these infants' mothers had lower MATFPS scores ($F=26.16/p<0.001/\eta2=0.12$) and higher WEMWBS scores ($X=12.31/p = 0.002/$) (Table 3).

Table 2. Descriptive characteristics of mothers and infants (n=369)

Variables		**Mean±SD**
Mothers'	Age (years)	30.55±4.61
	Body weight (kg)	66.66±12.63
	Body height (cm)	162.86±13.52
	BMI (kg/m^2)	24.94±4.25
	The number of living children	1.55±0.82
Infants'	Birth gestation (weeks)	38.12±1.83
	Age (month)	17.02±4.31
	Birth weight (gr)	3229.20±496.74
	Current weight (gr)	10.86±2.00
	Current weight percentile	47.26±30.45
	Current height (cm)	79.18±9.21
	Current height percentile	42.47±35.25
Infants' feeding features	Duration of full breastfeeding	17.99±7.07
	Time to start complementary food	5.52±0.79
	Duration to finish a single main	19.46±9.71
		n (%)
Mothers' information about breastfeeding	No, she didn't get any information.	60 (16.26)
	Yes, she's got information.	309 (83.74)
Source of information about transition to complementary food*	Healthcare professionals	240 (65.04)
	Books	144 (39.02)
	Internet	226 (61.25)
	Written/visual media	118 (31.98)
	Family elders	129 (34.96)
	Past experiences	76 (20.60)
	Other	1 (0.27)

BMI: Body Mass Index

* More than one option is selected.

Table 3. Comparison of sociodemographic and nutritional characteristics with MATFPS and WEMEBS

			MATFPS		WEMEBS	
Variables		**n (%)**	**Mean±SD Median (Min-Max)**	**p**	**Mean±SD Median (Min-Max)**	**p**
Mothers' Educational Status	High school and lower	119 (32.25)	59.84±16.53	t=-1.30 0.19	56.00 (27.00-70.00)	**U=-2.99 0.003 r=0.02**
	University or higher	250 (67.75)	62.32±17.28		54.00 (15.00-70.00)	
Mothers' Occupational Status	Housewife and maternity leave	258 (69.92)	61.16±17.26	t=-0.61 0.54	55.00 (15.00-70.00)	**U=-2.14 0.03 r=0.012**
	Full-time, part-time, and work from home	111 (30.08)	62.35±16.63		53.00 (18.00-70.00)	
Socioeconomic Status	Income less than expense (a)	57 (15.45)	61.29±16.90	**W=4.33 0.01 b>c η2=0.02**	51.54±9.66	F=2.03 0.13
	Income equals expense (b)	232 (62.87)	63.04±17.84		53.32±9.94	
	Income more than expenses (c)	80 (21.68)	57.27±14.02		55.03±10.71	
Infant development according to the mother	Behind compared to peers (a)	15 (4.06)	68.53±16.35	**F=7.79 <0.001 a>c; b>c η2=0.04**	53.00 (28.00-70.00)	X=0.16 0.92
	Normal (b)	285 (77.24)	62.79±17.28		55.00 (18.00-70.00)	
	Ahead compared to peers (c)	69 (18.70)	54.73±14.42		55.00 (15.00-70.00)	
Who advised you to start complementary food?	Of my own volition (a)	165 (44.72)	62.46±16.37	**F=3.07 0.04 b>c η2=0.01**	56.00 (15.00-70.00)	X=0.90 0.63
	Family elders' suggestion (b)	22 (5.96)	68.59±20.86		55.00 (38.00-70.00)	
	Doctor's suggestion (c)	182 (49.32)	59.81±16.98		54.00 (18.00-70.00)	
The person feeding the complementary food	Mother or father	323 (87.53)	61.12±17.30	t=-1.19 0.23	53.76±10.16	t=1.75 0.08
	Babysitter or grandmother	46 (12.47)	64.32±15.09		50.97±9.35	
Infant's mealtime	With other family members, at mealtime	253 (68.56)	58.26±16.18	**t=-5.64 <0.001 d=-0.63**	55.00 (15.00-70.00)	U=-0.62 0.53
	At a separate time, other than family members	116 (31.44)	68.63±16.82		55.00 (21.00-70.00)	
Infant's eating pattern	Eat independently (a)	219 (59.35)	57.96±15.46	**W=15.39 <0.001 b>a; b>c η2=0.08**	55.00 (15.00-70.00)	X=4.31 0.11
	Is fed by someone else (b)	126 (34.15)	68.48±18.46		54.00 (21.00-70.00)	
	Both (c)	24 (6.50)	57.45±11.64		50.50 (18.00-70.00)	

Activities during complementary feeding	Only eats, does not engage in other activities (a)	194 (52.58)	55.85±15.51	**F=26.16 <0.001 b>a; c>a η2=0.12**	56.00 (15.00-70.00)	**X=12.31 0.002 a>c r=0.03**
	Watches cartoons on a phone, tablet, or television (b)	71 (19.24)	69.28±17.76		55.00 (28.00-69.00)	
	Plays with toys or flashcards (c)	104 (28.18)	66.79±15.62		52.00 (27.00-70.00)	

U: Mann-Whitney U test; W: Welch test; t: Independent Samples T Test; F: One-way ANOVA; X: Kruskal-Wallis test; d: Cohen's d; η^2: Eta-squared; r: nonparametric effect size; p<0.05 indicates a significant difference.

In the study, there was a weak positive correlation between the infant's birth weight and the duration of exclusive breastfeeding (r=0.124/p=0.01). A weak positive correlation was identified between the timing of complementary feeding initiation and both the infant's birth weight (r=0.105/p = 0.04) and the duration of exclusive breastfeeding (r=0.269/p < 0.001). Notably, a weak negative correlation was observed between the WEMWBS score and maternal age (r=-0.133/p = 0.01) as well as between WEMWBS and MATFPS scores (r=-0.255/p < 0.001) (Table 4).

Table 4. Correlation of MATFPS and WEMEBS with some variables

		Mothers' age	**Infants' birth weight (g)**	**Duration of full breastfeeding (weeks)**	**Time to start complementary food (month)**	**MATFPS**
Infants' birth weight (g)	r	-0.080	1			
	p	0.123				
Duration of full breastfeeding (weeks)	r	-0.047	0.124	1		
	p	0.37	**0.01**			
Time to start complementary food (month)	r	0.011	0.105	0.269	1	
	p	0.83	**0.04**	**<0.001**		
MATFPS	r	-0.049	-0.019	0.011	0.027	1
	p	0.346	0.71	0.82	0.59	
WEMEBS	r	-0.133	0.014	-0.014	-0.025	-0.255
	p	**0.01**	0.79	0.78	0.62	**<0.001**

r=Pearson's correlation coefficient; The bold values are significant at the 0.05 level (2-tailed); p<0.05 indicates a significant difference.

It was found that activities during complementary feeding ($p<0.001$), WEMWBS score ($p<0.001$), the infant's method of consuming complementary feeding ($p<0.001$), and meal timing ($p=0.008$) significantly predicted the total MATFPS score ($R^2 = 0.21$; $p < 0.001$). Additionally, maternal age ($p<0.001$), total number of children ($p=0.02$), and activities during complementary feeding ($p=0.03$) were significant predictors of the total WEMWBS score ($R^2 = 0.13$; $p<0.001$) (Table 5).

Table 5. Multivariable linear regression of factors related to the MATFPS and WEMEBS

Method	Variables	B	Beta	t	p	VIF
Dependent variable: MATFPS						
Stepwise	Constant	85.779		18.159	**<0.001**	
	Activities during complementary feeding[a]	-7.880	-0.229	-4.441	**<0.001**	1.207
	Infant's eating pattern[b]	6.172	0.172	3.363	**<0.001**	1.179
	Infant's meal time[c]	-5.083	-0.138	-2.656	**0.008**	1.230
	WEMEBS	-0.351	-0.207	-4.366	**<0.001**	1.013
F=25.166; Model p<0.001; R^2=0.21; Durbin-Watson=2.068						
Dependent variable: WEMEBS						
Stepwise	Constant	62.215		17.831	**<0.001**	
	Mothers' age	-0.394	-0.182	-3.389	**<0.001**	1.070
	The number of living children	1.443	0.119	2.233	**0.02**	1.056
	Activities during complementary feeding[a]	2.260	0.112	2.135	**0.03**	1.013
F=5.615; Model p<0.001; R^2=0.13; Durbin-Watson=1.987						

VIF: Variance inflation factor; R^2: Explanatory power of the variable; B: Estimated coefficient of the independent variable in the linear predictor; $p<0.05$ indicates a significant difference; [a]Reference category: Only eats, does not engage in other activities; [b]Reference category: Is fed by someone else; [c]Reference category: With other family members, at mealtime.

Discussion

Our study found that improved mental well-being among mothers with infants aged 12–24 months is linked to more positive attitudes toward complementary feeding, aligning with previous research on maternal mental health and feeding behaviors.[6,21] While extensive studies focus on breastfeeding, research on maternal well-being during complementary feeding remains limited. For example, Jiang et al. (2022) reported that depression, anxiety, and stress symptoms in mothers with infants under six months negatively affect breastfeeding attitudes and self-efficacy.[6] According to the 2022 Türkiye Health Survey, 26.7% of infants were exclusively breastfed in the first six months[22], while the WHO reports a global rate of 44%.[1] Our study found a higher rate of 56.37%, though still below the desired levels. Studies show that feeding attitudes are crucial for child development.[24] In Türkiye, Küçük et al. (2023) found that mothers perceiving insufficient milk were 6.5 times more likely to start complementary feeding early.[24] In our study, the mean initiation age was 5.52 ± 0.79 months, consistent with the literature. Maternal beliefs and attitudes during this period shape children's long-term eating habits.[23] Additionally, Wolstenholme et al. (2020) reported that parents' negative emotions can lead to fussy eating behaviors in children over one year, affecting mealtime dynamics.[21] These findings emphasize the critical role of maternal psychological well-being not only in breastfeeding but also in complementary feeding, underscoring the need for support during this phase.

A mother's knowledge is vital for ensuring proper breastfeeding duration and a healthy transition to complementary feeding in line with international guidelines.[26] This study showed that many mothers knew about breastfeeding, with healthcare professionals and the Internet being key information sources. Mothers who followed medical advice showed more positive attitudes. In Türkiye, Karataş et al. (2022) found that nearly half of the mothers received breastfeeding information from midwives or nurses before birth, and 48.5% were influenced by healthcare professionals during complementary feeding.[26] While midwives and nurses in primary care are key sources, the Internet's widespread use must also be acknowledged. Strengthening primary care and ensuring mothers' access to reliable information is crucial, as increased maternal knowledge positively affects children's eating habits.[23] A study where nurses guided primiparous mothers found improved feeding routines and reduced use of non-responsive practices like pressuring or soothing with food.[28] Additionally, Matvienko-Sikar (2018) highlighted that parental information needs vary across the stages of complementary feeding.[25] Thus, maternal nutrition education should begin before pregnancy and continue through postpartum, with content tailored to the child's developmental stage and supported by midwives, nurses, and dietitians.

In the literature, the relationships between the frequency of family meals and eating patterns, obesity, irregular eating habits, and psychosocial effects have been emphasized.[10] This study found that infants who ate without distractions and dined with family had a positive effect on maternal feeding attitudes, whereas being fed by others had a negative effect. These findings support research highlighting the benefits of self-feeding in fostering positive feeding practices. For instance, Bialek-Dratwa et al. (2022) observed that infants following the Baby-Led Weaning (BLW) approach were more likely to partake in family meals by taking food from the family table compared to those fed using the traditional spoon-feeding method.[28] These findings underscore the significance of family meals not only for nutritional intake but also for promoting social interaction. Similarly, in a qualitative study by Spence et al. (2016), the social role of the family environment was emphasized, and it was reported that, in most cases, eating together and staying away from television were stated as the primary reasons for family meals.[29] These findings support the results obtained in our study, indicating that family meals positively influence both the feeding process and mothers' attitudes toward it.

In our study, increasing maternal age was associated with a negative impact on maternal mental well-being, whereas having a greater number of living children and infants eating without engaging in other activities positively predicted maternal mental well-being. This finding is consistent with the literature. For instance, a qualitative study reported that parents' experiences with previous children influenced their feeding practices, enabling them to develop improved strategies through learned experience.[29] Consequently, mothers raising their second or subsequent children may feel more confident and experienced in complementary feeding processes, which, in turn, can positively affect their mental well-being. Mothers with multiple children may feel more confident in complementary feeding, positively impacting their mental well-being by reducing stress and enhancing interaction.

However, increasing maternal age may negatively affect well-being due to physical fatigue, health issues, and reduced social support, complicating childcare and feeding processes.

Our study indicated that lower maternal education levels and being a homemaker or on maternity leave positively influenced maternal mental well-being.[30] Found that among women taking 12 weeks or less of maternity leave, each additional week reduced the likelihood of experiencing postpartum depressive symptoms.[31] A lower level of maternal education is thought to increase the likelihood of being a homemaker. Consequently, it can be inferred that mothers with lower education levels may experience better mental well-being compared to working mothers, as they have the opportunity to dedicate their entire day to caring for their infants. Additionally, our study revealed that higher socioeconomic status was associated with more positive maternal attitudes toward the feeding process. This improvement may be attributed to the fact that families with higher socioeconomic status can more easily access healthy food choices and professional support, such as nutritional counseling. In addition, higher socioeconomic status may allow parents to have more control over their working conditions and to allocate more time to their children's feeding processes. These factors can lead to an improvement in mothers' attitudes related to the feeding process.

Limitations and Strengths

The primary limitation of our study is the inclusion of only mothers with infants aged 12–24 months. This inclusion restricts the generalizability of the findings to infants aged 6–12 months, a period considered critical in the complementary feeding process. The secondary limitation of the study is the inability to account for other factors that may influence maternal mental well-being, given the study's design.

One of the strengths of this study is the inclusion of experts from different disciplines who could contribute to the subject matter within the research team. The participation of professionals such as pediatric nurses, midwives, and dietitians provided a multidisciplinary perspective. This diversity allowed for more comprehensive results and recommendations by examining maternal and infant health from three viewpoints.

In conclusion, this study contributes to understanding the relationship between breastfeeding behaviors, maternal mental well-being, and attitudes during the complementary feeding period. Findings show that better maternal mental well-being positively influences feeding attitudes. The average exclusive breastfeeding duration was 17.99 ± 7.07 weeks, and the mean age for starting complementary feeding was 5.52 ± 0.79 months. Key predictors of maternal attitudes included the infant eating without distractions, being fed by others, attending family meals, and maternal mental health. In turn, maternal mental well-being was affected by maternal age, number of children, and the infant's mealtime behaviors.

The complementary feeding period is a critical transition that, if mismanaged, can lead to adverse health outcomes, making it important for both individual and public health. In this context, midwives and nurses—central figures in primary care—are well-positioned to provide education and support to improve maternal feeding practices. Furthermore, enhancing dietitian support for parents during the complementary feeding process within primary healthcare services is strongly recommended. Ultimately, collaboration among nurses, midwives, dietitians, and other healthcare professionals is essential for promoting healthy complementary feeding.

Ethical Considerations: This study adhered to the Declaration of Helsinki. Ethical approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Karabük University (Protocol No/Date: E-77192459-050.99-232724/2023), followed by institutional permission from the Karabük Provincial Health Directorate (Protocol No/Date: E-86662556-604.01.02-213012244/2023). Written informed consent was provided on the first page of the questionnaire, explaining the study's purpose, confidentiality, voluntary participation, and the right to withdraw at any time.

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

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ASSOCIATION BETWEEN FEAR OF FALLING–RELATED AVOIDANCE AND DAILY LIVING ACTIVITIES IN OLDER ADULTS

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Abstract

Objectives: This study aimed to evaluate the relationship between fear of falling (FoF)-related avoidance behavior and activities of daily living in older adults.

Materials and Methods: This cross-sectional study was conducted between April and July 2023 with individuals aged 65 years and older who presented to the Family Medicine Outpatient Clinic of a tertiary hospital and met the inclusion criteria for the study. Data were collected using a Descriptive Information Form, the Lawton Instrumental Activities of Daily Living Scale (LIADLS), and the Fear of Falling Avoidance Behavior Questionnaire (FoFABQ).

Results: A total of 317 participants (mean age 71.5 ± 6.1 years) were included. Mean LIADLS and FoFABQ scores were 6.9 ± 1.5 and 10.6 ± 13.0, respectively. LIADLS scores showed a significant negative correlation with FoFABQ ($r = -0.42$; $p<0.001$) and age ($r = -0.480$; $p<0.01$). FoFABQ scores were positively correlated with age ($r = 0.181$; $p<0.01$) and BMI ($r = 0.156$; $p<0.01$). Participants with chronic diseases or medication use had higher FoFABQ and lower LIADLS scores (all $p<0.001$).

Conclusion: Based on the distribution of FoFABQ and LIADLS scores, avoidance tendencies appeared generally modest, while functional independence was relatively preserved. Higher avoidance levels were associated with reduced daily living activity performance. Advanced age, higher BMI, chronic diseases, and medication use were also linked with greater avoidance and lower functional capacity. These findings underscore the need for interventions targeting both FoF and functional independence—particularly for older adults with a higher clinical burden.

Keywords: Avoidance behavior, daily living activities, elderly, fear of falling.

Introduction

Aging is characterized by progressive declines in physical and cognitive capacities, reduced biopsychosocial adaptability, and shifts in social roles.[1] These multidimensional changes increase susceptibility not only to falls but also to behavioral and functional consequences that follow fall-related concerns. Falls constitute one of the most prevalent and disabling geriatric syndromes, driven by age-related reductions in muscle strength, impaired balance, diminished bone mineral density, and cognitive slowing.[2]

Globally, more than 30% of older adults experience at least one fall each year, with prevalence rates reported between 23% and 34% across different populations, highlighting a substantial but consistent global burden.[3] Comparable prevalence has also been reported in Türkiye, where roughly one-third of older adults experience a fall annually.[4] Beyond their high frequency, falls pose significant clinical and economic consequences. Approximately 10–15% result in serious injuries—such as hip fractures, traumatic brain injuries, or subdural hematomas—leading to increased morbidity, mortality, functional decline, and healthcare utilization.[5] The health system burden attributable to falls is substantial.[6]

Fear of falling (FoF), a psychological construct closely intertwined with fall risk, intensifies this burden. FoF frequently leads older adults to limit or avoid daily activities perceived as risky, even in the absence of an actual fall.[7] Current evidence indicates that up to 70% of individuals with a prior fall develop FoF, and nearly half subsequently engage in avoidance behaviors that restrict mobility and participation.[8,9] These behaviors may precipitate a downward spiral of inactivity, deconditioning, loss of independence, and reduced quality of life.[10,11]

Despite extensive research on falls and their determinants, the specific contribution of FoF-related avoidance to everyday functioning remains insufficiently characterized. Evidence on how avoidance behaviors shape instrumental activities of daily living is limited, and this gap is particularly pronounced in the Turkish context, where empirical data on FoF-associated behavioral adaptations and their functional consequences are scarce. Understanding this relationship is essential for designing preventive interventions. Therefore, this study aimed to examine the association between FoF–related avoidance behavior and daily living activities among older adults, and to assess whether sociodemographic and clinical factors influence this relationship.

Materials and Methods

Study Design, Setting, and Participants

This cross-sectional study was conducted at the Family Medicine Outpatient Clinic of a tertiary hospital between April 27 and July 25, 2023. The study included 317 volunteer individuals aged 65 years and older who met the inclusion criteria.

Inclusion criteria were: age ≥65 years, absence of known neurological or psychiatric disorders (e.g., dementia, amnestic syndrome, cerebrovascular disease), absence of conditions causing movement limitations (e.g., orthopedic disability, use of assistive devices, history of major surgery), ability to understand and respond to questions, and adequate reading and writing skills. Exclusion criteria included: age <65 years, being fully bedridden, presence of neurological or psychiatric disorders, communication difficulties (hearing or speech problems, inability to cooperate), significant movement limitations, and lack of literacy.

The sample size was calculated using G*Power version 3.1.9.4, based on effect size estimates from prior research. With $\alpha = 0.05$ and power $(1-\beta) = 0.95$, the minimum required sample size was 286 participants. A total of 317 individuals were recruited, exceeding the required minimum sample size.

Data Collection

Data were collected using a Descriptive Information Form, the Lawton Instrumental Activities of Daily Living Scale (LIADLS), and the Fear of Falling Avoidance Behavior Questionnaire (FoFABQ).

Descriptive Information Form

This form was developed by the researchers based on the literature. It included sociodemographic characteristics (age, sex, marital status, number of children, household composition, type of residence, primary place of living, education level, and self-perceived income level), history of falls (occurrence, number, location, causes, medical care needed after falls), presence of chronic diseases, medication use, and anthropometric measurements (height, weight). Body mass index (BMI) was calculated as weight/height^2 (kg/m^2), and analyzed as a continuous variable, without applying categorical cutoffs.

Lawton Instrumental Activities of Daily Living Scale

The LIADLS, developed by Lawton and Brody in 1969, assesses functional independence in older adults.[12] The Turkish adaptation and validation were conducted by Işık et al. in 2020. The scale includes eight items (telephone use, shopping, food preparation, housekeeping, laundry, transportation, medication management, financial management), each scored 0 (dependent/partially able) or 1 (independent). Total scores range from 0 to 8, with higher scores indicating greater independence. The Turkish version demonstrated good internal consistency, with a Cronbach's alpha of 0.843.[13]

Fear of Falling Avoidance Behavior Questionnaire

The FoFABQ was developed by Landers et al. in 2011 to assess activity limitation and participation restriction due to FoF in older adults.[14] The Turkish adaptation and validation were conducted by Acaröz Candan et al. in 2020. The 14-item, 5-point Likert scale is grouped into two factors: Factor 1 (nine items) assesses balance-demanding tasks (e.g., climbing stairs, walking on uneven surfaces, exercising). Factor 2 (five items) assesses instrumental and social activities (e.g., bathing, housework). Total scores range from 0 to 56, with higher scores indicating greater avoidance behavior due to FoF. The Turkish version demonstrated excellent internal consistency with a Cronbach's alpha of 0.956.[15]

Ethical Approval

Ethical approval for the study was obtained from the Clinical Research Ethics Committee of Gaziosmanpaşa Training and Research Hospital on 26.04.2023 with approval number 60. All procedures were conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics version 22 (IBM Corp., Armonk, NY, USA). The normality of continuous variables was assessed using the Kolmogorov–Smirnov test. As most variables were not normally distributed, non-parametric tests were primarily applied. Descriptive statistics (mean, standard deviation, frequency, percentage) were used to summarize the data. Group comparisons were conducted using the Kruskal–Wallis test (with post hoc Dunn's test if significant) for multiple groups and the Mann–Whitney U test for two groups. For normally distributed variables, parametric tests were considered. Correlation analyses were performed using Spearman's rho correlation coefficient. Internal consistency of the scales was assessed using Cronbach's alpha coefficient. Statistical significance was set at $p < 0.05$.

Results

This cross-sectional study was conducted with 317 participants aged 65–95 years (mean = 71.53 ± 6.06). The mean body mass index (BMI) was 28.45 ± 5.48 kg/m^2 (range: 17.9–43.54), and the mean number of children was 3.36 ± 1.74 (range: 0–11). Sociodemographic, health, and living characteristics of the participants are presented in Table 1.

Fall-related characteristics are summarized in Table 2. A total of 33.8% (n = 107) reported at least one fall in the past year, with indoor and outdoor falls occurring at similar frequencies. Among those who experienced a fall in the past year, 37.4% required medical care following the event. The most common causes of falls were tripping (62.6%), visual blackout/dizziness (28.0%), slippery surfaces (15.9%), and collision (10.3%).

Table 1. Sociodemographic, Health, and Living Characteristics of the Participants

Variables		n	%
Sociodemographic and health characteristics			
Gender	Female	183	57.7
	Male	134	42.3
Education level	Literate only	105	33.1
	Primary school	137	43.2
	Middle school	18	5.7
	High school	27	8.5
	University	30	9.5
Marital status	Single	97	30.6
	Married	220	69.4
Self-perceived income level	Low	104	32.8
	Moderate	193	60.9
	High	20	6.3
Presence of chronic disease	No	55	17.4
	Yes	262	82.6
Medication use	No	53	16.7
	Yes	264	83.3
Housing and living arrangements			
Residence type	Single-story house	36	11.4
	Multi-story house	48	15.1
	Apartment	233	73.5
Living arrangement	With spouse	211	66.6
	With children	71	22.4
	With relatives	5	1.6
	With caregiver	2	0.6
	Alone	44	13.9

Data are presented as n (number) and % (percentage)

Table 2. Distribution of Fall-Related Characteristics of the Participants

Variables		**n**	**%**
History of falls	Yes	107	33.8
	No	210	66.2
Number of falls (n = 107)	1	58	54.2
	2	30	28.0
	3	9	8.4
	4	7	6.5
	5	3	2.8
Place of fall (n = 107)	Indoors	50	46.7
	Outdoors	57	53.3
Causes of fall (n = 107)	Tripping	67	62.6
	Slippery surface	17	15.9
	Collision	11	10.3
	Visual blackout/dizziness	30	28.0
	Other	1	0.9
Need for medical care after fall (n = 107)	Yes	40	37.4
	No	67	62.6

Data are presented as n (number) and % (percentage)

Descriptive statistics and the internal consistency of the scales are presented in Table 3. The FoFABQ total score ranged from 0 to 56, with a mean of 10.61 ± 13.02, indicating a generally modest level of avoidance with wide variability across participants. The LIADLS total score ranged from 0 to 8, with a mean of 6.87 ± 1.54, reflecting relatively preserved functional independence. Internal consistency coefficients for both scales were high.

Table 3. Descriptive Statistics of the Fear of Falling Avoidance Behavior Questionnaire and the Lawton Instrumental Activities of Daily Living Scale

Scale/subscales	**Min - Max**	**Mean ± SD**	**Cronbach's alpha**
FoFABQ total score	0 – 56	10.61 ± 13.02	0.967
FoFABQ Factor 1	0 – 36	7.57 ± 8.82	0.958
FoFABQ Factor 2	0 – 20	3.04 ± 4.72	0.926
LIADLS total score	0 – 8	6.87 ± 1.54	0.744

Data presented as minimum (min), maximum (max), mean, and standard deviation (SD) values, FoFABQ: Fear of Falling Avoidance Behavior Questionnaire; LIADLS: Lawton Instrumental Activities of Daily Living Scale.

Correlation analysis, as seen in Table 4, demonstrated a significant, moderate negative relationship between LIADLS and FoFABQ total scores (r = –0.421; p<0.001). Further associations with clinical variables are presented in Table 5. Age was negatively correlated with LIADLS (r = –0.480; p < 0.001) and positively correlated with FoFABQ (r = 0.181; p = 0.001). Similarly, BMI showed a positive correlation with FoFABQ scores (r = 0.156; p = 0.005). The number of children was negatively correlated with LIADLS total scores (r = –0.232, p < 0.001), indicating lower functional independence among participants with more children.

Table 4. Correlations Among FoFABQ and LIADLS Scores

		LIADLS total score
FoFABQ total score	r	–0.421
	p	< 0.001*
FoFABQ Factor 1	r	–0.407
	p	< 0.001*
FoFABQ Factor 2	r	–0.405
	p	< 0.001*

*Spearman's rho correlation test; *p < 0.05. FoFABQ: Fear of Falling Avoidance Behavior Questionnaire; LIADLS: Lawton Instrumental Activities of Daily Living Scale.

Table 5. Correlations of Scale Scores with Age, BMI, and Number of Children

		LIADLS total score	FoFABQ total score	FoFABQ Factor 1	FoFABQ Factor 2
Age	r	-0.480	0.181	0.173	0.184
	p	**0.001****	**0.001***	**0.002***	**0.001***
BMI	r	-0.043	0.156	0.160	0.138
	p	0.445	**0.005***	**0.004***	**0.014***
Number of children	r	-0.232	0.050	0.059	0.024
	p	**0.001***	0.372	0.294	0.665

*Spearman's rho correlation test; *p < 0.05, **p < 0.001, FoFABQ: Fear of Falling Avoidance Behavior Questionnaire; LIADLS: Lawton Instrumental Activities of Daily Living Scale; BMI: Body Mass Index.

Group comparisons are presented in Table 6. FoFABQ total scores were significantly higher among women (p = 0.001), those with chronic diseases (p = 0.001), and those using medications (p = 0.001). Conversely, LIADLS total scores were significantly lower among participants with chronic diseases, those using medications, and those living with children (all p < 0.001). Married participants had significantly higher LIADLS scores compared with single participants (p = 0.001). Education level was significantly associated with LIADLS scores (p = 0.001), while self-perceived income level showed significant associations with both FoFABQ (p = 0.003) and LIADLS (p < 0.001). Participants who had fallen in the past year and those who fell indoors had significantly higher FoFABQ scores (p = 0.001 and p = 0.023, respectively). In addition, participants with a fall history had significantly lower LIADLS scores than those without a fall history (p < 0.001).

