Online ISSN 1308-531X

Turkish Journal of Family Practice

Volume 30 | Issue 1 | March 2026

Published by Turkish Association of Family Physicians
www.turkjfampract.org

Turkish Journal of Family Practice

Volume **30** | *Issue* **1** | *March* **2026**

Online ISSN 1308-531X

Turkish Journal of Family Practice

Official abbreviation: Turk J Fam Pract

ISSN (Online): 1308-531X

DOI Prefix: 10.54308

Owner
Owner on behalf of the Turkish Association of Family Physicians
Prof. Dr. Güzin Zeren Öztürk (President)

Publication Type
International peer-reviewed journal

Publication Frequency and Language
Quarterly (March, June, September, December), English

Abstracting and Indexing
Turkish Journal of Family Practice is abstracted and indexed in TR-Index, DOAJ, EBSCOhost, Gale OneFile.

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Publisher
Turkish Association of Family Physicians

Publisher Address
Hacettepe Mah. Talatpaşa Bulvarı No: 113/15, 06230, Altındağ/Ankara, Türkiye
Phone: +90 530 642 92 43
E-mail: tahud@tahud.org.tr
Web: www.tahud.org.tr

Publishing Services
Akdema Informatics and Publishing
Address: Kızılay Mah. Gazi Mustafa Kemal Bulvarı No: 23/8 06420 Çankaya/Ankara, Türkiye
Certificate number: 52576
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Editorial

Dear Colleagues,

We are pleased to present Volume 30, Issue 1 of the Turkish Journal of Family Practice. This issue brings together valuable contributions spanning preventive care, chronic disease management, women's health, behavioral health, elderly care, and primary care practice, reflecting the broad and evolving scope of family medicine. We hope these articles will support both clinical practice and academic development in primary care.

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

Turk J Fam Pract 2026;30(1):1-10
DOI: 10.54308/TJFP.2026.814

Research Article

Adaptation of the Gosnell Pressure Ulcer Risk Assessment Scale to Turkish: validity and reliability study

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ABSTRACT

Objective: This study aimed to adapt the Gosnell Pressure Ulcer Risk Assessment Scale into Turkish and to evaluate its linguistic validity, content validity, inter-observer reliability, and construct validity through exploratory and confirmatory factor analyses.

Methods: This methodological study was conducted with 150 patients treated in a palliative care unit over one year. The adaptation process consisted of two stages: linguistic validation and assessment of validity and reliability. Linguistic validity was assessed using the translation-back translation method and expert reviews. Content validity was evaluated using the Lawshe technique with input from five experts from the Department of Family Medicine. Reliability was assessed by measuring inter-observer agreement using the Kappa coefficient, Cramer's V coefficient, and Spearman correlation analysis. To evaluate construct validity, Exploratory Factor Analysis (EFA) using Principal Component Analysis and Confirmatory Factor Analysis (CFA) using the Diagonally Weighted Least Squares (DWLS) estimation method were conducted.

Results: A total of 150 participants were included, with a mean age of 74.74 years, and 58% were female. The Content Validity Ratio (CVR) for each item was calculated as 1. Regarding reliability, the Kappa coefficient for the Mental Status item was 0.903, and Cramer's V coefficient was 0.896; for the Continence, Mobility, and Activity items, both the Kappa and Cramer's V coefficients were 1. For the Nutrition item, the Kappa coefficient was 0.840, and Cramer's V coefficient was 0.862. A significant and positive correlation was found between the total scores of the two observers ($p<0.001$). For construct validity, the EFA revealed a single-factor structure explaining 62.039% of the total variance, with a Kaiser-Meyer-Olkin (KMO) value of 0.783 and Bartlett's test of sphericity being significant ($\chi^2(10)=383.266$, $p<0.001$). The subsequent CFA showed a marginal model fit ($\chi^2/df=5.627$), while all factor loadings were statistically significant ($p<0.001$). The Nutrition item demonstrated a relatively lower loading (0.457), suggesting possible cultural or contextual differences in the Turkish sample.

Conclusion: The Turkish version of the Gosnell Pressure Ulcer Risk Assessment Scale was found to be a valid and reliable tool for use by healthcare professionals in Türkiye. The scale showed acceptable content and construct validity.

Keywords: Pressure ulcer, risk assessment scale, validity, reliability, exploratory factor analysis, confirmatory factor analysis

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Received: 27.12.2024 **Accepted:** 15.01.2026 **Published:** 29.03.2026

Introduction

Pressure ulcers are a common and serious complication often resulting from immobility and comorbidities.[1] These ulcers typically develop in areas where bones exert pressure on hard surfaces such as the sacrum, heels, ischium, and trochanter in adults, and the occipital region in children due to factors such as reduced immune response, hormonal changes, and decreased blood flow.[2-6]

As defined in the 2019 Clinical Practice Guideline on the Prevention and Treatment of Pressure Ulcers/Injuries, a pressure ulcer is localized damage to the skin or underlying tissue resulting from sustained pressure, or a combination of pressure and shear forces.[7] This condition places significant financial burdens on healthcare systems and patients, with annual treatment costs reaching $17.8 billion in the United States alone. In Türkiye, around 300,000 patients require pressure ulcer treatment each year, leading to an economic impact of approximately $1.425 billion.[8,9]

The most effective way to mitigate the morbidity, mortality, and financial burden associated with pressure ulcers is prevention, including risk assessment, skin care, use of supportive surfaces, and patient education.[10] Risk assessment scales, such as the Norton, Braden, Gosnell, and Waterlow scales, are widely used to identify patients at risk.[2]

The Norton Scale, developed in 1962, rates five parameters to identify risk, while the Braden Scale includes six subscales and is commonly used with a cut-off score of 16. The Waterlow Scale, based on the Norton Scale, assesses eight parameters, including body mass index and medication use. While the Braden, Norton, and Waterlow scales have undergone Turkish validity and reliability studies, the Gosnell Pressure Ulcer Scale has not yet been validated in Turkish.[2,11-16]

Therefore, the aim of this study is to translate and culturally adapt the Gosnell Pressure Ulcer Scale into Turkish and to evaluate its reliability and validity.

Methods

Type of research

This methodological study aimed to adapt the Gosnell Pressure Ulcer Risk Assessment Scale into Turkish and to evaluate its validity and reliability. The study was conducted in the Palliative Care Unit of Kütahya University of Health Sciences Evliya Çelebi Training and Research Hospital, with data collected between October 2022 and November 2023. Eligible patients participated voluntarily.

Population and sample

For methodological studies, a sample size at least five times greater than the number of scale items is recommended. Thus, with five items on the scale, the minimum required sample size was 25 participants. However, to enhance statistical power, the sample size was increased to 150 patients.

Inclusion criteria

- Voluntary participation
- Aged 18 years or older
- Presence of a pressure ulcer (excluding Stage 4) or absence of pressure ulcer development
- Currently receiving treatment in the palliative care unit
- Hospitalized for more than 14 days

Data collection tools

Data were gathered using a Sociodemographic Questionnaire and the Gosnell Pressure Ulcer Risk Assessment Scale.

- Sociodemographic Form: This form, developed based on the relevant literature, consists of two sections: (1) basic demographics (e.g., age,

gender, chronic illness) and (2) pressure ulcer-related data (e.g., stage, location).[7,17-19]

- Gosnell Pressure Ulcer Risk Assessment Scale: Developed by Davina J. Gosnell in 1973 and revised in 1989, this scale comprises five primary items: mental status (5 points), continence, mobility, activity (4 points each), and nutrition (3 points). Additional factors such as vital signs and skin appearance, while included in the assessment, do not affect the total score, which ranges from 5 to 20. Patients scoring 16 or above are considered at high risk for pressure ulcers.[2,17-19]

Language validity study

The scale was translated into Turkish by three independent English-proficient individuals. The Turkish version was then reviewed by a Turkish language expert for accuracy. Following revisions, the scale was back-translated into English. No semantic discrepancies were identified. The final version was confirmed by three academic experts specializing in pressure ulcers.

Validity study of the scale

To assess content validity, the Lawshe method was employed. Five experts evaluated the scale items using a three-point Likert scale:

1. The item is essential and must be included.
2. The item is useful but may require revision.
3. The item is not necessary.

The Content Validity Ratio (CVR) for each item was calculated using the following formula:

$$CVR=[G / (N / 2)] - 1$$

Where G is the number of experts rating the item as "essential," and N is the total number of experts. Items with a CVR of 0 or less were to be removed.[20] Since no items in this study had a CVR value of 0 or less, none were excluded.

Items with a positive CVR were compared to the minimum required CVR value, which was determined to be 0.99 at a significance level of $\alpha=0.05$ for a panel of 5–7 experts.

Reliability study of the scale

To assess reliability, the scale was administered independently by two observers for each patient. Inter-observer agreement was analyzed using the Kappa coefficient and Cramer's V.

- A Kappa value between 0.81 and 1.00 indicates "very good agreement,"
- 0.61–0.80 "good agreement,"
- 0.41–0.60 "moderate agreement,"
- 0.21–0.40 "fair agreement,"
- 0–0.20 "poor agreement,"
- <0 "no agreement."

Cramer's V (υ) ranges from 0 to 1:

- $\upsilon=0$ indicates no relationship,
- $\upsilon=1$ indicates perfect relationship,
- $\upsilon \rightarrow 0$ indicates a weak relationship,
- $\upsilon \rightarrow 1$ indicates a strong relationship.[20]

Data analysis

Statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 29.0 (IBM Corp., Armonk, NY, USA). Normally distributed numerical variables between two groups were analyzed using the Independent Samples t-test. Relationships between non-normally distributed numerical variables were assessed using Spearman's correlation analysis. Inter-observer agreement was evaluated using Kappa coefficients, and Cramer's V was used to assess the strength of association. The level of statistical significance was set at $p<0.05$.

In addition, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to assess the construct validity of the scale. The EFA was performed using principal component analysis with Varimax rotation, and the suitability of the data for factor analysis was confirmed with

the KMO measure and Bartlett's test. CFA was carried out using the Diagonally Weighted Least Squares (DWLS) method due to the ordinal nature of the data.

Ethical aspect of the research

Ethical approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Kütahya University of Health Sciences, Faculty of Medicine (Approval No.: 2022/09-13, Date: 14.09.2022).

Results

A total of 150 patients were included in the study. The mean age of the participants was 74.7 ± 13.9 years, and 58% were female. Cardiovascular disease was the most prevalent chronic condition, reported by 64% of the patients. Prior to hospitalization, 55.3% of the patients had used air mattresses, and 98% were dependent on diapers. The sociodemographic characteristics of the study population are presented in Table 1.

The distribution of the patients' nutritional routes is shown in Table 2.

Pressure ulcers were most commonly observed on the sacrum. Notably, 2% of the patients did not develop any pressure ulcers during their hospital stay. The localization of pressure ulcers is detailed in Table 3.

Validity findings of the scale

The content validity of the Turkish version of the Gosnell Pressure Ulcer Risk Assessment Scale was assessed using the Lawshe method. Five experts evaluated each of the five items, and all items achieved a Content Validity Ratio (CVR) of 1.00, exceeding the minimum acceptable value of 0.99. The Content Validity Index (CVI), calculated as the average of the CVR values, was also above the recommended threshold of 0.67, indicating excellent content validity.

Table 1. Sociodemographic characteristics and comorbidities

	n (%)
Age (years)	74.7 ± 13.9*
Gender	
Female	87 (58)
Male	63 (42)
Comorbidities	
Cardiovascular Disease	96 (64)
Neurological Disease	89 (59.3)
Diabetes Mellitus	65 (43.3)
Malignancy	34 (22.7)
Respiratory Diseases	30 (20)
Renal Diseases	14 (9.3)
Liver Diseases	8 (5.3)
Other Diseases**	33 (22)
Use of Air Mattress	83 (55.3)

*Mean±SD; **Urological diseases, musculoskeletal diseases.

Table 2. Distribution by nutritional route

	n (%)
Oral	70 (46.7)
Percutaneous Endoscopic Gastrostomy	42 (28)
Nasogastric Tube	35 (23.3)
Parenteral	3 (2)

Table 3. Localization of pressure ulcers

	n (%)
Sacrum	73 (48.7)
Spine	17 (11.3)
Coccyx	12 (8)
Right Trochanter	9 (6)
Right Ischial Tuberosity	8 (5.3)
Left Ischial Tuberosity	4 (2.7)
Right Lower Leg	4 (2.7)
Left Heel	4 (2.7)
Right Heel	3 (2)
Right Scapula	2 (1.3)
Right Iliac Crest	1 (0.7)
Left Iliac Crest	1 (0.7)
Left Knee	1 (0.7)
Left Lower Leg	1 (0.7)
Right Foot Toes	1 (0.7)

Construct validity was then examined using Exploratory Factor Analysis (EFA). The Kaiser–Meyer–Olkin (KMO) value of 0.783 and Bartlett's test of sphericity ($\chi^2(10)=383.266$, $p<0.001$) confirmed that the data were suitable for factor analysis. The EFA identified a single-factor structure that explained 62.0% of the total variance, as detailed in Table 4, which presents the factor loadings for each item and supports the unidimensional structure of the scale.

A clear inflection was observed after the first component in the scree plot (Figure 1), confirming that the scale has a unidimensional structure.

A confirmatory factor analysis (CFA) was conducted to verify the one-factor structure obtained from the EFA. The analysis used the Diagonally Weighted Least Squares (DWLS) estimation method. The model demonstrated acceptable fit ($\chi^2(5)=28.137$, $p<0.001$). All standardized factor loadings were statistically significant ($p<0.001$) and ranged from 0.457 to 1.181, confirming that all items contributed meaningfully to the latent construct. The model's path diagram is shown in Figure 2, and detailed loadings and fit indices are presented in Table 5.

Table 4. Exploratory factor analysis results for the Gosnell pressure ulcer risk assessment scale

Item	Factor Loading
Mental Status	0.766
Continence	0.886
Mobility	0.874
Activity	0.893
Nutrition	0.413

KMO=0.783, Bartlett's $\chi^2(10)=383.266$, $p<0.001$
Explained Variance=62.0%

Reliability findings of the scale

The Gosnell Pressure Ulcer Risk Assessment Scale includes five core items: Mental Status, Continence, Mobility, Activity, and Nutrition. Each item is evaluated according to specific response

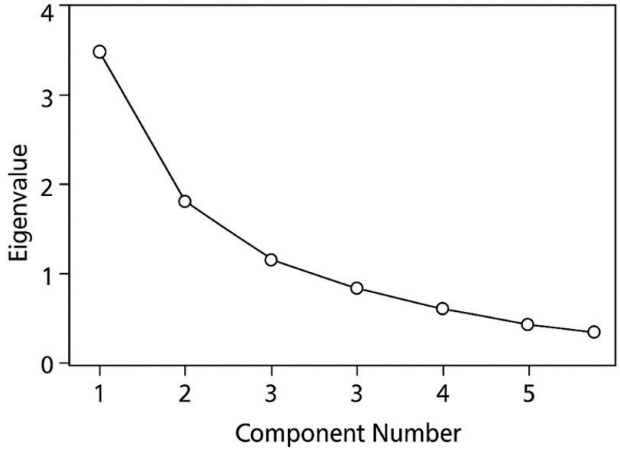

Figure 1. Scree plot showing the one-factor structure of the Turkish version of the Gosnell Scale

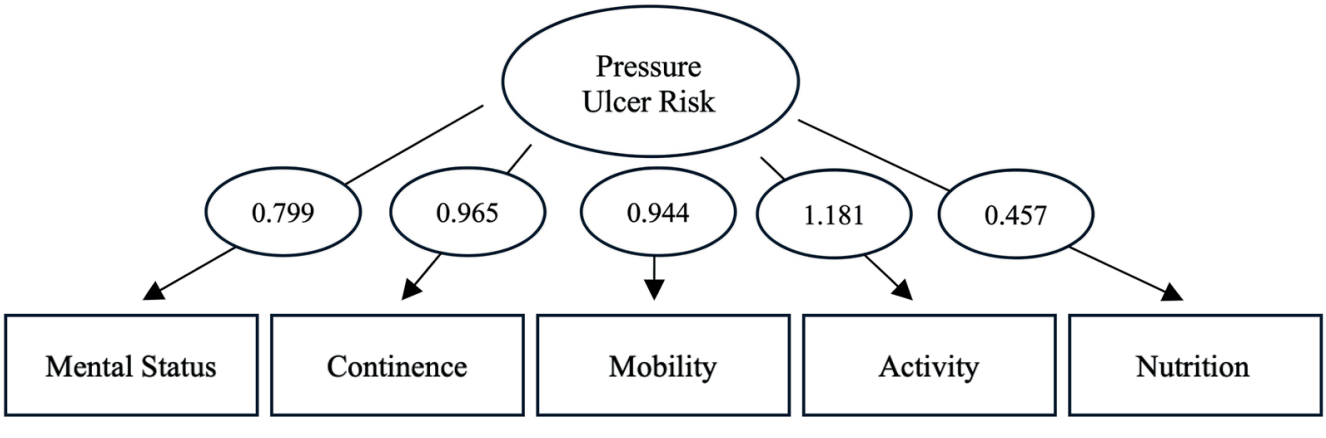

Figure 2. Path diagram of the one-factor model of the Turkish version of the Gosnell Scale

Table 5. Confirmatory factor analysis standardized loadings and fit indices

Item	Standardized Loading
Mental Status	0.799
Continence	0.965
Mobility	0.944
Activity	1.181
Nutrition	0.457

Model Fit Indices: $\chi^2(5)=28.137$, $p<0.001$.
Estimation Method: DWLS.

options that reflect the patient's overall risk profile. The agreement between the two observers for these items was examined, and the results are summarized in Table 6.

The inter-rater reliability analysis revealed a high degree of agreement between observers, as evidenced by Kappa coefficients ranging from 0.840 to 1.000 and strong Cramer's V associations across all items. Statistical significance was confirmed for all findings ($p<0.001$, Chi-square test).

The internal consistency of the Turkish version of the Gosnell Pressure Ulcer Risk Assessment Scale was then examined using Cronbach's alpha. The coefficient for the overall scale was 0.817, reflecting a high level of internal consistency. Item–total correlations ranged from 0.318 to 0.757, showing that all items contributed meaningfully to the overall construct, although the Nutrition item exhibited a relatively lower correlation. The stability of the scale's internal structure was further supported by the fact that the removal of any item did not notably increase the alpha value, as shown in Table 7.

Table 6. Inter-observer agreement for all items and response options of the Gosnell Scale

Item	Response Options	Observer 1 (n, %)	Observer 2 (n, %)	Kappa	Cramer's V	p-value*
Mental Status	Alert	34 (87.2)	34 (87.2)	0.903	0.896	<0.001
	Apathetic	20 (100)	20 (100)			
	Confused	24 (100)	24 (100)			
	Stuporous	51 (96.2)	51 (96.2)			
	Unconscious	10 (71.4)	10 (71.4)			
Continence	Fully Controlled	9 (100)	9 (100)	1.000	1.000	<0.001
	Usually Controlled	7 (100)	7 (100)			
	Minimally Controlled	19 (100)	19 (100)			
	Absence of Control	115 (100)	115 (100)			
Mobility	Mobile	8 (100)	8 (100)	1.000	1.000	<0.001
	Slightly Limited	18 (100)	18 (100)			
	Very Limited	38 (100)	38 (100)			
	Immobile	86 (100)	86 (100)			
Activity	Ambulatory	7 (100)	7 (100)	1.000	1.000	<0.001
	Walks with Assistance	9 (100)	9 (100)			
	Chairfast	15 (100)	15 (100)			
	Bedfast	119 (100)	119 (100)			
Nutrition	Good	28 (71.8)	28 (71.8)	0.840	0.862	<0.001
	Fair	68 (94.4)	68 (94.4)			
	Poor	39 (100)	39 (100)			

*Chi-square test.

Table 7. Item-total correlations and Cronbach's alpha values for the Turkish version of the Gosnell Scale (n=150)

Item	Corrected item-total correlation	Cronbach's α if Item Deleted
Mental Status	0.639	0.804
Continence	0.752	0.744
Mobility	0.723	0.749
Activity	0.757	0.747
Nutrition	0.318	0.849
Overall scale (5 items)	—	α=0.817

Table 8. Correlation of total scores

	Total Score (1)	Total Score (2)
Spearman's rho	1.000	0.987
p-value	-	<0.001

Spearman correlation analysis between total scores of the two observers.

Correlation analysis of total scores revealed a positive and significant relationship between the scores of the first and second observers ($p<0.001$). Table 8 presents the correlation analysis of the total scores on the Gosnell scale between observers.

Discussion

Various methods are employed to assess whether the linguistic validity of a scale accurately reflects the original version. One of the most utilized approaches is the traditional method, which consists of three stages. The first stage involves translating the scale from the source language to the target language, followed by back-translation into the original language. In the final stage, both translations are reviewed by experts and tested on a sample group to ensure clarity and accuracy.[21,22] In our study, the traditional method was adopted to establish linguistic validity. Language experts carefully reviewed each stage, and necessary revisions were made.

To assess the appropriateness, representativeness, and cultural relevance of the scale and its items, content validity was evaluated using expert assessments and the Lawshe method. Five experts rated each item using a three-point scale, and the Content Validity Ratio (CVR) was calculated for each item. Items with positive CVR values were compared to the minimum required CVR values listed in the reference table, based on the number of experts and a significance level of $\alpha=0.05$. For 5–7 experts, the minimum acceptable CVR value is 0.99. In this study, all items achieved a CVR of 1.00, indicating their appropriateness, and no items were excluded. Subsequently, the Content Validity Index (CVI) for the overall scale was calculated and found to exceed 0.67, which was statistically significant.[20,23]

Beyond content validity, the construct validity of the Turkish version was also evaluated. Exploratory and confirmatory factor analyses were conducted, revealing a strong unidimensional structure. The EFA accounted for over 62% of the total variance, and CFA demonstrated a good model fit with significant factor loadings. These results support the internal structure and cultural adaptability of the scale.

The reliability of a scale can be evaluated using various methods. In this study, inter-observer reliability was assessed to determine the consistency of the Gosnell Pressure Ulcer Risk Assessment Scale. The scale was administered independently by two observers within 24 hours of the patient's admission. The Kappa coefficient was used to evaluate inter-observer agreement, while Cramer's V coefficient assessed the strength of associations. In addition, the Spearman correlation coefficient was calculated to assess the correlation between the total scores of the two observers. A strong and statistically significant correlation ($r=0.987$, $p<0.001$) supports the consistency of the scale when used by different raters.

As shown in the analyses presented in Tables 6 and Table 7, the Kappa coefficient indicated excellent agreement across all items, and Cramer's V coefficient demonstrated strong associations. Furthermore, Spearman correlation analysis of total scores revealed a positive and statistically significant correlation between the two observers. These findings confirm the reliability of the scale based on the conducted statistical analyses.

Although the Gosnell Pressure Ulcer Risk Assessment Scale has been frequently utilized in clinical settings, its cross-cultural adaptation and validation studies remain limited in the international literature. To the best of our knowledge, the only publication addressing the validity of the Gosnell scale in a non-English context is a Spanish-language study titled "Validación de dos escalas de valoración del riesgo de úlceras por presión: Gosnell y Nova-4," published in Enfermería Viva in 1999. This prospective study compared the original Gosnell scale with a modified version of the Nova-4 scale in four hospital units, focusing on predictive validity, sensitivity, and specificity.[24] The authors reported that the Gosnell scale demonstrated acceptable predictive value but relatively low specificity, ultimately recommending the alternative scale for routine use.

It is important to note, however, that the aforementioned study did not conduct a formal linguistic adaptation process for the Gosnell scale, nor did it evaluate the instrument using content validity indices or inter-rater reliability statistics. In contrast, the present study represents the first known effort to adapt the Gosnell scale into Turkish through a systematic methodological process, including forward and back translation, expert evaluation using the Lawshe technique, and detailed assessment of inter-observer agreement through the Kappa coefficient and Cramer's V.

The findings of our study demonstrate that all items on the Turkish version of the scale met the necessary criteria for content validity, and inter-observer agreement across subdomains was consistently high. Compared with the limited existing literature, these results contribute original evidence regarding the scale's applicability within a different linguistic and cultural context and offer a more comprehensive perspective on its measurement properties.

Conclusion

This study evaluated the Turkish adaptation, validity, and reliability of the Gosnell Pressure Ulcer Risk Assessment Scale, originally developed by Davina J. Gosnell. Statistical analyses confirmed that the scale is both reliable and valid, supporting its use by healthcare professionals in Türkiye for assessing pressure ulcer risk.

Future research may explore the application of this scale in diverse healthcare settings and populations. Longitudinal studies are also needed to deepen our understanding of risk factors and preventive strategies for pressure ulcers. Such efforts would contribute to the development of more effective prevention and management approaches. Additionally, comparative clinical studies evaluating this scale against other pressure ulcer risk assessment tools could offer further insights and enrich the literature in this field.

One limitation of this study is the advanced age of the participants, which stems from the fact that the study was conducted in a palliative care unit. This factor may, albeit to a limited extent, influence the generalizability of the findings to other age groups and healthcare settings.

Furthermore, both exploratory and confirmatory factor analyses confirmed the unidimensional construct validity of the Turkish version of the Gosnell Pressure Ulcer Risk Assessment Scale. These results offer a solid empirical foundation supporting the use of the scale in Turkish clinical settings.

This study represents a notable contribution to the early detection and prevention of pressure ulcers, providing Turkish healthcare professionals with a validated and reliable tool. The findings underscore the importance of a multidisciplinary approach in pressure ulcer management and highlight the value of standardized assessment tools in enhancing healthcare outcomes.

Ethical approval

Ethical approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Kütahya University of Health Sciences Faculty of Medicine (date: 14.09.2022, number: 2022/09-13). Written informed consent was obtained from the participants or their legal representatives.

Author contribution

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

Source of funding

The authors declare that the study received no funding.

Conflict of interest

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

References

1. Anders J, Heinemann A, Leffmann C, Leutenegger M, Pröfener F, von Renteln-Kruse W. Decubitus ulcers: pathophysiology and primary prevention. Dtsch Arztebl Int. 2010;107(21):371-381; quiz 382. **[Crossref]**
2. Jalali R, Rezaie M. Predicting pressure ulcer risk: comparing the predictive validity of 4 scales. Adv Skin Wound Care. 2005;18(2):92-97. **[Crossref]**
3. Reid J, Morison M. Classification of pressure sore severity. Nurs Times. 1994;90(20):46-50.
4. Hajhosseini B, Longaker MT, Gurtner GC. Pressure injury. Ann Surg. 2020;271(4):671-679. **[Crossref]**
5. Jaul E, Barron J, Rosenzweig JP, Menczel J. An overview of co-morbidities and the development of pressure ulcers among older adults. BMC Geriatr. 2018;18(1):305. **[Crossref]**
6. Jaul E. Assessment and management of pressure ulcers in the elderly: current strategies. Drugs Aging. 2010;27(4):311-325. **[Crossref]**
7. Kottner J, Cuddigan J, Carville K, et al. Prevention and treatment of pressure ulcers/injuries: The protocol for the second update of the international Clinical Practice Guideline 2019. J Tissue Viability. 2019;28(2):51-58. **[Crossref]**
8. Bates-Jensen BM, Cheng J. Quality of care. Pressure ulcers in the aging population: a guide for clinicians. In: Thomas DR, Compton GA, editors. Totowa: Humana Press; 2014: 177-212.
9. Gencer ZE, Ünal E, Özkan Ö. Basınç ülserleri tedavi maliyetleri etkililik analizi: konvansiyonel ve modern yara bakım tedavi maliyetlerinin karşılaştırılması. Akd Tıp D. 2019;5(2):201-208.
10. Pancorbo-Hidalgo PL, Garcia-Fernandez FP, Lopez-Medina IM, Alvarez-Nieto C. Risk assessment scales for pressure ulcer prevention: a systematic review. J Adv Nurs. 2006;54(1):94-110. **[Crossref]**
11. Norton D, Exton-Smith AN, McLaren R. An investigation of geriatric nursing problems in hospital. London: Churchill Livingstone; 1962.
12. Bergstrom N, Braden BJ, Laguzza A, Holman V. The braden scale for predicting pressure sore risk. Nurs Res. 1987;36(4):205-210.
13. Waterlow J. Pressure sores: a risk assessment card. Nurs Times. 1985;81(48):49-55.
14. Oğuz S, Olgun N. Braden Ölçeği ile hastaların risklerinin belirlenmesi ve planlı hemşirelik bakımının bası yaralarının önlenmesindeki etkinliğinin saptanması. Hemşirelik Forumu Derg. 1998;3(1):131-135.
15. Pınar R, Oğuz S. Norton ve Braden bası yarası değerlendirme ölçeklerinin yatağa bağımlı aynı hasta grubunda güvenirlik ve geçerliliklerinin sınanması. VI. Ulusal Hemşirelik Kongresi; 1998.

16. Avşar P, Karadağ A. Waterlow Basınç Ülseri Risk Değerlendirme Ölçeği'nin Türkçeye uyarlanması, geçerlik-güvenirlik çalışması. HUHEMFAD. 2016;3(3):1-15.

17. Gosnell DJ. Pressure sore risk assessment: a critique. Part I. The Gosnell scale. Decubitus. 1989;2(3):32-38.

18. Gosnell DJ. Pressure sore risk assessment. Part II. Analysis of risk factors. Decubitus. 1989;2(3):40-43.

19. Gosnell DJ. Gosnell pressure sore risk assessment instrument revision. J Enterostomal Ther. 1989;16(6):272. **[Crossref]**

20. Alpar R. Spor sağlık ve eğitim bilimlerinden örneklerle uygulamalı istatistik ve geçerlik-güvenirlik: SPSS'de çözümleme adımları ile birlikte. Ankara: Detay Yayıncılık; 2022: 527-638.

21. Akman Ö, Ecevit Alpar Ş. Suriadi ve Sanada basınç yarası risk değerlendirme ölçeğinin Türkçe geçerlik ve güvenirliği. Hemşirelikte Araştırma Geliştirme Dergisi. 2014;16(1):1-11.

22. Hancer M. Ölçeklerin yazım dilinden başka bir dile çevirileri ve kullanılan değişik yaklaşımlar. Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi. 2003;6(10):47-59.

23. Yeşilyurt S, Çapraz C. Ölçek geliştirme çalışmalarında kullanılan kapsam geçerliği için bir yol haritası. Erzincan Üniversitesi Eğitim Fakültesi Dergisi. 2018;20(1):251-264. **[Crossref]**

24. Celdrán-Mañas M, Rueda-Lara MA, Gálvez-Toro A, Martínez-García R, Abizanda-Soler P. Validación de dos escalas de valoración del riesgo de úlceras por presión: Gosnell y Nova-4. Enfermería Viva. 1999;5(15):13-21.

Turk J Fam Pract 2026;30(1):11-20
DOI: 10.54308/TJFP.2026.918

Research Article

Smoking cessation behaviors of patients who refer to smoking cessation clinics affiliated to family medicine departments

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ABSTRACT

Objective: Tobacco use continues to be one of the most important causes of preventable death and diseases globally. The present study was designed to evaluate the smoking cessation behaviors of patients who referred to smoking cessation clinics operated by family medicine departments at different universities.

Methods: The present study was conducted as a cross-sectional study with the participation of 611 individuals who referred to smoking cessation clinics operated by family medicine departments at Bolu Abant Izzet Baysal University Faculty of Medicine Training and Research Hospital, Duzce University Faculty of Medicine Hospital, Suleyman Demirel University Faculty of Medicine Hospital, Balıkesir Atatürk City Hospital and who agreed to participate in the study. The survey form includes questions about the patients' demographic information and smoking habits. The participants who agreed to participate in the study were contacted by phone six months later to learn about their smoking status along with the treatment they received. The data were analyzed using IBM SPSS Statistics 20, with a significance level set at $p<0.05$.

Results: The study was completed with 611 individuals. Of the participants, 57.9% (n=354) were male, while 42.1% (n=257) were female. The primary reason for starting smoking was reported as friends by 63.7% (n=289). While the mean age of starting smoking was found as 19.69±6.91 (min:10-max:50) years in participants who stated that their reason for starting smoking was friends. It was found that 28.8% (n=176) of the participants who referred to the clinic had not previously attempted to quit smoking. Of the participants who had previously attempted to quit smoking, 39.7% (n=173) had decided to refer to the clinic after their first try. It was found that 20% (n=122) of the participants had previously received professional support at least once. At the end of 6 months, it was found that while 72.2% (n=439) of the participants had received pharmacotherapy, 27.8% (n=170) stated that they preferred non-pharmacological treatment. It was also found that 26.2% (n=160) of

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Received: 08.10.2025 **Accepted:** 09.12.2025 **Published:** 29.03.2026

the participants had completely stopped smoking at the end of six months. The rate of smoking cessation was significantly higher in participants who had received pharmacotherapy (p=0.01).

Conclusion: Smoking cessation programs should be addressed in a multidimensional manner. Smoking cessation clinics operated by family medicine departments offer a holistic approach that evaluates individuals not only biomedically, but also with psychosocial, behavioral and environmental aspects.

Keywords: Family medicine, smokers, smoking cessation, treatment

Introduction

Tobacco use continues to be one of the most important causes of preventable death and diseases globally. According to the World Health Organization data, each year approximately more than 8 million people die due to tobacco-related diseases.[1] Tobacco and tobacco product use is a major risk factor for cardiovascular disease, chronic obstructive pulmonary disease and many types of cancer.[1]

Tobacco use is a significant public health issue in Türkiye. In a study conducted, it was found that 30.7% of the population aged 15 and older used tobacco products, with the rate being 41.9% in men and 19.6% in women.[2] These rates show indicate that tobacco use is widespread throughout the society, creating a serious burden on both the health system and individuals.

Türkiye signed the World Health Organization Framework Convention on Tobacco Control in 2004, making an international commitment to combat tobacco use. Following this process, "National Tobacco Control Program" was implemented in 2008, and policies such as smoke-free zone laws, package warnings and advertising bans were put into effect.[3] In addition, Republic of Türkiye Ministry of Health established free "Smoking Cessation Clinics" throughout the country in 2010s. These clinics aimed to increase smoking cessation rates by offering pharmacological treatments, psychosocial support and counseling services.[4]

Public health programs and physical counseling increase smoking cessation rates, but long-term relapse rates may remain high.[5] Factors determining success include the combined use of behavioral therapy and pharmacological treatment, the length of follow-up, patient motivation and social support system.[6]

In studies conducted in our country, the success rates of those who refer to smoking cessation clinics range from 11% to 47.5% between 6 months to 1 year. This variability depends on many factors such as the type of treatment, patient profile and frequency of follow-up.[7,8]

Family medicine clinics provide services and health education to all patients, regardless of age or gender. Family physicians not only treat their patients but also aim to prevent disease before it occurs. Preventive care is a fundamental component of family medicine and plays a crucial role in promoting both individual and community health. Through patient education, family physicians seek to prevent or minimize potential health problems. They are responsible for health promotion and education for both the individuals they serve and the broader community. The ultimate goal of family physicians is to enhance the health status of each individual and contribute to a healthier society. To achieve this, they provide patients with information on all health-related matters, enabling them to take an active role in their own health and make informed decisions. They conduct necessary health checks, aim to detect diseases at an early stage, and implement

preventive measures to reduce the risk and impact of illnesses.[9]

Family medicine and primary healthcare services have a strategically important role in cigarette smoking cessation services. This is because family medicine has strong aspects such as easy accessibility, continuity, a holistic approach and a relationship of trust between patients and physicians.[10] Smoking cessation initiatives carried out at the primary care level are highly advantageous in terms of both effectiveness and cost. In addition, family medicine has a critical role in the smoking cessation process, not only in terms of curative, but also preventive healthcare services.[11,12]

In this context, evaluating the smoking cessation behaviors of patients who refer to smoking cessation clinics affiliated to family medicine departments will contribute to both understanding the factors that affect clinical success and also to evaluating the effects of national tobacco control policies in the field.

This study aimed to evaluate smoking cessation behaviors and the factors influencing these behaviors among individuals who applied to smoking cessation clinics affiliated with family medicine departments at different universities.

Materials and Methods

This cross-sectional study, conducted from January to September 2025, included 611 individuals who referred to smoking cessation clinics operated by family medicine departments at Bolu Abant İzzet Baysal University Faculty of Medicine Training and Research Hospital, Düzce University Faculty of Medicine Hospital, Suleyman Demirel University Faculty of Medicine Hospital, Balıkesir Atatürk City Hospital and who agreed to participate in the study. The information was collected face-to-face through surveys. The survey form included questions about the demographic information and smoking habits of patients. The personal information form used in the study included questions about marital status, income status, the status of having children, occupation, educational status, chronic diseases, regularly used medication, while the questions related with tobacco use were the age of starting to smoke regularly, the age of starting smoking, the number of cigarettes smoked a day, the status of accessing cigarette, the status of smoking in the workplace for employed participants, the presence of other smokers in the house, the reasons which increased the desire to smoke, the reasons for wanting to quit smoking, previous attempts to quit smoking and the status of using other tobacco products. Fagerström Nicotine Dependence Test (FNDT) values were calculated. Height and weight of the participants were measured and body mass index (BMI) value was found from the calculation of weight/height.[2]

The present study included individuals over 18 years of age who were referred to smoking cessation clinics within family medicine departments, were reachable by phone, and consented to participate.