Table 6. Comparison of LIADLS and FoFABQ Scores According to Demographic and Health-Related Variables

		LIADLS total score	FoFABQ total score	FoFABQ Factor 1	FoFABQ Factor 2
		Mean ± SD (median)	**Mean ± SD (median)**	**Mean ± SD (median)**	**Mean ± SD (median)**
Gender	Female	6.72 ± 1.65 (7)	12.66 ± 13.85 (8)	8.97 ± 9.29 (7)	3.68 ± 5.15 (1)
	Male	7.07 ± 1.36 (8)	7.82 ± 11.25 (2.5)	5.66 ± 7.77 (2)	2.16 ± 3.89 (0)
	¹p	0.056	**0.001***	**0.001***	**0.003***
Marital status	Married	7.15 ± 1.24 (8)	9.39 ± 11.88 (4)	6.79 ± 8.23 (3)	2.6 ± 4.09 (0)
	Single	6.19 ±1.94 (7)	13.9 ± 15.08 (8)	9.69 ± 9.91 (7)	4.22 ± 5.86 (2)
	¹p	**0.001***	**0.043***	**0.038***	0.086
Education level	Literate only	6.19 ±1.78 (6)	13.62 ± 14.46 (11)	9.5 ± 9.5 (9)	4.12 ± 5.45 (2)
	Primary school	7.09 ± 1.4 (8)	9.65 ± 13.15 (4)	6.87 ± 8.83 (3)	2.78 ± 4.83 (0)
	Middle school	7.11 ± 0.96 (7.5)	6.44 ± 8.31 (3.5)	4.67 ± 6.32 (3)	1.78 ± 2.49 (1)
	High school	7.56 ± 0.89 (8)	10.33 ± 9.98 (8)	7.59 ± 7.52 (6)	2.74 ± 3.29 (1)
	University	7.43 ± 1.1 (8)	7.23 ± 9.79 (3)	5.77 ± 7.77 (2.5)	1.47 ± 2.24 (0)
	²p	**0.001***	0.133	0.143	0.088
Self-perceived income level	Low	6.32 ± 1.55 (6)	12.92 ± 13.98 (10)	9.06 ± 9.22 (8)	3.87 ± 5.24 (2)
	Moderate	7.12 ± 1.49 (8)	8.89 ± 12.35 (3)	6.35 ± 8.35 (3)	2.54 ± 4.49 (0)
	High	7.3 ± 1.17 (8)	15.2 ± 11.7 (16.5)	11.65 ± 9.15 (13)	3.55 ± 3.27 (2.5)
	²p	**0.001***	**0.003***	**0.003***	**0.004***
Presence of chronic disease	No	7.51 ± 0.86 (8)	5.27± 8.34 (0)	3.56 ± 5.61 (0)	1.71 ± 3.17 (0)
	Yes	6.73 ± 1.61 (7)	11.73 ± 13.55 (7)	8.41 ± 9.14 (5)	3.32 ± 4.94 (1)
	¹p	**0.001***	**0.001***	**0,001***	**0.011***
Medication use	Yes	6.74 ± 1.61 (7)	11.77 ± 13.48 (7)	8.39 ± 9.06 (5)	3.38 ± 4.97 (1)
	No	7.51 ± 0.89 (8)	4.87 ± 8.39 (0)	3.51 ± 6.12 (0)	1.36 ± 2.63 (0)
	¹p	**0.001***	**0.001***	**0.001***	**0.002***
History of falls	Yes	6.42 ± 1.79 (7)	16.07 ± 14.25 (14)	11.03 ± 9.43 (9)	5.04 ± 5.5 (3)
	No	7.1 ± 1.34 (8)	7.83 ± 11.41 (2)	5.81 ± 7.96 (2)	2.02 ± 3.9 (0)
	¹p	**0.001***	**0.001***	**0.001***	**0.001***
Number of falls (n =107)	1	6.64 ± 1.91 (8)	15.33 ± 14.51 (12)	10.38 ± 9.27 (9)	4.95 ± 5.89 (2)
	2	6.03 ± 1.71 (6)	16.3 ± 14.26 (15)	11.5 ± 9.81 (9.5)	4.8 ± 5.25 (3)
	≥ 3	6.37 ± 1.5 (7)	17.95 ± 14 (17)	12.26 ± 9.64 (12)	5.68 ± 4.87 (5)
	²p	0.088	0.725	0.747	0.612
Place of fall (n = 107)	Indoors	6.4 ± 2.02 (7)	19.42 ± 15.12 (17)	12.84 ± 9.91 (11)	6.58 ± 5.96 (6)
	Outdoors	6.44 ± 1.58 (7)	13.12 ± 12.86 (11)	9.44 ± 8.76 (8)	3.68 ± 4.72 (2)
	¹p	0.595	**0.023***	0.067	**0.003***

¹ *Mann Whitney U Test* ² *Kruskal Wallis Test* **p<0.05*

Discussion

This study demonstrated a clear inverse association between FoF-related avoidance and daily living activities in community-dwelling older adults. Approximately one-third of participants had experienced a fall in the past year. Based on score distributions, avoidance tendencies were generally modest, although FoFABQ values showed wide variability across individuals. Functional independence was relatively preserved, yet participants with lower LIADLS scores were markedly more likely to restrict their activities due to fall-related concerns. This inverse pattern underscores that greater functional capacity is associated with lower avoidance tendencies. Advanced age, higher BMI, multimorbidity, and regular medication use were all associated with greater avoidance and poorer functional status, highlighting a broader pattern of age- and health-related factors that shape fall-related behavioral responses.

The negative association between avoidance behavior and functional performance aligns with findings from recent community-based studies reporting that fear-related behavioral restriction predicts reduced mobility, impaired balance, and lower physical activity.[16,17] These patterns are consistent with the fear–avoidance framework, which proposes that perceived fall risk triggers protective withdrawal from daily tasks; although initially adaptive, long-term avoidance promotes deconditioning, balance deterioration, and loss of confidence.[18,19] Our findings reinforce this model by showing that higher FoFABQ scores were accompanied by lower levels of functional independence, suggesting that avoidance behavior may reflect underlying changes in functional performance.

The role of fall history further reinforces the conceptual behavioral pathway. Older adults who had fallen during the previous year tended to exhibit higher avoidance levels compared with those without a fall history, consistent with prior research showing that fall experience is associated with elevated FoF and activity restriction.[20] Such experiences may intensify fear-related cognitions, leading individuals to overestimate their likelihood of falling and underestimate their physical capabilities. This cognitive–emotional shift can widen the discrepancy between actual and perceived functional capacity, thereby promoting greater withdrawal from daily activities.[21] Over time, this process may contribute to measurable declines in functional performance, emphasizing the importance of early psychological and behavioral evaluation following a fall event.

Age-related declines in functional performance, as observed in our cohort, mirror evidence from large population-based studies demonstrating that instrumental activities of daily living limitations increase progressively with age.[22,23] These limitations are attributed to interacting factors such as sarcopenia, multimorbidity, sensory impairment, and reduced mobility.[24,25] In line with this, chronic disease burden and higher BMI in our sample were associated with both greater avoidance and poorer daily functioning, consistent with studies reporting increased fall risk, FoF, and functional disability in individuals with multimorbidity or obesity.[26,27] Higher educational attainment, conversely, was related to better daily living performance, possibly through enhanced health literacy, self-management skills, and social resources.[23,28] The lack of association between education and avoidance behavior suggests that activity restriction driven by FoF may be more strongly shaped by physical and psychological factors than by sociodemographic characteristics. Taken together, these findings underscore the importance of integrating behavioral, functional, and clinical determinants into comprehensive fall-risk evaluation in older adults. Routine use of brief tools such as the FoFABQ may help identify individuals beginning to limit activities before overt functional decline becomes apparent, and multimodal strategies—including strength and balance training, environmental modifications, and medication review—remain essential for prevention. [29, 30]

This study has several limitations. Its cross-sectional design does not allow for causal inference. The sample consisted of independently presenting, mobile older adults from a single center, which may limit generalizability; more frail individuals or those receiving home care may be underrepresented. The reliance on self-reported measures may introduce recall or social desirability bias, and assessing daily living activities solely with the LIADLS may not capture broader functional domains. Additionally, environmental factors influencing fall risk and objective performance-based assessments were not included, which limits the ability to explore underlying mechanisms more comprehensively.

Despite these limitations, the study offers several strengths. FoF–related avoidance and daily living activities were assessed concurrently within the same sample using validated and culturally adapted instruments, allowing for a comprehensive evaluation of fall-related behavioral and functional indicators. Demonstrating consistent associations between avoidance behavior, functional performance, and various clinical characteristics suggests that incorporating brief avoidance-based measures into routine functional assessment may have practical value.

In conclusion, this study demonstrated an inverse association between FoF–related avoidance and daily living activities in older adults. Higher avoidance levels were consistently linked with lower functional capacity, while advanced age and greater clinical burden further strengthened this pattern. These findings highlight the importance of integrating behavioral and functional assessments into routine primary care evaluations of older adults. Targeted interventions addressing both FoF and functional independence may help prevent activity restriction and preserve autonomy, and these behavioral patterns are likely to remain clinically relevant as the population continues to age.

Ethical Considerations: Ethical approval for the study was obtained from the Clinical Research Ethics Committee of Gaziosmanpaşa Training and Research Hospital on 26.04.2023 with approval number 60.

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

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EVALUATION OF GREEN ZONE ADMISSIONS TO THE EMERGENCY DEPARTMENT FOLLOWING THE FEBRUARY 6 EARTHQUAKE AT A UNIVERSITY HOSPITAL

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Abstract

Objectives: This study aimed to evaluate the demographic characteristics, presenting complaints, and diagnoses of patients admitted to the green zone of an emergency department following the Kahramanmaraş-centered earthquakes on February 6, 2023, to identify healthcare needs in the post-disaster period.

Materials and Methods: In this retrospective descriptive study, a total of 12,890 patients admitted between February 13 and April 30, 2023, were analyzed based on ICD-10 codes. Age, gender, presenting complaints, and diagnoses were evaluated.

Results: 12,890 unique green zone visits were included (46.5% female, 53.5% male). Admissions peaked in March, accounting for 44.3% of visits, with males consistently higher across all months. The 19–65 age group represented the majority (87.6%), followed by pediatric/adolescent (0–18 years) and elderly (65+ years) patients. A total of 948 ICD-10 diagnosis codes were recorded. The most frequent was Z00.8 – General Examination (29.1%), though it mainly reflected routine assessments. Other leading diagnoses included upper respiratory tract infections, musculoskeletal complaints, dermatological conditions, and eye diseases.

Conclusion: Effective management of patient load in emergency departments following disasters is crucial for ensuring the efficient use of limited healthcare personnel and resources. To this end, measures such as strengthening triage procedures, directing green zone patients to appropriate units, planning for additional staff and supplies, and informing the public should be incorporated into disaster preparedness plans.

Keywords: Earthquakes, disaster management, emergency service, ambulatory care, public health

Introduction

Türkiye, located in one of the world's most active seismic zones, has experienced 20 earthquakes with magnitudes>7 since 1900, ranking it among the highest-risk countries for earthquake-related fatalities and economic losses. The consecutive Kahramanmaraş-centered earthquakes in 2023 were the most destructive, resulting in over 50,000 deaths across 11 provinces along the East Anatolian Fault, the destruction or severe damage of more than half a million buildings, and substantial material losses.[1] Among the affected structures were critical healthcare facilities, and many healthcare workers were directly impacted.[2]

Kahramanmaraş Sütçü İmam University Hospital, remaining intact, became the city's primary functional healthcare institution immediately after the disaster, managing a surge of patients from 5:00 a.m. onward. The morgue quickly exceeded capacity, necessitating refrigerated vehicles, while severe weather and transport disruptions delayed additional support from Istanbul until the evening of the first day. Outpatient services remained closed, and the hospital continued providing emergency care only until April. [3,4]

Following the earthquake, standard triage procedures could not be implemented during the initial days due to the sudden surge in patient volume, shortage of healthcare personnel, and the delivery of services under disorganized conditions. After the acute phase of the disaster had partially subsided, the emergency department was reorganized on February 13, 2023 (one week after the earthquake) into red, yellow, and green zones, and formal triage procedures were initiated. From this date until May, patient examinations and treatments in the green zone were carried out by faculty members and resident physicians from the Department of Family Medicine, Kahramanmaraş Sütçü İmam University.

This study aimed to investigate the reasons for admission, sociodemographic characteristics, and various clinical data of patients presenting to the emergency department green zone after the earthquake. The purpose of the study is to provide findings that can contribute to more effective and organized health service planning in future natural disasters, to identify green zone emergency service needs, and to guide the literature in implementing necessary preventive measures.

Materials and Methods

Study design

This retrospective and descriptive study was conducted using the hospital's quality management unit automation system.

Data Collection Tool

Study data were collected through a retrospective review of the records of patients who presented to the green zone of the emergency department between February 13 and April 30, 2023. All presentations to the green zone during the specified period were identified through the hospital information management system and were recorded using a structured data collection form developed by the researchers based on a review of the literature.

The data collection form included variables related to patients' sociodemographic characteristics, such as age and sex, as well as clinical information, including the International Classification of Diseases, 10th Revision (ICD-10) diagnosis assigned at the time of admission. In accordance with the study objectives, the ten most frequently recorded diagnoses were identified and classified according to the ICD-10.

Ethical Considerations:

Ethical approval for this study was obtained from the Kahramanmaraş Sütçü İmam University Faculty of Medicine Medical Research Ethics Committee on November 8, 2023 (session 2023/13, protocol code 51, decision number 08).

Results

Between February 13 and April 30, a total of 45,921 patients presented to the Emergency Department of Kahramanmaraş Sütçü İmam University Hospital. Of these, 8,022 patients lacked triage records, likely because they were registered for minor procedures (e.g., injections or blood pressure measurements) without undergoing a comprehensive medical evaluation. Consequently, triage data were available for 37,899 patients.

This study focused exclusively on green zone admissions. Accordingly, patients' national ID numbers and triage information were used to filter the dataset, and duplicate records were removed, resulting in 12,890 distinct patient visits during the study period (Figure 1).

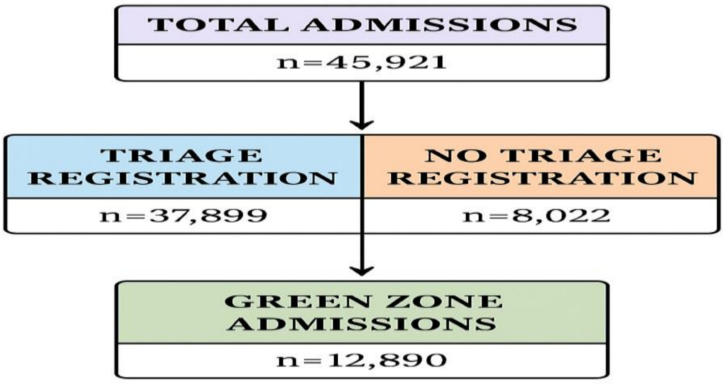

Figure 1. Classification of emergency room visits (February 13-April 30, 2023)

Of these patients, 46.47% (n=5,990) were female, and 53.53% (n=6,900) were male. When the monthly distribution of green zone admissions was examined, the highest number of visits occurred in March. A total of 5,708 patients (44.28%) presented to the green zone emergency department during that month. Although monthly variations were observed in admissions based on sex, overall, male patient visits were higher throughout the study period (53.53%).

The numerical data, proportions, and gender distribution of patient visits for each month are shown in Table 1.

Table 1. Change in emergency room green area admissions rates by month (February 13–April 30, 2023)

	February		March		April		Total	
	n	%	n	%	n	%	n	%
Female	1567	26.16	2638	44.04	1785	29.80	5990	46.47
Male	1636	23.71	3070	44.49	2194	31.80	6900	53.53
Total	3203	24.85	5708	44.28	3979	30.87	12890	100

Patient records were analyzed according to age groups, and patients were classified into mutually exclusive categories: children (<18 years), adults (18–64 years), and the elderly (≥65 years). The highest number of visits was observed in the adult group, with a total of 11,290 patients, representing 87.6% of all records. Children accounted for 5.3% of visits, while elderly patients comprised 7.1%. In the pediatric group (<18 years), 121 visits were recorded in February, 313 in March, and 253 in April. In the elderly group (≥65 years), 227 visits were recorded in February, 437 in March, and 248 in April. The distribution of patient visits by month, age group, and gender is presented in Table 2.

Table 2. Distribution of Kahramanmaraş Sütçü İmam University Hospital emergency department green area admissions by age groups and gender (February 13–April 30, 2023)

	February				March				April				Total			
	Female		Male		Female		Male		Female		Male		Female		Male	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
<18 Age	52	3.32	69	4.22	141	5.34	172	5.60	97	5.43	156	7.11	290	4.84	397	5.75
18-64 Age	1400	89.34	1454	88.88	2285	86.62	2673	87.07	1564	87.62	1914	87.24	5249	87.63	6041	87.55
≥65 Age	114	7.34	113	6.9	212	8.04	225	7.33	124	6.95	124	5.65	450	7.53	462	6.70
Total	1566	100	1636	100	2638	100	3070	100	1785	100	2194	100	5989	100	6900	100

Analysis of patients' presenting complaints according to ICD-10 codes identified a total of 948 distinct diagnosis codes. Among these, the ten most frequent diagnoses were selected for the study. The most common code was Z00.8 (General Examination; 29.05%). As this code primarily reflects routine visits rather than specific disease conditions, the ten most frequent subsequent diagnoses were also presented to better represent disease-related presentations. All remaining diagnoses were grouped under the "Other" category. The frequency distribution of diagnoses is presented in Figure 2.

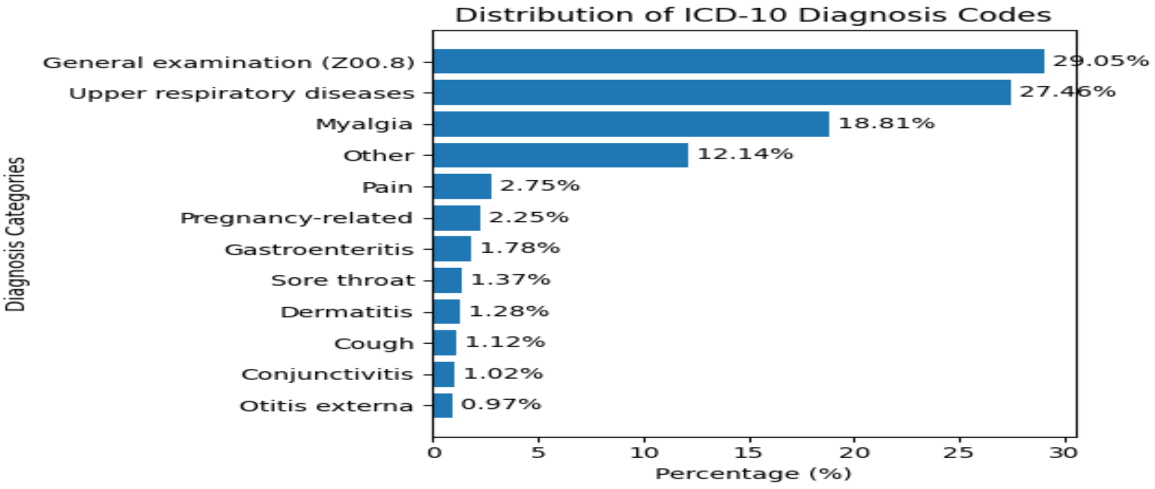

Figure 2. Overall Distribution of Green Zone Emergency Department Visits by ICD-10 Diagnosis Codes (Ordered from highest to lowest)

Examination of Figure 2 indicates that, excluding general examinations (Z00.8), the most common diagnoses among Green Zone visits were upper respiratory tract diseases—including acute sinusitis, pharyngitis, and tonsillitis (J01–J06, J39 and subcodes; 27.46%) —and myalgia, encompassing back, limb, and other musculoskeletal pain (M54–M79 and subcodes; 18.81%). Less frequent diagnoses included pain (R52 and subcodes; 2.75%), pregnancy-related conditions (O26.9; 2.25%), and gastroenteritis (K52 and subcodes; 1.78%). Rare presentations comprised sore throat (R07.0; 1.37%), dermatitis—including atopic and contact dermatitis (L30, L50 and subcodes; 1.28%), cough (R05; 1.12%), conjunctivitis (H10 and subcodes; 1.02%), and otitis externa (H60–H62 and subcodes; 0.97%). The "Other" category accounted for 12.14% of total visits and predominantly included nausea and vomiting (R11), allergic rhinitis and other allergic conditions (J30, L50), dental caries (K02), cystitis (N30), chest and abdominal pain (R07, R10), and fatigue or general weakness (R53).

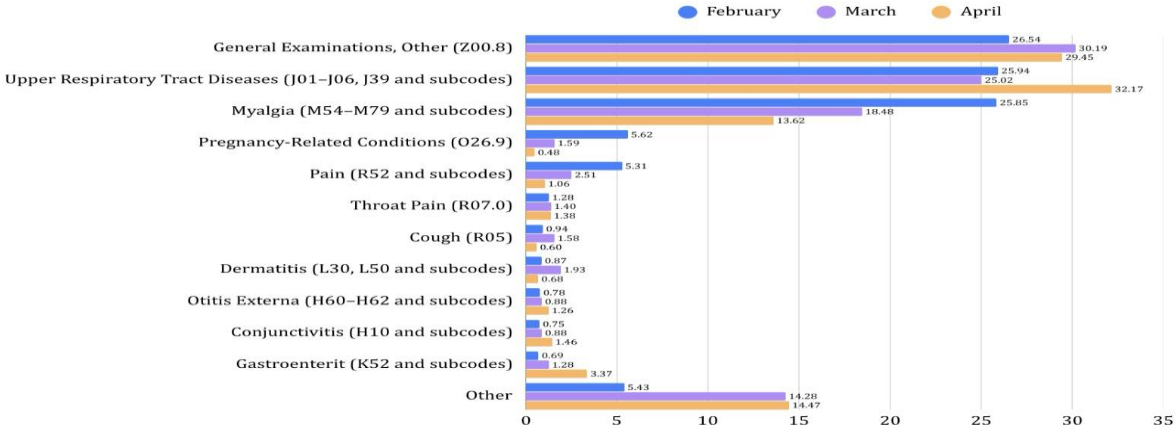

Fıgure 3 presents the monthly distribution of the most frequent ICD-10 diagnosis codes in green zone emergency department visits at Kahramanmaraş Sütçü İmam University Hospital (February 13–April 30, 2023).

The most frequent diagnosis was general examinations, other (Z00.8), with 850 cases (26.54%) in February, 1,723 cases (30.19%) in March, and 1,172 cases (29.45%) in April. Upper respiratory tract infections (J01–J06, J39, and subcodes) were the second most common, accounting for 831 cases (25.94%) in February, 1,428 cases (25.02%) in March, and 1,280 cases (32.17%) in April. Myalgia (M54–M79 and subcodes) was observed in 828 cases (25.85%) in February, 1,055 cases (18.48%) in March, and 542 cases (13.62%) in April. Pregnancy-related conditions (O26.9) were observed in 5.62% of cases in February and 0.48% in April, while pain (R52 and subcodes) was recorded in 5.31% of cases in February and 1.06% in April. Symptoms such as sore throat (R07.0), cough (R05), dermatitis (L30, L50 and subcodes), otitis externa (H60–H62 and subcodes), and conjunctivitis (H10 and subcodes) generally remained below 2% per month. Gastroenteritis (K52 and subcodes) showed a gradual increase over the study period, rising from 0.69% in February to 3.37% in April.

Discussion

The earthquakes centered in Kahramanmaraş on February 6, 2023, and the subsequent aftershocks caused widespread destruction, particularly in the provinces of Kahramanmaraş, Hatay, Malatya, and Adıyaman, resulting in substantial mortality, injuries, and significant damage to healthcare infrastructure.[1-4] The collapse of numerous private hospitals and the structural damage rendering state hospital buildings unusable, along with the impairment of family health centers (FHCs), increased demand on the limited remaining functional healthcare facilities.[4] During this period, Kahramanmaraş Sütçü İmam University Health Application and Research Hospital continued its operations, serving as a critical healthcare hub for the city. However, the surge in patient volume, constrained resources, and personnel shortages led to delays in registration and triage processes, and the emergency department only reached full operational capacity one week later. These circumstances underscore the importance of infrastructure resilience and resource management in post-disaster healthcare delivery.

One week after the earthquake, when the Emergency Department Green Zone became operational, it was deemed appropriate to assign the management of the unit's healthcare services to the faculty members and residents of the university's Department of Family Medicine. The delegation of Green Zone management to family physicians can be justified on several grounds. First, Green Zone visits typically involve non-urgent, low-acuity, and outpatient-like cases, which require a comprehensive and holistic clinical approach. Family physicians can manage such cases effectively due to their integrative perspective, which considers patients within a single system and addresses multiple health issues. Furthermore, the inclusion of emergency rotations in family medicine training ensures that these physicians are familiar with emergency department workflows and possess the necessary clinical decision-making skills. Considering the post-disaster constraints of limited resources and increased patient volume, the capacity of family physicians to systematically organize triage, patient routing, and coordination processes both facilitates the management of Green Zone visits and alleviates the workload of emergency physicians. Therefore, assigning Green Zone cases to family physicians enables the delivery of patient care from a holistic perspective while enhancing the efficiency of resource and service management under disaster conditions. In this context, the findings related to the organization and management of the Green Zone following the disaster are discussed in this section.

In this study, the gender distribution of green zone admissions indicated that the proportion of male patients was higher than that of female patients. Existing literature indicates that gender distribution in post-disaster healthcare utilization may vary. For instance, Kurt et al. reported a higher proportion of female patients (54.4%) among post-earthquake emergency department visits.[5] In contrast, Aydın et al., in their Hatay-centered study, found that 52.7% of mildly to moderately affected adults were male and 47.3% were female.[6] In studies from Istanbul and other non-central regions, the proportion of female patients in all earthquake-related visits was slightly higher or approximately balanced (around 55% female).[7-9] These findings suggest that post-disaster healthcare utilization cannot be explained solely by gender, and that non gender related factors also play a significant role.

In this study, the majority of visits were observed in the adult age group (18–64 years). Within one month following the earthquake, 1,833 patients presented to the Emergency Department of Akdeniz University Faculty of Medicine, of whom 70.6% were adults (1,294 patients), and 29.4% were children under 18 years of age (539 patients). The mean age of adult patients was 53.11 years (SD = 19.03).[10] Following the 2023 Turkey earthquakes, among 662 patients presenting to two hospitals in Diyarbakır during the first week, the mean age was 10.7 years for children (0–17), 36.9 years for adults (18–63), and 72.9 years for elderly patients (65–84).[8] In the same study, children accounted for 19.7% of all visits, while elderly patients comprised 8%.[8] In Hatay, among 1,257 adults presenting due to secondary effects without direct trauma, the median age was 41 years (IQR 29–58).[6] In another university hospital, the median age of 3,072 adult patients was reported as 44 years

(IQR 31–61)[9], while Kaya et al. reported a mean patient age of 41 years.[11] Since adult emergency departments do not normally treat pediatric patients, families may have sought alternative hospitals, primary care centers, or out-of-town healthcare facilities for their children, assuming this would be the case even in exceptional circumstances. Older patients and those with chronic illnesses generally present with more severe symptoms, leading to a higher likelihood of referral to and hospitalization in yellow or red zones.[12] Consequently, the relatively low population density of those aged 65 and over in green zones may explain the dominance of adults in green zone emergency department visits.

In this study, the largest proportion of emergency department green zone visits was attributed to general examination (Z00.8). The high frequency of the general examination code may be explained by its common use in clinical practice and its ease of assignment, as well as the requirement of hospital information systems to enter a diagnosis before proceeding with any clinical process.

The literature emphasizes that the use of ICD code X34 (victim of earthquake) enables a more systematic evaluation of emergency department visits among disaster victims.[10] In such disaster settings, the use of the X34 code is important for improving the traceability of patient data and facilitating early classification of admissions.

However, the X34 code was not widely used in our study; instead, the routinely used pre-earthquake general examination code (Z00.8) was preferred. This may lead to confusion when collecting data in the future, and using the X34 code at least during the initial period of the disaster could have facilitated traceability and data integrity. The limited use of the X34 code may be attributed to physicians’ lack of familiarity with this diagnosis and their tendency to use the Z00.8 code, which they were accustomed to and knew by rote.

In our study, most visits were recorded using symptom and disease-based diagnostic codes. In this context, the most frequently observed diagnoses were upper respiratory tract diseases and myalgia. Similar findings have been reported in the literature; at a hospital located outside the central area of Istanbul, the most common diagnoses among nontrauma emergency department visits were upper and lower respiratory tract infections (34.4%), myalgia (12%), and anxiety (5.6%).[13]Following the 2023 Hatay earthquake, it was reported that 83.1% of adult patients without direct trauma were triaged in the green category, with the primary reasons for these visits being exacerbation of chronic conditions or new symptoms (30.5%), medication loss (24.8%), and psychosocial complaints (25.1%).[6] Furthermore, among earthquake victims referred to more distant hospitals, respiratory system diseases were the most frequent reason for emergency visits, with an even higher prevalence among children.[14] Our findings are consistent with the literature, and the predominance of upper respiratory tract infections can be attributed to several factors, including the occurrence of the earthquake during cold winter conditions, prolonged uninhabitability of homes, and the necessity for survivors to shelter in crowded, inadequately isolated, and temporary environments. These conditions may have led to insufficient nutrition and weakened immune defenses, increasing susceptibility to respiratory infections.

In our study, Myalgia and musculoskeletal pain were other frequently observed complaints. Eyler et al. examined emergency department visits following the September 30 İzmir earthquake and reported that the most frequent diagnoses were soft tissue injuries and myalgia, with the orthopedic and traumatology departments receiving the highest number of consultations.[15] Similarly, Kurt et al. found that the majority of emergency visits were related to trauma, fractures, and injuries caused by falling debris, and noted that orthopedic consultations were the most commonly required.[5] Our findings are consistent with the literature, and the high frequency of myalgia diagnoses may be related to factors such as being trapped under debris, having to lift heavy objects while rescuing relatives or others from debris, inadequate shelter, and survivors having to rest for extended periods in vehicles, on benches, or on hard surfaces. Prolonged maintenance of improper postures can place additional strain on the musculoskeletal system, leading to pain and stiffness, while stress and other psychosocial factors may further exacerbate muscle tension and discomfort. These findings indicate that the symptom and disease profiles observed in post-disaster Emergency Department Green Zone visits are influenced not only by epidemiological factors but also by physical living conditions, sheltering circumstances, and environmental factors. Therefore, in post-disaster healthcare planning, measures such as the provision of temporary shelter, adequate resting areas, and mitigation of environmental risks are critical for reducing patient volume and morbidity.

The literature emphasizes that predominant health problems vary according to the type of disaster and age groups. Heat waves, droughts, and wildfires are associated with cardiovascular, respiratory, and metabolic effects, particularly among the elderly, as well as increased mortality due to extreme heat.[16] Earthquakes and tsunamis are linked to post-traumatic stress, depression, anxiety, disruption of healthcare services, and exacerbation of chronic diseases in vulnerable populations.[16] Floods have been associated with respiratory infections, water and food-borne diseases, skin infections, and malnutrition.[17] Hurricanes, typhoons, and storms contribute to cardiovascular and respiratory complications, acute injuries, interruptions in medication or dialysis, and increased hospital admissions.[12] Hashimoto et al. and Taji et al. reported that, following floods in Japan, the majority of presenting patients were elderly, with the most common diagnoses being hypertension, diabetes, and respiratory tract infections; dermatological conditions and upper respiratory infections were more frequent among children, injuries among adults, and hypertension, along with treatment interruptions, were more pronounced in the elderly.[18,19] These findings underscore the necessity of disaster-type specific strategies in post-disaster healthcare planning.

Analysis of monthly emergency department visits revealed an overall increase during the study period. In a study by Kaya et al., conducted at a hospital outside the earthquake-affected region, 43.7% of disaster-related visits occurred in the first month after the February 6 earthquake, 37.4% in the second month, and 18.9% in the third month.[11] While studies outside affected areas generally report a gradual decline in visits over time, the upward trend observed in our study may reflect contextual factors, such as the gradual return of the population to the affected region and improving access to healthcare services after the immediate post-earthquake period. In Aydın Ö et al.'s study, 83.1% of adult patients without direct trauma were classified as green triage, with primary reasons including exacerbation or newly emerging symptoms of chronic diseases (30.5%), medication loss (24.8%), and psychosocial complaints (25.1%).[6] Similarly, delayed exacerbations of chronic conditions, secondary injuries, and late-onset infectious diseases may have contributed to the observed increase in visits. These findings suggest that, following the acute phase, nontraumatic and predominantly nonurgent healthcare needs become more prominent, shaping temporal patterns of emergency department utilization.