Considering that participants who agreed to participate in the study came for follow-up in different units, telephone interviews were made 6 months later regardless of the frequency of their interim follow-up. Cigarette use of participants was questioned based on their own statements. Pharmacotherapeutic drugs specified by our Ministry of Health were grouped together and evaluated.

Fagerström Nicotine Dependence Test: It was developed by Fagerström[13] as 6 questions to evaluate the level of dependence. The total score varies between 0 and 10 and increased score indicates increased dependence. The total scores from the questions determine the level of nicotine dependence. The scores are interpreted as very low dependence (0-2 points); low dependence (3-4 points); moderate dependence (5 points); high

dependence (6-7 points); very high dependence (8-10 points). Validity and reliability study of the test was conducted by Uysal et al.[14]

The data were analyzed by using IBM SPSS Statistics 20 program. Results were presented as mean±standard deviation and minimum–maximum for quantitative data. In the comparison of paired independent groups, Mann-Whitney U test was used since the data were not normally distributed. Chi-square test was used to analyse the categorical variables. The level of significance was considered as $p < 0.05$ in all tests.

In our multi-center study, institutional permissions were obtained from all participating centers. This study has been approved by the Bolu Abant İzzet Baysal University Non-Interventional Clinical Research Ethics Committee (approval date 07.01.2025, number 2024/376). Written informed consent was obtained from the participants.

Results

The study was completed with 611 participants. The participants were distributed across the centers as follows: 224 at Bolu Abant İzzet Baysal University Faculty of Medicine Training and Research Hospital, 34 at Düzce University Faculty of Medicine Hospital, 74 at Suleyman Demirel University Faculty of Medicine Hospital and 279 at Balıkesir Atatürk City Hospital. Of the participants, 57.9% (n=354) were male and 42.1% (n=257) were female. Mean age was found as 42.79±12.95 (min:18-max:76). Mean height was found as 171.04± 8.65 cm (min: 145- max:190), while mean weight was found as 77.82±14.77 kg (min:42-max:135). Mean BMI was found as 26.92±4.34 in male individuals and as 26.03±4.41 in female individuals. Of the participants, 74.8% (n=457) were found to be married and 73.3% (n=448) had at least one child (Table 1).

The age of starting smoking was 19.87±7.39 (min:10-max:55). The number of cigarettes smoked a day was 26.15±11.31 (min:4-max:55). The primary reason for starting smoking was reported as friends by 63.7% (n=289). While the mean age of starting smoking was found as 19.69±6.91 (min:10-max:50) years in participants who stated that their reason for starting smoking was friends, while the mean age was found as 15.54±2.84(min:10-max:19) years in those who stated that they started smoking by imitating their parents. It was found that the mean age of starting smoking was significantly low in male participants when compared with female participants (p=0.007).

Table 1. Sociodemographic characteristics of the participants

Variables	Categories	n	%
Gender	Male	354	57.9
	Female	257	42.1
Marital status	Single	154	25.2
	Married	457	74.8
Having child	No	163	26.7
	Yes	448	73.3
Education	Primary school	116	19.0
	High school	281	46.0
	Higher	214	35.0
Income	Below minimum wage	136	22.3
	Minimum wage	176	28.8
	Above minimum wage	299	48.9
Chronic disease	No	292	47.8
	Yes	319	52.2
Regular medication use	No	343	56.1
	Yes	268	43.9
Employment status	Employee	325	53.2
	Not regular employee	286	46.8
Shift work status	No	200	61.5
	Yes	125	38.5

It was found that 28.8% (n=176) of the participants who referred to the clinic had not previously attempted to quit smoking. Of the participants who had previously attempted to quit smoking, 39.7% (n=173) had decided to refer to the clinic after their first try. It was stated by 64.3% (n=393) of the participants that the primary reason for referring to the clinic was fear of becoming ill in the future. Only 10.5% (n=64) of those had referred to the clinic with the recommendation of health professionals.

FNDT score of the participants who had referred to the clinic was found as 6.73±2.43 (min:1-max:10). At the end of six months, FNDT score was found as 7.03±2.28 in the participants who did not quit smoking and as 5.88±2.62 in the participants who quit smoking; the mean score of participants who did not quit smoking was significantly higher (p<0.001). When the primary reason that increased the desire to smoke was asked, 30.6% (n=187) answered as "when they felt stressed". There was at least one more smoker in the houses of 35.7% (n=218) of the participants. It was found that 85.6% (n=523) of the participants stated that they did not smoke inside the house (Table 2). While the presence of another smoker in the house increased the rate of smoking inside the house significantly (p<0.001), it was not found to cause a significant difference in the rates of smoking cessation at the end of six months (p=0.055).

It was found that 53.2% (n=325) of the participants were working regularly and 15.4% (n=50) of the employed participants stated that they smoked indoors in the workplace.

It was found that 20% (n=122) of the participants had received professional support at least once previously. In the present study, while 72.2% (n=439) of the participants had received pharmacotherapy at the end of 6 months, 27.8% (n=170) stated that they preferred non-pharmacological treatment. At the end of 6 months, 26.2% of participants (n=160) had completely quit smoking. The rate of quitting smoking was significantly higher among those who received pharmacotherapy (p=0.01) (Table 3).

Table 2. Smoking behavior and exposure to smoke among participants

Variables	Categories	n	%
Reasons for wanting to quit smoking	Fear of getting ill	393	64.3
	Due to an existing illness	73	11.9
	Doctor's recommendation	64	10.5
	Social pressure	45	7.4
	Financial difficulty	36	5.9
Primary reason that increased the desire to smoke	Stress	187	30.6
	Tea	179	29.3
	After eating	111	18.2
	Coffee	66	10.8
	Other	50	8.2
	Alcohol	18	2.9
Smoker in the house	No	393	64.3
	Yes	218	35.7
Smoke inside the house	No	523	85.6
	Yes	88	14.4
Exposure to cigarette smoke in the workplace	No	275	45.0
	Yes	50	8.2

Table 3. Factors associated with smoking cessation status

Variables	Categories	Smoking cessation status				p*
		No		Yes		
		n	%	n	%	
Gender	Male	279	78.8	75	21.2	0.010
	Female	172	66.9	85	33.1	
Marital status	Single	114	74.0	40	26.0	
	Married	337	73.7	120	26.3	0.518
Shift work status	No	239	73.5	86	26.5	0.471
	Yes	212	74.1	74	25.9	
Income	Below minimum wage	136	77.3	40	22.7	0.001
	Minimum wage	114	83.8	22	16.2	
	Above minimum wage	201	67.2	98	32.8	
Professional support	No	372	76.1	117	23.9	0.010
	Yes	79	64.1	43	35.2	
Number of cigarettes smoked daily	≤20	46	68.7	21	31.3	0.040
	21-40	217	82.2	47	17.8	
	41≤	48	92.3	4	7.7	
Smoker in the house	No	280	71.2	113	28.8	0.055
	Yes	171	78.4	47	21.6	
Smoke inside the house	No	382	73	141	27	0.359
	Yes	69	78.4	19	21.6	
Treatment	Non-pharmacological	138	81.2	32	18.8	0.010
	Pharmacotherapy	313	71.0	128	29.0	

* Chi-square test, p<0.05.

Discussion

Smoking cessation clinics play a critical role in individuals' struggle with addiction. These centers do not only provide pharmacotherapy and behavioral support, they also strengthen the cessation process by providing clients with motivation, information and follow-up support. It is reported in the literature that individuals receiving professional support have a significantly higher rate of success in quitting smoking when compared with those who try to quit on their own.[15,16] Therefore, accessibility and effective use of clinics come to the fore as a critical factor in increasing the success of smoking cessation attempts.

Studies report that recommendations of healthcare professionals have significant effects on increasing the success of smoking cessation attempts.[17,18]

A study has shown that there are variations in the knowledge, confidence, and frequency of practice regarding smoking cessation among primary care physicians and healthcare professionals, with some physicians being hesitant about e-cigarettes and cessation methods.[11,19] The Turkish Thoracic Society and current clinical research highlight structural problems related to access to smoking cessation clinics, treatment options and staff training and show that strengthening the vocational training of healthcare professionals and systematic screening and referral protocols can increase both the number of referrals and the effectiveness of treatment.[20] While the fear

of getting ill is a strong trigger for individual motivation, making the recommendations of healthcare professionals systematic and effective use of clinical-communication channels (ALO 171, Patient Appointment System, local clinic referrals) are keys that can increase referrals to smoking cessation clinics and successful cessation rates.[20,21]

Family health centers are ideal places to deliver smoking cessation services most effectively at the community level. However, it is very important to increase the knowledge and skills of healthcare professionals about smoking cessation in order to make these services sustainable and widespread. It is stated that counseling and referrals in primary healthcare increase cessation rates significantly.[16] For this reason, regular training programs to be planned and incorporating the latest methods[22] will enable family physicians to play a more effective role in the smoking cessation process and make a significant contribution to reducing tobacco use in the community. In addition, the Tobacco Control Strategy Document and Action Plan (2024-2028) emphasizes that it is a requirement for healthcare professionals to provide brief clinical interventions to advise patients to quit smoking.[21] In the present study, it was found that the most frequent reason for referring to smoking cessation clinics was the fear of getting ill, while the number of those who referred with the recommendation of healthcare professionals was low. This finding suggests that personal health concerns are decisive in individuals' motivation to quit smoking, but the referral and counseling roles of healthcare professionals are not used effectively enough. Therefore, in increasing referrals to smoking cessation clinics, it is important to strengthen the awareness of healthcare professionals and to make systematic screening and referral practices widespread.

Studies conducted worldwide have shown that physiological symptoms associated with nicotine withdrawal, stress, negative emotions, and environmental stimuli related to smoking trigger the desire to smoke to significantly.[23,24] Demir et al. reported that environmental and peer influences and the motivation to enjoy smoking were prominent factors in continuing smoking[25], while Türkkan et al. reported that university students started smoking at an early age and that this process mostly started within their family group.[26] Studies targeting adolescents have also found that rates of moderate to severe nicotine dependence are significant, while there are significant limitations in accessing treatment.[27] These results suggest that social environment and stress play a fundamental role in the increase in smoking desire in our country. Similarly, friend group was found as the primary reason for starting smoking. Providing structured counseling in primary healthcare by considering age groups is very important in terms of preventing individuals from starting smoking, providing cessation support and protecting from the harms of smoking.

The increase in the desire to smoke is considered to have multiple aspects. Nicotine withdrawal and dependence level come to the fore in terms of biological factors. A decrease in nicotine levels lead to withdrawal symptoms such as tremors, restlessness and impaired attention and trigger the desire to smoke directly.[23] Nicotine activates the reward mechanism in the brain and increases craving by creating short-term pleasure and reward sensation. Environmental triggers such as friends or family members who smoke, places where people smoke, and visual and auditory cues associated with smoking also trigger the desire to smoke, both at the initiation and continuation stages.[24] The results of a study that the age of starting smoking was early in university students and that smoking mostly occurred with friends shows the strong role of social interaction in the desire to smoke.[26] Psychosocial and emotional states such as stress, negative mood, anxiety and depression cause smoking to be considered as a

short-term relaxation and increase craving.[25,26] These results show that the desire to smoke cannot be explained only with addiction and that environmental and psychosocial triggers also play a critical role. In the present study, the participants reported that they smoked indoors in their workplace. This result shows that workplace can increase the desire to smoke as an environmental trigger. It is stated in the literature that smoking indoors is a risk in terms of both active smokers and also passive exposure.[28] Smoking indoors in the workplace is not only an environmental risk, it also leads to smoking being considered as a short-term relaxation by interacting with psychosocial triggers such as stress, social interaction, anxiety and depression and makes the desire to smoke stronger. In a study, it was found that the prevalence of smoking in work places can make smoking cessation interventions difficult.[25] Therefore, multifaceted strategies should be used together to decrease craving and increase the rates of successful cessation. The results of the present study show that the factors increasing the desire to smoke are in parallel with studies in both national and international literature. It seems appropriate to prioritize the development of programs that will reduce the influence of the social environment and increase motivation among young people and adolescents in our country.

Medications used for pharmacotherapy increase the rates of quitting significantly. The rates of success in smoking cessation were found to be higher in individuals who used these drugs.[29] It was also found in the present study that only 20% of the participants had received professional support at least once. It was found at the end of the 6-month follow-up that 72.2% of the participants received pharmacotherapy, while 27.8% preferred non-drug treatment methods. These results show that individuals mostly turn to pharmacological support, but the use of behavioral or psychosocial support remains limited. In the present study, the significantly high dropout rate in pharmacotherapy areas supports the effectiveness of pharmacological interventions.[15,16] This result is in line with the strong effect of pharmacotherapy in smoking cessation. In order to decrease craving and increase the rates of successful cessation, both pharmacological support and trigger-focused behavioral interventions, social support mechanisms, and stress management strategies must be used together. Recently, digital interventions have become increasingly important in smoking cessation strategies. Short Message Service (SMS) based support programs and web based personalized applications increase the success in quitting significantly and their effectiveness become stronger when used with pharmacotherapy.[30] Recent studies conducted in Türkiye also show that the combination of pharmacotherapy and behavioral support increase the rates of smoking cessation, while limited accesses to these services especially in rural areas, and the fact that access is limited to these services especially in rural areas and low socioeconomic groups has a negative effect on the cessation period.[24] These results show that the process of smoking cessation is not limited to only pharmacological interventions and environmental, psychosocial and digital support should also be integrated with a holistic approach. In the present study, it was found that only a limited number of participants had previously received professional support. This shows that smokers cannot sufficiently make use of cigarette smoking services.

In the six-month follow-up, the significantly higher smoking cessation rate among participants receiving pharmacotherapy supports the effectiveness of pharmacological interventions. On the other hand, the limited use of behavioral and psychosocial support has prevented the full assessment of the potential effectiveness of these methods. The low level of professional support experienced by our participants highlights the need to plan multidimensional strategies for

future interventions. Therefore, supporting smoking cessation programs with policies centered on pharmacotherapy while strengthening psychosocial support, integrating digital practices, and facilitating access to treatment services will increase sustainable cessation rates.

In conclusion, smoking cessation programs should be approached in a multidimensional manner. Smoking cessation clinics operated by Family Medicine Departments offer a comprehensive approach that evaluates individuals not only from a biomedical perspective but also in terms of their psychosocial, behavioral, and environmental dimensions. In this regard, smoking cessation efforts can focus not only on nicotine addiction, but also on the individual's lifestyle, sources of motivation, and social support systems. In addition, smoking cessation clinics strive to ensure the continuity of smoking cessation programs, support individuals in taking responsibility for their own health, and create lasting health gains at the community level. Thus, we believe that we are maintaining our position as one of the most effective disciplines in reducing cigarette use at both individual and societal levels.

Limitations of the study

Short study period and limited number of participating departments are among the limitations of our study. We believe that future studies with larger participation, which will examine other factors that may influence smoking cessation, will contribute to the development of smoking cessation programs.

Ethical approval

This study has been approved by the Bolu Abant İzzet Baysal University Non-Interventional Clinical Research Ethics Committee (approval date 07.01.2025, number 2024/376). Written informed consent was obtained from the participants.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: SG, HD; data collection: HD, Gİ, AK, MBK, DAB; analysis and interpretation of results: GZÖ, YÇ; Draft manuscript preparation:SG. All authors reviewed the results and approved the final version of the article.

Source of funding

The authors declare that the study received no funding.

Conflict of interest

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

References

1. World Health Organization (WHO). WHO report on the global tobacco epidemic. Geneva: WHO; 2023.
2. The Tobacco Atlas. Turkey factsheet. 2023. https://tobaccoatlas.org/factsheets/turkey
3. Sönmez ÖF. Tobacco control in Türkiye: a brief review of achievements, challenges, and prospects. Tob Prev Cessat. 2025;11:10.18332/tpc/191783. **[Crossref]**
4. T.C Sağlık Bakanlığı. 2024-2028 tütün kontrolü strateji belgesi ve eylem planı. 2024. https://alo171.saglik.gov.tr/TR-106213/dokumanlar.html
5. Wang Y, Salamanca LF, Sanchez CS, Fang H. Evaluating smoking cessation interventions in China's primary care facility networks for hypertensive patients aged 45 years and older: a retrospective cohort study. Tob Induc Dis. 2023;21:119. **[Crossref]**
6. Kruk A, Czerwińska C, Dolna-Michno J, Broniatowska E, Kolanko E. Effectiveness of a smoking cessation program during the COVID-19 pandemic. Healthcare (Basel). 2023;11(11):1536. **[Crossref]**
7. Altunsoy S, Karadoğan D, Telatar TG, Şahin Ü. Long-term outcomes of smoking cessation outpatient clinic: A single center retrospective cohort study from the Eastern Black Sea Region of Türkiye. Population Medicine. 2024;6(February):4. **[Crossref]**

8. Konyalıhatipoğlu EB, Karadoğan D, Telatar TG, Şahin Ü. Mid-term outcomes of a smoking cessation program in hospitalized patients in Türkiye. Tob Induc Dis. 2024;22:10.18332/tid/191239. **[Crossref]**

9. Murugan H, Spigner C, McKinney CM, Wong CJ. Primary care provider approaches to preventive health delivery: a qualitative study. Prim Health Care Res Dev. 2018;19(5):464-474. **[Crossref]**

10. Boesch A, Durand MA, Habfast-Robertson I, Jacot-Sadowski I, Berlin I, Selby K. Patient reactions to proactive tobacco cessation counseling using a decision aid in primary care: a qualitative study. Tob Use Insights. 2024;17:1179173X241304271. **[Crossref]**

11. Alasmari AM, Alzahrani AA, Philip KEJ, et al. Usage patterns, knowledge, and attitudes of healthcare providers regarding e-cigarettes: a cross-sectional study in Saudi Arabia. Tob Induc Dis. 2025;23:10.18332/tid/205871. **[Crossref]**

12. Papadakis S, Anastasaki M, Papadakaki M, et al. 'Very brief advice' (VBA) on smoking in family practice: a qualitative evaluation of the tobacco user's perspective. BMC Fam Pract. 2020;21(1):121. **[Crossref]**

13. Fagerstrom KO, Schneider NG. Measuring nicotine dependence: a review of the Fagerstrom Tolerance Questionnaire. J Behav Med. 1989;12(2):159-182. **[Crossref]**

14. Uysal MA, Kadakal F, Karşidağ C, Bayram NG, Uysal O, Yilmaz V. Fagerstrom test for nicotine dependence: reliability in a Turkish sample and factor analysis. Tuberk Toraks. 2004;52(2):115-121.

15. Cahill K, Stevens S, Perera R, Lancaster T. Pharmacological interventions for smoking cessation: an overview and network meta-analysis. Cochrane Database Syst Rev. 2013;2013(5):CD009329. **[Crossref]**

16. European Network for Smoking and Tobacco Prevention. 2020 Guidelines for treating tobacco dependence. 2020. https://ensp.network/wp-content/uploads/2020/10/guidelines_2020_english_forprint.pdf

17. Znyk M, Wężyk-Caba I, Kaleta D. The frequency of tobacco smoking and e-cigarettes use among primary health care patients-the association between anti-tobacco interventions and smoking in Poland. Int J Environ Res Public Health. 2022;19(18):11584. **[Crossref]**

18. Odorico M, Le Goff D, Aerts N, Bastiaens H, Le Reste JY. How to support smoking cessation in primary care and the community: a systematic review of interventions for the prevention of cardiovascular diseases. Vasc Health Risk Manag. 2019;15:485-502. **[Crossref]**

19. Selamoglu M, Onal AE, Erbas B, et al. Perceptions of family physicians in Istanbul about e-cigarettes as smoking cessation aids: a qualitative study. Addict Sci Clin Pract. 2024;19(1):99. **[Crossref]**

20. Türk Toraks Derneği. Türk Toraks Derneği tütün ürünleri ve nikotin bağımlılığında tanı ve tedavi uzlaşı raporu. 2025. https://www.toraks.org.tr/site/sf/books/2025/04/735605b126d09929dfb6fc9c4e94f8321c47a54176b4b999c30c9c80e9ba02df.pdf

21. T.C. Resmi Gazete. Türkiye Cumhuriyeti Sağlık Bakanlığı. 4207 Sayılı Tütün Ürünlerinin Zararlarının Önlenmesi ve Kontrolü Hakkında Kanun. 26 Kasım 1996, Sayı: 22829. https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=4207&MevzuatTur=1&MevzuatTertip=5

22. Erdem F, Altun M, Üçüncü E, Balcı H, Gunher Arıca S. Aile hekimliği polikliniğinde sigara bırakma durumunun değerlendirilmesi. TJFMPC. 2021;15(4):707-714. **[Crossref]**

23. Zhao Y, Li Y, Shu Y, Wang X, Wang W, Yang L. The effect of negative emotions on smoking craving: the chain-mediating role of self-control and self-exempting beliefs. Front Psychiatry. 2025;16:1642341. **[Crossref]**

24. Taylor G, McNeill A, Girling A, Farley A, Lindson-Hawley N, Aveyard P. Change in mental health after smoking cessation: systematic review and meta-analysis. BMJ. 2014;348:g1151. **[Crossref]**

25. Demir G, Kılıç Ş, Yavuz S et al. Türkiye'de sigaraya başlama, sürdürme motivasyonlarının ve nikotin bağımlılık düzeylerinin incelenmesi. Bull Cardiovasc Acad. 2025;3(1):17-22. **[Crossref]**

26. Türkkan T, Kulakaç N. Üniversite öğrencilerinin sigara kullanımına yönelik motivasyonları: Nitel bir çalışma. Sağlık Akademisyenleri Dergisi. 2024;11(4):483-492. **[Crossref]**

27. Kalkan EŞ, Pehlivantürk Kızılkan M, Derman O, Akgül S. Sigara içen ergenlerde nikotin replasman tedavisine erişimin değerlendirilmesi. CSHD. 2025;66(1):6-12.

28. World Health Organization (WHO). WHO report on the global tobacco epidemic 2024. Geneva: WHO; 2024.

29. Hartmann-Boyce J, Livingstone-Banks J, Ordóñez-Mena JM, et al. Behavioural interventions for smoking cessation: an overview and network meta-analysis. Cochrane Database Syst Rev. 2021;1(1):CD013229. **[Crossref]**

30. Goh KW, Ming LC, Al-Worafi YM, et al. Effectiveness of digital tools for smoking cessation in Asian countries: a systematic review. Ann Med. 2024;56(1):2271942. **[Crossref]**

Turk J Fam Pract 2026;30(1):21-28
DOI: 10.54308/TJFP.2026.879

Research Article

Association between smartphone addiction and symptoms of depression and anxiety among young adults

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ABSTRACT

Objective: Smartphones, now ubiquitous across the globe, have the potential to contribute to behavioral addiction. Among the psychological concerns linked to such addictions are depression and anxiety. This study aimed to investigate potential associations between smartphone addiction and symptoms of depression and anxiety in a sample of young adults.

Methods: This descriptive, cross-sectional study was conducted over a two-month period among 512 university students. Participants completed a questionnaire comprising sociodemographic information and smartphone usage patterns, along with the Smartphone Addiction Scale–Short Version (SAS-SV), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI). Group comparisons were performed using the Kruskal–Wallis and Mann–Whitney U tests. Spearman and Pearson correlation coefficients were used to assess the strength and direction of associations.

Results: The study population consisted of young adults with a mean age of 20.45 ± 1.95 years.A statistically significant relationship was found between depression-based on cut-off values-and smartphone addiction (p=0.001). Moreover, weak but statistically significant positive associations were observed between smartphone addiction and both depression (r=0.232, p=0.001) and anxiety (r=0.209, p=0.001). Participants who self-identified as smartphone addicts reported significantly higher SAS-SV scores compared to those who were unsure or did not consider themselves addicted (p=0.001).

Conclusions: The findings demonstrate a significant association between smartphone addiction and symptoms of depression and anxiety. Given that individuals perceiving themselves as addicted exhibited notably higher addiction scores, self-perception may serve as a useful indicator in preventive mental health approaches—particularly within the context of primary care.

Keywords: Smartphone addiction, internet addiction disorder, depression, anxiety, mental health

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Received: 01.07.2025 **Accepted:** 27.10.2025 **Published:** 29.03.2026

Introduction

In recent years, smartphones have become an integral part of daily life for most people worldwide. According to data from the Turkish Statistical Institute (2024), 86.2% of children aged 11 to 15 use smartphones.[1] The increasing exposure to enjoyable digital content and the early age at which smartphones are adopted raise concerns regarding their potential to foster behavioral addiction.

Growing interest among physicians in behavioral addictions has highlighted both the potential negative implications (e.g., stigmatization) and positive outcomes (e.g., preventive interventions, early identification, and evidence-based treatments) associated with diagnosing such conditions.[2] The American Psychiatric Association (APA) refers to behavioral addictions in the DSM-5-TR (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision), listing gambling disorder as a recognized behavioral addiction and identifying internet gaming disorder as a condition warranting further study.[3] Similarly, the World Health Organization's ICD-11 (International Classification of Diseases, 11th Revision) categorizes "disorders due to addictive behaviors", which includes both gambling and gaming disorders, each further classified by online or offline predominance.[4,5]

Although standardized diagnostic criteria for smartphone addiction have not yet been established, a growing body of research has positioned it as a form of behavioral addiction that is increasingly attracting clinical attention.[6-8] A comprehensive meta-analysis of over 500 studies across 64 countries, encompassing more than two million participants, estimated the global prevalence of smartphone addiction at 26.99%.[7]

Furthermore, studies have shown that behavioral addictions may co-occur with other mental health conditions, particularly anxiety and depression, emphasizing their significance not only as independent psychiatric disorders but also as part of broader comorbid profiles.[6,8]

The aim of this study was to investigate the prevalence of smartphone addiction among young adults, to identify potential contributing factors, and to examine associations between smartphone addiction and symptoms of anxiety and depression.

Materials and Methods

This descriptive, cross-sectional study was conducted among volunteer students from the Faculty of Health Sciences (Department of Nursing) and the Faculty of Medicine at Ankara Yıldırım Beyazıt University, all of whom were at least 18 years old and reported no history of psychiatric disorders. Following the provision of informed verbal and written consent, 558 questionnaires were distributed. Of these, 35 were excluded due to incomplete responses and 11 due to a self-reported history of psychiatric disorders, the final sample consisted of 512 participants.

The data collection tool consisted of a structured questionnaire assessing sociodemographic characteristics and smartphone use patterns, alongside the Smartphone Addiction Scale-Short Version (SAS-SV)[9,10], the Beck Depression Inventory (BDI)[11,12] and the Beck Anxiety Inventory (BAI).[13,14]

Smartphone Addiction Scale – Short Version

Originally developed by Kwon et al. as a 33-item scale to assess smartphone addiction[15], the SAS was later condensed into a 10-item version to enhance usability.[9] The items are categorized as follows: daily life disturbance (items 1–3), withdrawal (items 4–7), and one item each on virtual relationship orientation, overuse, and

tolerance (items 8–10). In the Korean sample, cut-off scores were reported as 31 for males and 33 for females.[9] A Turkish validation and reliability study was conducted by Noyan et al. in 2015[10]; however, no established cut-off score exists for the Turkish version.

Beck depression inventory

The BDI, developed by Beck et al. in 1961[11], is a widely used 21-item scale for assessing depressive symptoms and severity. Validity and reliability in the Turkish context were confirmed by Hisli (1989), and it was stated that scores of 17 and above among Turkish university students indicate a risk group for depression.[12]

Beck anxiety inventory

The BAI, created by Beck et al. in 1988[13], includes 21 items measuring anxiety symptoms experienced in the preceding week. The Turkish validation study was conducted by Ulusoy in 1993.[14]

Data collection took place over two months. Questionnaires and scales were distributed during class breaks, and participants completed them independently. Researchers were available for clarification as needed.

All responses were digitally recorded. Statistical analysis was performed using IBM SPSS version 24.0. Descriptive statistics were expressed as means ± standard deviations or percentages. Statistical significance was defined as $p< 0.05$. Non-parametric group comparisons were made using the Kruskal–Wallis test and, if significant, followed by the Mann–Whitney U test for pairwise analysis. The strength and nature of the association were assessed using Spearman or Pearson correlation analysis, depending on data distribution.

Results

Participant characteristics

A total of 512 students participated in the study: 24.6% (n=126) were male and 75.4% (n=386) were female. The mean age was 20.45 ± 1.95 years, ranging from 18 to 30. Among participants, 45.5% (n=233) were enrolled in the Faculty of Medicine and 54.5% (n=279) in the Faculty of Health Sciences (Department of Nursing).

Smartphone usage characteristics

The vast majority of students (99.2%, n=508) owned a smartphone. On average, participants had been using smartphones for 7.35 ± 2.85 years and reported an average daily usage of 4.44 ± 2.72

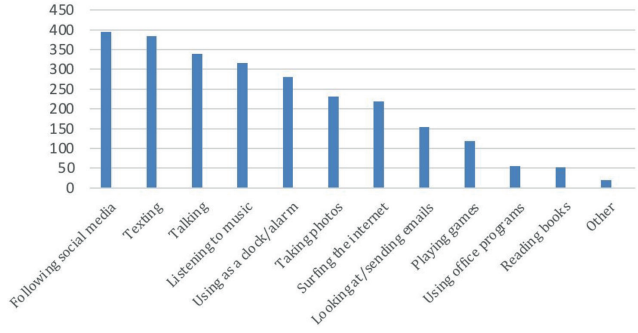

Figure 1. The distribution of participants' responses to the question "For what purposes do you use your phone?"

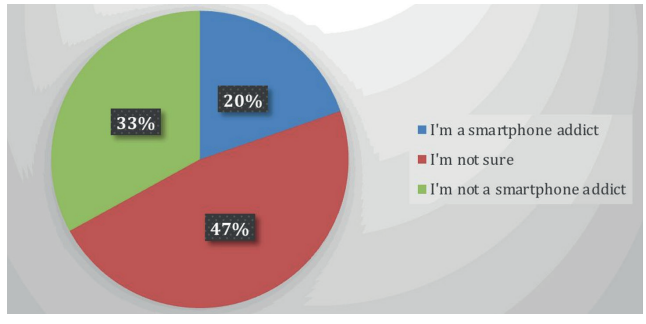

Figure 2. Responses from Participants Regarding the Survey Question "Do you perceive yourself as a smartphone addict?"

hours (range: 0–16 hours). Figure 1 presents the distribution of smartphone usage purposes, where participants could select multiple options.

Smartphone addiction scores and influencing variables

SAS-SV scores ranged from 10 to 60, with a mean of 28.69 ± 10.19. Since the Turkish version lacks an established cut-off score, prevalence rates could not be determined. When asked, 20% of participants self-identified as smartphone addicts (Figure 2).

Statistical analysis revealed that female participants had significantly higher SAS-SV scores than males (p=0.004). No significant associations were observed between smartphone addiction and participants' age (p=0.27) (Table 1).

Participants who used their smartphones for social media, photography, or listening to music had significantly higher SAS-SV scores (all p< 0.01; Table 2).

There was a highly significant relationship between daily smartphone usage duration and SAS-SV scores (p=0.001); addiction scores increased with duration of use. A Kruskal–Wallis test was conducted to examine differences in SAS-SV scores across four usage duration groups. The results indicated a statistically significant difference in SAS-SV scores among the groups (p<0.001). Subsequent pairwise Mann–Whitney U tests revealed a clear pattern of increasing SAS-SV scores with longer usage duration (Table 3).

Table 1. Comparison of SAS-SV scores by gender and age

		Mean ± SD	p-value
Gender	Female	29.40±10.10	0.004
	Male	26.52±10.19	
Age (years)	18	27.40±9.69	0.270
	19	30.49±10.65	
	20	29.29±9.59	
	21	28.29±10.19	
	22	28.77±9.51	
	23	26.84±11.80	
	24	27.43±10.63	
	25	25.40±9.20	
	26	27.50±13.43	
	27	48.0±0.00	
	29	22.25±9.32	
	30	27.0±0.00	

Mann-Whitney U test and Kruskal-Wallis Analysis were used.

Table 2. Relationship between smartphone usage purpose and SAS-SV scores

Usage Purpose		Mean ± SD	p-value
Social Media	Yes	29.98±10.20	0.001
	No	24.33±8.91	
Taking Photos	Yes	30.57±10.20	0.001
	No	27.15±9.94	
Listening to Music	Yes	29.75±10.28	0.006
	No	26.99±9.83	

Mann-Whitney U test was used.

Table 3. Association between daily smartphone usage duration and SAS-SV scores

Usage Duration (hours)	Mean ± SD	p-value
Less than 1	19.51±9.01[a]	0.001
1-2	24.21±8.88[b]	
3-4	27.84±8.65[c]	
More than 4	33.05±10.01[d]	

Different letters (a, b, c, d) indicate statistically significant differences between groups (p<0.001). Kruskal-Wallis Analysis was used. Pairwise comparisons were conducted using Mann-Whitney U tests with Bonferroni correction.

Participants who self-identified as smartphone addicts had significantly higher SAS-SV scores than those who were unsure or disagreed. Pairwise comparisons were conducted using Mann–Whitney U tests with Bonferroni correction. All pairwise post-hoc comparisons between groups were statistically significant. Overall, these results suggest a stepwise increase in SAS-SV scores across the three categories, with Addict participants showing the highest levels of smartphone addiction symptoms, followed by Not Sure, and then Not Addict participants (Table 4).

Smartphone addiction, depression and anxiety sympthoms levels

BDI analysis showed that 18.2% (n=93) of participants scored above the cut-off point of 17. Students with scores above 17 had significantly higher SAS-SV scores than those below the cut-off (p=0.001).

Spearman correlation analysis indicated a weak but statistically significant positive relationship between smartphone addiction and both depression and anxiety sympthoms levels (Table 5).

Table 4. Relationship between self-perceived smartphone addiction and SAS-SV scores

Self-Perception	Mean ± SD	p-value
Addict	36.86±10.71[a]	0.001
Not Sure	30.17±7.84[b]	
Not Addicted	21.70±8.17[c]	

Different letters (a, b, c) indicate statistically significant differences between groups (p<0.001). Kruskal-Wallis Analysis was used. Pairwise comparisons were conducted using Mann–Whitney U tests with Bonferroni correction.

Discussion

In our study, SAS-SV scores were positively and significantly correlated with BDI and BAI scores. This aligns with previous research suggesting associations between smartphone use and mental health outcomes.

Although the term smartphone addiction is commonly used, alternative expressions such as smartphone dependency[16], excessive smartphone use[17], problematic smartphone use[18-20], nomophobia (No Mobile Phone PhoBIA)[21] appear frequently in the literature. Despite terminological variations, a systematic review of 27 studies has confirmed a link between smartphone addiction and mental health issues.[6] The present findings, emphasizing a significant relationship between smartphone addiction and depressive and anxiety symptoms, align with previous results.[6]

A large-scale study from Korea involving 4,854 adults reported similar findings: both internet and smartphone addiction were associated with higher levels of depression and anxiety sympthoms.[22] Interestingly, the association was stronger for smartphone addiction than for internet addiction[22], suggesting that smartphone addiction may constitute a distinct behavioral concern—despite its absence from formal diagnostic manuals such as the DSM-5-TR[3] and ICD-11[4].

Our results are also in agreement with prior cross-sectional studies showing a linear association between SAS-SV and BDI scores[23], and with other findings linking smartphone use with elevated depression and trait anxiety scores based on the PUMP (Problematic Use of Mobile Phones) scale[20].

Table 5. Associations between smartphone addiction and depression and anxiety sympthoms levels

	Depression Sympthoms Levels		Anxiety Symptoms Levels	
Smartphone	p-value	Correlation Coefficient (r)	p-value	Correlation Coefficient (r)
Addiction	0.001	0.232	0.001	0.209

Spearman Correlation Analysis was used.

In a multicenter study involving 1,236 university students, each unit increase in smartphone addiction score was associated with a 7% rise in anxiety among males and 9% among females.[16] Similarly, data from postgraduate students across 187 universities worldwide revealed a significant association between smartphone addiction and Major Depressive Disorder (MDD).[24] Although these studies used varying terminologies[16,20,23,24], they collectively support the positive association we observed between smartphone addiction and psychological distress. Notably, the cross-sectional nature of these studies (including ours) precludes conclusions about causality.[16,20,23,24]

A longitudinal study from Korea tracking 1,877 adolescents over three years found a bidirectional relationship between smartphone addiction and depressive symptoms, with both intensifying over time.[25] Another Turkish study employing multiple regression analysis also identified depression and anxiety as significant predictors of smartphone addiction.[26] These findings underscore the importance of prospective studies to better understand the causal pathways involved.

In our study, participants who self-identified as smartphone addicts scored significantly higher on the SAS-SV. This suggests that a simple self-report question like "Do you perceive yourself as a smartphone addict?" may offer practical value in screening, especially given the potential psychological comorbidities.[6]

We observed a significant association between smartphone addiction and female gender. This finding is supported by some studies[16,17], but contradicted by others reporting no gender difference[24] or higher addiction levels among males[27]. Such discrepancies may reflect sample characteristics, as in our study, where females represented more than 75% of participants or differing usage patterns, such as males being more vulnerable to gaming- or internet-related addiction.[7]

No significant relationship was found between age and smartphone addiction in our sample. This contrasts with a previous SAS-SV-based study involving adults over 55 years, which reported higher addiction scores among younger users.[23] Our narrower age range may explain this divergence.