This study identified pregnancy-related conditions as one of the most frequently recorded diagnosis codes among hospital visits. Keskin et al. reported that post-earthquake trauma levels negatively affected maternal complaints and quality of life during pregnancy.[20] In Uysal et al.'s study, among 58 pregnant women presenting to a tertiary care center following the Kahramanmaraş earthquakes, the most common obstetric complaint was pelvic pain or contractions (36.3%).[21] The literature indicates that after earthquakes and similar natural disasters, hospital visits among pregnant women are initially dominated by acute obstetric emergencies such as trauma, contractions, and bleeding, whereas in the subsequent period, routine follow-up needs and psychological issues (depression, PTSD) become more prominent.[21,22] In the present study, post-earthquake fear, panic, and chaos, along with maternal concerns regarding fetal health, likely contributed to the increased emergency department visits among pregnant women. These findings underscore the necessity of incorporating both acute obstetric care and accessible psychosocial support in disaster preparedness and response plans.

In this study, an increase in cases of conjunctivitis, dermatitis, and gastroenteritis was observed approximately one month after the earthquake, and this trend persisted throughout April. Öztürk et al. reported that during the acute phase following a disaster, crush syndrome and trauma-related organ failures are the primary concerns; however, in the subsequent period, infectious diseases, exacerbations of chronic conditions, and psychological problems become more prominent.[23] Similarly, following the 2010 Haiti earthquake, traumatic cases predominated during the first two weeks, while infections as well as dermatological and ophthalmological conditions increased in the subsequent weeks.[24]

In a study by Çetinkaya et al., which evaluated ocular diseases and injuries following the Kahramanmaraş earthquake, approximately 30% of admissions were reported to be associated with conjunctivitis, with red eye being one of the most common presenting complaints.[25] Exposure to dust particles and various chemical irritants released from collapsed or damaged buildings may have contributed to the development of conjunctivitis, characterized by symptoms such as redness, tearing, and ocular pain. As eye conditions may threaten vision if not treated in a timely manner, the provision of eye care services is of critical importance during the acute phase of natural disasters.

A review of the literature indicates that dermatological problems increase following disasters. In the initial months, infections, parasitic diseases, and dermatoses related to physical factors are predominant, whereas from the second and third months onward, stress-related conditions such as eczema, neurocutaneous disorders, and erythematous squamous diseases become more prominent.[26] Crowded and unhygienic living conditions, along with shared clothing and bedding, facilitate the spread of bacterial and fungal skin infections. Additionally, exposure to parasites and insects (e.g., scabies, insect bites) triggers dermatological infestations, while prolonged exposure to sunlight, humidity, or cold compromises skin integrity, increasing the incidence of dermatitis and sunburn.[26,27] Psychological stress may also precipitate eczema, psoriasis, and other inflammatory skin disorders, and interruptions in the treatment of existing dermatological conditions can exacerbate symptoms.

During this study, acute gastroenteritis and related diagnoses (K52 and subcodes) were frequently observed. Following the 2015 Gorkha earthquake, cholera outbreaks were reported in Kathmandu, the capital of Nepal.[28] Similarly, after the 1999 İzmit and Düzce earthquakes, which affected northwestern Turkey within a span of less than three months, outbreaks of Hepatitis A (HAV) and Hepatitis E (HEV) were reported among children residing in temporary settlements.[29,30] In contrast, following the 2023 Kahramanmaraş earthquakes in Turkey, no official reports of major diarrheal outbreaks, including cholera, have been documented. Observed cases, however, may be associated with post-earthquake deterioration in water and sanitation conditions, crowded living environments, and inadequate hygiene. These findings underscore the importance of hygiene, access to clean water, and preventive health measures in the post-disaster period.

Analysis of green zone emergency department visits in this study indicates that under normal conditions, some patients could have been managed in outpatient clinics, and keeping these clinics operational might have reduced the patient load in the emergency department. Common presenting complaints, including conjunctivitis, dermatological conditions, pregnancy-related visits, chronic otitis, foreign bodies in the ear, and ear pain, could have been directed to appropriate outpatient services during triage, or to their family physicians if available. However, following the earthquake, many hospital outpatient units and family health centers were inaccessible, forcing these patients to seek care in the emergency green zone. This finding underscores the importance of maintaining accessible outpatient services in the post-disaster period to optimize patient flow and ensure effective use of healthcare resources.

In conclusion, the findings indicate that, in disaster situations such as earthquakes, effectively managing patient load in green zone emergency departments requires directing the population to appropriate healthcare units and strengthening primary healthcare services during the disaster period. This approach can reduce the burden on emergency departments and contribute to more efficient use of healthcare resources. For effective disaster preparedness and post-event management, equipping healthcare facilities to handle high patient volumes and promptly compensating for non-functional outpatient clinics, primary care centers, and staff shortages are critical for reducing the burden on emergency services. Additionally, as observed in our study, family physicians play a pivotal role in all disaster scenarios and can serve as strategic support when needed. Therefore, strengthening family physicians through specialized disaster-related training may enhance the effectiveness of post-disaster healthcare services.

Limitations

The study was conducted at a hospital located at the epicenter of the earthquake that remained structurally intact, providing access to a larger dataset due to the high volume of patient admissions following the disaster. The magnitude of the earthquake and the extensive damage it caused underscore the significance of the collected data and its potential to guide the management of future large-scale disasters. However, several limitations should be acknowledged.

Given the circumstances at the time and the nature of emergency care, data were collected rapidly with a primarily treatment-focused approach. In the immediate aftermath of the earthquake—particularly during the first days, when power outages, excessive patient load, and staff shortages occurred—some patient records were initially documented manually and later transferred to the electronic hospital information system. Therefore, potential inconsistencies or missing data arising from retrospective record entry should be considered when interpreting the findings.

Ethical Considerations: Ethical approval for this study was obtained from the XXX University Faculty of Medicine Medical Research Ethics Committee on November 8, 2023 (session 2023/13, protocol code 51, decision number 08).

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

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Research Article

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EVALUATION OF THE RELATIONSHIP BETWEEN HEALTH LITERACY AND BODY MASS INDEX, BLOOD PRESSURE AND HEALTHY LIFESTYLE BEHAVIORS IN ADULT POPULATION; GLM MEDIATION MODEL ANALYSIS

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Abstract

Objectives: This study examines the relationship between health literacy (HL) and body mass index (BMI), blood pressure, and healthy lifestyle behaviors in 526 adults attending primary care centers. Mediation analysis was used to assess both direct and indirect effects of HL on these outcomes.

Materials and Methods: HL was measured using the Turkey Health Literacy Scale-32 (THLS-32). Independent variables included demographic characteristics, BMI, blood pressure, dietary habits, physical activity, and scores from the Healthy Lifestyle Behaviors Scale-II (HLSBS). Chi-squared tests were applied for categorical variables, Student's t tests for parametric data, and Mann-Whitney U tests for non-parametric data. GLM mediation analysis conducted in JAMOVI examined the role of HL in BMI, body fat, and mean arterial pressure (MAP), with $p<0.05$ considered statistically significant.

Results: Among 526 participants, 40.7% were overweight, and 27.8% were obese, while 48.1% had sufficient-perfect HL. Individuals with inadequate-limited HL had higher BMI and blood pressure and lower engagement in healthy behaviors. GLM analysis showed HL was significantly and directly associated with BMI, fat mass, and MAP ($\beta = -0.195$, -0.139, and -0.146, respectively; all $p < 0.001$). However, healthy lifestyle behaviors did not mediate these associations.

Conclusion: HL was independently associated with BMI, fat mass, and blood pressure, although the tested behavioral mediators did not explain this relationship. Health literacy plays a key role in health promotion. Health professionals should emphasize HL to improve lifestyle behaviors and reduce risks of obesity and hypertension. Practical strategies include HL-tailored patient education, simplified prescriptions, HL screening in routine care, individualized counseling, and community programs.

Keywords: Obesity, health literacy, healthy lifestyle behaviors, mediation model analysis

Introduction

The WHO estimates that 70-80% of deaths in developed countries and 40-50% of deaths in underdeveloped countries are caused by lifestyle-related diseases.[1] Health literacy (HL) plays an important role in helping individuals adopt healthy lifestyle behaviors.[2] WHO defines HL as "an individual's ability to access, understand, and use health information to protect and maintain health.".[3] Improved HL increases individuals' control over their own health.[4] Low HL is associated with many chronic diseases, such as obesity, hypertension, and diabetes. The European HL Survey found that 12% of the European population had inadequate HL and 35% had limited HL.[5] The Turkish HL Survey found that 30.9% of individuals had inadequate HL and 38% had problematic-limited HL.[6] These high rates highlight the necessity to evaluate which healthy lifestyle behaviors mediate the relationship between HL and negative health outcomes such as high body weight and blood pressure.

HL and healthy lifestyles are closely linked. Improvement in HL can increase adults' confidence in managing their health-related behaviors.[7] It has been found that individuals with high levels of HL make healthier choices and decisions throughout their lives and pay more attention to healthy nutrition. Studies have shown that individuals with adequate HL prefer sugary foods less and consume more fruits and vegetables.[1] Increasing HL in the community is important in the fight against chronic diseases. In order to evaluate the relationship between HL and a healthy lifestyle in detail, the effect of this relationship on health status should be predicted together. Such studies are limited in the literature. For instance, Nguyen et al. found that cigarette smoking, alcohol drinking, physical activity, and healthy eating variables do not mediate the effect of HL on hypertension.[8] Furthermore, Sahafiee et al.'s mediation analysis revealed that the association between fast-food consumption and depression was largely independent of obesity.[9]

This study aims to evaluate the relationship between HL and BMI, blood pressure, and healthy living behaviors in the adult population. Accordingly, the GLM mediation analysis model will be used to examine the direct and indirect effects of HL on BMI, blood pressure, and healthy life behaviors. The findings will provide important insights into how interventions to improve HL can contribute to the prevention and management of common health problems such as obesity and hypertension. This study was reported in accordance with the STROBE guidelines.

Materials and Methods

This cross-sectional study consisted of individuals over the age of 18 who applied to the family health centers included in the sample between 15/01/2022 and 15/02/2022 in the Pursaklar district within the borders of Ankara province. The sample size (α=0.05, d=5% and 31% obesity prevalence at 95% confidence interval) was calculated as 327. The study was designed to achieve a sample size that was twice as large as the original planned sample size to increase statistical power and reduce the potential impact of missing data or exclusions on the final sample. A consecutive sampling method was used; all eligible individuals presenting to the three largest family health centers during the study period were invited to participate. Individuals who applied to the 3 largest family health centers in the district within one month were included in the study, and the study was completed with 526 (76,79%, a total of 159 individuals declined to participate in the study.

The questionnaire form was prepared by the investigators and administered face-to-face. The dependent variable of the study was HL status measured by the Turkey HL Scale-32 (THLS-32). Independent variables are age, gender, educational status, employment status, marital status, income status, presence of chronic diseases, health self-rating, body perception, smoking status, alcohol consumption, BMI, muscle mass, fat ratio, systolic blood pressure, diastolic blood pressure, mean blood pressure, weekend breakfast, weekday breakfast, consumption of fatty and sugary foods, salt added to foods, coffee/soda/tea consumption, red meat consumption, fast food consumption, vegetable and fruit consumption, regular physical activity, adequate sleep duration, visit to a dietician in the past year, time spent in front of TV/PC, score on the HLSBS.

Each participant was rested, and blood pressure was measured with an Omron M2 sphygmomanometer (Omron Corporation, Kyoto, Japan), and weight, height, muscle mass, fat percentage, and BMI were measured with Tanita MC 580 (Tanita Corporation, Tokyo, Japan). MAP presented in the results was calculated using the formula MAP = (SBP + 2 × DBP) / 3. The obesity classification of the individuals was made according to the WHO. Accordingly, BMI (kg/m^2) <18.5 was considered underweight, BMI (kg/m^2) =18.5-24.99 was considered normal weight, BMI (kg/m^2) =25-29.99 was considered overweight, and BMI (kg/m^2) ≥30 was considered obese.

The validity and reliability study of the THLS-32 was conducted by Okyay et al. in 2016.[10] As a result of the internal consistency analysis of the scale, the Cronbach's alpha coefficient was calculated as 0.927. The following formula was used to evaluate the Scale Index = (mean-1) x (50/3). After this calculation, 0 indicates the lowest HL, and 50 indicates the highest HL. The index obtained was divided into four categories of scores [(0-25): Insufficient HL, (>25-33): Problematic-limited HL, (>33-42): Adequate HL, (>42-50): Excellent HL].

HLSBS; It was developed by Walker et al. in 1996 and translated into Turkish by Bahar et al. in 2008, and its validity and reliability were studied. This scale consists of 52 items and six factors (spiritual development, interpersonal relationships, nutrition, physical activity, health responsibility, and stress management). A high score indicates a positive, healthy lifestyle behavior.[11]

Ethical approval was obtained from the Ankara Yıldırım Beyazıt University Ethics Committee (Date: 06.01.2022; No: 35). A questionnaire was administered in an average of 10-15 minutes. Written informed consent was obtained from the participants. Our study was in accordance with the ethics of research and publishing. Published research data must be kept by the researcher for 5 years.

Statistical analysis

Research data were analyzed using the SPSS 23 statistical package. Categorical variables were presented as numbers and percentages, and continuous variables were presented as mean ± standard deviation and median (IQR 25-75). Chi-squared test was used for categorical variables, Student t test in independent groups for parametric conditions, and Mann-Whitney U test for non-parametric conditions.

After the variables that may have an effect on HL were identified by univariate analysis, further analysis was performed with the significant variables. The selection of candidate mediator variables was guided by theoretical reasoning and prior empirical evidence. HLSBS was selected as a mediator because prior studies have demonstrated that individuals with higher HL levels engage more consistently in health-promoting lifestyle behaviors, including regular physical activity, balanced nutrition, and stress management, all of which are captured by the HLSBS subscales.[7,11] Weekend breakfast habit was included because HL has been associated with healthier dietary behaviors, including regular meal patterns, and adequate nutritional knowledge—such as recognizing the importance of breakfast—is linked to lower BMI and better metabolic health.[1,26] Regular physical activity was selected, given that individuals with low HL have been shown to exhibit more risky behaviors, including physical inactivity, and physical activity is robustly associated with reductions in body fat and blood pressure. These three variables were therefore theoretically hypothesized to serve as behavioral mechanisms through which HL exerts its influence on cardiometabolic outcomes. [8,13] GLM model was used to test the mediating role of HL with the significant variables. The direct, indirect, and total effects of HL and healthy lifestyle behaviors, breakfast, and regular physical activity on BMI, body fat, and mean arterial pressure were examined with 3 separate models. We used the JAMM module using maximum likelihood estimation, an optimal method for parameter estimation. Confidence intervals were calculated using the delta method, which extends the central limit theorem approximations. Model fit was evaluated through regression coefficients, standard errors, and z-statistics for each path. No multiple comparison correction was applied, given the exploratory nature of the mediation analyses. All analyses were performed in the JAMOVI package program, and statistical significance was accepted as p<0.05.

Ethical approval for this study was obtained from the Ankara Yıldırım Beyazıt University Ethics Committee (Date: 06.01.2022; No: 35). Written informed consent was obtained from all participants. The study was conducted in accordance with the principles of the Declaration of Helsinki. Data will be retained by the investigators for five years, as required by the journal policy.

Results

Our study was completed with 526 participants. 61.8% of the participants were female, and 38.2% were male. The mean age was 38.9±10.8 years. The HL level of 253 (48.1%) of the participants in the study is sufficient-perfect. Of the individuals who participated in the study, 31.6% were underweight/normal weight, 40.7% were overweight, and 27.8% were obese. In univariate analyses, variables significantly associated with HL included age, education level, presence of chronic disease, health self-rating, BMI classification, blood pressure, weekend breakfast habit, regular physical activity, and HLSBS score; these variables were subsequently included in the multivariable GLM mediation model. Table 1 shows the HL status of the study participants according to some descriptive characteristics. There was no significant correlation between HL and employment status, marital status, body perception, smoking, and alcohol consumption (p>0.005). The frequency of inadequate HL was found to be lower among those with high school or university education (48.6%) compared to those with secondary education (50.7%) and primary school graduates/non-graduates (66.7%) (p=0.024). The prevalence of inadequate-limited HL was higher among those with chronic diseases (61.6%) compared to those without chronic diseases (48.2%) (p=0.006). The prevalence of inadequate-limited

Among those who rated their health as very good-good (46.5%) was lower than the prevalence of inadequate-limited HL among those who rated their health as neither good nor bad (56.4%) and bad-very bad (75%) (p=0.006) (Table 1).

Table 2 shows the distribution of some health criteria according to the HL status of the individuals. According to the BMI classification, the prevalence of inadequate HL in underweight/normal individuals (43.4%) was lower than the prevalence of inadequate HL in mildly overweight (56.4%) and obese (75%) individuals (p=0.006). Systolic blood pressure, diastolic blood pressure, and mean arterial pressure were all higher in individuals with inadequate-limited HL than in those with adequate-excellent HL (p=0.019; p=0.013; p=0.011). No significant relationship was found between HL status and muscle mass (Table 2).

Table 3 shows the comparison of the HL status of the study participants according to healthy lifestyle behaviors. No significant correlation was found between the HL status of individuals and eating breakfast on weekdays, eating fatty/sugary foods, adding salt to foods, drinking coffee/tea/soda, eating red meat, eating fast food, and eating vegetables and fruits. The prevalence of inadequate-limited HL was higher among those who did not eat breakfast on weekends (65.5%) than among those who did eat breakfast on weekends (50.3%) (p=0.034). The prevalence of inadequate-limited HL was lower among those who engaged in regular physical activity (40%) than among those who did not engage in regular physical activity (55.4%) (p=0.003). In addition, those with inadequate-limited HL had a significantly lower HLSS score than those with adequate-excellent HL (p<0.001) (Table 3).

Table 1. Health Literacy Status of the Individuals Participating in the Research According to Some Descriptive Characteristics

	Insufficient-Limited Health Literacy n (%)*	Sufficient-Perfect Health Literacy n (%)*	p
Sex			
Female	164 (50.5)	161 (49.5)	0.401[1]
Male	109 (54.2)	92 (45.8)	
Age			
Mean ± sd	40.7±11.5	36.9±9.7	**<0.001[2]**
Median (IQR 25-75)	42 (32-48)	37 (18-64)	
Education			
No education or primary school	48 (66.7)	24 (33.3)	**0.024[1]**
Secondary school	102 (50.7)	99 (49.3)	
High school or University	123 (48.6)	130 (51.4)	
Working Status			
Yes	165 (51.9)	153 (48.1)	0.994[1]
No	108 (51.9)	100 (48.1)	
Marital Status			
Married	206 (51.1)	197 (48.9)	0.515[1]
Single/widowed	67 (54.5)	56 (45.5)	
Chronic disease			
Yes	90 (61.6)	56 (38.4)	**0.006[1]**
No	183 (48.2)	197 (51.8)	
Body perception			
Underweight	48 (49.5)	49 (50.5)	0.838[1]
Ideal	121 (53.1)	107 (46.9)	
Overweight-obese	104 (51.7)	97 (48.3)	
Health assessment			
Very good-good	131 (46.5)	151 (53.5)	**0.006[1]**
Neither good nor bad	124 (56.4)	96 (43.6)	
Bad-very bad	18 (75)	6 (25)	
Smoking			
Never used	161 (51.3)	153 (48.7)	0.754[1]
Used before but quit	29 (49.2)	30 (50.8)	
Still using	83 (54.2)	70 (45.8)	
Alcohol consumption			
Yes	24 (54.5)	20 (45.5)	0.714[1]
No	249 (51.7)	233 (48.3)	

1: Chi-square test; 2: Mann–Whitney U test; 3: Student’s t-test. *: Row Percentage

Table 2. The Distribution of Some Health Measures According to the Health Literacy Status of the Individuals Participating in the Research

	Insufficient-Limited Health Literacy	**Sufficient-Perfect Health Literacy**	p
	n (%)*	**n (%)***	
Weight Status			
Underweight-Normal	72 (43.4)	94 (56.6)	**0.006**[1]
Overweight	111 (51.9)	103 (48.1)	
Obese	90 (61.6)	56 (38.4)	
Muscle Mass			
Median (IQR 25-75)	28 (24.1-33.5)	28.3 (24.2-34.6)	0.960[2]
Fat Mass			
Mean ± sd	32.1± 8.5	30.3± 8.4	**0.016**[3]
Systolic blood pressure			
Median (IQR 25-75)	120 (110-131.5)	118 (107-130)	**0.019**[2]
Diastolic blood pressure			
Median (IQR 25-75)	80 (74-86)	78 (71-83)	**0.013**[2]
Mean Arterial Pressure (MAP)			
Median (IQR 25-75)	93.3 (86.7-100.7)	91.0 (84.7-96.7)	**0.011**[2]

1:Chi-square test; 2: Mann Whitney U test; 3: Student's t test

In terms of clinical significance, a 1-unit increase in the HL index score was associated with a 0.089 kg/m^2 decrease in BMI (direct effect β = -0.195) and a 0.140 mmHg decrease in MAP (direct effect β = -0.146), indicating a modest but meaningful association at the population level. As presented in Table 4, breakfast on weekends, doing regular physical activity, and HLSBS did not mediate the relationship between HL and fat mass, BMI, or MAP. On the other hand, HLSBS, breakfast on weekends, and doing regular physical activity components were significant with HL [β = 0.18, p < 0.001; β = 0.15, p < 0.001; β = -0.12, p < 0.001]. The path diagram of the GLM mediation models, with the β coefficients, is displayed in Figure 1 (Table 4) (Figure 1).

The total effect and direct effect of HL on fat mass, BMI, and MAP were significant [β = -0.13, p < 0.001; β= -0.14, p < 0.001; β = -0.20, p < 0.001; β = -0.19, p < 0.001; β = -0.16, p < 0.001; β = -0.14, p < 0.001, respectively].

Table 3. Comparison of Health Literacy Status of Individuals Participating in the Study According to Some Nutritional Habits

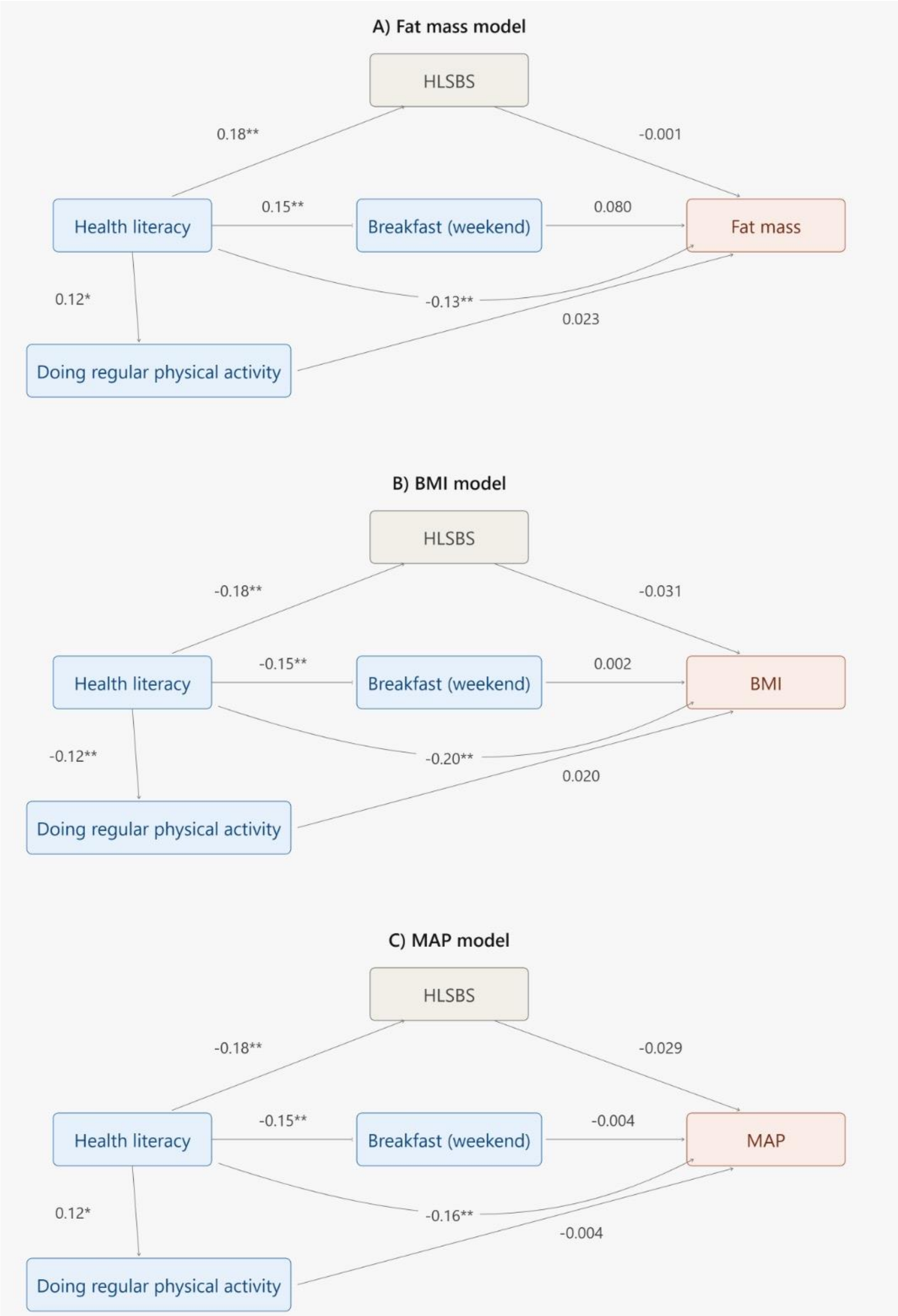
		Insufficient-Limited Health Literacy	Sufficient-Perfect Health Literacy	p
		n (%)*	n (%)*	
Breakfast on weekdays				
	No	79 (55.6)	63 (44.4)	0.297[1]
	Yes	194 (50.5)	190 (49.5)	
Breakfast on weekends				
	No	36 (65.5)	19 (34.5)	**0.034[1]**
	Yes	237 (50.3)	234 (49.7)	
Eating fatty and sugary foods				
	No	159 (51)	153 (49)	0.603[1]
	Yes	114 (53.3)	100 (46.7)	
Adding salt to food				
	Yes	170 (52.5)	154 (47.5)	0.741[1]
	No	103 (51)	99 (49)	
Coffee/cola/tea consumption				
	Yes	127 (56.2)	99 (43.8)	0.087[1]
	No	146 (48.7)	154 (51.3)	
Red meat consumption				
	Yes	158 (55.6)	126 (44.4)	0.063[1]
	No	115 (47.5)	127 (52.5)	
Fast food consumption				
	Yes	232 (52.8)	207 (47.2)	0.329[1]
	No	41 (47.1)	46 (52.9)	
Vegetable and fruit consumption				
	Yes	92 (57.1)	69 (42.9)	0.110[1]
	No	181 (49.6)	184 (50.4)	
Doing regular physical activity				
	Yes	48 (40)	72 (60)	**0.003[1]**
	No	225 (55.4)	181 (44.6)	
Having enough sleep time				
	Yes	187 (51.9)	173 (48.1)	0.977[1]
	No	86 (51.8)	80 (48.2)	
Visiting a dietitian in the last 1 year				
	Yes	24 (58.5)	17 (41.5)	0.356[1]
	No	246 (51)	236 (49)	
Time spent in front of the TV/pc				
	Median (IQR 25-75)	3 (2-6)	3 (0-16)	0.076[2]
Healthy Lifestyle Behaviors Scale				
	Median (IQR 25-75)	117 (104-133)	127 (111.5-143)	**<0.001[1]**

Note, 1: Chi-square test; 2: Mann–Whitney U test; 3: Student's t-test. *: Row Percentage

Table 4. The path diagram of the GLM mediation models, with the β coefficients

				95% C,I,				
Type	**Effect**	**Estimate**	**SE**	**Lower**	**Upper**	**β**	**z**	**p**
MODEL 1 (Fat Mass)								
Indirect	Health Literacy ⇒ HLSBS ⇒ Fat Mass	<0.001	0.006	-0.012	0.012	<0.001	-0.015	0.988
	Health Literacy ⇒ Breakfast on weekends ⇒ Fat Mass	0.010	0.006	-0.002	0.021	0.012	16449.0	0.100
	Health Literacy ⇒ Doing regular physical activity ⇒ Fat Mass	-0.002	0.004	-0.011	0.006	-0.003	-0.527	0.598
Direct	Health Literacy ⇒ Fat Mass	-0.114	0.034	-0.181	-0.047	-0.149	-33368.0	< 0.001
Total	Health Literacy ⇒ Fat Mass	-0.107	0.033	-0.171	-0.042	-0.139	-32277.0	0.001
MODEL 2 (BMI)								
Indirect	Health Literacy ⇒ HLSBS ⇒ BMI	-0.003	0.004	-0.010	0.005	-0.006	-0.718	0.473
	Health Literacy ⇒ Breakfast on weekends ⇒ BMI	0.001	0.003	-0.006	0.006	0.000	0.054	0.957
	Health Literacy ⇒ Doing regular physical activity ⇒ BMI	-0.001	0.003	-0.006	0.004	-0.003	-0.461	0.645
Direct	Health Literacy ⇒ BMI	-0.089	0.020	-0.128	-0.049	-0.195	-44081.0	<0.001
Total	Health Literacy ⇒ BMI	-0.092	0.019	-0.130	-0.054	-0.203	-47475.0	< 0.001
MODEL 3 (MAP)								
Indirect	Health Literacy ⇒ HLSBS ⇒ MAP	-0.005	0.008	-0.020	0.010	-0.005	-0.676	0.499
	Health Literacy ⇒ Breakfast on weekends ⇒ MAP	-0.006	0.007	-0.019	0.007	-0.007	-0.965	0.334
	Health Literacy ⇒ Doing regular physical activity ⇒ MAP	-0.006	0.006	-0.017	0.005	-0.006	-1052.0	0.293
Direct	Health Literacy ⇒ MAP	-0.140	0.043	-0.224	-0.057	-0.146	-3292.0	<0.001
Total	Health Literacy ⇒ MAP	-0.158	0.041	-0.239	-0.077	-0.165	-3824.0	< 0.001

Note, Confidence intervals computed with method: Standard (Delta method), Betas are completely standardized effect sizes.



* p<0.05, ** p<0.01. Coefficients are standardized path (β) values.

Figure 1. Path diagram of the GLM mediation models with standardized β coefficients. *p<0.05; **p<0.001.

Discussion

In our study, the total effect and direct effect of HL on fat mass, BMI, and MAP were significant. Although there was a significant association between HL, eating breakfast on weekends, regular physical activity, and HLSBS, these behaviors did not mediate the increase in fat mass, BMI, and MAP. Given the cross-sectional design of this study, it is not possible to establish causality; findings should be interpreted as associations rather than causal relationships. The absence of significant mediation effects may be explained by several factors. First, the relatively high educational level of the sample may have attenuated expected mediation pathways by reducing variance in mediating behaviors; education is closely intertwined with both HL and health behavior adoption, and samples with higher educational attainment tend to show ceiling effects in behavioral variables.[13] Second, measurement of mediators through binary cross-sectional self-report may have limited sensitivity; this methodological constraint is also present in comparable mediation studies in the HL literature, where similarly selected behavioral variables failed to show significant indirect effects.[8] Third, the selected mediators represent only a subset of potential behavioral mechanisms; variables such as dietary quality, sedentary time, and sleep quality were not included, yet these broader behavioral dimensions have been shown to link HL to health status in prior research.[27] Fourth, BMI, fat mass, and MAP are shaped by long-term cumulative behavioral patterns, and a cross-sectional design may be insufficient to capture these temporally distal mediation effects; longitudinal studies have highlighted that the relationship between HL and excess body weight accumulates over time rather than reflecting short-term behavioral changes.[26] This may be because the increase in fat mass, BMI, and MAP values occurred over long periods of time, and individuals perceived negative healthy lifestyle choices as simple detours they used in daily life. Informing individuals that healthy lifestyles in daily life are associated with better health outcomes would be an important initiative to reduce the prevalence of non-communicable diseases. One possible explanation for this observed association is that individuals with adequate HL tend to report lower rates of unhealthy dietary choices, physical inactivity, and harmful lifestyle behaviors such as smoking and alcohol use, and higher rates of adherence to control measures for blood pressure, BMI, and MAP; however, the direction of this relationship cannot be determined from the current cross-sectional data. However, studies have shown that HL is a key factor in achieving ideal values.[12] Studies examining mediation found that smoking, alcohol, physical activity, and healthy eating variables did not mediate the effect of HL on hypertension.[8] Another study focusing on a potential mediating role of BMI focused on the complex relationship between fast-food consumption and depression. The study reported that obese people had a significantly increased risk of depression, accounting for 27% of the overall risk.[9]

According to the results of this study, lower levels of HL were found with increasing age. In terms of education level, those with a high school or university degree were shown to have a statistically significantly higher level of HL than those with completed/incomplete secondary and primary education. In a study conducted in Croatia, health literacy was found to be higher in patients with university education than in those with lower education.[13] Again, in a study conducted in Iran with 407 diabetic patients older than 15 years, health literacy was found to be higher in patients with higher levels of education and who were employed.[14]

It has been reported that individuals with high HL are more concerned about healthy eating and making healthy choices throughout their lives. Studies have shown that individuals with adequate HL prefer foods with less sugar and consume more fruits and vegetables.[1] In our study, although no significant association was found between HL and consumption of more fruits, vegetables, and foods with less sugar, individuals who regularly ate breakfast on weekends were found to have higher HL than those who did not. These differences between studies may be due to sociocultural differences in the places where the studies were conducted and the different instruments used to measure HL levels.

Many studies in the literature have reported a negative association between HL and overweight.[15-19] Among the participants, 40.7% were mildly overweight, and 27.8% were obese, and there was a negative correlation between obesity and HL. This association suggests that lower HL levels may be linked to less engagement in healthy lifestyle behaviors, which in turn is associated with a higher prevalence of chronic diseases such as obesity and hypertension; however, causal directionality cannot be established from this cross-sectional design.[12,13] In a study of 1035 adolescents in China, low HL was significantly associated with overweight and obesity.[19] Similar results were found in our study, and the BMI of those with inadequate-limited HL was found to be higher than that of those with adequate-excellent HL. In addition, one of the findings of our study, that those with chronic diseases had lower levels of HL than those without chronic diseases, was consistent with the fact that the prevalence of chronic diseases increases with increasing BMI. Studies on the relationship between HL and the development of type 2 DM have reported inconsistent results, including a nonsignificant association between inadequate HL and the occurrence of type 2 DM.[20,21] In addition, there are studies in the literature showing a negative association between HL and hemoglobin A1C levels.[22-24] Similarly, studies have shown that patients with low HL use higher doses of insulin and experience more disease-related complications.[22,25] Assuming that patients with high HL are more compliant with their physicians' recommendations and better understand health-related information, these patients will use less insulin and have fewer complications.

It has been reported that individuals with high HL make healthier choices and decisions throughout their lives and pay more attention to healthy eating and living. Individuals with low HL have been found to have less knowledge about the health problems caused by obesity and to make less effort to maintain their ideal weight.[26]

Liu YB et al. showed that individuals with low HL had more risky behaviors, such as irregular diet and lack of physical activity.[27] In our study, individuals with high HL were found to have more regular physical activity. In addition, the relationship between HL and perceived health status was found to be significant: specifically, participants with high HL were significantly more likely to report that they rated their health as good. Similar results were found in a study conducted in China among people aged 60-99 years that examined the relationship between HL and health status and health-related behaviors.[27] Individuals with more active lifestyles tended to have higher levels of HL than those who were sedentary. These findings suggest that individuals with adequate levels of HL have higher rates of obtaining information about their own health and perceiving their current health status.

In our study, systolic blood pressure, diastolic blood pressure, and mean arterial pressure were found to be higher in individuals with inadequate-limited HL. Similar results were found in a study conducted in hypertensive patients in the literature.[28] In a study of participants over 18 years of age who presented to primary health care centers in Brazil, 70% of participants with hypertension were found to have inadequate HL.[29] Individuals with hypertension require more health services than normotensive individuals. This means that their HL needs to be increased in order to control blood pressure through lifestyle changes, including the provision and monitoring of their medications, healthy dietary control, and weekly physical activity routines.

According to our results, which showed a positive correlation between HL and the HLSBS, participants with high HL also scored high on the HLSBS. This was an expected finding. Although there are no studies in the literature examining the relationship between HL and HLSBS in adults, a study conducted with adolescents found a significant positive relationship between HL and HLSBS.[30]

This study has some limitations. First, due to the cross-sectional nature of our study, we were not able to infer causality. The study was conducted with patients who applied to FHC, which is a primary health care institution. It does not give us an idea about patients who never or rarely visit the FHC. At the same time, about half (48.1%) of the individuals participating in the study were university graduates, which is among the limitations of the study due to its relationship with HL. The educational distribution of the sample does not fully reflect the general population; the overrepresentation of higher-educated individuals may have contributed to the relatively elevated HL levels observed, potentially limiting generalizability to populations with lower educational attainment. [14] In addition, BMI, fat mass, and blood pressure are influenced by long-term behaviors; thus, mediation pathways may require longitudinal designs to be accurately detected.

In conclusion, increasing the HL of the population will contribute to raising awareness not only on hypertension and obesity, but also on general health awareness and emphasizing the importance of preventive health services. This will greatly reduce the incidence of communicable and non-communicable diseases and their complications. Therefore, HL plays an important role in health protection, improvement, and promotion. Health professionals should pay more attention to the impact of HL on healthy lifestyle behaviors. Assessing the relationship between HL and healthy lifestyle behaviors that have an impact on whether individuals are obese or have high blood pressure is important to increase the impact of health promotion interventions. These findings carry practical implications for primary care. Although a single unit increase in HL score was associated with a modest but meaningful reduction in both BMI and MAP at the population level, even small improvements in HL may translate into clinically relevant gains when applied across large populations. To translate these findings into practice, several concrete interventions can be implemented within primary care settings: developing HL-tailored education materials for family health center consultations using plain language and visual aids; presenting prescriptions and treatment plans in simplified formats; incorporating brief HL screening tools into routine assessments; implementing individualized counseling on healthy nutrition and physical activity adapted to each patient's HL level; utilizing digital health tools such as SMS reminders and mobile application-based follow-up systems; and organizing community-based HL education programs for populations with limited access to health services. Integrating health literacy improvement strategies into primary care may enhance the effectiveness of lifestyle-based interventions.

Ethical Considerations: Ethical approval for this study was obtained from the Ankara Yıldırım Beyazıt University Ethics Committee (Date: 06.01.2022; No: 35). Written informed consent was obtained from all participants. The study was conducted in accordance with the principles of the Declaration of Helsinki. Data will be retained by the investigators for five years, as required by the journal policy.

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

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Research Article

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CAREGIVER BURDEN AND DEPRESSIVE SYMPTOMS AMONG CAREGIVERS OF PATIENTS RECEIVING HOME HEALTHCARE FOR PRESSURE ULCERS

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Abstract

Objectives: This study aimed to evaluate the relationship between depressive symptoms and caregiver burden among caregivers of patients with PUs (pressure ulcers) and to identify factors associated with these outcomes.

Materials and Methods: This single-center, cross-sectional study included 106 caregivers of patients with PUs. Caregiver burden and depressive symptoms were assessed using the ZBI (Zarit Burden Interview) and BDI (Beck Depression Inventory). Associations were examined using nonparametric tests, correlation analysis, and robust regression models because the outcome variables were not normally distributed.

Results: The mean age of the participants was 51.91 ± 11.55 years, and most were female. The median ZBI score was 22.5, and the median BDI score was 7. Caregiver burden and depressive symptom scores were positively correlated (Spearman's rho=0.614, p<0.001). Higher scores were observed among unemployed caregivers (p=0.005 and p<0.001, respectively), those with insufficient income (p=0.014 and p<0.001, respectively), and those providing regular continuous care (p<0.001 and p=0.010, respectively). Scores were also higher among caregivers of patients with advanced-stage PUs and wound-related hospitalization. Higher caregiver burden was additionally associated with sole caregiving and larger wounds. In multivariable analyses, depressive symptoms were independently associated with caregiver burden and unemployment, whereas caregiver burden was associated with regular continuous caregiving, caregiving duration of 1–5 years, and larger wound size.

Conclusion: Caregiver burden and depressive symptoms were closely related among caregivers of patients with PUs. Intensive caregiving, unemployment, and wound severity were associated with poorer caregiver outcomes.

Keywords: Caregivers, depression, pressure ulcer, primary health care

Introduction

Global demographic aging has increased the demand for long-term health and caregiving services. Advances in health care have increased life expectancy worldwide, but population aging has also increased the need for long-term care and caregiving support.[1,2] As the prevalence of chronic diseases increases, mobility limitations have become more common, contributing to a growing burden of PUs (referred to as pressure injuries in recent international guidelines).[3] PUs are defined as localized injury to the skin and/or underlying tissues, typically occurring over bony prominences. They are caused by prolonged pressure alone or in combination with shear forces.[4] In addition to their clinical impact, PUs are a global public health problem due to their high prevalence, preventability, and economic burden.[5]

PUs are associated with substantial morbidity and mortality and represent a major health problem due to prolonged and costly treatment processes, adverse effects on patients' quality of life, and the increased burden placed on caregivers.[6] They may impair activities of daily living, delay rehabilitation, and extend hospital length of stay; when complicated by severe infection, they can lead to sepsis or death. Importantly, these consequences affect not only patients but also caregivers across psychological, social, physical, and economic domains. In many cases, care requires intensive and long-term support from family members in addition to professional health services.[7]

Previous studies suggest that preventing PUs is less costly and more effective than treating them.[8] Accordingly, in community and home care settings, PUs are increasingly regarded as a patient safety and quality-of-care issue requiring proactive risk assessment and coordinated preventive strategies rather than episodic wound management. PUs also represent a largely preventable source of morbidity, caregiving burden, and healthcare costs.[5] Among individuals who are bedridden or chair-bound, regular repositioning, adequate nutritional support, and measures to maintain skin integrity are central to prevention. Within primary health care, family physicians play a key role by educating patients and caregivers and by coordinating preventive and therapeutic services. This holistic approach facilitates the early recognition and management of physical, psychological, and pain-related problems.[9] Accordingly, evaluating caregiver burden and depressive symptoms is an important component of comprehensive primary health care for patients with PUs.

Caregivers provide a wide range of support, from personal hygiene to nutritional assistance, often at the expense of their own daily activities and social participation. As caregiving responsibilities increase, caregivers' mental and physical health may be adversely affected, with higher levels of depression and anxiety reported.[10] Identifying caregivers' needs and providing appropriate support may help reduce caregiver burden and improve care quality. However, evidence linking specific clinical characteristics of PUs, such as location, stage, and size, to caregiver burden and mental health outcomes remains limited.

This study aimed to assess caregiver burden and depressive symptoms among caregivers of patients with PUs and to examine sociodemographic, clinical, and care-related factors associated with these outcomes.

Materials and Methods

This single-center cross-sectional study was conducted between April and August 2025 after institutional ethics approval had been obtained. The study was reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross-sectional studies. During the study period, 106 caregivers of patients with PUs were enrolled. Participants were recruited using a consecutive convenience sampling approach during the study period. All eligible caregivers who attended the participating units and agreed to participate were invited to the study. Because participation was voluntary and the study was conducted at a single center, the findings may not be fully generalizable to all caregivers of patients with pressure ulcers.

Eligible participants were caregivers of patients with PUs who were registered at a university-affiliated training and research hospital and who voluntarily agreed to participate. Inclusion criteria were being aged 18 years or older, providing care for a patient with a pressure ulcer, being literate, and having no health condition that could interfere with completion of the questionnaire. Caregivers who had discontinued caregiving responsibilities or who declined participation were excluded. Primary caregiving status was not required for inclusion. For descriptive purposes, the primary caregiver was defined as the individual primarily responsible for meeting the patient's basic care needs and assisting with routine daily activities.[11]

Data were collected using a 59-item questionnaire that included a sociodemographic form with care-related variables, the ZBI, and the BDI. Written informed consent was obtained from all participants before enrollment, and all 106 caregivers completed the questionnaire in full. Sociodemographic and care-related data were obtained through face-to-face interviews conducted by physicians working in palliative care units, home care services, inpatient wards, and primary care clinics. Clinical characteristics of PUs, including location, stage, and size, were evaluated by the administering physician in accordance with the EPUAP (European Pressure Ulcer Advisory Panel) 2019 guidelines. Wound size was recorded as the largest diameter measured in centimeters. When patients had more than one pressure ulcer, the lesion with the most advanced stage was used for analysis.

Caregiver burden was assessed using the ZBI, a 22-item instrument with response options ranging from 0 (never) to 4 (nearly always). In the Turkish adaptation study by İnci and Erdem, the scale demonstrated excellent internal consistency, with a Cronbach's alpha of 0.95. Based on prior literature, scores of 0–20 correspond to no burden, 21–40 to mild burden, 41–60 to moderate burden, and 61–88 to severe burden.[12,13]

Depressive symptoms were evaluated using the BDI, a 21-item self-report scale originally developed by Beck et al. The Turkish validity and reliability of the instrument were established by Hisli.[14-16] Each item is scored on a 4-point scale from 0 to 3 based on symptom severity, yielding total scores between 0 and 63. Accordingly, scores were categorized as follows: 0–9 minimal or no depression, 10–16 mild, 17–29 moderate, and 30–63 severe.[15,16]

Data analysis was carried out in R (v4.4.1). The distributional properties of the variables were examined using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Since the continuous variables were not normally distributed, comparisons between two independent groups were made with the Mann–Whitney U test, whereas comparisons involving three or more groups were performed using the Kruskal–Wallis H test. When overall significance was found, pairwise group differences were further explored with Dunn's post hoc test, applying Bonferroni adjustment. Relationships between non-normally distributed continuous variables were assessed by Spearman's rho correlation coefficient. Because ZBI and BDI scores were not normally distributed, their associations with independent variables were examined using robust regression analysis with the MASS package. Variables included in the multivariable robust regression models were selected based on both clinical relevance and statistical significance in univariable analyses. Variables with a p-value <0.10 in univariable analyses were considered candidates for multivariable modeling. Continuous variables are presented as mean ± standard deviation or median (minimum–maximum), as appropriate. Categorical variables are reported as frequencies and percentages. Statistical significance was set at p<0.05. A post hoc power analysis for the correlation between the scales indicated that, with a sample size of n=106, an effect size of r=0.61, and α=0.05, the statistical power exceeded 99%.

Ethical Considerations

This study was conducted as part of a medical specialty (residency) thesis entitled "Examination of Mental Health Status and Care Burden of Caregivers of Patients with Pressure Ulcers" (Thesis No: 989990). The research protocol was approved by the Non-Interventional Scientific Research Ethics Committee of Ordu University (decision no. 2025/131, dated April 11, 2025).

Results

A total of 106 caregivers of patients with PUs were included in the study. The mean age was 51.91 ± 11.55 years, and 57.6% of participants were female. Most caregivers were unemployed (62.3%), and 43.4% reported that their income was lower than their expenses. Sole caregiving responsibility was reported by 26.4% of participants, whereas 49.1% provided regular, continuous care. Regarding wound characteristics, 26.4% of patients had stage 3, stage 4, or unstageable PUs, 25.5% had wounds larger than 10 cm, and 25.5% had a history of wound-related hospitalization (Table 1).

Table 1. Baseline characteristics of caregivers and patients

Variable	n (%) or mean ± SD
Age, years	51.91 ± 11.55
Female sex	61 (57.6)
Unemployed	66 (62.3)
Income lower than expenses	46 (43.4)
Sole caregiving responsibility	28 (26.4)
Regular continuous caregiving	52 (49.1)
Wound stage 3/4 or unstageable	28 (26.4)
Wound size >10 cm	27 (25.5)
Wound-related hospitalization history	27 (25.5)

Data are presented as mean ± standard deviation or n (%), as appropriate.

In univariable analyses, caregiver burden was significantly associated with employment status ($p=0.005$), income status ($p=0.014$), sole caregiving responsibility ($p=0.015$), caregiving pattern ($p<0.001$), wound stage ($p=0.009$), wound size ($p=0.010$), and wound-related hospitalization ($p=0.013$). Depressive symptom scores were significantly associated with age group ($p<0.001$), educational level ($p=0.002$), employment status ($p<0.001$), income status ($p<0.001$), caregiving pattern ($p=0.010$), wound stage ($p=0.005$), and wound-related hospitalization ($p=0.009$) (Table 2).

Table 2. Main univariable associations with caregiver burden and depressive symptoms

Variable	ZBI p-value	BDI p-value
Age group	0.058	<0.001
Educational level	0.594	0.002
Employment status	0.005	<0.001
Income status	0.014	<0.001
Sole caregiving responsibility	0.015	0.107
Caregiving pattern	<0.001	0.010
Wound stage	0.009	0.005
Wound size	0.010	0.086
Wound-related hospitalization	0.013	0.009

P values were obtained using the Mann-Whitney U test or Kruskal-Wallis H test, as appropriate. ZBI, Zarit Burden Interview; BDI, Beck Depression Inventory.

Caregiver burden and depressive symptom scores were strongly and positively correlated (Spearman's rho=0.614, p<0.001). In multivariable robust regression analyses, higher depressive symptom scores were independently associated with greater caregiver burden (β=0.213, 95% CI:0.115 to 0.311, p<0.001) and unemployment (β=5.857, 95% CI:2.946 to 8.768, p<0.001). Higher caregiver burden scores were independently associated with regular continuous caregiving (β=8.435, 95% CI:2.461 to 14.409, p=0.006), caregiving duration of 1–5 years (β=7.707, 95% CI: 0.566 to 14.848, p=0.035), and larger wound size, reflected by lower burden scores in the 0–5 cm group compared with the >10 cm group (β=−6.565, 95% CI: −12.769 to −0.362, p=0.038) (Table 3).

Table 3. Final multivariable robust regression models

Predictor	BDI, β (95% CI)	P value	ZBI, β (95% CI)	P
ZBI score (per 1-point increase)	0.213 (0.115 to 0.311)	<0.001	—	—
Unemployed	5.857 (2.946 to 8.768)	<0.001	—	—
Regular continuous caregiving	—	—	8.435 (2.461 to 14.409)	0.006
Caregiving duration 1–5 years	—	—	7.707 (0.566 to 14.848)	0.035
Wound size 0–5 cm	—	—	−6.565 (−12.769 to −0.362)	0.038

BDI, Beck Depression Inventory; ZBI, Zarit Burden Interview; β, unstandardized regression coefficient; CI, confidence interval.

Discussion

Population aging and the increasing prevalence of chronic disease have increased caregiving demands and may adversely affect caregivers' mental health.[17-19] Consistent with previous studies, our findings showed a strong positive association between caregiver burden and depressive symptoms.[20,21] The observed correlation between caregiver burden and depressive symptoms was not only statistically significant but also clinically meaningful. The magnitude of the association suggests that increasing caregiving burden may substantially affect caregivers' psychological well-being and daily functioning. The relatively lower levels of burden and depression observed in this study may reflect the contribution of home care and palliative care services, as well as the inclusion of both primary and shared caregivers.

Sociodemographic factors were significantly associated with caregiver outcomes. Older age and lower educational level were associated with higher depressive symptom scores. Unemployment and lower income were associated with both higher caregiver burden and higher depressive symptom scores. These findings are consistent with the literature.[22-24] Unemployed caregivers may experience greater psychological vulnerability because caregiving responsibilities can further limit social participation, financial independence, and access to supportive resources. Reduced physical resilience, financial strain, and limited coping resources may partly explain these associations. Treatment-related costs may also increase caregiver stress.[6,25]

Wound-related clinical characteristics were also important. Caregiver burden and depressive symptoms increased with advancing wound stage, consistent with previous studies reporting higher burden among caregivers of patients with more severe PUs. [6] Larger wounds were associated with greater caregiver burden, possibly because they require more intensive and prolonged care. Wound location also appeared to influence caregiver outcomes. Caregivers of patients with gluteal wounds had higher burden scores in univariable analyses, and regression analyses showed higher burden and depressive symptom scores among caregivers of patients with sacral and trochanteric wounds than among those caring for patients with sacral and gluteal wounds. Because some wound-location subgroups were small, these findings should be interpreted cautiously. Previous chronic wound research has also suggested that wound size and wound location may influence caregiver burden.[26] Care involving anatomically difficult or exposed areas may increase caregiving demands and caregiver stress.

Caregivers providing regular, continuous care had higher burden scores than those involved in shared care. In addition, caregivers with a caregiving duration of 1–5 years had higher burden scores than those providing care for more than 10 years. The higher burden observed among caregivers with an intermediate caregiving duration (1–5 years) may reflect a period during which caregiving demands intensify before long-term adaptation and coping mechanisms are fully established. Caregivers of patients with a history of wound-related hospitalization also had higher burden and depressive symptom scores, and sole caregiving responsibility was associated with higher caregiver burden in univariable analyses. These findings may reflect the greater demands of more severe illness and the limited opportunity to share caregiving responsibilities. [17,27]

Overall, the findings suggest that caregiver outcomes are influenced by both wound severity and caregiving intensity. Among caregivers of patients with PUs, greater caregiver burden was associated with higher depressive symptom scores. Unemployment, regular continuous caregiving, caregiving duration of 1–5 years, and greater wound severity were associated with poorer caregiver outcomes. These findings underscore the importance of incorporating caregiver assessment and psychosocial support into holistic primary health care services. In family medicine and home care follow-up, routine assessment of caregiver burden and depressive symptoms may help identify high-risk caregivers. Brief screening, caregiver education, and timely psychosocial support may be useful components of care.

These findings may help family physicians identify caregivers at increased psychological risk and support earlier intervention within home-based primary care services.

This study has certain limitations. Primarily, the findings are derived from data collected at a single institution, which may restrict the broader applicability of the results. Second, the cross-sectional design does not allow causal inference. Third, voluntary participation may have introduced selection bias. Additionally, caregiver burden and depressive symptoms were assessed using self-reported scales, which may have introduced information bias. Residual confounding may also be present because some potentially relevant psychosocial and clinical variables could not be evaluated within the scope of the study. Fourth, the sample size was relatively small, and some subgroup analyses may have been underpowered, particularly for wound-location categories. An a priori sample size calculation was not performed because the study was based on the available caregiver population during the study period. Fifth, because primary caregiving status was not required for inclusion, the study population may have been heterogeneous in terms of caregiving intensity and responsibility. In addition, depressive symptoms were assessed using the BDI, which is a screening tool and does not establish a clinical psychiatric diagnosis. Other potentially relevant variables, such as anxiety, burnout, coping style, and social support, were not evaluated.

Despite these limitations, the study simultaneously evaluated pressure ulcer characteristics, caregiver burden, and depressive symptoms. This may contribute to the limited literature on caregiver outcomes in the context of PUs.

Ethical Considerations: The research protocol was approved by the Non-Interventional Scientific Research Ethics Committee of Ordu University (decision no. 2025/131, dated April 11, 2025).

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

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Research Article

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USE OF TRADITIONAL AND COMPLEMENTARY MEDICINE AMONG PALLIATIVE CARE PATIENTS: ITS ASSOCIATION WITH PAIN, FUNCTIONAL DEPENDENCE, AND PATIENT ATTITUDES

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Abstract

Objectives: This study aims to examine the use of Traditional and Complementary Medicine (T&CM) in palliative care patients; its relationship with pain intensity, levels of functional dependence, and attitudes toward complementary treatments; and to evaluate patients' willingness to share these practices with healthcare professionals.

Materials and Methods: This cross-sectional descriptive study was conducted in the palliative care unit of a medical faculty hospital between May and July 2025. Pain intensity was assessed using the Visual Analog Scale (VAS), functional status with the Barthel Activities of Daily Living Index, and attitudes toward complementary medicine with the Attitudes Towards Using Complementary Treatments Scale (ACTS).

Results: A total of 87 patients were included, of whom 73.6% reported using at least one officially recognized T&CM method. Family was the most common source of information (50.5%), and musculoskeletal pain was the primary reason for use (82.8%). Most patients (81.2%) did not disclose T&CM use to healthcare professionals. No significant relationship was found between the level of dependence and ACTS scores (p=0.547). While no significant association was observed between T&CM use and pain intensity or functional dependence (p=0,386 and 0,657), ACTS scores were significantly higher among users of phytotherapy (p=0.001), cupping therapy (p=0.029), osteopathy (p=0.001), reflexology (p=0.049), and music therapy (p=0.016).

Conclusion: This study shows that T&CM use is common among palliative care patients, independent of pain intensity and functional dependency, and is largely associated with individual attitudes. Limited disclosure of T&CM practices to healthcare professionals underscores the need to routinely address T&CM use in palliative care assessments.

Keywords: Palliative care, traditional and complementary medicine, functional status, pain, patient attitude.

Introduction

With the increase in life expectancy, the incidence of chronic and life-threatening diseases has risen, and consequently, the need for long-term care and palliative services has also increased.[1,2] Palliative care is a support system delivered by a multidisciplinary team that aims to improve the quality of life for individuals facing life-threatening illnesses and their caregivers. It depends on the early identification, comprehensive assessment, and effective management of pain and other physical, psychosocial, or psychological problems.[3-5] Complementary or integrative treatment methods can be used in palliative care settings to support symptom control and improve patients' quality of life.[6] The belief that Traditional and Complementary Medicine (T&CM) methods are completely natural and have very limited side effects has been seen as one of the main reasons for the popularity of these practices.[7] Its easy application, non-invasive nature, and relatively low cost also support this trend.[8] In line with this growing need, T&CM applications have become widespread in Turkey, and various methods have been legally established.

In Turkey, T&CM practices, including acupuncture, apitherapy, phytotherapy, hypnosis, hirudotherapy (leech therapy), homeopathy, wet cupping (hijama), larval therapy, mesotherapy, prolotherapy, osteopathy, chiropractic, ozone therapy, reflexology, and music therapy have been officially defined and regulated by the Ministry of Health since 2014.[7,9] Although the reasons for using T&CM differ from patient to patient, it is generally observed that complementary methods are used in situations where modern medicine is considered inadequate or to support conventional medical treatments.[6] It is reported that the reasons for use are different among countries.[7,10,11]

It is indicated that palliative care patients use T&CM frequently, but they do not always share these practices with healthcare professionals.[1,5,7] It is known that the tendency to use T&CM is closely related to knowledge about it, and that usage behavior increases as positive attitudes increase; whereas when there are negative attitudes and a lack of knowledge, a cautious approach is taken towards its application.[6,12] Understanding the motivations, concerns, and communication mechanisms with healthcare professionals regarding the use of T&CM among palliative care patients is of great importance.

This study evaluated the frequency of T&CM use, reasons for use, and preferred methods among palliative care patients, as well as the effects of patients' pain and functional dependency levels on usage. Additionally, patients' sharing of their practices with healthcare professionals and their attitudes toward complementary medicine were examined. The findings are expected to contribute to the safe and comprehensive planning of T&CM practice in palliative care services.

Materials and Methods

Study Population and Design

This cross-sectional descriptive study was conducted at the Palliative Care Service of a Medical Faculty Hospital between May and July 2025. Individuals aged 18 years and older who provided voluntary informed consent were included in the study. Those who refused to participate and those with cognitive impairments that would prevent them from answering the questions were excluded.

The sample size was calculated using the G Power 3.1 program. Since there was no study in the literature evaluating the correlation between complementary medicine attitudes and the addiction scale, an effect size of $r = 0.30$ was assumed. A priori calculations with two-tailed $\alpha = 0.05$ and power = 0.80 determined that a minimum of 84 participants were required. A total of 96 patients who met the inclusion criteria and voluntarily agreed to participate in the study were evaluated from among all patients admitted to the palliative care unit during the period specified in the study; however, the analyses of patients who provided incomplete answers to the questions after the study began were not included. Consequently, the final analyses of the study were conducted using data obtained from 87 patients who completed the study in full.

In order to conduct the study, ethical committee approval was obtained from the Aydın Adnan Menderes University, Faculty of Medicine, Non-Interventional Clinical Research Ethics Committee with decision number 2025-159 dated May 22, 2025. All processes in the study were conducted in accordance with the Declaration of Helsinki, and participants signed a voluntary consent form.

Evaluation of Participants

The sociodemographic characteristics and T&CM usage status of all participants were recorded. The patients' pain intensity, functional status, disability levels, and attitudes toward complementary medicine were assessed.

Individual introduction form and Traditional and Complementary Medicine usage situations

Patients' demographic data and reasons for admission to palliative care were recorded. In terms of T&CM use, patients were assessed in terms of which methods they used, their purposes for use, whether they discontinued their current treatments while using these methods, and their behavior in sharing this situation with healthcare professionals.

Visual Analog Scale (VAS)

A visual scale used to measure pain intensity, rated on a scale of 0–10 cm (0=no pain, 10=most severe pain).[13]

Barthel Activities of Daily Living Index

This is a 10-item measure that assesses an individual's level of physical independence and is scored on a scale of 0–100. Higher scores indicate a higher level of independence. The validity and reliability of the scale in Turkish have been demonstrated.[14]

Attitudes Towards Using Complementary Treatments Scale (ACTS)

This is a 13-item, 4-point Likert-type scale (0–3 scoring) developed by Bilge et al. A high score on the scale indicates a positive attitude toward complementary therapies.[15]

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics for Windows, version 22.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was evaluated using the Kolmogorov–Smirnov test and visual inspection of histograms. Normally distributed variables were expressed as mean ± standard deviation (SD), whereas non-normally distributed variables were presented as median and interquartile range (25th–75th percentile). Categorical variables were summarized as numbers and percentages [n (%)]. Comparisons of continuous variables between two groups were performed using the independent samples *t*-test for normally distributed data and the Mann–Whitney *U* test for non-normally distributed data. For comparisons involving more than two groups with non-normally distributed data, the Kruskal–Wallis test was used. All statistical tests were two-tailed, and a p-value < 0.05 was considered statistically significant.