Participants who reported using smartphones for social media, photography, or music had significantly higher addiction scores. This is not surprising, as social media addiction alone affects an estimated 17.42% of the global population according to a meta-analysis of over 500 studies.[7] Moreover, a randomized controlled trial in 2022 found that abstaining from social media for just one week resulted in improved well-being and reduced symptoms of depression and anxiety.[28] While photo-taking behavior may be linked to social media use, our findings are supported by previous research associating selfie-taking with problematic smartphone use.[18] The link between music listening and addiction requires further investigation to better understand underlying mechanisms.

Limitations

Due to the cross-sectional design, causal relationships between smartphone addiction and depression or anxiety cannot be established. Moreover, because there is no validated cut-off score for the Turkish version of the SAS-SV[10], we were unable to calculate prevalence rates. Our sample was limited to students from two faculties with a predominantly female composition and a narrow age range, which may limit generalizability and influence gender-related findings.

Conclusions

This study identified a significant association between smartphone addiction and symptom levels of depression and anxiety. Risk factors for higher smartphone addiction scores included female gender, increased daily smartphone usege duration, and usage for social media, photography, or music. Individuals who self-perceived as addicted had significantly higher SAS-SV scores, suggesting that direct questioning may have value in early identification efforts, particularly in primary care and preventive mental health settings. Future research, especially longitudinal studies, is needed to further elucidate these associations.

Ethical approval

Ethics committee approval was obtained from Ankara Yıldırım Beyazıt University Faculty of Medicine Clinical Research Ethics Committee with the decision numbered 293 and dated 21.12.2016.

Author contribution

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

Source of funding

The authors declare that the study received no funding.

Conflict of interest

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

Acknowledgements

During the preparation and revision of this manuscript, artificial intelligence tools (Microsoft Copilot and ChatGPT) were used solely to improve the clarity, grammar, and academic writing style of the text. No AI tools were used for data analysis, interpretation, generation of scientific content, or drawing conclusions. All content was reviewed and approved by the authors, who take full responsibility for the final version of the manuscript.

References

1. Türkiye İstatistik Kurumu. Çocuklarda bilişim teknolojileri kullanım araştırması-2024. 2024. Available at: https://data.tuik.gov.tr/Bulten/Index?p=Cocuklarda-Bilisim-Teknolojileri-Kullanim-Arastirmasi-2024-53638 (Accessed on Dec 28, 2024).
2. Petry NM, Zajac K, Ginley MK. behavioral addictions as mental disorders: to be or not to be? Annu Rev Clin Psychol. 2018;14:399-423. **[Crossref]**
3. American Psychiatric Association. DSM-5-TR Classification. Diagnostic and statistical manual of mental disorders. 2022. **[Crossref]**
4. World Health Organization (WHO). ICD-11 for mortality and morbidity statistics. Available at: https://icd.who.int/browse/2024-01/mms/en#499894965%2Funspecified (Accessed on Dec 28, 2024).
5. Brand M, Potenza MN. behavioral addictions in the ıcd-11: an important debate that is anticipated to continue for some time. J Behav Addict. 2023;12(3):585-589. **[Crossref]**
6. Ratan ZA, Parrish AM, Zaman SB, Alotaibi MS, Hosseinzadeh H. Smartphone addiction and associated health outcomes in adult populations: a systematic review. Int J Environ Res Public Health. 2021;18(22):12257. **[Crossref]**
7. Meng SQ, Cheng JL, Li YY, et al. Global prevalence of digital addiction in general population: a systematic review and meta-analysis. Clin Psychol Rev. 2022;92:102128. **[Crossref]**
8. Osorio-Molina C, Martos-Cabrera MB, Membrive-Jiménez MJ, et al. Smartphone addiction, risk factors and its adverse effects in nursing students: a systematic review and meta-analysis. Nurse Educ Today. 2021;98:104741. **[Crossref]**

9. Kwon M, Kim DJ, Cho H, Yang S. The smartphone addiction scale: development and validation of a short version for adolescents. PLoS One. 2013;8(12):e83558. **[Crossref]**

10. Noyan CO, Enez Darçin A, Nurmedov S, et al. Validity and reliability study of the short form of the smartphone addiction scale in Turkish among university students. Anatolian Journal Of Psychiatry. 2015;16:71-83. **[Crossref]**

11. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry. 1961;4:561-571. **[Crossref]**

12. Hisli N. Validity and reliability of the beck depression inventory for university students. Turkish Journal of Psychology. 1989;7:3-13.

13. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. J Consult Clin Psychol. 1988;56(6):893-897. **[Crossref]**

14. Ulusoy M. Beck anksiyete envanteri-geçerlik ve güvenirlik çalışması. İstanbul: Bakırköy Ruh ve Sinir Hastalıkları Hastanesi; 1993.

15. Kwon M, Lee JY, Won WY, et al. Development and validation of a smartphone addiction scale (SAS). PLoS One. 2013;8(2):e56936. **[Crossref]**

16. Lee KE, Kim SH, Ha TY, et al. Dependency on smartphone use and its association with anxiety in Korea. Public Health Rep. 2016;131(3):411-419. **[Crossref]**

17. Tangmunkongvorakul A, Musumari PM, Thongpibul K, et al. Association of excessive smartphone use with psychological well-being among university students in Chiang Mai, Thailand. PLoS One. 2019;14(1):e0210294. **[Crossref]**

18. Richardson M, Hussain Z, Griffiths MD. Problematic smartphone use, nature connectedness, and anxiety. J Behav Addict. 2018;7(1):109-116. **[Crossref]**

19. Elhai JD, Yang H, Fang J, Bai X, Hall BJ. Depression and anxiety symptoms are related to problematic smartphone use severity in Chinese young adults: fear of missing out as a mediator. Addict Behav. 2020;101:105962. **[Crossref]**

20. El-Sayed Desouky D, Abu-Zaid H. Mobile phone use pattern and addiction in relation to depression and anxiety. East Mediterr Health J. 2020;26(6):692-699. **[Crossref]**

21. Notara V, Vagka E, Gnardellis C, Lagiou A. The emerging phenomenon of nomophobia in young adults: a systematic review study. Addict Health. 2021;13(2):120-136. **[Crossref]**

22. Kim YJ, Jang HM, Lee Y, Lee D, Kim DJ. Effects of internet and smartphone addictions on depression and anxiety based on propensity score matching analysis. Int J Environ Res Public Health. 2018;15(5):859. **[Crossref]**

23. Alhassan AA, Alqadhib EM, Taha NW, Alahmari RA, Salam M, Almutairi AF. The relationship between addiction to smartphone usage and depression among adults: a cross sectional study. BMC Psychiatry. 2018;18(1):148. **[Crossref]**

24. Alageel AA, Alyahya RA, A Bahatheq Y, et al. Smartphone addiction and associated factors among postgraduate students in an Arabic sample: a cross-sectional study. BMC Psychiatry. 2021;21(1):302. **[Crossref]**

25. Jun S. The reciprocal longitudinal relationships between mobile phone addiction and depressive symptoms among Korean adolescents. Computers in Human Behavior 2016;58:179-186. **[Crossref]**

26. Aker S, Şahin MK, Sezgin S, Oğuz G. Psychosocial factors affecting smartphone addiction in university students. J Addict Nurs. 2017;28(4):215-219. **[Crossref]**

27. Song A, Song G, Wang H, et al. Prevalence of mobile phone addiction among medical students: a systematic review. Am J Transl Res. 2023;15(5):2985-2998.

28. Lambert J, Barnstable G, Minter E, Cooper J, McEwan D. Taking a one-week break from social media ımproves well-being, depression, and anxiety: a randomized controlled trial. Cyberpsychol Behav Soc Netw. 2022;25(5):287-293. **[Crossref]**

Turk J Fam Pract 2026;30(1):29-39
DOI: 10.54308/TJFP.2026.896

Research Article

The impact of media influence on pregnant women's perceptions of oral glucose tolerance tests in primary health care settings

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ABSTRACT

Objective: Screening for gestational diabetes mellitus with the oral glucose tolerance test is recommended between the 24th and 28th weeks of pregnancy. In recent years, views opposing the oral glucose tolerance test have gained prominence in the Turkish media, potentially influencing pregnant women's decisions. This study aimed to determine how often the oral glucose tolerance test is used and by which physicians, to examine the relationship between socioeconomic status and test use, and to assess the impact of the media on those who refuse the test.

Methods: This descriptive, prospective, cross-sectional study was conducted between May and August 2020 with pregnant women who presented to, and were registered and followed up at, the family medicine outpatient clinics in Çankaya, Ankara. A total of 334 pregnant women who met the inclusion criteria participated in the study. Sociodemographic caracteristics, socioeconomic status, oral glucose tolarence test acceptance status, physician recommendation variability, effect of media influence of various media sources in decision-making process was questioned by a 16-question survey.

Results: Of the participants, 68.0% (n=227) had obtained a university degree, and 56.3% (n=188) reported a high income. Overall, 41.6% (n=139) said the didn't received any information about the oral glucose tolerance test from their primary care physician. Of the informed subjects 58.8% (n=114) received information from their family doctors. 15.6% (n=52) declined the test, while 33.8% (n=113) were undecided. For those who declined the test 53.8% (n=28) pointed at negative media or social media content to be the primary reason for their decision. Pregnant women from a lower socioeconomic background were more likely to decline the test or be undecided, particularly if they had not received information about it from a healthcare professional. Conversely, physician-provided information was associated with higher acceptance rates for the oral glucose tolerance test.

Conclusion: A low socioeconomic status, combined with a lack of information provided by physicians and negative media influence, was associated with higher rates of refusal or indecision regarding oral glucose tolerance test. However, providing accurate and clear information about gestational diabetes screening through family physicians was found to significantly increase the likelihood of test acceptance.

Keywords: Gestational diabetes, glucose tolerance test, family practice, media impact

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Received: 14.08.2025 **Accepted:** 15.10.2025 **Published:** 29.03.2026

Introduction

Pregnancy is a diabetogenic period characterised by insulin resistance, which begins in the second trimester and is accompanied by β-cell hyperplasia and hyperinsulinemia.[1] Hyperglycemia that first occurs during pregnancy, typically in the second or third trimester, and persists throughout gestation is referred to as gestational diabetes mellitus (GDM).[2] Most GDM cases occur in developing countries with low to middle incomes, where access to prenatal care is often limited, antenatal follow-up is irregular and diabetes screening during pregnancy is ineffective.[3] Various degrees of glucose intolerance are present in 1–14% of pregnancies.[4] The prevalence of GDM is increasing in parallel with rising rates of type 2 diabetes and obesity.[5] In Türkiye, the average prevalence of gestational diabetes is reported to be 7.7%.[6]

Gestational diabetes is the most common endocrine complication of pregnancy. It increases maternal and neonatal morbidity and poses short- and long-term risks to the health of the mother, fetus and newborn.[7,8] It is globally recommended that all pregnant women who are not diagnosed with diabetes in the early stages of pregnancy undergo an oral glucose tolerance test (OGTT) between the 24th and 28th weeks of gestation for GDM screening.[2,5,9] This approach has also been adopted in Türkiye.[1,10]

Primary Health Care (PHC) services play a key role in antenatal care to promote a healthy pregnancy. In Türkiye, family physicians conduct routine antenatal check-ups four times during pregnancy (the first between weeks 1–14, the second between weeks 18–24, the third between weeks 28–32, and the fourth between weeks 36–38) [11]. For high-risk pregnancies such as those involving GDM, the Turkish Ministry of Health's Public Health Institution has increased the number of antenatal follow-ups in accordance with the High-Risk Pregnancies and Management Guideline, requiring physicians to perform more detailed monitoring of pregnancies.[12]

In recent years, media reports in Türkiye have claimed that the OGTT, used to diagnose GDM in pregnant women, is harmful to both mother and baby. Some sources have alleged that the glucose administered during the test damages the placenta's structure, negatively affects fetal development and may cause preterm birth. This has led to the misconception that the test is harmful.[13] However, the Turkish Society of Obstetrics and Gynecology (TSOG) and the Turkish Society of Endocrinology and Metabolism (TEMD) have stated that these claims are unfounded, and there is no scientific evidence to suggest that the glucose challenge test has an adverse effect on the fetus. Nevertheless, some pregnant women, influenced by media reports, are reluctant to undergo the OGTT for GDM screening.[14] Following these reports, there has been a decline in the number of this long-established, safe and vital test being performed for both the expectant mother and the baby.[15]

This study aimed to determine the rate at which the OGTT isperformed according to socioeconomic status (SES) among pregnant women monitored by family physicians in PHC settings. The study also aimed to identify which group of physician (family physician or obstetrician) most frequently informed participants about the test, assess their knowledge regarding the OGTT, determine the factors contributing to refusal of the test in the community and examine the role of the media in this context. Based on the data obtained in our study, we also aimed to understand and fulfil the responsibilities of primary care physicians in raising public awareness of the importance of the OGTT, and in overcoming the challenges encountered when applying it to pregnant women.

Materials and Methods

Study design and participants

This study is descriptive, prospective and cross-sectional in nature. The authors confirm that all procedures performed in this study were in accordance with the ethical standards set out in the Declaration of Helsinki, which was first published in 1975 and revised in 2008. Informed consent was obtained from pregnant women who met the inclusion criteria and agreed to participate.

According to the power analysis conducted to determine the sample size for the study, considering the incidence of gestational diabetes, a sample size of 334 participants was found to provide a two-sided 95% confidence interval with a 0.050 margin of error when the sample ratio was 0.050. Accordingly, the study group consisted of 334 patients.

The first 334 patients who accepted the conditions for participation in the study and applied to family health centers in order of application were accepted into the study group. The case collection process was terminated when the target number of cases was reached.

Data collection

Data were collected between May and August 2020. Participants were interviewed face-to-face at family health centers using a 16-item questionnaire. These were administered by trained family medicine research assistants. The questionnaire items were developed by a committee comprised of faculty members and physicians from the Department of Family Medicine. The inclusion criteria for the study were pregnant women aged 20–45 years with a gestational age of 20 weeks or less who had not been diagnosed with diabetes before pregnancy and had not yet undergone an OGTT.

Exclusion criteria are removed according to reviewer suggestions.

Data analysis

The data obtained from the questionnaires completed as part of the study were recorded using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp. Released 2017, Armonk, NY: IBM Corp.). Descriptive statistical data were expressed as the mean ± standard deviation and minimum–maximum values for continuous variables and as the frequency and percentage distribution for categorical variables. If the assumptions for parametric tests were met, continuous variables were analyzed using the independent samples t-test (Student's t-test), analysis of variance (ANOVA) and, when necessary, the Tukey HSD test for multiple comparisons. If these assumptions were not met and could not be satisfied by transforming the data, continuous variables were analyzed using the Mann–Whitney U test, the Kruskal–Wallis test and, when necessary, the Dunn test for multiple comparisons. Categorical variables were analyzed using the chi-squared test or Fisher's exact test. A p-value of <0.05 within a 95% confidence interval was considered statistically significant.

Ethical approval

The research project was reviewed and approved on 22 May 2019 by the Research and Ethics Committee of Başkent University in terms of its scientific and ethical appropriateness. The project was given the number KA18/298. Additionally, permission to conduct the research was obtained from the Ankara Public Health Directorate, Public Health General Directorate, Department of Community Health Services and Education on 8 April 2020, as evidenced by official letter number 49654233-604.02.

Results

The study comprised a total of 334 pregnant women. The mean age of the participants was 30.49 ± 5.18 years (min: 20, max: 44). The data revealed that 68% (n=227) of the participants graduated from a university, postgraduate or higher education programs. Additionally 21.9% (n=73) had completed high school, 10.2% (n=34) were graduated from a primary school, or were illiterate with no participation in a formal education program. When analyzing their occupational status, 67.1% (n=224) were civil servants, 5.7% (n=19) belonged to unidentified occupational groups, and 27.2% (n=91) were unemployed. Participants were predominantly living in urban areas with a proportion of 98.2% (n=328). The income level of 6.9% (n=23) were low, while 36.8% (n=123) were from medium, and 56.3% (n=188) from high-income level families.

The mean gestational age of the participants was 14.78 ± 4.01 weeks (min: 5, max: 20, median: 16 weeks). Overall 12% (n=40) had a gestational week of less than 10 weeks, while 32.3% (n=108) had a gestational week between 10 and 15 weeks, and 55.7% (n=186) of more than 15 weeks.

When analyzing the answers to the question regarding the source of knowledge from which the

Table 1. Sources from which pregnant women follow health-related topics

Sources for following health-related topics	n	%
Written and Visual Media Sources	37	11.1
Scientific Sources – Attending Physician	135	40.4
Internet and Social Media	146	43.7
From Acquaintances or 'I Do Not Follow at All'	16	4.8
Total	334	100

Table 2. The effect of demographic characteristics on pregnant women's follow-up of health-related topics

		Which sources do you use to follow health-related information?										
		Written or Visual Media Sources		Scientific articles, books or physicians		Internet or Social Media		Those around me or I do not follow them at all		Total		p*
		n	%	n	%	n	%	n	%	n	%	
Age (years)	20-29	19	13.0	58	39.7	61	41.8	8	5.5	146	100	0.846
	30-39	16	9.2	72	41.6	77	44.5	8	4.6	173	100	
	40-49	2	13.3	5	33.3	8	53.3	0	0.0	15	100	
Education Level	High school and below	30	28.0	18	16.8	46	43.0	13	12.1	107	100	<0.001
	University and higher	7	3.1	117	51.5	100	44.1	3	1.3	227	100	
Employment	Unemployed	24	26.4	22	24.2	37	40.7	8	8.8	91	100	<0.001
	Employed	10	4.5	110	49.1	101	45.1	3	1.3	224	100	
	Other	3	15.8	3	15.8	8	42.1	5	26.3	19	100	
Income	Low to medium	31	21.2	40	27.4	63	43.2	12	8.2	146	100	<0.001
	High	6	3.2	95	50.5	83	44.1	4	2.1	188	100	
Residential Ownership	Owner	14	9.3	64	42.4	63	41.7	10	6.6	151	100	0.354
	Rented	23	12.6	71	38.8	83	45.4	6	3.3	183	100	

*Chi-Square Test

participants followed health-related topics, 54.8% (n=183) said that they used predominantly media sources (Table 1).

Analysis of the demographic data revealed that the choice of sources for getting health-related information was significantly affected by the education level, employment status and monthly income of the participants. Those with higher levels of education were found to be significantly more likely to use scientific sources and/or consulting their physician opinions, as well as they tend to use media sources more frequently (Table 2).

According to our results, 58.4% (n=195) of the pregnant women received explanatory information about the glucose tolerance test by their following physicians, while 41.6% (n=139) had not received any information (Table 3).