Results

The study included a total of 87 patients with a mean age of 70.98±13.81 years, of whom 45 were female (51.7%) and 42 were male (48.3%). The majority of patients lived in the city center (48.3%), were elementary school graduates (60.9%), and were married (62.1%). The most common reason for admission to the palliative care unit was malignancy, followed by neurological diseases and senility. The median disease duration was 10 (3–36) months, and the median length of stay in the unit was 7 (4–30) days. The clinical and demographic characteristics of the patients are presented in Table 1.

When patients were asked about officially recognized T&CM methods in Turkey, 64 (73.6%) had used one of these methods before. They reported their own family (50.5%) as their primary source of information, followed by social media (29.8%). Most of them (53, or 60.9%) stated that they used these methods because of musculoskeletal pain. The most commonly used methods were phytotherapy, osteopathy, reflexology, and cupping therapy (47.1%, 35.6%, 26.4%, and 20.7%, respectively). Details of the patients' use of T&CM are provided in Table 2.

When examining patients' use of complementary medicine, 43.7% used it for support purposes. 52.9% of patients reported that the treatment was beneficial and would continue, while 60.9% stated they would recommend it to others. The findings are presented in Table 3.

Table 1. Clinical and Demographic Data of Patients

		n	**%**
Gender	Male	42	48.3
	Female	45	51.7
Educational status	Illiterate	6	6.9
	Elementary school	53	60.9
	Middle school	9	10.3
	High school	13	14.9
	University	3	3.4
	Master's degree	3	3.4
Marital status	Married	54	62.1
	Single	3	3.4
	Divorced	2	2.3
	Widowed	28	32.2
Number of children	None	7	8
	1	11	12.6
	2	30	34.5
	3 or more	39	44.6
Place of residence	Center	42	48.3
	District	34	39.1
	Village	11	12.6
Reason for admission to palliative care	Malignancy	31	35.6
	Neurological disease	25	28.2
	Senility	13	14.9
	Respiratory system disease	7	8
	Cardiovascular disease	5	5.6
	Other (Diabetes Mellitus, Renal failure, Gastrointestinal problems)	6	6.9

Table 2. Patients' Use of Traditional and Complementary Medicine

		n	%
History of use	Yes	64	73.6
	No	23	26.4
Use within the last year	Yes	43	44.4
	No	44	50.6
Stopped taking medication while using	Yes	2	2.3
	No	85	97.7
Source of information	Doctor/health professionals	19	21.8
	Family	44	50.5
	Neighbors	22	25.2
	Other patients	5	5.7
	Social media/ television	26	29.8
	No information	16	18.3
Reason for use	Musculoskeletal pain	53	60.9
	Respiratory system disorder/flu	10	11.4
	Gastrointestinal disorder	5	5.7
	Nervous, due to tension	4	4.5
	Cardiac problems	2	2.2
	Urinary problems	3	3.4
Officially recognized T&CM method used	Acupuncture	9	10.3
	Prolotherapy	0	0
	Apitherapy	3	8
	Leech therapy	0	0
	Ozone therapy	4	4.6
	Mesotherapy	7	8
	Phytotherapy	41	47.1
	Larva therapy	2	2.3
	Cupping therapy	18	20.7
	Osteopathy	31	35.6
	Homeopathy	2	2.3
	Hypnosis therapy	2	2.3
	Reflexology	23	26.4
	Chiropractic therapy	5	5.7
	Music therapy	12	13.8

T&CM: Traditional and Complementary Medicine

Table 3. Status of complementary medicine use

		n	%
Purpose of complementary medicine use	Treatment	22	25.3
	Supportive care	38	43.7
	Prevention	7	8
Belief that complementary treatment methods are beneficial	Yes	46	52.9
	No	20	23
	Undecided	21	24.1
Willingness to continue complementary treatment methods	Yes	46	52.9
	No	41	47.1
Recommendation of complementary treatment use	Yes	53	60.9
	No	34	39.1

The median VAS score was 6 (3-8), and the median Barthel score was 15 (0-75). There was a significant difference in VAS scores between patients admitted for palliative care due to malignancy and those admitted for other reasons (p=0.012). The median VAS score for patients admitted due to malignancy was 7 (5-8), while it was 5 (2-7) for other patients.

No statistically significant relationship was found between the dependency levels of patients determined according to the Barthel Index and their ACTS Scale (p=0.547). Detailed results are presented in Table 4.

Table 4. Relationship Between Functional Levels of Palliative Care Patients and Their Attitudes Toward Complementary Medicine

		n (%)	ACTS Value	p
Barthel score	Completely dependent	50 (%57.5)	21.58±9.75	0.547
	Severely dependent	15 (%17.2)	17.26±10.11	
	Moderately dependent	9 (%10.3)	23.55±13.62	
	Mildly dependent	2 (%2.3)	16±21.21	
	Completely independent	11 (%12.6)	19.09±12.44	

ACTS: Attitudes Towards Using Complementary Treatments Scale.

In comparison with the five most commonly used methods among our patients from officially accepted methods, no statistically significant difference was found between patients using and not using T&CM methods in terms of pain and functional status (p=0.386 and 0.657). In contrast, ACTS scores were significantly higher in patients using phytotherapy (p=0.001), cupping therapy (p=0.029), osteopathy (p=0.001), reflexology (p=0.049), and music therapy (p=0.016) than in those who did not use these methods. Detailed data are provided in Table 5.

Table 5. Comparison of Barthel Index, VAS, and Attitudes Towards Using Complementary Treatments Scale in Patients Using and Not Using T&CM Methods

*** T&CM Methods**	**n**	**Barthel Score**	**p**	**VAS Score**	**p**	**ACTS Score**	**p**
Phytotherapy			0.120		0.195		0.001
Users	41	20 (5-82.5)		7 (4-8)		24.60±9.56	
Non-users	46	10 (0-50)		5 (2.7-7.2)		17.02±10.57	
Cuppingtherapy			0.236		0.576		0.029
Users	18	30(8.7-66)		6.5 (3.7-8)		24.33±6.67	
Non-users	69	10 (0-77.5)		6 (3-7.5)		19.62±11.41	
Osteopathy			0.383		0.271		0.001
Users	31	5 (0-60)		5 (2-7)		25.51±9.09	
Non-users	56	15 (5-78.7)		6 (4-8)		17.87±10.69	
Reflexology			0.973		0.731		0.049
Users	23	20 (0-50)		5 (3-8)		23.82±7.92	
Non-users	64	12.5 (0-80)		6 (3-7)		19.43±11.43	
Music Therapy			0.822		0.270		0.016
Users	12	10 (0-98.7)		5.5(1.2-6.7)		27.5±6.94	
Non-users	75	15 (0-60)		6 (3-8)		19.49±10.87	

*T&CM: Traditional and Complementary Medicine, ACTS: Attitudes Towards Using Complementary Treatments Scale, VAS: Visual Analog Scale. Data are presented as median or mean ± standard deviation. * In the analyses, the five most frequently used officially recognized T&CM methods among the patients in our study were evaluated. Methods used less frequently were not included in the analysis because they did not reach a sufficient sample size for statistical comparison.*

86.2% of patients did not report their use of T&CM methods to healthcare professionals, and 83.9% of patients were not asked by any healthcare professional whether they used T&CM. The relevant data are presented in Table 6.

Table 6. Patients' communication with healthcare professionals

		n	%
Was the use of T&CM assessed?	Yes	14	16.1
	No	73	83.9
Did the participant report using T&CM?	Yes	12	13.8
	No	75	86.2

T&CM: Traditional and Complementary Medicine.

Discussion

This study evaluated the pain levels and functional dependency status of patients monitored in the palliative care unit, as well as their knowledge, use, and attitudes toward T&CM methods. Our findings indicated that T&CM use was associated with attitudes toward complementary therapies rather than functional status or pain intensity. Additionally, it was determined that although the vast majority of patients had used at least one T&CM method, a significant portion did not share the methods they used with healthcare professionals, and clinicians did not sufficiently examine the use of these methods in their routine clinical assessments.

The use of T&CM is reported to be common among palliative care patients in the literature. For example, according to a study conducted in Germany, approximately two-thirds (67%) of participants in a palliative care setting were reported to use T&CM.[16] A study reported from Turkey indicated that 29.7% of cancer patients hospitalized in palliative care units stated that they practiced T&CM.[5] Another study reported that 83.1% of palliative care patients used Complementary Medicine (CM) to manage pain.[1] The frequency of complementary therapy use in palliative care patients has been reported to be 37-83%.[17] In our study, consistent with the literature, it was found that 73.6% of patients used at least one T&CM method.

It is stated that all healthcare professionals should systematically screen individuals with advanced-stage disease for the use of complementary medicine. Such screening should include a detailed assessment of which methods patients use, which symptoms they use these methods to reduce, their reasons for use, and their perceived treatment effectiveness.[18] Our study shows that the most common reason for use is musculoskeletal pain, which is consistent with the literature indicating that pain is one of the most important symptoms leading to T&CM use.[12]

In palliative care, pain is one of the strongest factors leading patients to T&CM as a supplement to both pharmacological treatments and conventional treatments that prove insufficient.[6,18,19] It has been determined that patients use complementary therapies such as massage, exercise, and listening to music in addition to analgesic treatment to cope with pain. It has been determined that palliative care patients who use complementary treatment for pain experience lower pain intensity.[1] 61.8% of patients who previously underwent T&CM treatment reported that their pain issues were resolved after treatment, and this was statistically significantly associated with 69.6% of patients wanting to undergo these treatments again.[12] In our study, consistent with the literature, it was demonstrated that the most common reason for T&CM use among patients in the palliative care unit was musculoskeletal pain. It was found that 52.9% of patients benefited from CM use and reported that they would continue to use it. These findings emphasize the importance of reliable and non-judgmental information regarding evidence-based T&CM applications that support existing analgesic treatments in pain management in palliative care.

The Barthel Index is a measure used to determine the physical condition of patients.[20] Patients in palliative care are generally in the advanced stages of serious illnesses and therefore have a high level of dependency. A study found that over 90% of palliative care patients were completely dependent according to the Barthel Index. The same study also reported that the primary expectation of caregivers for these patients was the improvement of the patient's physical functions and their ability to meet their own needs independently.[21] 57.5% of the patients in our study were fully dependent. No significant relationship was found between the patients' dependency levels, as determined by the Barthel Index, and their scores on the ACTS. This finding suggests that functional dependency level alone does not determine attitude toward complementary therapies. In our study, the low number of patients in some subgroups may have contributed to the lack of statistical significance in the relationship between dependency level and ACTS scores. Similarly, no significant differences were found in the Barthel Index and VAS scores between users and non-users of the five most frequently used officially recognized T&CM methods among our patients. However, it was shown that the ACTS scores of patients who used these methods were significantly higher. This finding reveals that the use of T&CM is strongly associated with individuals' attitudes toward complementary therapies, regardless of pain intensity or functional status. In other words, T&CM use may be considered a reflection of patients' attitude and tendency rather than a clinical outcome.

A significant proportion of patients do not share these commonly used methods with healthcare professionals. In the study conducted by Abidi et al., more than half of cancer patients using CM did not report this use to their doctors, and their doctors did not ask them about it. Patients reported that they could not communicate with their physicians because they most often thought they would receive a negative reaction. Of those who reported it, 54.3% were advised to discontinue CM use.[22] In another study conducted with oncology patients, it was reported that 62% of patients using T&CM did not consult their physician.[7] The literature indicates that patients perceive healthcare professionals as being primarily focused on conventional treatments and not open to discussing CM methods or integrating them into the treatment process.[22] It has been reported that some patients turn to T&CM applications because it gives them a sense of active participation in their treatment process. It is noted that this may lead them to conceal information from healthcare professionals.[23,24]

A deficiency noted in the literature is that healthcare professionals do not sufficiently investigate patients' use of T&CM during routine clinical evaluations.[7,18,22] It has been reported that uncertainty regarding the effectiveness of complementary medicine practices and low familiarity with these methods may be among the possible reasons why healthcare professionals recommend them less frequently.[18] In a study conducted with patients experiencing pain who visited the physical therapy clinic, 49.4% of patients reported not receiving sufficient information about T&CM from healthcare professionals. The study also indicated that this situation may lead patients to prefer alternative sources of information outside of healthcare professionals.[12] Indeed, our study found that 86.2% of patients did not report their use of T&CM to healthcare professionals, and 83.9% were not asked about the use of these treatments by any healthcare professional. This finding indicates that the topic of T&CM is not sufficiently addressed in patient-healthcare professional communication in palliative care.

It is stated that obtaining accurate information about T&CM applications from reliable sources can positively influence the perspectives of caregivers and patients. However, studies conducted in the field of palliative care show that most of the information obtained about T&CM comes from sources other than healthcare professionals. In a study conducted with caregivers, it was reported that the most common source of information about T&CM was neighbors, friends, and relatives, followed by social media. It was reported that social media was significantly more common among the group with a higher level of education.[6] Similarly, cancer patients reported that their most common source of information was friends, family, and relatives (40.4%).[22] Muecke et al. also stated that radio, TV, and family/friends are the most important sources of CM for patients in palliative care.[16] In a study conducted with oncology patients in Turkey, it was shown that the percentage of healthcare personnel recommending T&CM methods was quite low (5.44%).[7] In line with the literature, our study found that the most common sources of information about T&CM were family members and social media, while the rate of obtaining information from healthcare professionals remained lower compared to other sources. This finding indicates that communication gaps with the healthcare team persist regarding T&CM use among palliative care patients and that information sources are predominantly shaped by non-professional sources.

This study has some limitations. The single-center nature of the study and the low number of patients in some subgroups may limit the generalizability of the findings. In addition, the use of T&CM was assessed based on patient self-reports. Nevertheless, the study's detailed examination of officially accepted T&CM methods in palliative care patients and its evaluation using functional status, pain, and attitude scales make a significant contribution to the literature.

In conclusion, this study demonstrates that the use of T&CM is common among palliative care patients, independent of functional dependency level and pain intensity, and that this use is strongly associated with individual attitudes. These findings demonstrate that questioning the use of T&CM as part of routine patient assessments in palliative care practice is clinically important for the early detection of potential safety risks and treatment interactions. Future multicenter studies with larger sample sizes would be useful to evaluate the effects of T&CM use on clinical outcomes, patient safety, and quality of life in greater detail.

Future studies should investigate the frequency with which healthcare professionals recommend T&CM for symptom control in palliative care patients and its relationship with palliative care teams' attitudes and conventional treatment practices. Such studies will contribute to patients using T&CM more safely and consciously. Furthermore, establishing clearer communication between healthcare professionals and patients and ensuring clinicians adopt current evidence regarding the efficacy and safety of T&CM will support the strengthening of a comprehensive and patient-centered approach in palliative care.

Ethical Considerations: Ethical committee approval was obtained from the Aydın Adnan Menderes University, Faculty of Medicine, Non-Interventional Clinical Research Ethics Committee with decision number 2025-159 dated May 22, 2025. All processes in the study were conducted in accordance with the Declaration of Helsinki, and participants signed a voluntary consent form.

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

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Research Article

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FAMILY MEDICINE-AFFILIATED PUBLICATIONS FROM TÜRKİYE INDEXED IN PUBMED AND WEB OF SCIENCE: A BIBLIOMETRIC ANALYSIS

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Abstract

Objectives: This study evaluated family medicine research in Türkiye by analyzing publication productivity, thematic patterns, journal distribution, collaboration structure, citation indicators, and the effect of metadata standardization on bibliometric interpretation.

Materials and Methods: PubMed and Web of Science (WoS) were searched for articles and reviews published between 2013 and 2023 using affiliation- and address-based strategies. Records were eligible when at least one Türkiye-based author affiliation clearly indicated family medicine. After screening and de-duplication, 2265 publications were analyzed with VOSviewer and Bibliometrix. Institutional names, source titles, author keywords, and cautiously identifiable author-name variants were harmonized through VOSviewer thesaurus files and Bibliometrix-compatible CSV files. Publication output, journal distribution, WoS categories, collaboration networks, citation indicators, and keyword trends were examined.

Results: The dataset comprised 2265 articles by 6843 authors, published in 735 journals and linked to 4491 author keywords and 1625 institutions. These publications received 13196 citations and cited 56121 references. Only 13 journals were specific to family medicine. Medicine, General & Internal accounted for 899 publications (39.69%), whereas Primary Health Care accounted for 62 (2.73%). COVID-19 (161), obesity (130), and type 2 diabetes mellitus (122) were the leading author-keyword themes.

Conclusion: Family medicine research in Türkiye showed a broad, multidisciplinary profile and was published largely outside field-specific journals. The findings also indicate that inconsistent institutional, source, keyword, and author metadata can fragment bibliometric maps and obscure the field's visibility within primary care research.

Keywords: Türkiye, family medicine, family practice, primary health care, bibliometrics, metadata standardization.

Introduction

A mature medical discipline is supported by a coherent research area and an organized body of knowledge that validates practice and fosters field-specific innovation.[1] Family medicine has an unusually wide clinical remit because it is not limited by patient age, sex, organ system, or single disease group.[2,3] This breadth creates rich research opportunities, but it also makes the field difficult to delineate bibliometrically.

This problem is especially relevant when research contributions are assessed through bibliographic databases. Family medicine publications may be identified through journal scope, topic terms, departmental affiliation, indexing categories, or author institutions, and each route captures a different portion of the literature.[4,5] Recent bibliometric studies therefore recommend combining performance indicators with science mapping techniques and reporting data-cleaning procedures transparently.[6-9]

This study assessed family medicine research in Türkiye between 2013 and 2023 by examining publication volume, institutional collaboration, journal distribution, Web of Science category patterns, thematic trends, and the influence of metadata standardization. The study corpus was defined as publications with at least one Türkiye-based author affiliation clearly indicating family medicine. This strategy was intended to capture internationally visible output from family medicine departments, clinics, and authors in Türkiye; it was not designed to map every primary care topic irrespective of author affiliation.

Materials and Methods

We screened publications with at least one Türkiye-based family medicine affiliation to characterize publication output, collaboration patterns, thematic trends, and bibliographic consistency over the last decade.

Ethical approval

Ethical approval for the study was obtained from Ankara Bilkent City Hospital Clinical Research Ethics Committee No. 1 (Decision No: E1-23-4254; November 15, 2023). As the study involved analysis of publicly available bibliographic metadata without direct interaction with human subjects or patient data, the requirement for informed consent was waived by the ethics committee. No additional administrative permissions were required to access the bibliographic data.

Data sources and search strategy

PubMed and Web of Science (WoS) Core Collection were searched for relevant articles. Data retrieval was finalized on December 20, 2023, and covered publications from December 1, 2013, to December 1, 2023. PubMed was searched through the Advanced Search interface using the query: ("Family medicine"[Affiliation]) AND ("Turkey"[Affiliation]). This search initially yielded 1481 records. WoS was searched in the Address field using: ADDRESS: (family med) AND COUNTRY/REGION: (Turkey OR Türkiye). The search was limited to Article and Review Article document types within the same date range and initially yielded 2437 records.

This search strategy was intentionally designed as a precision-oriented affiliation-based strategy rather than a broad topic-based primary care search. The aim was to construct a reproducible corpus of internationally indexed publications that could be clearly attributed to Türkiye-based family medicine departments, clinics, or institutional affiliations. Therefore, “family medicine” was used as the anchor affiliation term. Broader expressions such as “primary care” were not used as core retrieval terms because they may identify publications from several disciplines, including public health, internal medicine, pediatrics, nursing, and health services research, even when no family medicine affiliation is present. Similarly, terms such as “family physician” may refer to a professional role rather than a verifiable institutional affiliation. This approach was selected to reduce false-positive attribution and to ensure that the bibliometric maps reflected publications clearly connected to family medicine-affiliated authors or institutions in Türkiye.

Data screening, de-duplication, and standardization

The first reviewer retrieved and screened the records; both reviewers, each with family medicine expertise, then jointly reviewed the screened dataset and confirmed final eligibility by consensus. Records were included when at least one author had a Türkiye-based affiliation containing "Family Medicine" or an equivalent family medicine department, clinic, or institutional designation. This criterion identified publications connected to family medicine through author affiliation, not solely through article topic. Records were excluded if they were editorials, letters, meeting abstracts, other non-article types, duplicates, affiliated only with institutions outside Türkiye, or lacked an explicit family medicine designation. Bibliographic metadata were then standardized conservatively to reduce spelling variants, abbreviations, synonyms, and disambiguation problems without merging uncertain records.

The initial PubMed search retrieved 1481 records; 1178 remained after eligibility screening. During merging with the WoS dataset, 39 records were found to be unique to PubMed. These records were not used in citation-network analyses because they did not contain the cited-reference and citation-link metadata required for co-citation, bibliographic coupling, and citation-based mapping in a WoS-compatible format. They were retained for descriptive sensitivity assessment. The final analytic dataset included 2265 publications, primarily derived from WoS and cross-checked against PubMed results. The systematic selection process is summarized in Figure 1.

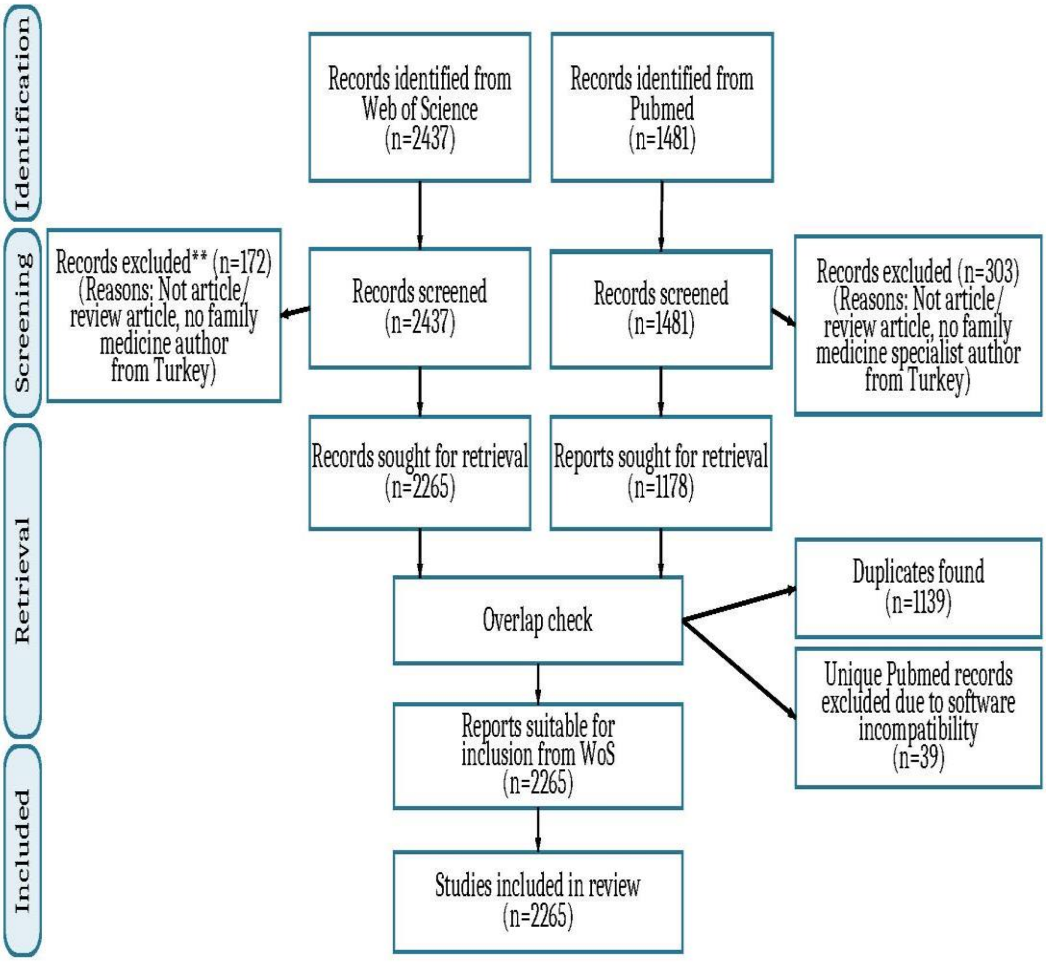

Figure 1. Flowchart of study selection

The sensitivity assessment reviewed the publication years, journals, and conservatively harmonized keyword themes of the 39 PubMed-only records. A summary is provided in Table 1. These records showed themes overlapping with the main analytic corpus and did not indicate a separate thematic pattern that would alter the interpretation of the study.

Table 1. Descriptive distribution of the 39 PubMed-only records by publication year, journal, and keyword themes

Variable		n	%
Publication year	2014	1	2.6
	2015	3	7.7
	2016	4	10.3
	2017	1	2.6
	2018	8	20.5
	2019	3	7.7
	2020	2	5.1
	2021	4	10.3
	2022	6	15.4
	2023	7	17.8
Journal	J Family Med Prim Care	7	17.8
	Prim Care Diabetes	5	12.7
	Eur J Gen Pract	4	10.2
	BMC Fam Pract	2	5.1
	Evid Based Complement Alternat Med	2	5.1
	Int Psychogeriatr	2	5.1
	J Gen Intern Med	2	5.1
	Prim Health Care Res Dev	2	5.1
	BJGP Open	1	2.6
	Fam Med Community Health	1	2.6
	Glob Health Promot	1	2.6
	Health Policy	1	2.6
	Healthcare (Basel)	1	2.6
	Int J Environ Res Public Health	1	2.6
	J Clin Periodontol	1	2.6
	JMIR Res Protoc	1	2.6
	Liver Int	1	2.6
	PLOS Digit Health	1	2.6
	PLoS One	1	2.6
	Saudi Med J	1	2.6
	Scand J Prim Health Care	1	2.6
Keyword/theme	Primary care / primary health care	16	20.00
	General practice/family medicine/family physician	12	15.00
	Diabetes / chronic kidney disease / chronic disease	9	11.25
	Cardiovascular disease/risk/blood pressure	7	8.75
	Older adults/dementia / long-term care	7	8.75
	COVID-19/pandemic / infectious disease	6	7.50
	Health promotion/prevention/screening / public health	6	7.50
	Medical education/training / professional wellbeing	6	7.50
	Quality of care/patient safety/health policy	5	6.25
	Cancer diagnosis / diagnostic error / clinical reasoning	4	5.00
	Mental health/quality of life	2	2.50

Note: Percentages for publication year and journal were calculated using the 39 PubMed-only records as the denominator and were minimally adjusted at the displayed decimal place so that each mutually exclusive section sums to 100.0%; the underlying counts were not changed. Percentages for keyword/theme categories were calculated using the total number of keyword/theme assignments as the denominator. Keyword/theme categories were conservatively grouped from the keyword fields of the PubMed records.

Bibliometric analysis and visualization settings

For VOSviewer, Association Strength normalization was used. Thresholds were set at five publications per institution for co-authorship analysis, 20 citations per cited source for co-citation analysis, and five publications per journal for bibliographic coupling.[10] In the co-citation analysis, cited source denotes the source-title entries found in the references of the included publications, usually journal titles, and not the citations received by the 2265 publications themselves. Before network construction, VOSviewer thesaurus files were used to harmonize institutional names, source titles, author keywords, and cautiously identifiable author-name variants. Bibliometrix was used to identify the 30 most frequent author keywords.[11] A standardized CSV file was also prepared for Bibliometrix/Biblioshiny so that cleaned keyword and metadata variants were represented consistently in frequency and trend-topic analyses. Only clearly equivalent entries were merged; ambiguous cases, especially author names, were left unchanged.

Temporal keyword trends were interpreted alongside journal and category patterns to distinguish persistent themes from newer topics. Descriptive indicators in Table 2 were generated with the biblioAnalysis function in Bibliometrix/Biblioshiny and checked against the standardized data file. The collaboration index was defined as the number of authors of multi-authored publications divided by the number of multi-authored publications, excluding single-author papers from the denominator.

The total number of citations received by the included publications was calculated by summing the WoS Core Collection “TC” field across all 2265 records.

Following current bibliometric practice, the analysis combined performance indicators, such as publication output and citation counts, with science mapping techniques, including co-occurrence, co-citation, bibliographic coupling, and trend analyses.[9]

Results

General overview

Table 2 summarizes the main bibliometric characteristics of the dataset. The indicators were generated from the Bibliometrix/Biblioshiny General Overview output and then checked against VOSviewer outputs and the standardized data file to ensure consistency.

Table 2. Main bibliometric characteristics of the dataset

General overview	
Language of Publication	English
Type of Publication	Article, Review article
Number of Publications	2265
Number of Journals	735
Number of Keywords	4491
Time Range	01/12/2013 – 01/12/2023
Number of Authors	6843
Number of Single-author Publications	34
Average Number of Authors per Publication	3.02
Average Number of Publications per Author	0.33
Number of Institutions	1625
Total Number of References Used	56121
Average Number of References per Publication	24.77
Total Number of Citations Received	13196

Institutional collaboration analysis

Institutional collaboration was examined in VOSviewer using co-authorship analysis with organizations as the unit of analysis. The minimum threshold was five documents per organization; 139 of 1625 institutions met this criterion. The resulting network contained 12 clusters, 1221 collaborative links, and a total link strength of 2136. By total link strength, the five leading institutions were the University of Health Sciences (310 publications, 1220 citations, total link strength 231), Hacettepe University (87 publications, 530 citations, total link strength 176), Istanbul University (54 publications, 456 citations, total link strength 104), Yozgat Bozok University (35 publications, 220 citations, total link strength 102), and Ankara Yildirim Beyazit University (62 publications, 372 citations, total link strength 97). Figure 2 shows the institutional co-authorship network; node size represents publication volume, link thickness indicates collaboration strength, and colors denote clusters generated through Association Strength normalization.

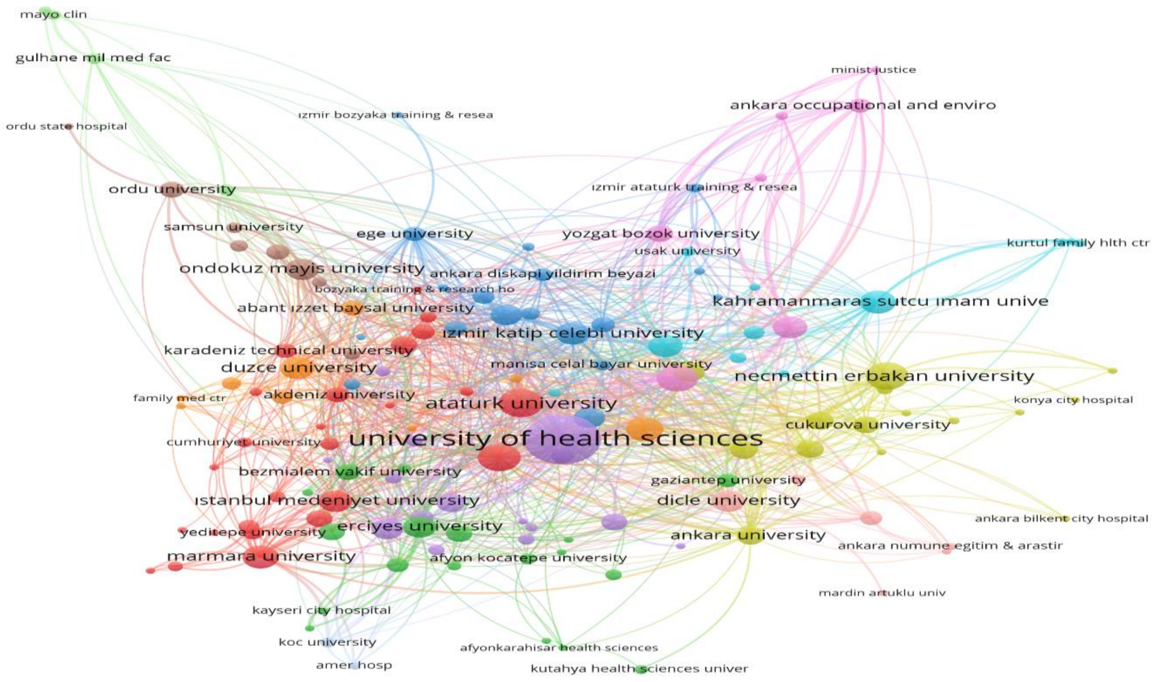

Figure 2. Institutional co-authorship network of institutions with at least five publications

Journal analysis

The 2265 articles appeared in 735 journals, but only 13 were classified as family medicine-specific according to the predefined title/scope criterion. Co-citation analysis used cited sources as the unit of analysis and a threshold of at least 20 citations per cited source. Here, cited source refers to source-title entries in the reference lists of the included articles, most often journal titles; it is separate from the citation count received by the study corpus. VOSviewer identified 13,672 cited-source entries, and 617 met the threshold. The resulting map contained nine clusters, 60,645 co-citation links, and a total link strength of 264,895. The strongest co-citation links were observed for The Lancet (601), Diabetes Care (557), New England Journal of Medicine (540), PLOS ONE (515), and JAMA - Journal of the American Medical Association (459). In Figure 3, node size represents citation volume, and colors indicate clusters with similar citation patterns.

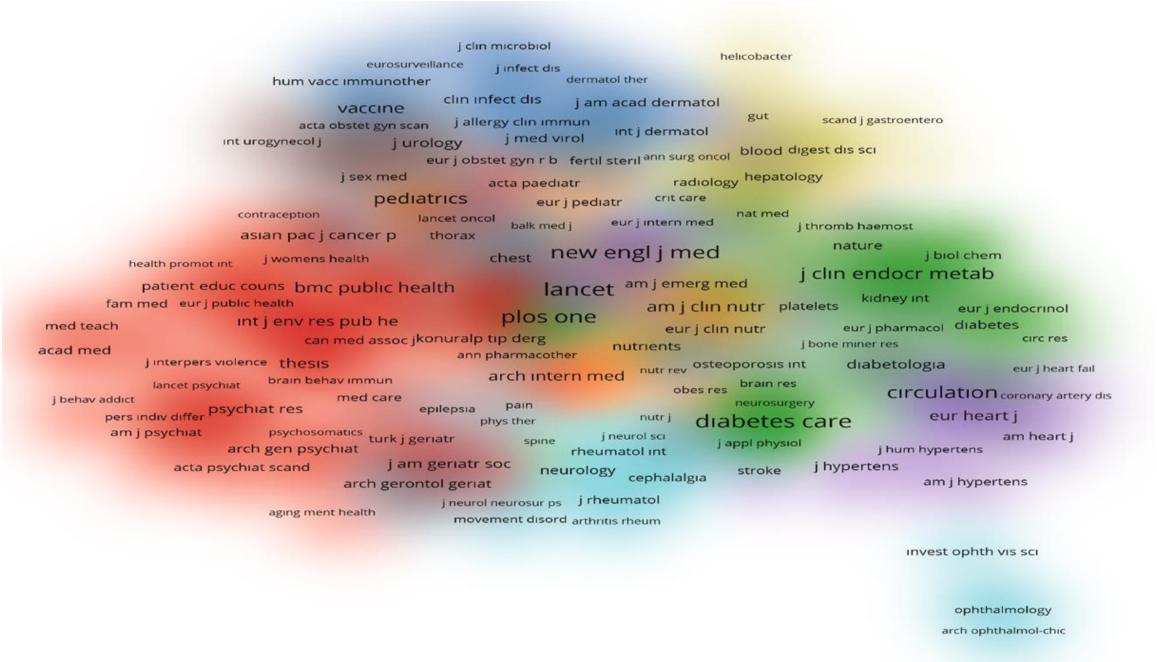

Figure 3. Co-citation network of journals cited at least 20 times

Bibliographic coupling was analyzed in VOSviewer with sources as the unit of analysis and a minimum threshold of five documents per source. Of the 735 journals, 92 met this threshold. The network contained eight clusters, 1507 links, and a total link strength of 5918. The top five journals by bibliographic coupling strength were Konuralp Medical Journal (1485), Acta Medica Mediterranea (743), Çukurova Medical Journal (580), International Journal of Clinical Practice (512), and Nigerian Journal of Clinical Practice (505). Figure 4 presents the coupling network; node size reflects publication volume, link thickness indicates bibliographic coupling strength, and colors indicate groups of journals sharing similar reference patterns.

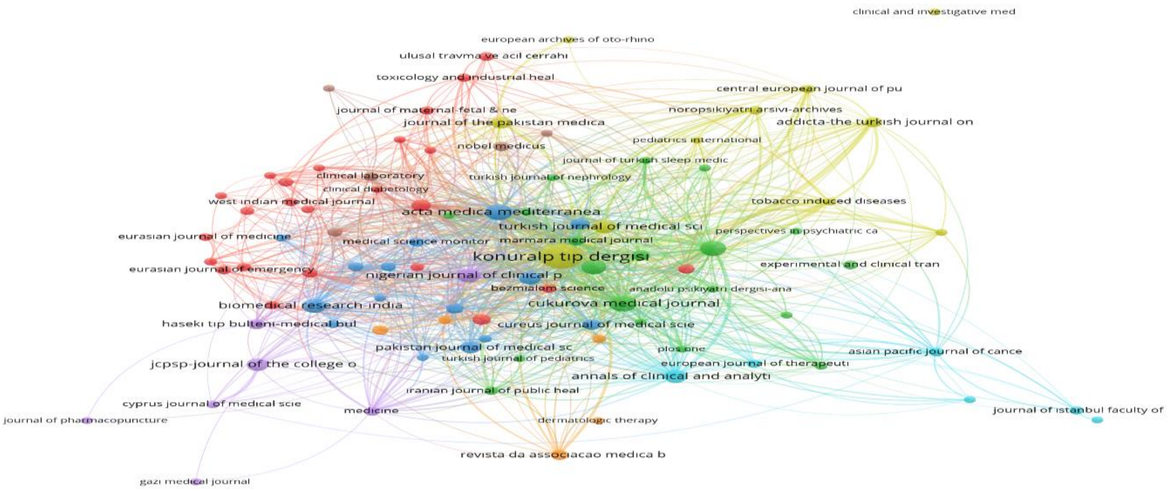

Figure 4. Bibliographic coupling network of journals with at least five publications

Document analysis

Medicine, General & Internal was the leading WoS category, with 899 publications (39.69%), followed by Medicine, Research & Experimental with 160 (7.06%) and Public, Environmental & Occupational Health with 107 (4.72%). Primary Health Care accounted for 62 publications (2.73%). Because WoS categories are assigned at the journal level and may overlap, these values represent indexing frequencies, not mutually exclusive article-level classes. In Figure 5, the rectangle size is proportional to the number of publications in each category.

Figure 5. Distribution of publications across WoS categories

Keyword analysis

A total of 4491 author keywords were identified in the 2265 publications. After keyword standardization, Bibliometrix was used to extract the 30 most frequent author keywords. Figure 6 presents these terms; bar length indicates frequency, and the circles display the exact occurrence counts. The five most frequent author keywords were COVID-19 (161), obesity (130), type 2 diabetes mellitus (122), primary care (97), and depression (85).

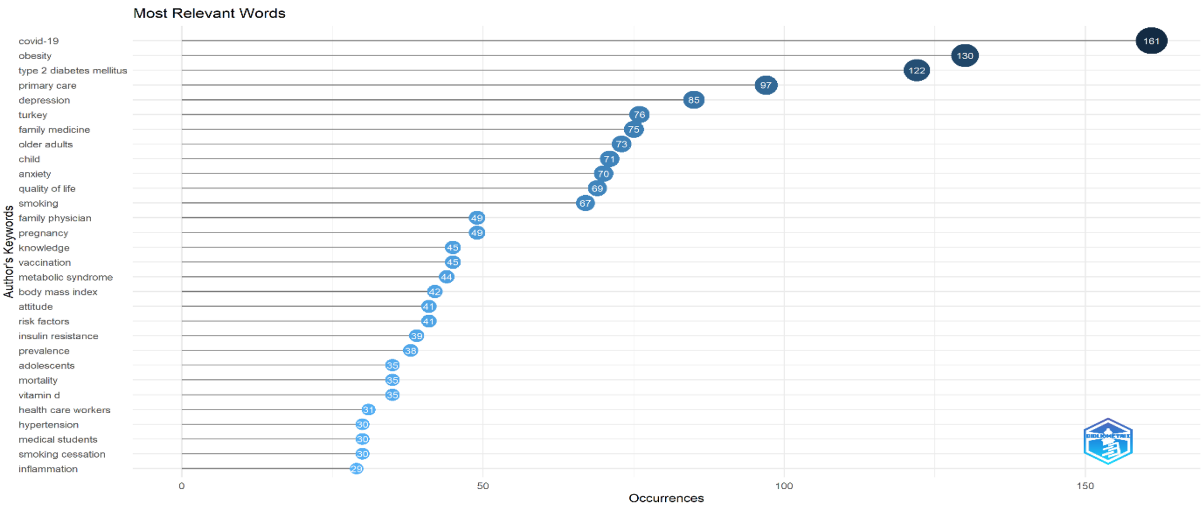

Figure 6. Top 30 most frequent author keywords

Annual trend-topic analysis identified the three most prominent author-keyword themes for each year from 2014 to 2023, using a minimum frequency of five. Earlier years included condition-specific topics such as allergic rhinitis, ankylosing spondylitis, sexual dysfunction, and bone mineral density. Later years increasingly featured primary care, obesity, diabetes mellitus, depression, quality of life, COVID-19, pandemic-related terms, long COVID, lymphocyte ratio, and albumin. Figure 7 displays the period of prominence, peak year, and annual frequency for each topic.

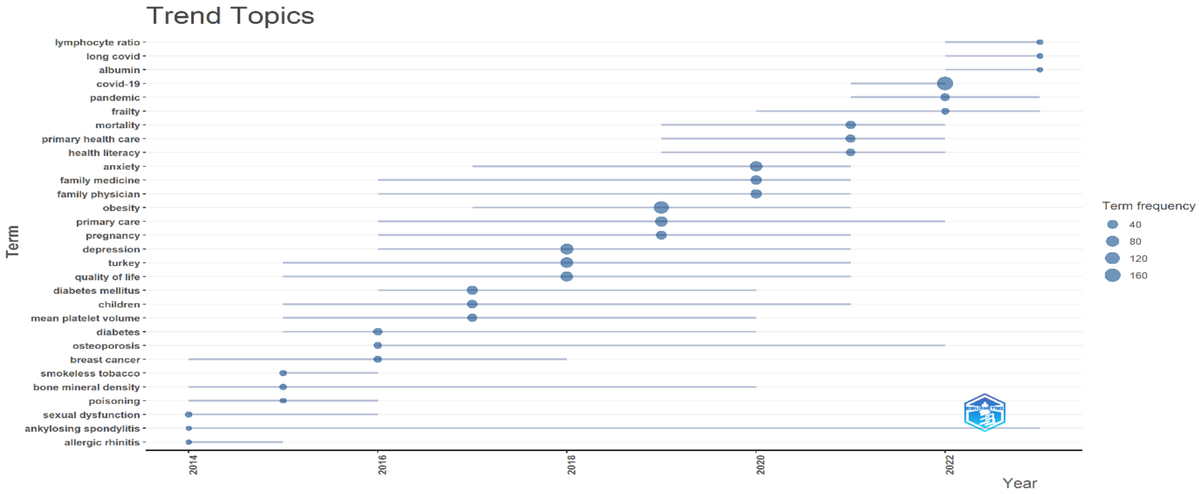

Figure 7. Yearly trend topic analysis based on author keywords (2014-2023)

Discussion

This study examined Türkiye-based publications with explicit family medicine affiliations to describe the internationally visible research profile of the field from 2013 to 2023. Three findings are noteworthy. Publication volume increased substantially; collaboration involved many institutions but was concentrated around major hubs; and articles were disseminated across a wide range of journals, with only a small subset appearing in family medicine-specific outlets. Overall, the field appears productive and clinically diverse, but not strongly consolidated within discipline-specific publication channels.

The dominance of Medicine, General & Internal over Primary Health Care mainly reflects the journal-level indexing structure of WoS, not the content of individual articles. Together with the small number of field-specific journals, this pattern indicates that family medicine authors in Türkiye often publish in general medical or specialty journals. Similar national bibliometric studies have reported that family medicine-related research extends across heterogeneous journals, categories, and clinical domains.[6,12-14] This dispersion can broaden interdisciplinary reach, but it may make the field less visible as a coherent primary care research area.

The keyword profile was consistent with the broad clinical scope of family medicine. Obesity, type 2 diabetes mellitus, depression, primary care, and quality of life reflect long-standing concerns in chronic disease management, mental health, prevention, and patient-centered care. The later emergence of COVID-19 and related terms indicates responsiveness to public health emergencies, in line with previous observations in family medicine journals.[15] The trend pattern suggests addition, not replacement: pandemic themes became prominent while chronic disease and primary care topics remained visible.

Using both PubMed and WoS improved retrieval while enabling citation mapping. PubMed was useful for identifying eligible records, whereas WoS supplied the cited-reference and citation-link metadata needed for co-citation and bibliographic coupling analyses.[16] Earlier studies have used MeSH terms, WoS topic searches, and department- or faculty-based identification strategies to define family medicine publication sets.[17-19] The present strategy was appropriate for measuring outputs connected to family medicine departments and authors across varied clinical topics; however, it should not be read as a complete topic-based map of all primary care research in Türkiye.

Metadata quality emerged as an important methodological issue. Before standardization, institutional names, keywords, source titles, and some author-name variants appeared under different spellings, abbreviations, translations, or synonymous forms. Conservative thesaurus-based and CSV-based cleaning reduced this fragmentation, although ambiguous records could not always be merged without risking false aggregation. These findings support more consistent affiliation reporting and wider use of institutional identifiers such as Research Organization Registry IDs, together with author identifiers such as ORCID.[20,21] Transparent cleaning procedures are also emphasized in recent bibliometric methodology literature because they affect reproducibility and the interpretation of network maps.[8,9]

Taken together, the findings suggest that growth in publication numbers alone may not be enough to strengthen the academic visibility of family medicine in Türkiye. Greater consistency in metadata reporting, stronger multicenter collaboration, and research infrastructure embedded in primary care settings could help convert a dispersed publication profile into a more interpretable and policy-relevant national research landscape.

Limitations of the study

Several limitations should be noted. First, the dataset was built from affiliation and address metadata; therefore, it represents publications identifiable through family medicine affiliations in Türkiye, not every primary care or family medicine topic produced nationally. In line with this precision-oriented affiliation-based design, relevant publications may have been missed if family medicine was not explicitly stated in the affiliation metadata or if alternative terminology such as “family practice,” “general practice,” “primary care,” or “family physician” was used without a clear family medicine departmental or institutional affiliation. Some included papers may also reflect interdisciplinary clinical or public health collaborations rather than exclusively family medicine-led research. Second, PubMed and WoS may underrepresent Turkish-language journals indexed only in regional or alternative databases. Third, incomplete or inconsistent affiliation reporting could have affected retrieval. Fourth, despite thesaurus- and CSV-based cleaning, residual metadata variation may have influenced collaboration and co-occurrence estimates. Finally, citation analyses depended on WoS-compatible metadata, making the results a database-dependent representation of the internationally visible segment of the field.

Conclusion and recommendations

This bibliometric analysis shows that family medicine research in Türkiye has expanded markedly and covers a wide range of clinical and public health topics. The publication profile is multidisciplinary and increasingly collaborative, but much of the output appears outside family medicine-specific journals and is affected by metadata fragmentation. Standardized affiliation reporting, routine use of institutional and author identifiers, stronger multicenter collaboration, and better integration of research activity into primary care settings may improve the visibility, interpretability, and policy relevance of this research field.

Ethical Considerations: Approval was obtained from Ankara Bilkent City Hospital Clinical Research Ethics Committee No. 1 (Decision No: E1-23-4254; November 15, 2023). As the study analyzed publicly available bibliographic metadata and involved no direct interaction with human subjects or patient data, the requirement for informed consent was waived by the ethics committee. No additional administrative permission was required to access the bibliographic data.

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

****This study was presented as an oral presentation at the 18th Family Medicine Autumn School Congress, held in Cyprus on 26 September 2024.***

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BYPASSING PRIMARY CARE? FIRST POINT OF CONTACT PREFERENCES AMONG ADULTS PRESENTING TO A TERTIARY HOSPITAL IN TÜRKIYE

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Abstract

Objectives: Despite the expansion of family medicine in Türkiye, the absence of a mandatory referral system allows patients to bypass primary care. This study aimed to determine the first-point-of-contact preferences of adult patients presenting to a tertiary hospital and to evaluate factors associated with bypassing primary care, utilization patterns, and attitudes toward family medicine services.

Materials and Methods: This descriptive and analytical cross-sectional study was conducted between December 2021 and February 2022. A researcher-administered questionnaire covering sociodemographic characteristics, health utilization habits, and 16 statements regarding family medicine attitudes was completed by 439 volunteers aged 18 or older at a tertiary hospital.

Results: A total of 367 participants (mean age 42.3±14.1 years; 65.1% female) were analyzed; of the 439 individuals approached, 72 were excluded because they did not complete the interview. In non-emergency situations, only 31.1% (n=114) preferred Family Health Centers (FHC) as their first point of contact, while 35.7% (n=131) preferred state hospitals. Multivariate logistic regression revealed no independent predictors of FHC preference ($p>0.05$ for all). While 62.4% utilized FHCs primarily for prescriptions, 55% identified their family physician as their first point of contact, 70% were satisfied with staff attentiveness, and 56.4% reported effective problem resolution.

Conclusion: Although patient satisfaction with FHC staff is high, only one in three patients utilizes primary care as their first point of contact.

Keywords: Family practice, referral and consultation, primary health care, tertiary care centers, patient satisfaction, Türkiye.

Introduction

Primary health care (PHC) provides an accessible and cost-effective foundation by integrating preventive and therapeutic practices.[1] At the core of this system, family medicine is vital for the sustainability and continuity of health services. In Türkiye, the 2003 Health Transformation Program (HTP) aimed to expand access through general health insurance and an effective family medicine model.[2] Currently, over 28,000 units operate across 8,163 Family Health Centers.[3]

However, the HTP has faced structural challenges. A high patient-to-physician ratio (~3,500:1) exceeds developed-country standards, increasing workloads and hindering individualized care.[4] Consequently, the referral chain has lost functionality, leading many patients to "bypass" PHC in favor of secondary or tertiary institutions. This trend escalates health costs and reduces efficiency, making the absence of a functional referral system one of the most critical structural barriers to equitable healthcare delivery in Türkiye.[5,6]

This study aimed to determine the first point of contact preferences of adult patients presenting to a tertiary hospital and to evaluate factors associated with bypassing primary care, utilization patterns, and attitudes toward family medicine services.

Materials and Methods

This descriptive and analytical cross-sectional study was conducted between December 2021 and February 2022 at Necmettin Erbakan University Faculty of Medicine Hospital among volunteers aged ≥18 years. Participants were recruited using convenience sampling; eligible individuals in outpatient clinic waiting areas were invited to participate voluntarily. The minimum sample size was calculated using the single-proportion formula, $n = Z^2 \times p \times (1-p) / d^2$. Assuming the most conservative proportion ($p = 0.50$), a 95% confidence level, a 5% margin of error, and an effectively unlimited source population (no finite population correction), the minimum required size was approximately 385. To allow for incomplete responses, 439 individuals were recruited.

Data were collected in the waiting areas of outpatient clinics located within the hospital's main service building. To minimize selection bias and ensure broad representation of adult outpatient presentations, all adult outpatient clinics housed in this building were included in the sampling frame. These comprised internal medicine and its subspecialties, cardiology, chest diseases, infectious diseases, general surgery, thoracic surgery, obstetrics and gynecology, urology, orthopedics and traumatology, otorhinolaryngology, ophthalmology, dermatology, and anesthesiology (preoperative assessment and pain clinics). All questionnaires were administered by a single researcher using the same face-to-face interview technique throughout the study period, ensuring uniformity in participant approach, instruction delivery, and item clarification.

Inclusion and Exclusion Criteria

Inclusion criteria were age ≥18 years, presentation to the study hospital's outpatient clinics, and voluntary informed consent. Exclusion criteria included applicants to the emergency or family medicine departments, individuals with communication barriers, patient companions, and pregnant women, given their mandatory primary care follow-ups.

Outpatient clinics were excluded from the sampling frame for three distinct reasons. First, the departments of hematology, oncology, pediatrics, physical medicine and rehabilitation, and psychiatry were excluded because their outpatient clinics were physically located in a separate building on the same campus and were therefore not accessible during the same recruitment visits. Second, the family medicine outpatient clinic was excluded a priori, as the research question directly concerned attitudes toward and utilization of primary care services; recruiting participants from a family medicine setting would have introduced selection bias toward individuals already engaged with the family medicine system. Third, the emergency department was excluded because the study focused on first point of contact preferences for non-emergent health concerns, and emergency presentations represent a distinct care-seeking pathway.

Data Collection Tools

Data were collected using a structured questionnaire developed by the research team from previous national family-medicine studies (references 7, 8, and 15) and from clinical experience. As no validated scale existed for this subject, some items were adapted from these studies, and others were newly written. The draft was reviewed by two family medicine academics and pilot-tested for clarity and feasibility on approximately 20 individuals, after which it was substantially revised before final use. It was administered by the researcher through face-to-face interviews, taking approximately ten minutes to complete. The questionnaire consisted of three parts:

Sociodemographic Form: Eleven items covering age, gender, marital status, education, residence, and chronic diseases.

Health System Utilization: Ten items on hospital department preferences, FHC utilization frequency, awareness of the family physician, and reasons for physician or institutional changes. Open-ended department responses were categorized as internal or surgical branches, and application reasons were grouped into themes (e.g., referral, satisfaction, examination request).

Family Medicine Attitudes: Sixteen statements on a five-point Likert scale (strongly agree to strongly disagree), developed from literature and clinical experience.

Statistical Analysis

Data were analyzed using SPSS v22.0. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. The chi-square test, independent samples t-test, and one-way ANOVA were used as appropriate. Multivariate logistic regression (enter method) identified independent predictors of preferring Family Health Centers as the first point of contact, with results expressed as odds ratios (OR) and 95% confidence intervals (CI). Cronbach's alpha was calculated for the 16 Likert-type items and was 0.627. As these items were designed as individual attitude statements rather than a unidimensional summative scale and were analysed separately, this coefficient is reported for completeness only. Statistical significance was set at $p<0.05$. In the subgroup comparisons, the ≤5/year FHC-visit group also included participants who had never visited an FHC.

Results

Participant Characteristics

Of the 439 adults who agreed to participate, 72 were excluded because they did not complete the interview, leaving 367 questionnaires for the final analysis. Sociodemographic characteristics are presented in Table 1.

Health System Utilization

Reasons for hospital visits included examination (46.2%), chronic disease follow-up (14.4%), and referral (9.1%); detailed data are presented in Table 2.

In non-emergency scenarios, 35.7% (n=131) preferred state hospitals as the first point of contact and 31.1% (n=114) preferred FHCs, primarily for obtaining prescriptions (62.4%) and examinations (46.3%) (Figure 1).

Attitudes Towards Family Medicine

Participants' perceptions were categorized as agreement, neutrality, or disagreement (Table 3). Notably, 55% (n=202) identified their family physician as their first point of contact, and 59.4% (n=218) felt they could share all problems with them. While 70% were satisfied with staff attentiveness and 56.4% reported effective problem resolution, 61.3% believed a referral was unnecessary for hospital applications.

Table 1. Sociodemographic characteristics of the participants

Gender	**n**	**%**
Male	128	**34.9**
Female	239	**65.1**
Age		
18-25	61	**16.6**
26-35	89	**24.3**
36-45	83	**22.6**
46-64	98	**26.7**
65 and over	36	**9.8**
Employment status		
Employed	138	**37.6**
Unemployed	229	**62.4**
Marital status		
Married	265	**72.2**
Single	102	**27.8**
Educational level		
Primary school	123	**33.5**
Middle school	50	**13.6**
High school	81	**22.1**
College / University	113	**30.8**
Place of residence		
District center	145	**39.5**
City center	222	**60.5**
Presence of chronic disease		
Yes	162	**44.1**
No	205	**55.9**
Car ownership		
Yes	258	**70.3**
No	109	**29.7**
Reason for being in the study city		
Residing in the study city	274	**74.7**
Guest	93	**25.3**
Total	**367**	**100**

Table 2. Participants' responses regarding the utilization of the health system

Department applied to in the hospital	**n**	**%**
Internal Medicine	240	**65.4**
Surgical	127	**34.6**
Reason for hospital application*		
Application for examination	157	**46.2**
Chronic disease follow-up	49	**14.4**
Satisfaction with previous experience	36	**10.6**
Being referred	31	**9.1**
Operation/Surgery	25	**7.4**
Ease of transportation	17	**5.0**
Other	25	**7.4**
Awareness of the family physician's identity		
Yes	327	**89.1**
No	40	**10.9**
Specialization status of the family physician		
Family medicine specialist	172	**46.9**
General practitioner family physician	60	**16.3**
Does not know	135	**36.8**
Status of changing the family physician		
Yes, changed	149	**40.6**
No, did not change	218	**59.4**
Reason for changing among those who changed**		
Change of address	93	**65.5**
Dissatisfaction with the physician	29	**20.4**
Departure of the physician	10	**7.0**
Other reasons	10	**7.0**
Frequency of application to the FHC		
Never applied	28	**7.6**
1–5 times per year	200	**54.5**
6 or more times per year	139	**37.9**

*340 people stated the reason for application, ** 142 people responded to the reason for changing the family physician.

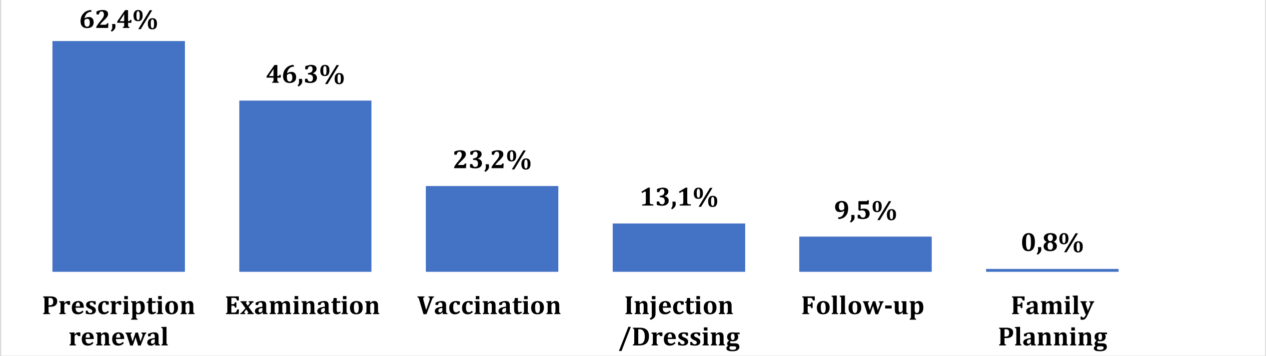

Figure 1. Reasons for utilizing the Family Health Center (FHC)

Analytical Findings

Agreement with the family physician as the first point of contact differed significantly by age (p=0.003) and educational level (p=0.007) (Table 4). Awareness of the family physician and FHC visit frequency significantly affected the ability to share all health problems (p=0.012 for both) (Table 5).

Multivariate logistic regression identified factors associated with preferring FHCs as the first point of contact (Table 6). None of the examined variables, including gender, age, educational level, awareness of the family physician, and frequency of FHC visits, was significantly associated with FHC preference (p>0.05 for all).

The model showed good fit (Hosmer–Lemeshow χ^2=6.95, p=0.542), although its explanatory power was low (Nagelkerke R^2=0.024).