When participants are asked if they would like to get a glucose tolerance test during their pregnancy, the results showed that the majority of them are willing to participate. Of the participants 50.6% (n=169) answered positively, while 15.6% (n=52) gave a negative answer, and 33.8% (n=113) were undecided. Among those who were agreeing to get an OGTT, 33.7% (n=57) accepted the procedure based on the recommendation of their obstetrician, while 30.2% (n=51) agreed based on the recommendation of both their obstetrician and a family physician, and 3.0% (n=5) agreed solely on the recommendation of their family physician.

Table 3. Informing pregnant women about the OGTT

Physician providing information about the OGTT to the pregnant woman		
	n	**%**
Obstetrician Provided Information	81	24.3
Family Physician Provided Information	10	3.0
Both Provided Information	104	31.1
Neither Provided Information	139	41.6

Table 4. Regression analysis of factors affecting pregnant women's decision to undergo OGTT

		Beta (SH)	**OR**	**95% CI (Lower Limit – Upper Limit)**		**P**
Age distribution	<35 years	1.269 (1.359)	3.556	0.902	14.011	0.070
	≥35 years	1.817 (0.700)	6.153	1.530	24.743	0.010
Education level	Below University Level	0.229 (0.784)	1.257	0.270	5.843	0.270
	University and Above	-0.004 (0.585)	0.996	0.316	3.136	0.316
Employment status	Employed	-0.031 (0.815)	0.970	0.970	0.196	0.196
	Unemployed	0.587 (0.852)	0.491	1.798	0.338	0.338
Income Status	<5000 ₺	-0.936 (0.716)	0.191	0.096	1.596	0.096
	>5000 ₺	0.326 (0.464)	0.483	0.558	3.438	0.558
Sources for trackinghealth-related topics	Written and Visual Media	1.158 (0.982)	3.184	0.464	21.829	0.238
	Social Media – Internet	1.753 (0.914)	5.772	0.963	34.603	0.55
	Scientific Sources – Physician	1.309 (0.873)	3.701	0.669	20.478	0.134
Gestational week	<15	-0.893 (0.577)	0.410	0.132	1.270	0.132
	≥15	0.049 (0.419)	0.952	0.419	2.164	0.419
Obstetrician provides information	Yes	1.456 (0.452)	4.287	1.768	10.391	0.001
Family physician provides information	Yes	-0.309 (0.440)	0.734	0.734	0.310	0.482

N=334, R2=0.394 (Nagelkerke), Model X2=139,371; P=<0.001

Table 5. Factors affecting responses to the question of why OGTT is performed during pregnancy

	Distribution of correct and incorrect answers regarding the OGTT			
		Correct (n/%)	**Incorrect (n/%)**	**P***
Age Groups (years)	20-29	57 (41.0)	89 (45.6)	0.511
	30-39	74 (53.2)	99 (50.8)	
	40-49	8 (5.8)	7 (3.6)	
Education Level	Primary Education and Below	4 (2.9)	30 (15.4)	<0.001
	High School	18 (12.9)	55 (28.2)	
	University and Above	117 (84.2)	110 (56.6)	
Employment Status	Unemployed	27 (19.4)	64 (32.8)	<0.001
	Civil Servant	110 (79.1)	114 (58.5)	
	Other Occupation	2 (1.4)	17 (8.7))	
Type of Residence	Rural Settlement	3 (2.2)	3 (1.5)	0.489
	Urban Settlement	136 (97.8)	192 (98.5)	
Income Status	2000₺ and Below	6 (4.3)	17 (8.7)	0.002
	2001-5000₺	39 (28.1)	84 (43.1)	
	5000₺ and Above	94 (67.6)	94 (48.2)	
Sources for trackinghealth-related topics	Written and Visual Media	8 (5.8)	29 (14.9)	<0.001
	Scientific Sources and Attending Physician	76 (54.7)	59 (30.3)	
	Internet and Social Media	53 (38.1)	93 (47.7)	
	From Acquaintances or I Do Not Follow at All	2 (1.4)	14 (7.2)	
Gestational Week	<10	12 (8.6)	28 (14.4)	<0.001
	10-15	29 (20.9)	79 (40.5)	
	>15	98 (70.5)	88 (45.1)	
Obstetrician	Yes	110 (79.1)	75 (38.5)	<0.001
	No	29 (20.9)	120 (61.5)	
Family Physician	Yes	66 (47.5)	48 (24.6)	<0.001
	No	73 (52.5)	147 (75.4)	
Total		139 (100)	195 (100)	

*Chi-Square Test

Of the patients who were rejecting to get the OGTT, 53.8% (n=28) said that negative media comments about the OGTT had effected their decision.

Furthermore, 29.2% (n=33) of those who were undecided said that their attending physicians had not provided them with sufficient information about the glucose loading test, which contributed to their indecision.

A regression analysis was conducted to identify the factors influencing the decision of pregnant women to undergo the OGTT. It was found that, among those willing to undergo the test, receiving information about the glucose tolerance test from their obstetrician and being over 35 years old were associated with a statistically significant increase in the likelihood of undergoing the OGTT (Table 4).

As the level of education increased among civil servants and those in higher income brackets, as well as with advancing gestational age, the proportion of pregnant women who answered the question correctly increased at a statistically significant level. Among those who answered correctly, a high proportion obtained information from scientific sources and their attending physicians. Conversely, the rate of incorrect

Table 6. Factors affecting participants' correct and incorrect answers to the question of what happens if OGTT is not performed during pregnancy

	Distribution of correct and incorrect answers to the question of what happens if ogtt is not performed			
		Correct (n/%)	**Incorrect (n/%)**	**P***
Age Groups (years)	20-29	61 (39.4)	85 (47.5)	0.316
	30-39	86 (55.5)	87 (48.6)	
	40-49	8 (5.2)	7 (3.9)	
Education Level	Primary Education and Below	5 (3.2)	29 (16.2)	<0.001
	High School	22 (14.2)	51 (28.5)	
	University and Above	128 (82.6)	99 (55.3)	
Employment Status	Unemployed	26 (16.8)	65 (36.3)	<0.001
	Civil Servant	124 (80.0)	100 (55.9)	
	Other Occupation	5 (3.2)	14 (7.8)	
Type of Residence	Rural Settlement	0 (0.0)	6 (3.4)	0.023
	Urban Settlement	155 (100.0)	173 (96.6)	
Income Status	2000₺ and Below	6 (3.9)	17 (9.5)	<0.001
	2001-5000₺	43 (27.7)	80 (44.7)	
	5000₺ and Above	106 (68.4)	82 (45.8)	
Sources for trackinghealth-related topics	Written and Visual Media	11 (7.1)	26 (14.5)	<0.001
	Scientific Sources and Attending Physician	79 (51.0)	56 (31.3)	
	Internet and Social Media	65 (41.9)	81 (45.3)	
	From Acquaintances or I Do Not Follow at All	0 (0.0)	16 (8.9)	
Gestational Week	<10	15 (9.7)	25 (14.0)	0.096
	10-15	44 (28.4)	64 (35.8)	
	>15	96 (61.9)	90 (50.3)	
Obstetrician	Yes	118 (76.1)	67 (37.4)	<0.001
	No	37 (23.9)	112 (62.6)	
Family Physician	Yes	71 (45.8)	43 (24.0)	<0.001
	No	84 (54.2)	136 (76.0)	
	Total	155 (100.0)	179 (100.0)	

*Chi-Square Test

answers was significantly higher among those who obtained health-related information from the internet and social media (see Table 5).

The proportion of correct responses was higher among subjects who had been informed by an obstetrician (76.0%) than among those who had been informed by a family physician (45.0%). Among the women who provided the correct answers, a significantly higher proportion of those who obtained health-related information from scientific sources did so in conjunction with their attending physician (Table 6).

Discussion

Early diagnosis and treatment of GDM through OGTT screening performed between the 24th and 28th weeks of pregnancy in all pregnant women constitutes a major step in preventing, delaying, or controlling potential complications, thereby protecting maternal and neonatal health, and consequently public health.[16] In Türkiye, despite

the steadily increasing prevalence of GDM over the years, there has been a significant decline in the rates at which pregnant women undergo OGTT, the only proven effective method for diagnosis and screening.

A number of articles have sought to demonstrate this decline by examining the factors that lead pregnant women to refuse or hesitate to undergo OGTT. The literature suggest that this declining behavior is multifactorial. Furthermore, research findings suggest that demographic differences within the pregnant population as well as variations in physicians attitudes or healthcare center regulations appear to influence the decisions of pregnant.[17,18] We conclude that re-examining this behavioral pattern in a sample with well-controlled variables will provide better understanding into both the differences in contributing factors and physician attitudes.

In the study conducted by Çakır et al., the majority of the participants had a primary school education (37.5%), were unemployed (72.9%), and had a medium income level (93.1%).[14] In contrast, our study revealed that 68% of the participants graduated from higher education, university, or postgraduate programs, 67.1% were civil servants, and 56.3% had a high-income level. The high representation of demographic variables such as age, income, education level, and employment status in our study is indicative of a more accurate reflection of the Turkish population. Including individuals from different socioeconomic backgrounds may have facilitated a more objective assessment of health literacy and related factors.

In response to the question regarding the sources from which participants drew information on health-related topics, 43.7% of respondents indicated the internet and social media as their primary source. According to responses to the question regarding sources of health related informations 40.4% of participants reported scientific sources and their attending physicians as their main sources of information, while 11% cited print and visual media as their main information sources. In the study conducted by Yaprak et al., the primary source of health-related information for pregnant women was their attending physicians (67.5%), followed by television and the internet (39.1%).[19] The present study was conducted in a relatively high-SES population, which may have facilitated more straightforward access to social media and the internet.

In a study by Başbuğ et al., 49.2% of pregnant women said they wanted to take the OGTT, while 50.8% said they did not want to take the test during pregnancy.[20] In the study by Turan et al., 49.9% of pregnant women wanted to undergo OGTT, while 50.1% did not.[21] In both studies, a higher proportion of pregnant women were unwilling to undergo OGTT than in our study. The present study sample comprised participants at 20 weeks of gestation or less. This constitutes a limitation of the present research, as it precluded long-term follow-up of the participants.

In the present study, 33.7% of pregnant women elected to undergo the glucose loading test following a recommendation by an obstetrician, while 30.2% of subjects made this decision subsequent to a recommendation by both an obstetrician and their attending family physician. The proportion of women who elected to undergo OGTT on the recommendation of a family physician was relatively low at 3.0%. The underlying reasons for this phenomenon may be multifaceted, including but not limited to: family physicians not allocating sufficient time to pregnant women during routine antenatal follow-ups; a decline in face-to-face consultations in PHC settings due to women attending regular check-ups with obstetricians; and the possibility that history-taking and physical examinations in these settings were inadequate.

The results of the study indicated that the majority (53.8%) of pregnant women in the study group made this decision due to being negatively

influenced by media sources regarding the glucose tolerance test. In the study conducted by Başbuğ et al., 30.8% of pregnant women who did not undergo OGTT stated that their decision was based on the fact that some healthcare professionals featured in visual media did not recommend the test.[20] In the study by Hocaoğlu et al., 78.5% of pregnant women who were unwilling to undergo OGTT reported that they had made this decision because they believed the test was harmful to the fetus.[22]

In the present study, the proportion of pregnant women who were undecided about undergoing OGTT was 33.8%. Of these, 31.9% reported fear that the test could harm their baby, while 25.7% stated that they were influenced by the opinions of prominent professors in the media regarding the glucose loading test. Furthermore, 29.2% of subjects reported being undecided on the matter due to the absence of sufficient information regarding the test from their attending physicians.

In the study conducted by Yaprak et al., the proportion of pregnant women who were undecided about undergoing OGTT was much lower than in our study (3.6%).[19] Given that the present study was conducted in a relatively higher SES population, it is conceivable that participants may have had more facile access to the internet and media sources.

This group represents a significant distinction between the present study and others in the field. The responsibility of family physicians working in primary healthcare is twofold: firstly, to overcome the indecision of pregnant women regarding OGTT, and secondly, to encourage them to undergo the test. It is hypothesised that if family physicians conduct regular antenatal follow-ups and provide their patients with clear information about the necessity of OGTT for gestational diabetes screening, the decisions of those who are currently undecided will be more likely to shift in a positive direction.

The present study is subject to several limitations. Firstly, the study was conducted in a single district (Çankaya, Ankara) with a relatively higher socioeconomic status, which may limit the generalisability of the results to pregnant women in rural areas or regions with lower socioeconomic levels. Secondly, the cross-sectional design of the study imposed limitations in establishing causal relationships between physician counseling, media influence, and the decision to undergo OGTT. Given the excessive change and variability in the content and characteristics of the media over the years, it is likely that the findings of this study, conducted in 2020, reflect the characteristics and perceptions of the period in which the study was conducted. Furthermore, considering that all participants were in the first half of their pregnancy (≤20 weeks gestation), it was not possible to assess whether opinions regarding OGTT changed in later stages of pregnancy.

Conclusion

The importance of early diagnosis of gestational diabetes for pregnant women is a widely accepted topic in medical circles. However, awareness of this issue among pregnant women in our society is insufficient.

A significant proportion of pregnant women who are uncertain about OGTT are concerned that the test may harm their babies. Information obtained from media sources is a major factor contributing to this perception. Another important factor is the inadequacy of information provided by physicians, especially family physicians.

Family physicians are in a unique position due to their important roles in preventive and protective health services. It is crucial that physicians provide accurate information. Prenatal and routine pregnancy follow-ups conducted by family physicians provide a valuable opportunity to give patients accurate information about OGTT.

Ethical approval

This research project was deemed scientifically and ethically appropriate by the Başkent University Faculty of Medicine Research and Ethics Committee and approved on May 22, 2019. The project number of the study was KA18/298. In addition, a research permit was obtained from the Ankara Public Health Directorate, General Directorate of Public Health, Department of Community Health Services and Education, dated April 8, 2020, with letter number 49654233-604.02.

Author contribution

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

Source of funding

The study was funded by the Başkent Universtiy Research Fund.

Conflict of interest

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

References

1. Turkish Society of Endocrinology and Metabolism. Guideline for the diagnosis, treatment and follow-up of diabetes mellitus and its complications. 2022.
2. American Diabetes Association. 14. Management of diabetes in pregnancy: standards of medical care in diabetes-2019. Diabetes care. 2019;42(Suppl 1):S165-S172. **[Crossref]**
3. Yuen L, Saeedi P, Riaz M, et al. Projections of the prevalence of hyperglycaemia in pregnancy in 2019 and beyond: results from the international diabetes federation diabetes atlas, 9th edition. Diabetes Res Clin Pract. 2019;157:107841. **[Crossref]**
4. National Institute for Health and Care Excellence (NICE). Diabetes in pregnancy: management from preconception to the postnatal period. NICE guideline [NG3]. London: NICE; 2015.
5. International Diabetes Federation. IDF diabetes atlas. 10th ed. Brussels: IDF; 2021.
6. Karaçam Z, Çelik D. The prevalence and risk factors of gestational diabetes mellitus in Turkey: a systematic review and meta-analysis. J Matern Fetal Neonatal Med. 2021;34(8):1331-1341. **[Crossref]**
7. Perinatology Specialists Association. Pregnancy and diabetes guideline. 2019.
8. Halici F, Engin Y. Maternal problems and complications. In: Cakal E, editor. Pregnancy and diabetes. Ankara: Turkiye Klinikleri; 2020: 44-50.
9. American College of Obstetricians and Gynecologists. ACOG Practice Bulletin No. 190: Gestational diabetes mellitus. Obstet Gynecol. 2018;131(2):e49-e54. **[Crossref]**
10. Republic of Turkey Ministry of Health, Public Health Institution of Turkey. Turkish diabetes program 2015-2020. Ankara: Ministry of Health Publication No: 960; 2015.
11. Republic of Turkey Ministry of Health, General Directorate of Public Health. Prenatal care management guideline. Ankara: Ministry of Health Publication No: 925; 2018.
12. Republic of Turkey Ministry of Health, Public Health Institution of Turkey. High-risk pregnancy management guideline. Ankara: Ministry of Health Publication No: 926; 2014.
13. Desdicioglu R, Yildirim M, Suleymanova I, Atalay I, Ozcan M, Yavuz AF. Factors affecting pregnant women's approach to antenatal tests. Ankara Med J. 2017;17(1). **[Crossref]**
14. Cakir A, Calik K. The effect of media on Oral Glucose Tolerance Test (OGTT) status of pregnant women. STED. 2020;29(5):318-28. **[Crossref]**
15. Karasu Y. What happened to the glucose loading test? The impact of media on public health. Ankara Egit Ars Hast Tip Derg. 2018;51(1):54-58.
16. World Health Organization. Global report on diabetes. Geneva: WHO; 2016.

17. Aydogmus H, Aydogmus S, Tiras HI, Cankaya Z. Behaviors of Turkish pregnant women towards gestational diabetes screening. Pak J Med Sci. 2021;37(5):1486-1490. **[Crossref]**

18. Sezer H, Yazici D, Canbaz HB, et al. The frequency of acceptance of oral glucose tolerance test in Turkish pregnant women: a single tertiary center results. North Clin Istanb. 2022;9(2):140-148. **[Crossref]**

19. Yaprak M, Gumustakim RS, Tok A, Doganer A. Determining the awareness of oral glucose tolerance test in pregnant women. Ankara Med J. 2019;19(3):635-647. **[Crossref]**

20. Basbug A, Kaya A, Sonmez C, Yildirim E. An important problem encountered in diabetes screening: why do pregnant women not want to undergo oral glucose tolerance testing? Konuralp Med J. 2018;10(2):144-148. **[Crossref]**

21. Turan Z, Toker E. Examination of factors affecting the performance of oral glucose tolerance test in pregnant women. Adiyaman Univ Saglik Bilim Derg. 2020;6(2):174-181. **[Crossref]**

22. Hocaoglu M, Turgut A, Guzin K, et al. Why some pregnant women refuse glucose challenge test? Turkish pregnant women's perspectives for gestational diabetes mellitus screening. North Clin Istanb. 2018;6(1):7-12. **[Crossref]**

Turk J Fam Pract 2026;30(1):40-52
DOI: 10.54308/TJFP.2026.888

Research Article

Challenges in achieving low-density lipoprotein targets: a cross-sectional study in statin users

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ABSTRACT

Objective: Statins are commonly used in the management of dyslipidemia, with their efficacy varying based on type and dose. They are prescribed for both primary and secondary cardiovascular prevention. However, achieving recommended low-density lipoprotein cholesterol (LDL-C) targets remains a challenge in clinical practice. This study aimed to assess achievement of target LDL-C levels in statin users and to identify modifiable factors related to treatment failure.

Methods: This cross-sectional study was conducted in a family medicine outpatient clinic and included adults (≥18 years) on statin therapy for at least six months. Data were collected through face-to-face interviews using a sociodemographic questionnaire and the Adherence to Refills and Medications Scale (ARMS-7). Cardiovascular risk levels were classified using the SCORE risk calculator, and LDL-C goal attainment was assessed based on risk categories.