Table 3. Distribution of responses to statements regarding family medicine

Statements Regarding Opinions on Family Medicine	Strongly Agree / Agree		Undecided		Strongly Disagree / Disagree	
	n	%	n	%	n	%
My family physician is the first doctor who comes to mind when I have a health problem.	202	**55**	58	**15.8**	107	**29.2**
The FHC is far from my home.	113	**30.8**	28	**7.6**	226	**61.6**
I go to other hospitals for problems that cannot be solved by my family physician	324	**88.3**	18	**4.9**	25	**6.8**
The equipment of the FHC is insufficient.	151	**41.1**	102	**27.8**	114	**31.1**
The waiting time for an examination with my family physician is longer than in hospitals.	60	**16.3**	51	**13.9**	256	**69.8**
I can share all my problems with my family physician.	218	**59.4**	76	**20.7**	73	**19.9**
My family physician examines me for longer durations compared to hospital doctors.	105	**28.6**	121	**33.0**	141	**38.4**
I can go to the FHC without an appointment.	230	**62.7**	35	**9.5**	102	**27.8**
I think follow-ups for chronic diseases (hypertension, diabetes, cholesterol, etc.) should be conducted at the FHC.	259	**70.6**	50	**13.6**	58	**15.8**
Procedures such as dressing, wound care, and suture removal can be performed at the FHC.	252	**68.7**	79	**21.5**	36	**9.8**
Procedures such as suturing, nail extraction, etc., can be	99	**27.0**	180	**49.0**	88	**24.0**
I would recommend my family physician to my relatives, neighbors, and acquaintances.	229	**62.4**	85	**23.2**	53	**14.4**
The co-payment I pay at university hospitals is higher	134	**36.5**	189	**51.5**	44	**12.0**
A referral from a family physician is not required for a	225	**61.3**	89	**24.3**	53	**14.4**
I am satisfied with the attentiveness of the FHC staff.	257	**70.0**	57	**15.5**	53	**14.4**
Effective solutions are provided for my complaints at the FHC.	207	**56.4**	98	**26.7**	62	**16.9**

Table 4. Statistically significant associations between participant responses and gender, age, and educational level

Statement	Gender, n (%)	Age, n (%)	Educational level, n (%)
My family physician is the first doctor who comes to mind when I have a health problem.	Male 67 (52), female 135 (57); p=0.222	≤35 yr 68 (45), ≥36 yr 134 (62); **p=0.003**	lower 110 (64), higher 92 (47); **p=0.007**
I go to other hospitals for problems that cannot be solved by my family physician.	Male 112 (86), female 212 (89); p=0.514	≤35 yr 125 (83), ≥36 yr 199 (92); **p=0.047**	lower 147 (85), higher 177 (91); p=0.176
The equipment of the FHC is insufficient.	Male 63 (48), female 88 (37); **p=0.022**	≤35 yr 58 (39), ≥36 yr 93 (43); p=0.716	lower 63 (36), higher 88 (45); p=0.214
The waiting time for an examination with my family physician is longer than in hospitals.	Male 24 (18), female 36 (15); p=0.658	≤35 yr 22 (15), ≥36 yr 38 (18); p=0.534	lower 40 (23), higher 20 (10); **p=0.003**
The co-payment I pay at university hospitals is higher compared to the FHC.	Male 55 (42), female 79 (33); p=0.057	≤35 yr 39 (26), ≥36 yr 95 (44); **p<0.001**	lower 67 (39), higher 67 (35); p=0.175
A referral from a family physician is not required for a hospital application.	Male 84 (65), female 141 (59); p=0.115	≤35 yr 80 (53), ≥36 yr 145 (67); **p=0.032**	lower 100 (58), higher 125 (64); p=0.414
I am satisfied with the attentiveness of the FHC staff.	Male 86 (66), female 171 (72); p=0.606	≤35 yr 96 (64), ≥36 yr 161 (74); **p=0.033**	lower 122 (71), higher 135 (70); p=0.234

*For each subgroup, the number (and percentage) of participants who agreed with the statement is shown, together with the p-value. Bold p-values indicate statistical significance ($p<0.05$). The chi-square test was used. Full response distributions are presented in Table 3. Lower educational level comprises primary and middle school; higher educational level comprises high school and university.

Table 5. Statistically significant associations between participant responses and awareness of family physician, reasons for changing physicians, and frequency of FHC utilization

Statement	Awareness of family physician, n (%)	Reason for changing physician, n (%)	FHC visit frequency, n (%)
My family physician is the first doctor who comes to mind when I have a health problem.	aware 184 (56), unaware 18 (45); p=0.093	dissatisfied 19 (66), other 58 (51); p=0.301	≤5/yr 113 (50), ≥6/yr 89 (64); **p=0.026**
The FHC is far from my home.	aware 92 (28), unaware 21 (52); **p<0.001**	dissatisfied 7 (24), other 36 (32); p=0.655	≤5/yr 64 (28), ≥6/yr 49 (35); p=0.257
I go to other hospitals for problems that cannot be solved by my family physician.	aware 293 (90), unaware 31 (78); **p=0.007**	dissatisfied 24 (83), other 100 (88); p=0.252	≤5/yr 203 (89), ≥6/yr 121 (87); p=0.549
The waiting time for an examination with my family physician is longer than in hospitals.	aware 51 (16), unaware 9 (22); **p=0.009**	dissatisfied 7 (24), other 19 (17); p=0.594	≤5/yr 31 (14), ≥6/yr 29 (21); **p=0.013**
I can share all my problems with my family physician.	aware 200 (61), unaware 18 (45); **p=0.012**	dissatisfied 17 (59), other 70 (62); p=0.909	≤5/yr 122 (54), ≥6/yr 96 (69); **p=0.012**
I am satisfied with the attentiveness of the FHC staff.	aware 240 (73), unaware 17 (42); **p<0.001**	dissatisfied 21 (72), other 77 (68); p=0.854	≤5/yr 152 (67), ≥6/yr 105 (76); p=0.072

*For each subgroup, the number (and percentage) of participants who agreed with the statement is shown, together with the p-value. Bold p-values indicate statistical significance (p<0.05). The chi-square test was used. The ≤5/yr group includes participants who had never visited a Family Health Center. Full response distributions are presented in Table 3. FHC: Family Health Center.

Table 6. Factors associated with preferring Family Health Centers as the first point of contact (multivariate logistic regression analysis)

Variable	B	SE	OR	95% CI	p
Gender (male)	-0.133	0.250	0.875	0.536–1.429	0.595
Awareness of family physician (yes)	0.544	0.421	1.723	0.755–3.932	0.196
Age (years)	0.003	0.008	1.003	0.987–1.019	0.727
Educational level (high)	0.026	0.262	1.027	0.615–1.716	0.919
Frequency of FHC visits (≥6/year)	0.176	0.156	1.193	0.951–1.497	0.128
Constant	-1.861	0.763	0.156	—	0.015

*OR: odds ratio; CI: confidence interval; SE: standard error. Logistic regression analysis was performed using the enter method. Model fit was acceptable (Hosmer–Lemeshow test, p=0.542). The explanatory power of the model was low (Nagelkerke R^2=0.024).

Discussion

Healthcare-Seeking Behavior and Family Medicine Utilization

Consistent with national and international research, two-thirds of participants were female, likely reflecting women's higher volunteerism and healthcare utilization.[7-12] The convenience sampling approach may also have contributed to this gender distribution.

Health facility visits typically rise after the third decade as chronic disease prevalence increases; consistently, about two-thirds of participants were aged 36 or older.[7,10,13]

Nearly two-thirds of participants were unemployed, with housewives accounting for about 40%, similar to previous studies reporting housewife proportions of 30–50%.[7,8] Notably, unemployed individuals preferred FHCs at first contact more frequently than employed ones, likely because FHCs are more accessible during business hours. Supporting this, regional research indicated one-third of patients would use FHCs more if weekend services were available.[14]

Effective gatekeeping by family physicians reduces unnecessary specialist visits, maintains continuity of care, and lowers healthcare costs, with trust as the cornerstone of the patient-physician relationship. Although awareness of family physicians appears higher post-HTP than pre-transition (18% vs 10-15%), one in ten participants still did not know their family physician.[7,15,16] This suggests a persisting gap in the long-term therapeutic relationships essential for effective primary care.

The number of family medicine specialists in Türkiye has continued to increase since the introduction of the family medicine system. In this study, while one-third of participants were unaware of their physician's specialization, nearly half identified them as "family medicine specialists." Similarly, a university hospital study in Kayseri reported that one-third of participants perceived their family physicians as specialists.[8]

Consistent with previous literature, knowing the family physician and regular FHC visits correlate positively with trust, satisfaction, and effective problem resolution. About one-tenth of participants had never visited an FHC, while half applied 1–5 times per year.[7] For the most frequently used institution, one-fourth preferred FHCs, the remainder split equally between state and university hospitals.

First point of contact preferences vary across studies: an FHC-based study in İzmir (2014) showed over 80% FHC preference, while hospital-based studies, including one in Kayseri (2018), report much lower rates (25–33%).[8,9] Interestingly, before the family medicine system, nearly half of patients preferred health centers during illness.[16] However, the frequent bypass of primary care for state and university hospitals highlights ongoing challenges for healthcare continuity and cost-effectiveness. [17]

While some Kayseri studies identified examination as the primary reason for FHC applications, in this study, it was obtaining prescriptions, followed by examination[15], likely reflecting differences in study settings.

About one-fourth applied to FHCs for vaccination, higher than previously reported, possibly reflecting the COVID-19 pandemic's impact.[8,9,15] Notably, despite most being of reproductive age, fewer than 1% sought family planning services.[7-9]

More than half identified their family physician as their first point of contact, an increase from 40% in a 2016 regional study, indicating the growing recognition of primary care.[14]

Two-thirds reported their FHC was near home, consistent with the accessibility principle of family medicine. Notably, perceiving the FHC as distant was strongly associated with awareness of the family physician ($p<0.001$): participants who knew their family physician were far less likely to regard the centre as far from home, suggesting that familiarity with primary care is accompanied by a stronger sense of access to it.

Almost all participants stated they would go to other hospitals for problems they perceived as unsolvable at an FHC, although it remains unclear who determines this. Normally, an unresolved issue should prompt referral, but the referral chain is currently not effective in Türkiye. Sustainable healthcare delivery may benefit from the implementation of a referral chain, provision of adequate infrastructure, and efficient use of health financing.[18]

Approximately 85% of participants considered a referral chain unnecessary for hospital admission, consistent with previous reports of 50–80%.[7,19] Opposition stems from the desire to maintain physician choice, perceived inadequacy of primary care, and the belief that hospitals provide higher-quality service.[19] Family physicians themselves note that structural issues, such as high patient-to-physician ratios and limited infrastructure, should be addressed before a mandatory referral system. [20,21]

A significant result of this study is the link between frequency of FHC utilization and FHC preference at first contact: three-quarters of frequent FHC users preferred it for first application, whereas infrequent users did not. However, these associations did not persist in the multivariate model, where none of the examined variables emerged as independent predictors of FHC preference. This discrepancy suggests confounding and indicates that healthcare-seeking behavior is shaped by a complex interplay of factors rather than a single determinant. The low explanatory power of the model (Nagelkerke R^2=0.024) implies that unmeasured variables, such as perceived illness severity, health literacy, trust, and prior primary-care experience, may play a more decisive role in shaping first point of contact preferences. Regarding infrastructure, about half of the participants found FHC equipment insufficient, whereas an İzmir FHC study reported that most considered the physical conditions good. This discrepancy likely reflects the specific institution surveyed.

Waiting times remain a leading source of patient complaints. About one-third of participants reported shorter examination waiting times with family physicians than at hospitals. The lack of an active referral chain has been associated with overcrowding in secondary and tertiary health institutions.[22,23]

More than half of the participants stated they could share all their problems with their family physician, reflecting the trust inherent in family medicine. This was particularly prevalent among those who knew their physician and visited frequently, underscoring the importance of longitudinal care. Similar findings in Istanbul showed high confidence in medical confidentiality, and a large-scale German study reported that three-quarters maintained high trust in their general practitioners.[11,13]

Consistent with previous research, participants used FHCs more for prescriptions, injections, and vaccinations than for clinical examinations.[7,8,15] Over half applied primarily for medication prescriptions, yet about three-quarters believed chronic disease follow-up (e.g., hypertension, diabetes) should be managed at the primary care level. Supporting this, Gücük et al. observed improved lifestyle changes in diabetic patients following the transition to the family medicine model. [24] Interestingly, over one-third perceived that family physicians provide longer examination durations than hospital doctors. This may reflect a pattern in which higher FHC awareness is associated with greater interest in examination-oriented visits. Additionally, two-thirds could visit FHCs without an appointment, consistent with other studies.[9]

While two-thirds believed FHCs could handle wound care, only one-fourth considered them suitable for more invasive procedures; expanding minor surgical services could reduce hospital waiting lists.[22]

Nearly half were unsure about higher co-payment rates at university hospitals, suggesting declining public awareness of the financial advantages of primary care.[15]

Satisfaction with FHC staff attentiveness increased with age and was significantly associated with knowing the family physician. Conversely, one-fifth of those who changed their family physician cited dissatisfaction as the reason.

Consistent with Durmuş et al. and other regional studies, satisfaction with the family medicine system is generally high, peaking in patients aged ≥65 years.[8] Ease of access, short waiting times, and effective problem resolution are key drivers.[19] The rising satisfaction over the last two decades underscores the growing reliability of the family medicine model in Türkiye.[13,14,16]

Sociodemographic Determinants of Attitudes Toward Primary Care

Age also appeared to be associated with several attitudes toward primary care. Older participants more often agreed that the family physician was the first doctor who came to mind in case of a health problem, were less inclined to consider a referral system necessary, and were more aware of the co-payment difference between FHCs and tertiary hospitals. More frequent FHC visits for chronic-disease follow-up among older adults may foster greater familiarity with the family medicine system. Younger participants, in contrast, more often reported uncertainty regarding co-payment differences, suggesting a relatively limited awareness of the financial aspects of healthcare-seeking behavior.

Participants with higher educational attainment were less likely to identify their family physician as the first doctor who comes to mind, and were less likely to perceive FHC waiting times as longer than those in hospitals. Similar patterns have been reported in other healthcare systems, where individuals with higher education more frequently bypass primary care in favor of higher-tier facilities.[25] Possible contributing factors include greater health-related information access, a tendency to self-assess the perceived severity of symptoms as requiring specialist evaluation, and easier navigation of online appointment systems for direct hospital access. These observations highlight the importance of strengthening communication of the family medicine system's role and capabilities to higher-educated populations.

Regarding gender, male participants more frequently considered the equipment of FHCs to be insufficient compared with female participants. This may reflect differing expectations or prior healthcare exposure, although the underlying reasons remain unclear.

Study Limitations

The limitations of this study include its single-center design and the fact that the data were collected before recent interventions, such as the "Approved Appointment" system[26,27] and updated co-payment regulations[28]. Because these system-level changes have since altered how patients access care, the findings cannot be directly generalized to current patient behavior. Additionally, the lack of a previously developed and validated scale specifically related to this subject is another limitation of the research. Although the minimum required sample size was 385, the final analyzed sample comprised 367 participants, falling below the calculated target. This shortfall is acknowledged as a limitation, as the multivariate model identified no significant predictors and may have been underpowered to detect weak associations. The logistic regression results should therefore be interpreted with this reduced power in mind. As the study used convenience sampling in a tertiary hospital, the findings may not be generalizable, and hospital-based recruitment may overrepresent individuals with higher healthcare utilization. Moreover, excluding several outpatient departments (psychiatry, oncology, hematology, pediatrics, and physical medicine and rehabilitation) from the sampling frame may have introduced selection bias and limited the representativeness of the study population. As noted in the Methods, the 16 attitude statements were individual items spanning conceptually distinct domains rather than a unidimensional scale; the single Cronbach's alpha (0.627) is therefore not a fully appropriate reliability index. Furthermore, all data were self-reported, which may be subject to recall and social desirability bias. The cross-sectional design precludes causal inferences regarding the associations observed.

In conclusion, this study demonstrates that one in three patients prefers an FHC as the first point of contact in non-emergency situations. That FHC use is often motivated by "obtaining a prescription" rather than "examination" suggests the clinical capacity of primary care is underrecognized by the public.

Furthermore, the links between trust in and perceived competence of the family physician and participants' education and visit frequency suggest that the physician-patient relationship often lacks sufficient opportunity to establish trust. This situation can be improved by emphasizing and increasing awareness of the family medicine system and the competencies of family physicians, alongside the implementation of a referral chain. Given the limited predictive value of sociodemographic variables, future studies should explore psychosocial determinants such as perceived illness severity and health literacy. In the absence of a mandatory referral mechanism, the burden on tertiary care may continue to be considerable. Strengthening the gatekeeping role of family physicians, ensuring continuity of care, and implementing an effective referral system could contribute to reducing unnecessary tertiary care utilization and to improving cost-effectiveness and health outcomes.

Ethical Considerations: The study was approved by the Ethics Committee of Necmettin Erbakan University Faculty of Medicine (Date: 17.12.2021, No: 2021/3554). Informed consent was obtained from all participants before data collection.

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

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PREVALENCE AND ASSOCIATED FACTORS OF MASKNE IN DENTISTRY STUDENTS

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Abstract

Objectives: Maskne (mask-related acne) is a prevalent occupational dermatosis among healthcare trainees. This study aimed to investigate the clinical prevalence, associated factors, and the association between maskne and disease-specific quality of life among dentistry students.

Materials and Methods: A cross-sectional study was conducted among 335 actively mask-wearing dentistry students. Maskne was definitively diagnosed via direct physician examination using standardized clinical criteria. Sociodemographic, clinical, and behavioral risk factors were evaluated. Multiple logistic regression identified factors independently associated with maskne. The impact of the condition on psychosocial well-being was assessed using the Turkish Acne Quality of Life Scale (T-AQOLS) via multiple linear regression.

Results: The overall clinical prevalence of maskne was 39.4%. Multivariate logistic regression revealed that prolonged daily mask usage duration (OR = 1.189, p = 0.014), application of sunscreen (OR = 3.155, p = 0.007), and use of facial cleansers (OR = 3.704, p = 0.010) under the mask were major independent risk factors. Interestingly, smoking emerged as a protective factor against maskne (OR = 0.481, p = 0.023). In the multiple linear regression model, adjusting for confounding factors, the clinical presence of maskne was independently associated with a 7.02-point higher T-AQOLS score ($p < 0.001$), demonstrating a severe impairment in the students' psychological and social well-being.

Conclusion: Maskne represents a significant occupational and psychological burden for dentistry students. Preventive strategies should focus on optimizing mask-wearing durations within safe limits and avoiding the application of potentially comedogenic dermocosmetics under the mask, alongside providing early psychosocial support for affected individuals.

Keywords: Dentistry, students, masks, acne vulgaris, quality of life

Introduction

Acne vulgaris is a common chronic inflammatory skin disease affecting mainly adolescents and young adults, although it may persist into adulthood.[1,2] Its pathogenesis involves altered sebum production, hyperkeratinization, microbial colonization (particularly Cutibacterium acnes), and skin barrier dysfunction.[3-5] Beyond its physical manifestations, acne is associated with anxiety, depression, and reduced health-related quality of life across different age groups.[6-9]

The global onset of the COVID-19 pandemic necessitated the widespread and prolonged use of personal protective equipment (PPE), particularly face masks, to mitigate airborne viral transmission.[10,11] While essential for infection control, prolonged mask use led to an increase in facial dermatoses, particularly “maskne,” a term used to describe mask-related acne.[12-14] Maskne is considered a variant of acne mechanica, triggered by the continuous physical friction of the textile against the skin. Mechanical friction together with increased temperature and humidity under the mask disrupts the epidermal barrier, alters sebum production and the cutaneous microbiome, and promotes acneiform lesions; inappropriate cosmetic use may further aggravate these effects.[14-18]

Healthcare professionals and medical trainees are particularly vulnerable to maskne because of prolonged use of surgical masks and respirators.[19,20] Mask-wearing duration, mask type, and skincare habits have been identified as important risk factors, and healthcare students report high rates of maskne associated with clinical exposure and daily mask use.[20,21]

Despite the growing body of literature on maskne among general healthcare workers, there is a paucity of data specifically focusing on dentistry students. Dental students represent a particularly high-risk group because of intensive clinical practice, aerosol exposure, and strict PPE requirements. However, evidence regarding the impact of maskne on disease-specific quality of life in this population remains limited.

While mask-related dermatoses have been widely reported among general healthcare workers, dentistry students represent a uniquely vulnerable population. Dental clinical education inherently involves aerosol-generating procedures, prolonged chairside training, and close-proximity patient contact, all of which necessitate stricter and more continuous use of personal protective equipment (PPE), including high-filtration masks. Despite this heightened occupational exposure, data specifically addressing maskne in this subgroup remain limited. Therefore, this study aimed to investigate the clinical prevalence, associated factors of maskne, and its association with disease-specific quality of life among dentistry students, considering the unique occupational exposures of dental education, such as aerosol-generating procedures and prolonged chairside training.

Materials and Methods

Study Design and Population

This was a cross-sectional descriptive study conducted between March and April 2025 among first- through fifth-year students enrolled at the Faculty of Dentistry, Ankara Yıldırım Beyazıt University. A formal a priori sample size calculation was not initially performed because the study adopted a total population sampling approach, aiming to invite all 537 registered dentistry students to participate. While the initial goal was to achieve a high response rate of at least 70% (n ≈ 376), the final sample consisted of 335 students. Nevertheless, for prevalence estimation, this final sample size of 335 provides adequate precision with a margin of error of approximately 5% at a 95% confidence level. Of the 537 registered students, 403 provided informed consent. As the primary objective was to evaluate mask-related dermatological issues, the final analysis was restricted exclusively to students who reported active, regular face mask usage. In this study, 'regular mask use' was operationally defined as the continuous wearing of any type of face mask (e.g., surgical, cloth, or N95/FFP2 masks) during clinical and laboratory training sessions, with a daily usage duration ranging from 1 to 8 hours depending on the student's clinical schedule. Following the application of this eligibility criterion, the final sample yielded 335 participants.

Data Collection and Clinical Examination

We collected data with a face-to-face structured questionnaire assessing sociodemographic variables, mask-use characteristics (mask type, duration, breaks), and skincare practices (use of cosmetics, sunscreen, cleansers). Crucially, the presence of maskne was determined through direct physical examinations conducted by physicians. The clinical examinations were conducted by three trained physicians from the research team. To ensure diagnostic consistency and minimize inter-observer variability, a calibration process was performed before the data collection period based on standardized clinical criteria for maskne. Any borderline or ambiguous cases during the field examinations were evaluated collectively by the physicians to reach a final diagnosis through joint consensus. Participants were diagnosed with maskne if they fulfilled the clinical criteria proposed by Teo (2021):[14] (i) onset or exacerbation of acne within six weeks of regular mask wear; (ii) localisation strictly to the "O-zone"; and (iii) clinical exclusion of other dermatoses like perioral dermatitis or rosacea.

Quality of Life Assessment

Quality of life was assessed using the Turkish Acne Quality of Life Scale, referred to hereafter as T-AQOLS. Measuring quality of life is a crucial component of dermatological evaluation in Turkish populations.[22] The T-AQOLS is built upon the original Acne Quality of Life scale developed by Gupta et al.,[22] whose Turkish-language reliability was independently established by Demirçay et al. with satisfactory internal consistency (Cronbach's $\alpha = 0.84$) and high test-retest reliability.[23] The scale comprises 11 items rated on a five-point Likert scale, where higher scores indicate a poorer quality of life.

Statistical Analysis

We analyzed the data using IBM SPSS Statistics v 27 (IBM Corp, Armonk, NY), except the ROC analysis, which was conducted with MedCalc® Statistical Software version 23.5.3 (MedCalc Software Ltd, Ostend, Belgium). To determine the appropriate statistical methods, the normality of the variables was tested via the Kolmogorov-Smirnov test alongside visual diagnostics (e.g., histograms and Q-Q plots). For group comparisons of continuous parametric we used the Student T test. For the non-parametric counterpart, we used the Mann-Whitney U test. Categorical variables were compared using the Pearson Chi-Squared test. And if there were more than 2 groups, we used the Column proportion test with Bonferroni correction for pairwise analysis. To evaluate the discriminative ability of daily mask usage duration for the presence of maskne, a Receiver Operating Characteristic (ROC) curve analysis was conducted. The overall discriminative power of the variable was assessed by calculating the Area Under the Curve (AUC) along with its 95% Confidence Interval (CI) and standard error (SE). To determine the optimal threshold for mask usage duration that maximizes both true positive and true negative rates, the Youden Index (J = Sensitivity + Specificity - 1) was calculated. Multiple logistic regression was performed to identify the factors independently associated with maskne. The association between maskne and students' quality of life (T-AQOLS score) was evaluated using multiple linear regression with the Enter method. Before conducting the multiple linear regression analysis, statistical assumptions were thoroughly evaluated. Although certain variables exhibited deviations from a strict normal distribution, the large sample size of the study (N = 335) invokes the Central Limit Theorem. According to large-sample theory, multiple linear regression estimates and hypothesis testing remain robust and asymptotically valid even in the presence of non-normal distributions. Multicollinearity was evaluated using Variance Inflation Factors (VIF), with all values falling well below 3.5, indicating no significant collinearity. Additionally, potential influential observations were assessed using Cook’s distance, and no problematic data points (Cook's d > 1.0) were detected. Covariate selection for the multivariable logistic regression model was not strictly data-driven; rather, it was guided by a combination of clinical relevance, existing literature, and statistical screening. Variables demonstrating a potential association in the univariable analysis (using a conservative inclusion threshold of $p < 0.20$) were considered for the initial model. Furthermore, theoretically essential confounders (e.g., age, gender, and smoking status) were intentionally retained in the final multivariable model regardless of their univariable p-values to comprehensively adjust for potential residual confounding. The 'Enter' method was utilized to construct the final model, ensuring a theoretically sound evaluation of the associated factors. Statistical significance was set at $p \leq 0.05$.

Ethical clearance for this research was granted by the Ethics Committee of Ankara Yıldırım Beyazıt University Health Sciences (dated 14.03.2024, No: 02/605). In compliance with the Declaration of Helsinki, informed consent was obtained from every participant before data collection commenced, ensuring the protection of participants' rights and privacy.

Results

Based on clinical examinations, the overall prevalence of maskne was 39.4%. Sociodemographic and baseline characteristics according to maskne status are presented in Table 1. Maskne was significantly more common among female students, non-smokers, and those with a lower BMI. However, the mean age did not show a significant difference between the groups.

Participant mask-use and skincare behaviors are summarized in Table 2. Surgical masks were the most frequently used type. Students who developed maskne were significantly more likely to use makeup, sunscreen, facial cleansers, moisturizers, and skin serums under their masks compared to the non-maskne group. Additionally, the daily mask usage duration and the number of masks used daily were higher among those with maskne.

Multivariate logistic regression (Table 3) identified prolonged daily mask-wearing duration, sunscreen application, and the use of facial cleansers as major independent risk factors for developing maskne. Conversely, smoking emerged as an independent protective factor. Other variables that were significant in the univariable analysis, such as gender and BMI, did not retain statistical significance in the adjusted model.

Table 1. Sociodemographic and Baseline Characteristics of Participants by Maskne Status

Variables	**Total (n=335)**	**No Maskne (n=203)**	**Maskne (n=132)**	**p-value**
Gender, n (%)				
Female	212 (63.3%)	98 (46.2%)	114 (53.8%)	<0.001*
Male	123 (36.7%)	105 (85.4%)	18 (14.6%)	
Age (years)				
Mean (SD)	21.60 (1.89)	21.64 (1.96)	21.56 (1.79)	0.719**
Smoking status, n (%)				
Yes	91 (27.2%)	69 (75.8%)	22 (24.2%)	<0.001*
No	244 (72.8%)	134 (54.9%)	110 (45.1%)	
Grade, n (%)				
1	31 (9.3%)	17 (54.8%)a	14 (45.2%)a	0.014*
2	88 (26.3%)	62 (70.5%)a	26 (29.5%)b	
3	83 (24.8%)	57 (68.7%)a	26 (31.3%)a	
4	62 (18.5%)	33 (53.2%)a	29 (46.8%)a	
5	71 (21.2%)	34 (47.9%)a	37 (52.1%)b	
BMI (Body Mass Index)				
Mean (SD)	22.78 (3.27)	23.44 (3.40)	21.76 (2.79)	<0.001**
T-AQOLS scores				
Median (Q1-Q3)	4.00 (0.00-13.00)	0.00 (0.00-5.00)	12.50 (6.00-19.00)	<0.001***

n=335. Subgroup percentages represent row percentages as provided in the original data, whereas total column percentages represent the proportion of the entire study cohort. * Pearson Chi-Square test was used. The column proportion test was used for pairwise comparisons with the Bonferroni correction. Subscript letters indicate subsets of maskne categories with statistically similar column proportions; those without shared letters differ significantly at $p \leq 0.05$. ** Student T Test was applied. *** Mann-Whitney U Test was executed.

ROC curve analysis (Figure 1) demonstrated that daily mask usage duration has a statistically significant discriminative ability in identifying the clinical presence of maskne (AUC = 0.599). Utilizing the Youden Index, the optimal cut-off point was determined to be >4 hours, which yielded a sensitivity of 49.24% and a specificity of 68.97%.

A multiple linear regression analysis was conducted to evaluate the factors affecting the T-AQOLS score (Table 4). After adjusting for confounding variables—such as gender, smoking status, daily mask usage duration, and skincare habits—the clinical presence of maskne was independently associated with a significantly higher T-AQOLS score, indicating a negative impact on psychosocial well-being. Furthermore, the use of facial cleansers was linked to an increase in the score, whereas daily mask usage duration showed a weak inverse relationship. Variables, including smoking status and sunscreen use under the mask, were not significantly associated with quality of life scores.

Table 2. Mask Usage Behaviors and Skincare Practices by Maskne Status

Variables	Total (n=335)	No Maskne (n=203)	Maskne (n=132)	p-value
Mask type used, n (%)				
Surgical mask	290 (86.6%)	168 (57.9%)a	122 (42.1%)b	0.036*
N95	7 (2.1%)	6 (85.7%)a	1 (14.3%)a	
Cloth mask	38 (11.3%)	29 (76.3%)a	9 (23.7%)b	
Taking breaks from wearing a mask, n (%)				
No	36 (10.7%)	23 (63.9%)	13 (36.1%)	0.805*
Yes	299 (89.3%)	180 (60.2%)	119 (39.8%)	
Wearing makeup under mask, n (%)				
No	191 (57.0%)	144 (75.4%)	47 (24.6%)	<0.001*
Yes	144 (43.0%)	59 (41.0%)	85 (59.0%)	
Wearing sunscreen under mask, n (%)				
No	156 (46.6%)	130 (83.3%)	26 (16.7%)	<0.001*
Yes	179 (53.4%)	73 (40.8%)	106 (59.2%)	
Facial cleanser use, n (%)				
No	106 (31.6%)	96 (90.6%)	10 (9.4%)	<0.001*
Yes	229 (68.4%)	107 (46.7%)	122 (53.3%)	
Moisturizer use, n (%)				
No	110 (32.8%)	96 (87.3%)	14 (12.7%)	<0.001*
Yes	225 (67.2%)	107 (47.6%)	118 (52.4%)	
Skin serum use, n (%)				
No	228 (67.5%)	159 (69.3%)	69 (30.7%)	<0.001*
Yes	110 (32.5%)	47 (42.7%)	63 (57.3%)	
Daily mask usage duration (hours)				
Median (Q1-Q3)	3.00 (2.00-6.00)	3.00 (2.00-5.00)	4.00 (3.00-6.00)	0.002**
Number of masks used daily				
Median (Q1-Q3)	2.00 (1.00-3.00)	3.00 (1.00-3.00)	2.00 (2.00-4.00)	0.045**
Break frequency (hours)				
Median (Q1-Q3)	1.00 (1.00-2.00)	1.00 (1.00-2.00)	2.00 (1.00-2.00)	0.546**
Break duration (minutes)				
Median (Q1-Q3)	15.00 (8.00-20.00)	15.00 (8.00-20.00)	13.00 (5.75-15.00)	0.068**

n=335. Subgroup percentages represent row percentages as provided in the original data, whereas the Total column percentages represent the proportion of the entire study cohort. *Pearson Chi-Square test was used. The column proportion test was used for pairwise comparisons with the Bonferroni correction. Subscript letters indicate subsets of maskne categories with statistically similar column proportions; those without shared letters differ significantly at p ≤ 0.05. ** The Mann-Whitney U Test was used.