Results: Of 334 participants, 51.8% were male. LDL-C levels exceeded 100 mg/dL in 43.1% of patients. According to SCORE classifications, 55.4% were identified as being at very high cardiovascular risk. Overall, 87.1% of participants failed to achieve target LDL-C levels. Target LDL-C levels were achieved by 30.4% of participants in the low-to-moderate risk group, 16.5% in the high-risk group, and only 6.5% in the very high-risk group ($p<0.001$). In the study population, patients using statins solely for dyslipidemia (without a history of cardiovascular disease) and those with hypertension, were more likely to achieve LDL-C targets ($p<0.05$). A significantly higher proportion of male participants (16.8%) achieved the target LDL-C level compared to female participants (8.7%) ($p<0.05$).

Conclusion: The majority of patients on statin therapy did not meet their target LDL-C levels, particularly those at high cardiovascular risk, highlighting the impact of clinical inertia and underscoring the importance of individualized statin dosing and regular monitoring based on patients' cardiovascular risk assessments in primary care settings.

Keywords: Primary health care, LDL cholesterol, treatment failure

Introduction

Dyslipidemia refers to abnormalities in plasma lipid levels that elevate cardiovascular risk, including increased total cholesterol, low-density lipoprotein cholesterol (LDL-C), and triglycerides, as well as decreased High-Density Lipoprotein Cholesterol (HDL-C) or hypoalphalipoproteinemia. These lipid disturbances are major contributors to the development of cardiovascular diseases, which

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Received: 29.07.2025 **Accepted:** 22.11.2025 **Published:** 29.03.2026

remain the leading cause of mortality worldwide.[1] Achieving guideline-recommended LDL-C targets remains a major challenge worldwide, particularly in high cardiovascular risk patients. For instance, the DA VINCI study reported that only 44% of high-risk patients across various European regions reached the 2016 ESC/EAS LDL-C targets.[2] In the TEKHARF 2011/14 cohort, LDL-C >130 mg/dL was observed in 39% of men and in 46% of women in a sample predominantly composed of postmenopausal women.[3]

However, data on LDL-C target attainment among patients receiving statin therapy in routine primary care are limited. This evidence gap highlights the need to evaluate LDL-C goal achievement in the Turkish population to optimize treatment strategies and reduce cardiovascular risk. According to established guidelines, the term dyslipidemia refers to deviations from target lipid values.[4] From a cardiovascular perspective, increases in total cholesterol and LDL-C, along with decreases in HDL-C, are defined as dyslipidemia.[5] Lowering LDL-C levels is currently the most crucial strategy in combating atherosclerotic diseases.[6]

Beyond LDL-C, non-HDL-C and apolipoprotein B have been shown to be stronger predictors in the assessment of cardiovascular risk.[7] In addition, elevated levels of lipoprotein(a) confer genetically determined additional atherogenic risk and are increasingly recognized as an important component of the residual cardiovascular risk under current treatment strategies.[8]

The effects of statins on the lipid profile are dose-dependent and vary according to the type of statin used. In high-intensity statin therapy, the goal is to achieve a ≥50% reduction in LDL-C levels. In moderate-intensity statin therapy, the target is a 30–50% reduction in LDL-C. Statins reduce triglyceride levels by approximately 10–20% on average. [9,10] Their effects on HDL-C are independent of their impact on LDL-C and are typically associated with a 1–10% increase.[11] In the treatment of dyslipidemia, the target lipid levels are determined based on cardiovascular risk stratification. Non-statin options include proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors, colesevelam, ezetimibe, fibrates, and niacin, used alone or in combination.[12]

The cornerstone of dyslipidemia treatment is the use of lipid-lowering medications to achieve optimal lipid control and reduce cardiovascular disease morbidity and mortality.[13] However, despite the widespread availability and prescription of these highly effective agents, a significant proportion of patients fail to reach recommended lipid targets. This gap highlights the critical role of treatment adherence in the effective management of dyslipidemia and its impact on overall therapeutic outcomes. Statin use and dose optimization can be limited in practice due to statin intolerance, with muscle symptoms reported by approximately 60% of adults as the main reason for discontinuation, which in turn affects achieving target levels.[14,15]

This study evaluates LDL-C goal attainment in routine primary care, highlighting real-world usage and patient adherence. In addition, medication adherence was quantitatively assessed using the ARMS 7 scale and analyzed alongside lipid outcomes. The combination of a large, real-world sample with integrated adherence and risk assessment provides a comprehensive perspective on factors influencing LDL-C target achievement. This underscores the need for individualized statin therapy and goal-oriented monitoring, offering direct implications for clinical practice. This study aimed to examine the rates of achieving target LDL-C levels among patients using statins and to identify the contributing factors, to identify modifiable factors associated with treatment failure, which can inform targeted interventions in primary care.

Materials and Methods

Our study has a descriptive and cross-sectional design. A total of 334 volunteers who applied to the Family Medicine Outpatient Clinic of Eskişehir Osmangazi University Hospital between April 1, 2024, and September 1, 2024, were included in the study. The minimum sample size of 285 was calculated using OpenEpi (5% margin of error, 50% frequency, 97% confidence level). The inclusion criteria were being over 18 years of age and receiving statin therapy for at least six months. Patients were excluded if they had familial hypercholesterolemia, a history of acute coronary syndrome within the previous three months, severe hepatic or renal disease, active malignancy, or were pregnant or breastfeeding. Cases with missing data were excluded from the analysis. The study was conducted in accordance with the Declaration of Helsinki and approved by the Non-invasive Clinical Research Ethics Committee of Eskişehir Osmangazi University (Protocol No: 16, Approval Date: March 19, 2024). Informed consent was obtained from all participants.

Data collection methods

After obtaining written informed consent from the participants, data were collected through face-to-face interviews using a structured questionnaire that included sociodemographic characteristics and certain health assessments, as well as the Medication Adherence and Prescription Refill Scale-7. The sociodemographic questionnaire included questions regarding smoking and alcohol use, marital status, existing chronic conditions, medications used, physical activity status, dietary adherence, and whether they had heard any negative comments about statins. Chronic conditions were identified through a combination of self-reported diagnoses and supporting clinical measurements (e.g., blood pressure readings, medication lists) when available. Blood pressure was measured using a validated sphygmomanometer following standard protocols, with patients in a seated position after a rest period, at least 5 days per week, preferably every day. Physical activity status and dietary adherence were assessed using single-item, self-reported questions. Participants were asked whether they engaged in regular physical activity and whether they generally adhered to a healthy diet.

The patient's laboratory data were obtained from the hospital records, and the most recent values at the time of admission were recorded.

Adherence to Refills and Medications Scale-7 (ARMS-7)

The scale consists of 7 items and is based on a 4-point Likert-type format. Items 1, 2, 3, and 6 assess medication adherence, while items 4, 5, and 7 evaluate prescription refill behavior. Each item is scored from 1 to 4, where 1=never, 2=sometimes, 3=often, and 4=always. The total score ranges from 7 to 28. Higher scores on the scale indicate poorer medication adherence. The validity and reliability study of the scale in Türkiye was conducted by Gökdoğan F. and the Cronbach's alpha coefficient was found to be 0.75.[16,17]

Determination of target LDL-C levels

Participants were classified into cardiovascular risk categories (very high, high, moderate, and low risk) according to the recommendations of the 2021 TEMD Dyslipidemia Guideline and the 2019 ESC Dyslipidemia Guidelines.[5,12] Target LDL-C levels were determined based on these cardiovascular risk categories. In addition, while categorizing patients' cardiovascular risk, we used the SCORE Risk Calculator, as recommended by the same guidelines for high-risk countries.[18] The target LDL-C levels in treatment were defined as follows: <55 mg/dL for the very high-risk group, <70 mg/dL for the high-risk group, and <100 mg/dL for the moderate-risk group.[5]

Statistical analysis

Data were analyzed using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY, USA). In descriptive statistics, categorical variables are presented as frequencies and percentages, while continuous variables are expressed as mean, standard deviation, median, minimum, and maximum values (reported as the range) The normality of continuous variables was assessed using the Shapiro-Wilk test. Since normal distribution assumptions were not met, the Mann-Whitney U test was used to compare two means. Pearson Chi-Square test was used for comparing categorical variables. A confidence interval of 95% and a significance level of $p<0.05$ were accepted for all statistical analyses.

Results

Of the participants, 48.2% (n=161) were female and 51.8% (n=173) were male. The mean age was 63.0±9.5 years, with a minimum of 40 and a maximum of 85 years.

A greater proportion of male participants (16.8%) achieved the target LDL-C level compared to female participants (8.7%). The difference in the achievement of target LDL-C levels between males and females was statistically significant (p=0.028). However, there was no statistically significant difference in the mean age between participants who achieved the target LDL-C level and those who did not (p=0.311) (Table 1).

In the analysis of the LDL-C levels of the participants, it was found that 43.1% (n=144) had LDL-C levels above 100 mg/dL, 37.7% (n=126) were

Table 1. The relationship between participants' sociodemographic characteristics and achievement of target LDL-C levels.

Sociodemographic Characteristics	Achievement of Target LDL-C Level		χ^2/MWU	p*
	Yes	No		
Age (Mean ± SD)	61.4±8.9	63.2±9.6	5.658	0.311
Gender	n (%)	n (%)		
Female	14 (8.7)	147 (91.3)	4.839	0.028
Male	29 (16.8)	144 (83.2)		
Marital Status				
Married	37 (12.8)	251 (87.2)	0.001	0.971
Single	6 (13.0)	40 (87.0)		
BMI				
Normal	11 (12.9)	74 (87.1)	0.278	0.870
Overweight	17 (11.9)	126 (88.1)		
Obese	15 (14.2)	91 (85.8)		
Alcohol Use				
Yes	3 (10.3)	26 (89.7)	0.181	0.670
No	40 (13.1)	265 (86.9)		
Smoking				
Yes	6 (9.1)	60 (90.9)	1.050	0.306
No	37 (13.8)	231 (86.2)		

* Mann-Whitney U test

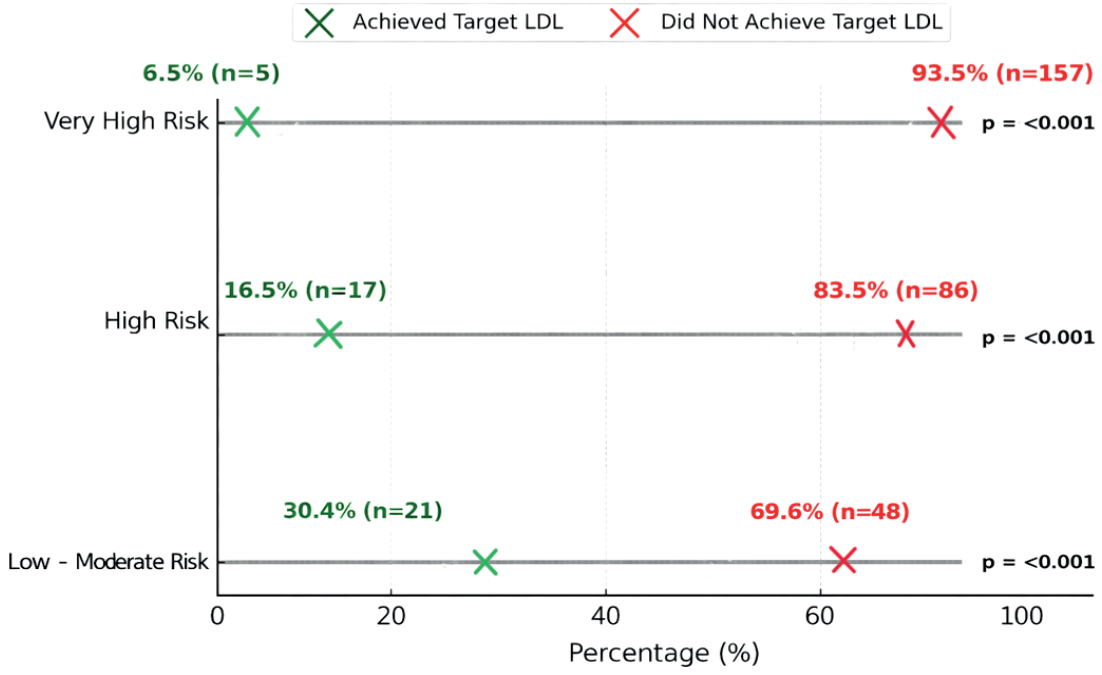

Figure 1. Achievement of target LDL-C levels by cardiovascular risk category

in the 71-100 mg/dL range, 14.1% (n=47) were in the 55-70 mg/dL range, and 5.1% (n=17) had LDL-C levels below 55 mg/dL. The participants' lipid profile showed a mean total cholesterol of 179±51 mg/dL (median 169, range 88–424), triglycerides 165±108 mg/dL (median 140, range 38–1308), LDL-C 104±41 mg/dL (median 95, range 27–298), and HDL-C 46±12 mg/dL (median 45, range 10–87).

According to cardiovascular risk categories; 13.8% of participants (n=46) were found to be at low-medium risk, 30.8% (n=103) at high risk, and 55.4% (n=185) at very high risk.

Based on cardiovascular risk categories, 12.9% of the participants (n=43) achieved the target LDL-C level, whereas 87.1% (n=291) failed to reach the target level.

The attainment of target LDL-C levels varied significantly across cardiovascular risk categories. Participants in the low–moderate risk group achieved target LDL-C levels at a rate of 30.4%, compared to 16.5% in the high-risk group and only 6.5% in the very high-risk group (p<0.001). This trend is visually depicted in Figure 1, where a marked decline in LDL-C goal attainment is observed with increasing cardiovascular risk.

The mean systolic blood pressure of the participants is 120.0±11.8 mmHg, and the mean diastolic blood pressure is 72.7±7.6 mmHg. There is no statistically significant relationship between systolic blood pressure and achievement of target LDL-C levels (p=0.372). Similarly, there is no statistically significant relationship between diastolic blood pressure and achievement of target LDL-C levels (p=0.201).

25.5% (n=85) of the participants were found to be normal, 42.8% (n=143) were overweight, and 31.7% (n=106) were obese. There is no statistically significant relationship between body mass index and reaching the target LDL-C value (p=0.870).

In the analysis the reasons for participants' initiation of statin therapy, it was found that 52.1% (n=174) started treatment due to dyslipidemia,

Table 2. The relationship between reason for statin use and achievement of target LDL-C levels.

Reason for Statin Use	Achievement of Target LDL-C Level		χ^2	p*
	Yes n (%)	No n (%)		
Dyslipidemia	30 (17.2)	144 (82.8)	6.176	0.013
Cardiac Reasons	13 (8.1)	147 (91.9)		

* Pearson Chi-Square test

37.4% (n=125) due to coronary artery disease, 9.9% (n=33) due to myocardial infarction, and 0.6% (n=2) due to angina pectoris. In the analysis the achievement of target LDL-C levels based on the reasons for statin use, participants using statins due to dyslipidemia had a higher rate of reaching the target LDL-C level compared to those using statins for cardiac reasons (p=0.013) (Table 2).

20.9% of participants have been using statins for 6 months to 1 year, 23.6% for 1-3 years, 17.4% for 3-5 years, 19.8% for 5-10 years, 8.7% for 10-15 years, 3.6% for 15-20 years, and 6.0% for more than 20 years. There is no statistically significant relationship between the duration of statin use and achievement of target LDL-C levels (p=0.139).

71.9% (n=240) of participants have hypertension, 56.0% (n=187) have diabetes mellitus, 15.6% (n=52) have heart failure, 12.0% (n=40) have chronic kidney failure, and 7.8% (n=26) have COPD. Figure 2 illustrates the proportion of participants achieving target LDL-C levels according to the presence or absence of various chronic diseases. Hypertension was the only condition significantly associated with lower target LDL-C attainment (p=0.012). Participants with hypertension achieved target LDL-C levels at a rate of 10.0%, compared to 20.2% in those without hypertension. Other chronic conditions, including diabetes mellitus, heart failure, chronic kidney failure, COPD, and obesity, did not show statistically significant differences in LDL-C target attainment rates (Figure 2).

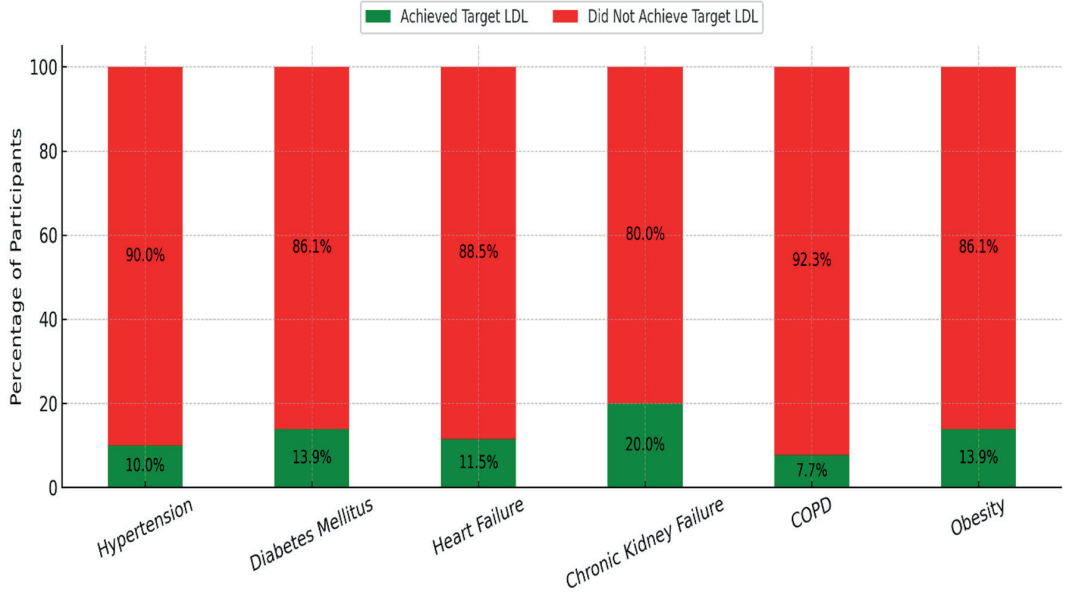

Figure 2. Relationship between chronic diseases and achievement of target LDL-C levels.

COPD: Chronic Obstructive Pulmonary Disease.

In the analysis of the types and dosages of statins used by participants, it was found that the most commonly used statin was atorvastatin 20 mg/day (41.0%), followed by atorvastatin 10 mg/day (29.0%) and atorvastatin 40 mg/day (18.6%). There was no statistically significant relationship between the type and dosage of statins used by participants and the achievement of target LDL-C levels (p>0.05).

94.9% of participants (n=317) did not use any additional lipid-lowering medications, while 2.7% (n=9) used fibrates, 1.8% (n=6) used ezetimibe, and 0.6% (n=2) used niacin.