Table 3. Logistic Regression Analysis of Factors Associated with Maskne

Variables	p	OR	95% CI (LL, UL)
Gender[a]	0.130	2.475	(0.765, 8.000)
Smoking status[b]	0.023*	0.481	(0.256, 0.903)
Mask type used[c]	0.518		
N95 mask	0.758	0.676	(0.056, 8.152)
Cloth mask	0.262	0.601	(0.247, 1.464)
Daily mask usage duration (hours)	0.014*	1.189	(1.035, 1.367)
Number of masks used daily	0.812	0.988	(0.892, 1.093)
Wearing makeup under a mask[b]	0.119	1.701	(0.873, 3.311)
Wearing sunscreen under a mask[b]	0.007*	3.155	(1.379, 7.246)
Facial cleanser use[b]	0.010*	3.704	(1.362, 10.000)
Moisturizer use[b]	0.177	1.873	(0.754, 4.651)
Skin serum use[b]	0.754	1.099	(0.610, 1.980)
BMI (kg/m2)	0.546	0.969	(0.875, 1.073)

n = 335. CI = confidence interval; LL = lower limit, UL = upper limit; OR = odds ratio. The model was statistically significant, $\chi^2(12) = 101.622$, $p < .001$. The model explained 35.4% (Nagelkerke R^2) of the variance in maskne and correctly classified 74.9% of cases. The Hosmer-Lemeshow goodness-of-fit test indicated a good model fit, $\chi^2(8) = 9.713$, $p = .286$. a parameter represents Female, b Parameter represents Yes, c Reference category is Surgical mask.

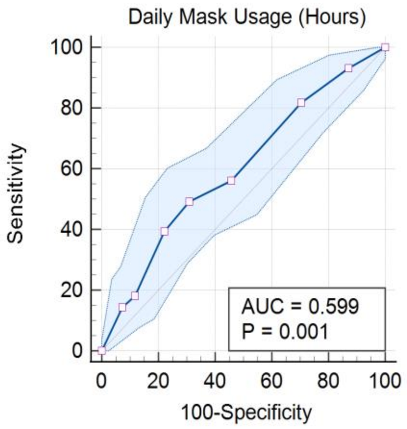

Figure 1. ROC curve analysis for daily mask usage duration.

The Area Under the Curve (AUC) is 0.599, illustrating the discriminative ability of prolonged mask wear (in hours) in identifying the clinical presence of maskne.

Table 4. Multiple Linear Regression Analysis of Factors Associated with the Turkish Quality of Life Scale (T-AQOLS) Score

Variable	**p**	**OR**	**95% CI (LL, UL)**	**VIF**
(Constant)	0.071	7.342	(-0.637, 15.322)	
Gender[a]	0.186	-1.931	(-4.795, 0.933)	3.108
Presence of maskne[b]	<0.001*	7.018	(5.172, 8.865)	1.328
Smoking status[b]	0.295	-0.965	(-2.775, 0.845)	1.057
Daily mask usage duration (hours)	<0.001*	-0.723	(-1.106, -0.339)	1.068
Wearing sunscreen under a mask[b]	0.324	1.268	(-1.257, 3.793)	2.587
Facial cleanser use[b]	0.023*	3.010	(0.426, 5.594)	2.356

n= 335. CI = confidence interval; OR = odds ratio, LL = lower limit, UL = upper limit; VIF = variance inflation factor. Higher scores on the T-AQOLS indicate poorer quality of life. The overall regression model was statistically significant, F(6, 328) = 29.088, p < .001. The model explained 34.7% (R^2 = .347, Adjusted R^2 = .335) of the variance in the T-AQOLS score. a Parameter represents Female. b Parameter represents Yes.

Discussion

This study is among the first to evaluate the prevalence and independent risk factors of maskne among dentistry students using physician-confirmed clinical diagnosis and to examine its association with disease-specific quality of life, as measured by the validated T-AQOLS instrument, in this population. Our findings indicate a clinically confirmed prevalence of 39.4%. Daily mask wear duration, smoking status, and specific skincare habits were identified as major independent risk factors, and maskne was significantly associated with poorer quality of life (T-AQOLS scores) independent of other confounders.

The 39.4% prevalence is consistent with previous studies among healthcare students and trainees.[20] Continuous friction and the humid microenvironment created by masks disrupt the epidermal barrier and microbiome, promoting lesion development.[13,14,16,17] Each additional hour of mask-wearing increased maskne risk by 19%, consistent with previous reports identifying daily duration as a significant determinant.[18,19] Prolonged occlusion may promote sebum accumulation and microbial proliferation.[16]

A notable finding was the lower prevalence of maskne among smokers than non-smokers (24.2% vs. 45.1%, p < 0.001), with smoking remaining inversely associated with maskne in multivariate analysis (OR = 0.481, 95% CI (0.256–0.903), $p = 0.023$). The association between smoking and acne remains controversial. Some studies suggest a protective effect against inflammatory acne, potentially mediated by nicotine-induced modulation of cutaneous inflammatory pathways through nicotinic acetylcholine receptors.[24,25] Because maskne is largely a mechanically induced inflammatory dermatosis, this mechanism may partly explain our findings. However, other studies have reported an increased risk of non-inflammatory acne among smokers.[26,27] Therefore, the observed association may be specific to inflammatory manifestations of maskne rather than a general anti-acne effect of smoking. Importantly, given the cross-sectional design of this study, this finding must be interpreted with extreme caution and cannot imply causality. Rather than a direct biological protective effect, this association is highly susceptible to residual confounding. For instance, dentistry students who smoke frequently take outdoor smoking breaks, which necessitates removing their masks. This incidental routine allows the skin to breathe and reduces the continuous duration of mechanical friction and localized humidity, thereby potentially reducing maskne risk indirectly. This association must be interpreted with caution; smoking is not a therapeutic option for acne and carries well-documented systemic health risks.[26]

Furthermore, the application of sunscreen and facial cleansers was significantly associated with an increased occurrence of maskne. While the occlusive nature of masks combined with topical products may theoretically exacerbate comedogenesis, this finding must be critically evaluated through the lens of reverse causality. It is highly plausible that students experiencing early signs of maskne, or those with pre-existing acne-prone skin, proactively increase their use of facial cleansers and topical agents as a self-management, therapeutic, or camouflaging strategy. Similarly, the finding that facial cleanser use is associated with a poorer quality of life (a 3.01-point increase in the T-AQOLS score) further supports this behavioral hypothesis. As maskne symptoms develop, or due to psychosocial stress, students likely resort to dermocosmetics increasingly as a coping mechanism.[18] Thus, this association likely reflects a secondary behavioral response rather than the products directly causing the dermatosis.

The association between maskne and quality of life represents an important finding of this study. Our multiple linear regression demonstrated that the presence of maskne independently increased the T-AQOLS score by an average of 7.02 points. It is well established that acne vulgaris has profound negative effects on psychosocial well-being.[6-8] Our findings contribute to the literature by suggesting that maskne is associated with substantially poorer disease-specific quality of life in this high-risk student population.

A paradoxical inverse association was also noted between longer daily mask-wearing duration and lower T-AQOLS scores in certain subsets. Rather than implying that prolonged mask use improves psychosocial well-being, this phenomenon may be attributed to psychological habituation and occupational adaptation. Dentistry students who are routinely subjected to extended hours of PPE use may progressively develop coping mechanisms, normalizing the presence of masks and mild dermatoses as an inherent part of their professional training, thereby blunting the perceived negative impact on their disease-specific quality of life.

In this study, ROC curve analysis was performed to identify a practical threshold for daily mask-wearing duration beyond the linear risk estimates provided by multivariable regression. The identified cut-off value of >4 hours may serve as a useful indicator for occupational health strategies in dental education, supporting measures such as scheduled mask changes or brief skin-exposure breaks during prolonged clinical sessions. However, this threshold should be interpreted cautiously, as it was derived from a single-center study conducted under specific environmental conditions and clinical schedules. The >4-hour cut-off may therefore differ across institutions with varying PPE protocols or microclimatic conditions. Future multicenter studies are needed to validate its generalizability.

This study has several limitations. First, although a total population approach was adopted with a target participation rate of at least 70% (n ≈ 376), the final sample included 335 students, which may have introduced non-response bias. Second, the adequacy of the sample for multivariable logistic regression should be considered. With 132 maskne cases and 12 variables, the events-per-variable (EPV) ratio was approximately 11. Although this exceeds the commonly recommended minimum threshold of 10 for model stability,[28] it remains close to this limit and the regression estimates should therefore be interpreted with caution.

While this study specifically focused on dentistry students, the identified risk factors—namely prolonged occlusion and mechanical friction—may also be applicable to other healthcare professionals and workers across various sectors adhering to similar masking protocols.

In conclusion, this cross-sectional study found that maskne was prevalent (39.4%) among dentistry students that significantly impacts their quality of life. Prolonged daily mask wear was identified as a potentially modifiable factor associated with maskne, increasing maskne odds by 19% per hour, while statistical associations with skincare product use and smoking likely reflect reactive behaviors or complex biological pathways requiring further prospective study. To address this occupational hazard, dental schools should implement mask hygiene protocols and routine dermatological screening. Family physicians should inquire about mask-wearing duration and topical product use when evaluating healthcare trainees with facial dermatoses. Given its psychosocial impact, management should also include psychosocial assessment and timely dermatological referral.

Ethical Considerations: This study was conducted in strict adherence to the ethical principles for medical research involving human subjects as outlined in the Declaration of Helsinki. The research protocol was formally reviewed and approved by the Scientific Research Ethics Committee of Ankara Yıldırım Beyazıt University (Decision No: 02-605; Date: 14 March 2024). Participation in the study was entirely voluntary, and written informed consent was obtained from all participants prior to data collection and clinical examination.

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

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PREVENTING SOCIAL ISOLATION IN LATER LIFE THROUGH PRIMARY CARE–BASED SOCIAL PRESCRIBING: A MODEL FOR TÜRKIYE

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Abstract

Social isolation is not merely a psychosocial experience but a major public health problem with established biological correlates, including increased cardiometabolic risk, inflammation, sleep–endocrine dysregulation, and immune dysfunction. Older adults are particularly vulnerable due to chronic disease burden, mobility limitations, and increasing care needs. Social prescribing is a person-centred approach that links individuals in primary care to non-clinical community resources through structured referral pathways, guided by the question “what matters to you?”

This narrative review synthesises international evidence published between 2015 and 2025. PubMed/MEDLINE and Scopus were searched using the keywords “social prescribing”, “older adults”, “loneliness”, “social isolation”, “primary care”, and “link worker”. Systematic reviews, policy frameworks, and implementation studies were prioritised, alongside grey literature from official sources, including National Health Service (NHS) and World Health Organization (WHO) reports. Findings were thematically analysed across implementation models, outcome evidence, measurement frameworks, and adaptation to the Turkish primary care context.

Evidence suggests that social prescribing is associated with reductions in loneliness and social isolation, and improvements in mental well-being and social participation among older adults. Effective programmes emphasise the link worker role, personalised care planning, supported transitions to community activities, and regular follow-up. Standardised outcome measures such as WEMWBS, UCLA Loneliness Scale, EQ-5D, and health service utilisation indicators are recommended. Social prescribing represents a feasible strategy to address social isolation among older adults. Türkiye’s strong family medicine system and community-based resources provide a suitable foundation for pilot implementation.

Keywords: Aging, loneliness, primary health care, social isolation, social prescribing.

Introduction

Social isolation is not only a psychosocial experience within society but also a public health issue with organic consequences affecting cardiometabolic risk, inflammation, the sleep–endocrine axis, and immune regulation.[1] Due to the burden of chronic diseases, limitations in mobility and transportation, and increased care needs, older adults constitute the group most heavily affected. Social prescribing is a personalised care approach shaped by the question “what matters to you?”, linking individuals—through primary care services—to non-clinical community resources (physical activity groups, arts and cultural workshops, volunteer-based activities, nature programmes, etc.) via a structured referral pathway.[2,3]

This narrative review aims to draw attention to a primary care–based social prescribing approach for the prevention of social isolation and to raise awareness through feasible model proposals grounded in Türkiye’s family medicine system, which provides personalised, holistic, and continuity-oriented care. By outlining the collaboration framework between primary care services and local stakeholders, practical measurement–monitoring indicators, and steps for sustainable implementation, the study aims to highlight the potential of social prescribing to enhance quality of life and social participation among older adults. Additionally, by drawing attention to the existing research gap in this field, establishing a conceptual and practical foundation for future pilot initiatives and field-based research constitutes a secondary contribution of this study.

Materials and Methods

This study was designed as a narrative review to synthesize a strategic framework for social prescribing within the Turkish primary care context. A narrative approach was preferred over a systematic review because the primary objective was to integrate diverse evidence types—including international policy frameworks, grey literature, and heterogeneous clinical studies—into a cohesive implementation model, rather than to perform a meta-analysis of standardized clinical outcomes.

Search strategy and selection criteria

A comprehensive literature search was conducted in PubMed/MEDLINE and Scopus databases, covering the period between 2015 and 2025. The search utilized keywords including “social prescribing,” “older adults,” “loneliness,” “social isolation,” “primary care,” “link worker,” and their MeSH/Emtree equivalents. Publications in both English and Turkish were included. This initial search identified more than 100 potentially relevant sources. Inclusion criteria focused on peer-reviewed systematic analyses, policy frameworks, and implementation evaluations that reported on the psychosocial impacts of social prescribing in geriatric populations. Exclusion criteria were defined as studies with no direct relevance to primary care integration, conference abstracts without full texts, and non-peer-reviewed opinion pieces. Following a rigorous screening based on these criteria, 30 core publications were selected to form the basis of the proposed model.

Screening and synthesis

Beyond academic databases, grey literature from official institutions—such as the United Kingdom primary care guidelines, the Irish health framework, and World Health Organization summary notes—was examined to ensure a global perspective on policy. The screening process prioritized documents defining standard process-outcome measures. Finally, the gathered evidence was thematically synthesized across five axes: conceptual definitions, implementation models, evidence of service utilization, standardized measurement indicators, and a proposed adaptation model for Türkiye.

Literature review and conceptual framework

Theoretical Foundations of Social Prescribing: Social prescribing should not be conceptualised merely as a system of directing individuals or linking them to social activities. Its foundations lie in a paradigm shift in the understanding of health—namely, the transition from a purely biological model to a holistic health model shaped by psychosocial and environmental determinants. In 1977, George Engel introduced the biopsychosocial model, emphasising that an individual's psychological state, social environment, and meaning-making processes are inseparable components of illness and treatment.[4] This holistic perspective aligns with Aaron Antonovsky's salutogenic model (1979), which focuses not on the causes of disease but on the protective factors that help individuals remain healthy. The model's key concept, "sense of coherence," refers to a person's ability to understand stressors in life and to mobilise coping resources. Concepts such as community participation, health literacy, and empowerment—highlighted in the World Health Organization's Health Promotion Glossary (1998)—further support the theoretical foundation of social prescribing.[5]

Social prescribing transforms the individual from a passive recipient of services into an active agent in improving their own health and well-being. In this respect, it parallels approaches such as person-centred care and shared decision-making. The WHO Commission on Social Determinants of Health (2008) emphasised that a person's social and economic conditions may influence health outcomes more strongly than their medical history.[6] Income level, education, social connections, community participation, environmental conditions, and support networks shape both life expectancy and quality of life. Social prescribing represents one practical application of this theory: during a clinical encounter, when a clinician identifies social isolation, a referral to a non-medical community resource allows direct intervention in the social determinants of health. From this perspective, primary care–level social prescribing serves as a public health tool with the potential to reduce health inequalities.

Results

Concept and history of social prescribing

The concept of social prescribing originates from the United Kingdom and dates back to the 1990s.[7] Building on examples of community–health service integration (e.g., neighbourhood-based centres), it was institutionalised in 2019 by the National Health Service (NHS) as one of the core components of personalised care under the Long Term

Plan.[8] At the heart of the model lies the link worker, a role dedicated to setting goals with the individual, helping to remove barriers such as transportation or caregiving burdens, and facilitating active transitions to community resources.[9] The World Health Organization defines the concept as a holistic approach aimed at addressing the social determinants of health and establishing a bridge between clinical and community resources.[10]

International regulations and programmes

In England, link workers are positioned within Primary Care Networks (PCNs), and good practice and monitoring criteria have been standardised through national summary guidelines and the Common Outcomes Framework.[11,12] Wales introduced a shared terminology and minimum standards for social prescribing through its 2023/2024 National Framework.[13] Scotland expanded its Community Link Worker network, particularly in disadvantaged areas, while Ireland (HSE) mainstreamed social prescribing across more than thirty sites.[14] In Canada (Ontario), social prescribing initiatives have linked family physicians with senior centres through a prescription-based referral pathway.[15] National evaluations in Australia have highlighted that micro-activities, community mapping, and accessibility are critical components for older adults.[16]

Current evidence on social prescribing

Systematic reviews and evaluation reports demonstrate that social prescribing interventions reduce loneliness and social isolation, enhance mental well-being, and strengthen indicators of self-efficacy and social participation.[17,18] Although positive signals regarding health service utilisation (repeat consultations, emergency department use) have been reported, the predominance of observational and heterogeneous study designs indicates the need for stronger, evidence-based research to support conclusions on cost-effectiveness. [19]

Active components associated with successful social prescribing include:
(i) the link worker allocating sufficient time to develop an individualised plan,

(ii) active transition support, such as accompanying the person during initial engagement,
(iii) availability of sustainable, low-threshold micro-activities,
(iv) mechanisms for regular feedback and monitoring.[7]

Assessment tools and monitoring indicators in social prescribing

Assessment tools recommended by UK frameworks and international guidance include:

- WEMWBS (Warwick–Edinburgh Mental Well-being Scale): A 14-item self-report scale evaluating functional mental well-being, positive affect, and satisfaction with social relationships. The Turkish validity and reliability study was conducted by Keldal in 2015; administration takes approximately 5 minutes.[20]
- UCLA Loneliness Scale: A 20-item instrument measuring perceived loneliness, requiring approximately 2–3 minutes to complete. The Turkish validity and reliability study was conducted by Demir in 1989.[21]
- EQ-5D / SF-12 / SF-36 (Quality of Life Measures): EQ-5D assesses five domains—mobility, self-care, usual activities, pain/discomfort, and anxiety/depression—and takes 3–5 minutes to administer. SF-12 and SF-36 include eight subdomains—physical functioning, role-physical, pain, general health perceptions, vitality, social functioning, role-emotional, and mental health—and take 5–7 minutes. The Turkish validity and reliability study of SF-36 was conducted by Koçyiğit et al. in 1999.[22,23]
- Service utilisation: Frequency of primary care and emergency service use within the last year.
- Community Capacity: As defined by the World Health Organization—“a community’s ability to identify and prioritise its own health problems, organise resources, and generate sustainable solutions”—community capacity scales assess participation, community leadership, social networks and trust, resource mobilisation, problem-solving, and sustainability. These tools help evaluate the potential of local NGOs and community structures in promoting population well-being.[11,24]

In primary care information systems, individuals identified during clinical consultation as candidates for social prescribing should be referred to link workers, who then conduct preliminary interviews and administer planned assessment tools. Throughout this personalised process, standard codes indicating participation, refusal, or completion should be established to reflect the individual's status based on feedback. This allows referral and monitoring processes to be integrated into the electronic health record system. Outcome monitoring should be undertaken at 3, 6, and 12 months for individuals enrolled in social prescribing programmes. During these follow-up periods, the same assessment tools used at baseline should be re-administered to evaluate changes at both individual and community levels, with personal plans updated as needed. This approach ensures continuity and enables the measurable evaluation of intervention success within social prescribing initiatives.[25]

Adaptation to Türkiye – proposed model

According to TÜİK data, in 2024, older adults constituted 10.9% of the population, and 29.3% of the population was reported to be at risk of poverty or social exclusion.[26,27] In light of these statistics, it is clear that social isolation has become a public health issue in Türkiye, both due to the increasing proportion of older adults and the rising risk of social exclusion. In the current context, the proposed model is pioneering in terms of providing a roadmap that synthesizes global social prescribing practices with the unique cultural structure and advanced family medicine system dynamics of our country. For the implementation of a social prescribing model in Türkiye, Family Health Centres (FHCs), Healthy Life Centres, social service units, the close community contact of local governments, the persistence of neighbourhood solidarity culture, municipal senior centres, and a strong NGO ecosystem provide a ready foundation for transition. The comprehensive strengths, weaknesses, opportunities, and threats regarding this transition are detailed in Table 1.

Table 1. SWOT analysis for implementing social prescribing in Türkiye

Strengths	**Weaknesses**
-Widespread utilisation of primary care services in Türkiye, enabling broad population reach	-Absence of a nationally standardised social prescribing framework
-Strong social service structures and active NGOs within local governments	-Insufficient time for effective screening due to the current workload of family physicians
-Increasing need driven by the growing older population and those at risk of social exclusion	-Lack of an up-to-date community service inventory and financial uncertainty for new planning
-Existing community-based models such as Universities of the Third Age (U3A)	-Societal inequalities in health literacy, technology use, and digital competence
-Strong neighbourhood solidarity and community connectedness within the cultural context	-Lack of standardised training, supervision, and sustainable funding for link workers
Opportunities	**Threats**
-Strong potential to initiate rapid pilot programmes through collaboration between Family Health Centres, local governments, and NGOs	-Periodic shifts in policy priorities within local governments, leading to unpredictability
-Feasibility of developing digital social prescribing platforms inspired by global models	-Limited service diversity and geographic barriers in rural regions
-Growing older population and strengthening healthy ageing policies	-Potential challenges in obtaining explicit consent and ensuring data security under the Personal Data Protection Law
-Financial support opportunities from international organisations such as the EU, WHO, and UNDP	-Economic fluctuations affecting the budgets of local governments and NGOs
-Increasing volunteerism and the potential support offered by youth populations	-The potential impact of periodic shifts in strategic priorities within local administrations on the continuity of program implementation

In the proposed model, illustrated in Figure 1, a Social Prescribing Link Worker (SP-LW)—a social worker, psychologist, nurse, or gerontologist—would work in collaboration with FHCs. Following initial pilot applications, the employment of SP-LWs could be formalised by appointing social workers or allied health personnel (e.g., midwives and nurses) as civil servants, with their compensation provided directly from the Ministry of Health budget. Family physicians, as the first point of contact who know individuals closely, conduct biopsychosocial assessments and ensure continuity of follow-up, thus playing a key role in screening and referral. However, it is anticipated that the potential increase in the workload of family physicians will be one of the most challenging aspects of a pilot implementation. To address this and ensure feasibility, a serious reassessment and reduction of the maximum number of registered patients per family medicine unit must be considered as the most effective solution. The SP-LW, in turn, is essential for conducting in-depth interviews, preparing personalised plans, facilitating active transitions, and ensuring system-level traceability. The process consists of the following steps: brief loneliness screening (UCLA short form) → “what matters to you?” conversation → personalised plan → active linkage to the municipality/NGO service catalogue → follow-up at 3, 6, and 12 months. To measure effectiveness, the following may be used: WEMWBS, UCLA, EQ-5D, healthcare utilisation, medication adherence, and self-management indicators. Regarding information systems, the inclusion of “social prescription referral/participation” fields within software used by family physicians, hospital information systems, and the national e-Nabız platform would enable standardised data flow and allow referrals from all levels of the healthcare system. From a financing perspective, implementation could proceed through joint contributions from the Ministry of Health, the Ministry of Family and Social Services, local governments, NGOs, and project/grant mechanisms, in compliance with personal data protection regulations through explicit consent and data minimisation principles. While the foundational support of the Ministry of Health is indispensable for financial sustainability, keeping the spectrum of prescribed activities broad can significantly alleviate costs. In this regard, integrating the existing resources and budgets of local municipalities and NGOs into the activity catalogue will be highly effective.

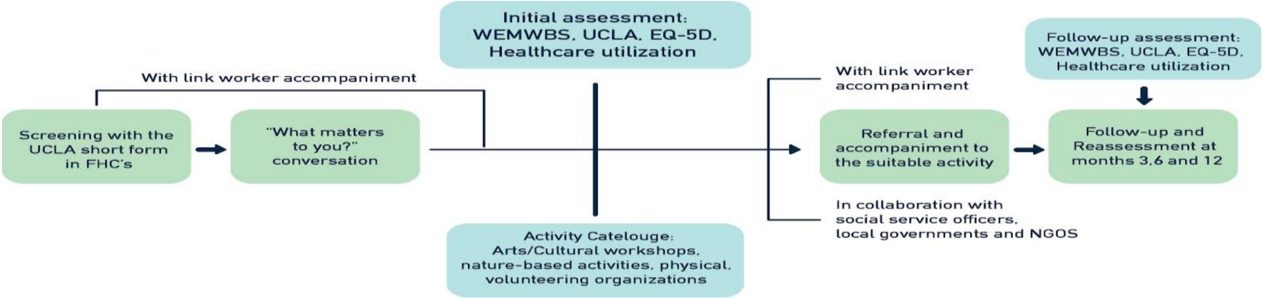

Figure 1. Simplified flowchart of the proposed model for Türkiye

*Abbreviations: FHC: Family Health Centre; SP-LW: Social Prescribing Link Worker; NGO: Non-Governmental Organisation; UCLA: University of California, Los Angeles Loneliness Scale; WEMWBS: Warwick-Edinburgh Mental Well-being Scale.

To ensure the model's generalizability and scalability across the country, a phased pilot approach is recommended. Existing provinces could be categorized into 5 to 7 distinct groups based on specific criteria such as healthcare utilisation rates, health literacy levels, and geographical access to health centres. The programme could initially launch in a representative pilot province or district selected from each group. Following a one-year implementation period, an evaluation committee would convene through sequential meetings to assess the programme's feasibility. This structured evaluation would allow for the continuous refinement of the model year by year and the gradual integration of new provinces from each group into the system.

Discussion

The findings of this narrative review indicate that social prescribing yields consistent results in reducing loneliness and isolation and improving well-being among older adults. In successful implementations, the human-centred role of the link worker, active transition support, and accessible micro-activities appear to be key determinants. At the policy level, a shared language, standardised measurement sets, and clear national/local frameworks emerge as essential components for effectiveness.

The Rotherham social prescribing pilot programme (2012–2014) in the United Kingdom—where most early studies on social prescribing have been conducted—supported 1,607 patients (over 86% aged 60+) through 31 services delivered by 24 community organisations. At 3–4 months post-intervention, 83% of participants showed improved well-being according to validated scales; inpatient admissions decreased by 21%, emergency department use by 20%, and outpatient appointments by 21%. A total cost reduction of £552,000 was estimated for the National Health Service, corresponding to a return of £0.50 for every £1 invested during the two-year pilot. Researchers anticipated that the return on investment would increase in the long term as chronic disease burden declined. To establish causal inferences regarding cost-effectiveness and healthcare utilisation, there is a clear need for new standardised, comparative studies with adequate sample sizes, similar to the Rotherham programme.[28] However, while the described results are promising, the observational nature of such pilot studies makes it difficult to draw definitive causal inferences. For example, the reported reduction in healthcare utilization may be influenced by factors such as concurrent health policy changes or seasonal variations, which could complicate the standardization of the results. Comparative studies with adequate control groups and larger sample sizes are required to establish a robust causal relationship regarding cost-effectiveness and healthcare utilization.

Social prescribing is not merely directing individuals to selected activities. It is an adaptable and multi-layered care model encompassing a wide range of interventions—from nature-based programmes to arts and cultural workshops, from physical activity to volunteering and community support groups. For example, a meta-analysis including six unique studies on “green social prescribing” demonstrated that nature-based interventions improve multiple dimensions of quality of life and represent an important modality for enhancing biopsychosocial well-being.[29]

Despite increasing interest and a growing number of recent studies, substantial research gaps remain in standardisation, scalability, and context-specific adaptation of social prescribing. Most existing studies have been conducted in high-income countries with established national frameworks and link worker infrastructures—particularly the United Kingdom and Ireland. Consequently, the evidence base largely comprises observational or programme-evaluation designs that are methodologically heterogeneous and have limited generalisability. On the other hand, a potential selection bias is noteworthy. Individuals enrolled in these programs are likely to have higher social motivation and further developed health literacy compared to the general elderly population, which would have a direct impact on the outcomes. Furthermore, the predominance of positive results in the literature points toward a potential publication bias, indicating the possibility that neutral or negative outcomes of social prescribing interventions may be underreported. Prospective or longitudinal studies evaluating the medium- and long-term effects of social prescribing on measurable outcomes—such as healthcare utilisation, treatment adherence, or cost-effectiveness—are notably scarce. Furthermore, the psychosocial outcomes of social prescribing, particularly its effects on loneliness, sense of purpose, and subjective well-being, have been minimally explored in non-Western cultural and healthcare contexts.

In Türkiye, rapid pilot implementation is feasible through existing collaborations among family medicine, local governments, social networks, and municipalities–NGO partnerships. “University of the Third Age (U3A)” programmes led by universities and municipalities—successful examples of cooperation among public institutions, local administrations, volunteer academics, NGOs, and older adults—have demonstrated their value in reducing social isolation. Building on this model, similar success could be achieved by effectively utilising accessible community resources for eligible individuals within the scope of social prescribing. Moreover, integrating this system—which functions as a supportive community where older adults can share the experiences they have accumulated throughout their lives—would enhance measurable social contact opportunities and support the scalability of the programme. For primary care professionals, the critical step is to routinise isolation screening and incorporate a social component into the prescription.

As observed globally, digital pathways are expected to play an increasingly important role in scaling social prescribing in Türkiye. However, the effectiveness of “Digital Social

Prescribing" for older adults may remain limited due to digital literacy barriers and inequalities in access to technology. Uncertainty regarding funding mechanisms, sustainability of the link worker workforce, adequacy of intersectoral coordination, and the absence of fully established standard measurement tools also pose significant implementation barriers. Nonetheless, anticipated challenges—such as outdated service inventories, transportation issues, sustainable financing, and digital inequality—may be addressed through digital service catalogues, neighbourhood-based micro-activities, volunteer companions, outcome-based contracting, and hybrid (online–face-to-face) delivery options.[30]

In conclusion, in later life, social isolation is a health risk with biological correlates and should be approached in primary care as a condition that must be identified, monitored, and managed. Social prescribing—through its components of the link worker, personalised plan, and active transition—offers a potentially effective and feasible approach that could reconnect older adults to the person–community–activity triangle.

International experience demonstrates that, when supported by standardisation and measurement, social prescribing may have the potential to yield sustained improvements in loneliness and well-being indicators. In Türkiye, rapidly implementable pilot models along the family medicine–social services–municipality–NGO pathway appear to be within reach. In the short term (12–24 months), reductions in the sense of loneliness and improvements in general well-being are predicted; in the medium term, a decrease in inappropriate demand and repeat presentations is potentially anticipated. With this structured model, a social prescribing application proposal integrated into Turkiye's existing health system is presented for the first time. The next step is for primary care to advance toward the goal of "going beyond the medical prescription", implementing this system through shared measurement tools, small but determined pilot initiatives, strong collaborations, and higher-quality research.

Ethical Considerations: Since this study is a narrative review and does not involve any human or animal subjects, primary data collection, or experimental procedures, institutional ethical review board approval is not required.

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

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