There was no statistically significant relationship between physical activity and achievement of target LDL-C levels (p=0.374).

The mean score on the Adherence to Refills and Medications Scale-7 (ARMS-7) was 8.9±4.7. The mean score for the Medication Adherence subscale was 5.0±2.6, and the mean score for the Prescription Refill subscale was 3.9±2.1.

The mean ARMS-7 total scale score was slightly lower among participants who achieved target LDL-C levels (8.4 ± 4.2) compared to those who did not (9.0 ± 4.7). Similarly, mean scores on the Medication Adherence subscale (4.7 ± 2.4 vs. 5.0 ± 2.7) and Prescription Refill subscale (3.7 ± 1.9 vs. 3.9 ± 2.1) were marginally lower in the LDL-C-achieving group. However, these differences did not reach statistical significance (p>0.05 for all comparisons). Although not statistically significant, slightly lower ARMS-7 scores in participants achieving target LDL-C suggest better medication adherence may contribute to improved lipid control.

Figure 3 displays violin plots of ARMS-7 total and subscale scores by achievement of target LDL-C levels. The total score distribution was higher among patients who did not achieve target LDL-C, whereas the distributions of the medication adherence and prescription refill subscales showed no statistically significant differences between the groups (p>0.05) (Figure 3).

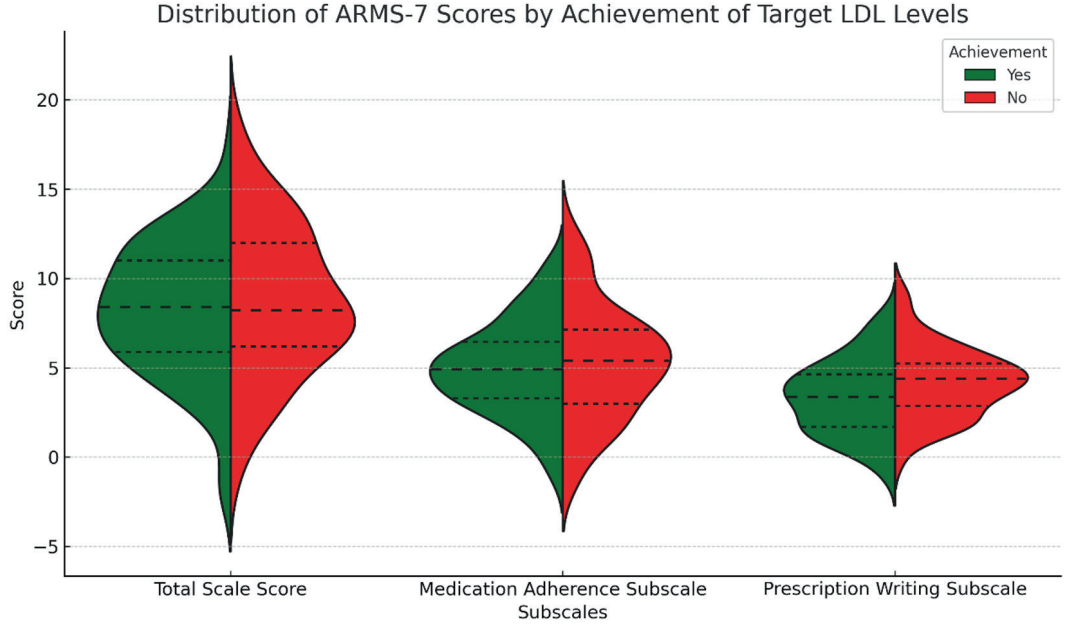

Figure 3. Distribution of ARMS-7 total and subscale scores according to achievement of target LDL-C levels.

Discussion

A large proportion of patients receiving statin therapy failed to achieve their target LDL-C levels (87.1%), with attainment rates being lowest among those at very high cardiovascular risk (6.5%). Male participants were more likely to reach LDL-C goals compared to females, and target achievement was higher among individuals with hypertension and those using statins solely for dyslipidemia without established cardiovascular disease. These findings indicate a significant treatment gap in the management of dyslipidemia within primary care and emphasize the need for more personalized treatment strategies, including appropriate dose adjustment, close monitoring, and enhanced adherence support. Overall, the results highlight the pivotal role of family physicians in optimizing lipid-lowering therapy and improving cardiovascular prevention outcomes.

When cardiovascular risk calculations were evaluated in our study, only 12.9% of participants achieved their target LDL-C levels. Similarly, the CEPHEUS (Centralized Pan-European Survey on the Undertreatment of Hypercholesterolemia) study, which included 575 dyslipidemic patients from nine centers in Türkiye, also reported low rates of LDL-C target attainment.[19] According to the Adult Treatment Panel III (ATP III) guidelines of the National Cholesterol Education Program (NCEP) (2004), the proportion of patients achieving target LDL-C levels was 35.1%.[20] The findings of our study are consistent with national data, indicating persistent challenges in the implementation of guideline-based dyslipidemia management. These results suggest that treatment strategies and patient adherence require closer evaluation and optimization to improve lipid control outcomes.

It was observed that 43.1% of participants had LDL-C levels above 100 mg/dL. In many comprehensive studies conducted in our country, the average LDL-C level is above 100 mg/dL.[21,22] In a systematic review by Kızılırmak P et al have shown that with treatment, 47.9% of patients had LDL-C levels reduced to below 100 mg/dL. After low-dose treatment, this rate was found to be 41.0%, and after high-dose statin treatment, it was 66.1%.[23] The low use of high-intensity statins and combination therapies in our study partly explains this finding; however, other factors such as diet, physical activity, and family predisposition also play a role.

These data indicate that the targets proposed by the guidelines have not been sufficiently reflected in clinical practice.

Several studies have also examined the relationship between statin intensity and target LDL-C attainment. According to the 2019 ESC Guidelines, high-intensity statin therapy at the maximum tolerated dose is recommended to achieve LDL-C targets.[5] In our study population, although 23.7% of patients received high-intensity statin therapy, only 12.9% reached their target LDL-C levels. Failure to achieve LDL-C targets in patients receiving high-intensity statins may be related to poor adherence, statin-related side effects, and individual cardiovascular risk profiles.[24] Moreover, while high-intensity statin therapy reduces cardiovascular risk, it does not always guarantee LDL-C target attainment.[25,26] Collectively, these results highlight the need for individualized statin dosing, regular follow-up, and adherence strategies in primary care to improve lipid control and cardiovascular outcomes.

Many studies in the literature have reported that longer durations of statin therapy are associated with a reduction in cardiovascular events, which has been attributed to improved treatment adherence over time and the more pronounced long-term effects of the medication.[26,27] In our study, 94.9% of participants were not receiving any additional lipid-lowering agents alongside statins, and the rate of fibrate use was only 2.7%. Similar

patterns have been observed in large-scale studies conducted in Türkiye, where the low utilization of non-statin lipid-lowering medications limits the ability to assess their overall impact. In the CEPHEUS study, despite low rates of LDL-C target attainment, 70.5% of patients did not have any changes to their initial lipid-lowering therapy or dosage adjustments.[19]

As patients' cardiovascular risk increases, a significant decrease is observed in the rates of achieving target LDL-C levels. In high-risk groups, the target LDL-C level is set lower, which contributes to a lower attainment rate. In contrast, in low-risk groups, the target LDL-C level is more attainable. Especially in high and very high-risk patients, high-intensity statins should be preferred, and in cases where monotherapy is insufficient, it may be necessary to add Ezetimibe or PCSK9 inhibitors to the treatment regimen.[28]

The rate of achieving target LDL-C levels was 8.7% in women, compared to 16.7% in men. Women had a significantly lower rate of target attainment than men. According to the literature, it is well known that the burden of cardiovascular and metabolic diseases increases in postmenopausal women due to the decline in estrogen levels. In addition, factors such as increased systemic inflammation, HDL-C dysfunction, and gene–environment interactions contribute to the more adverse outcomes observed in women. Moreover, it has been shown that the absorption of long-chain fatty acids is higher in women.[29] In our study, the rate of achieving target LDL-C levels was significantly lower in patients diagnosed with hypertension compared to those without hypertension. The coexistence of hypercholesterolemia and hypertension in adults, and its contribution to cardiovascular disease risk, has been well documented. Previous studies report that approximately one in ten Turkish adults over the age of 30 has elevated LDL-C levels in combination with hypertension, with an age- and sex-adjusted relative risk for CVD increased by 2.4 times.[30] However, the lower achievement rate observed in our hypertensive cohort should be interpreted with careful consideration of clinical context. Patients with hypertension are frequently categorized as very high-risk according to contemporary guidelines, which subjects them to a much stricter LDL-C target (<55 mg/dL). Therefore, the lower success rate in this group may not solely reflect the presence of hypertension itself, but rather the difficulty of attaining this more demanding therapeutic threshold. In this regard, the observed “failure” likely represents the consequences of a more stringent LDL-C goal rather than a direct effect of hypertension.[5]

The low LDL-C target attainment in hypertensive patients may, in part, reflect “clinical inertia,” where treatment intensification is often delayed in patients with multiple comorbidities despite unmet goals. Therapeutic inertia, sometimes referred to as clinical inertia, has been defined as failure to initiate or intensify therapy when therapeutic goals are not reached. It is relevant for conditions where therapeutic targets are clearly defined, the benefits of reaching those targets are well established, effective therapies are accessible, and up-to-date clinical guidelines are available.[31,32]

Recognizing this phenomenon underscores the importance of proactive, risk-based management strategies to improve lipid control in this high-risk population. Furthermore, in individuals with chronic conditions such as hypertension and diabetes, adherence to statin therapy tends to be more difficult, and side effects are more frequently observed, which in turn makes achieving target LDL-C levels more challenging.[29]

Obesity is a well-established major risk factor for the development of cardiovascular disease. In our study, obesity was present in 30.2% of the patient population, highlighting its significant role in the control of LDL-C levels. The inability to achieve

effective weight management in these patients may have contributed to the failure to reach target LDL-C levels.

In addition to pharmacological treatment, adopting a healthy lifestyle is an essential component of dyslipidemia management. In our study, only 17.7% of participants reported engaging in regular exercise 2–3 times per week. According to the literature, the combination of statin therapy and exercise has been shown to significantly reduce LDL-C levels.[33] The low number of patients engaging in regular physical activity in our cohort may have negatively influenced the rate of achieving target LDL-C levels. Therefore, at every clinical visit, patients should be reminded of the importance of healthy lifestyle changes and provided with accessible exercise programs.

In the ARMS-7 survey conducted to assess medication adherence and prescription behavior, the mean adherence score among patients who achieved target LDL-C levels was 4.7 ± 2.4, while the mean prescription score was 3.7 ± 1.9. These findings are consistent with previous national data and align with international reports indicating suboptimal LDL-C target attainment despite adequate self-reported adherence.[34-36] Nevertheless, failure to achieve LDL-C targets may be explained by the lack of regular LDL-C monitoring during follow-up visits and insufficient statin dose titration. These results highlight the role of patient behavior in clinical outcomes and provide a foundation for designing future health education and follow-up strategies. However, considerable variability observed within groups suggests that factors beyond self-reported adherence—such as patient clinical characteristics or treatment-related factors—may have a greater influence on LDL-C goal attainment.

Recent studies have similarly emphasized that therapeutic inertia, including limited treatment intensification or inadequate statin dose adjustment, remains a major barrier to achieving LDL-C targets, even among patients reporting good adherence.[37-39] For instance, in the Turkish AIZANOI study, only 26.2% of high- and very high-risk patients achieved target LDL-C levels, largely due to physician-related inertia.[35] Likewise, Bayram et al. (2020) reported low statin utilization and poor LDL-C target attainment among patients with type 2 diabetes.[34] Collectively, these findings suggest that while patient adherence is an important determinant, system-level barriers and clinician-related factors play a decisive role in lipid management outcomes. Future research should examine the interplay between patient behavior and health system processes, and evaluate interventions targeting both adherence support and clinical decision-making. Clinician-related factors contributing to therapeutic inertia include gaps in knowledge, uncertainty about diagnosis, treatment goals, or evidence, concerns about the safety of intensifying therapy, limited time, and lack of access to or integration of clinical guidelines and decision support. Additional contributors are insufficient system support for structured follow-up to review goal attainment and the absence of a team-based care approach involving pharmacists.[40]

In this study, 87.1% of patients failed to achieve their risk-based LDL-C targets. This proportion is consistent with findings from large-scale European data such as the DA VINCI study highlighting a substantial treatment gap in primary care.[2] Our results further demonstrate that as cardiovascular risk increases, the likelihood of achieving LDL-C goals decreases, underscoring the challenge of meeting more stringent targets in high-risk groups.[5] Notably, patients prescribed statins for “dyslipidemia” achieved LDL-C goals more frequently than those prescribed for “cardiac reasons,” which can be explained by the stricter LDL-C targets in the secondary prevention population. This finding reflects an important nuance in how risk stratification influences

treatment success. Overall, our study provides quantitative confirmation of the treatment gap in Türkiye and emphasizes the need for strengthened lipid-lowering strategies in routine practice.

Limitations

A limitation of this study is the potentially insufficient statistical power in certain subgroups, which may explain nonsignificant findings. Unmeasured potential confounders, such as detailed dietary intake, may have influenced LDL-C target attainment. In addition, the single-center design may limit the generalizability of the findings to other primary care settings in Türkiye. Repeating the study with patient randomization and a larger sample size will provide more definitive information and enhance the validity of the results.

Conclusions

Our study highlights the presence of clinical inertia in lipid management within primary care in Türkiye. Despite clear guideline-based LDL-C targets, 87.1% of patients failed to achieve their risk-based goals, with the lowest attainment observed in very high-risk groups. Most patients were treated with low- to moderate-intensity statins, and dose titration or combination therapies were infrequently utilized, reflecting a lack of treatment intensification. Additionally, lower target attainment among women, hypertensive, and obese patients suggests that clinicians may face challenges in managing more complex or high-risk populations. Limited structured follow-up, insufficient system support, and the absence of a team-based care approach further exacerbate the gap between risk stratification and therapeutic action. These findings quantitatively demonstrate how clinician- and system-related factors contribute to clinical inertia, emphasizing the need for proactive, individualized treatment strategies to optimize LDL-C control and reduce cardiovascular risk.

Ethical approval

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Non-invasive Clinical Research Ethics Committee of Eskişehir Osmangazi University (protocol code 16 and date of approval March 19, 2024).

Author contribution

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

Source of funding

The authors declare that the study received no funding.

Conflict of interest

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

References

1. Ballena-Caicedo J, Zuzunaga-Montoya FE, Loayza-Castro JA, et al. Global prevalence of dyslipidemias in the general adult population: a systematic review and meta-analysis. J Health Popul Nutr. 2025;44(1):308. **[Crossref]**
2. Ray KK, Molemans B, Schoonen WM, et al. EU-Wide Cross-Sectional Observational Study of Lipid-Modifying Therapy Use in Secondary and Primary Care: the DA VINCI study. Eur J Prev Cardiol. 2021;28(11):1279-1289. **[Crossref]**
3. Onat A, Karakoyun S, Akbaş T, et al. Turkish Adult Risk Factor survey 2014: overall mortality and coronary disease incidence in Turkey's geographic regions. Turk Kardiyol Dern Ars. 2015;43(4):326-332. **[Crossref]**

4. Grundy SM, Stone NJ, Bailey AL, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA guideline on the management of blood cholesterol: a report of the American College of Cardiology/American Heart Association task force on clinical practice guidelines. J Am Coll Cardiol. 2019;73(24):e285-e350. **[Crossref]**

5. Mach F, Baigent C, Catapano AL, et al. 2019 ESC/EAS guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk. Eur Heart J. 2020;41(1):111-188. **[Crossref]**

6. Ference BA, Ginsberg HN, Graham I, et al. Low-density lipoproteins cause atherosclerotic cardiovascular disease. 1. Evidence from genetic, epidemiologic, and clinical studies. A consensus statement from the European Atherosclerosis Society Consensus Panel. Eur Heart J. 2017;38(32):2459-2472. **[Crossref]**

7. Ahmad M, Sniderman AD, Hegele RA. Apolipoprotein B in cardiovascular risk assessment. CMAJ. 2023;195(33). **[Crossref]**

8. Bashir B, Schofield J, Downie P, et al. Beyond LDL-C: unravelling the residual atherosclerotic cardiovascular disease risk landscape-focus on hypertriglyceridaemia. Front Cardiovasc Med. 2024;11:1389106. **[Crossref]**

9. Reiner Z. Managing the residual cardiovascular disease risk associated with HDL-cholesterol and triglycerides in statin-treated patients: a clinical update. Nutr Metab Cardiovasc Dis. 2013;23(9):799-807. **[Crossref]**

10. Sharma A, Joshi PH, Rinehart S, Thakker KM, Lele A, Voros S. Baseline very low-density lipoprotein cholesterol is associated with the magnitude of triglyceride lowering on statins, fenofibric acid, or their combination in patients with mixed dyslipidemia. J Cardiovasc Transl Res. 2014;7(4):465-474. **[Crossref]**

11. Barter PJ, Brandrup-Wognsen G, Palmer MK, Nicholls SJ. Effect of statins on HDL-C: a complex process unrelated to changes in LDL-C: analysis of the VOYAGER Database. J Lipid Res. 2010;51(6):1546-1553. **[Crossref]**

12. Turkish Endocrinology and Metabolism Association. Dyslipidemia diagnosis and treatment guide 2021. Available at: https://file.temd.org.tr/Uploads/publications/guides/documents/20211026164301-2021tbl_kilavuzb66456ad2f.pdf

13. Berman AN, Blankstein R. Optimizing dyslipidemia management for the prevention of cardiovascular disease: a focus on risk assessment and therapeutic options. Curr Cardiol Rep. 2019;21(9):110. **[Crossref]**

14. Bytyçi I, Penson PE, Mikhailidis DP, et al. Prevalence of statin intolerance: a meta-analysis. Eur Heart J. 2022;43(34):3213-3223. **[Crossref]**

15. Jacobson TA, Cheeley MK, Jones PH, et al. The statin adverse treatment experience survey: experience of patients reporting side effects of statin therapy. J Clin Lipidol. 2019;13(3):415-424. **[Crossref]**

16. Gökdoğan F, Kes D. Validity and reliability of the Turkish adherence to refills and medications scale. Int J Nurs Pract. 2017;23(5):10.1111/ijn.12566. **[Crossref]**

17. Kripalani S, Risser J, Gatti ME, Jacobson TA. Development and evaluation of the Adherence to Refills and Medications Scale (ARMS) among low-literacy patients with chronic disease. Value Health. 2009;12(1):118-123. **[Crossref]**

18. Conroy RM, Pyörälä K, Fitzgerald AP, et al. Estimation of ten-year risk of fatal cardiovascular disease in Europe: the SCORE project. Eur Heart J. 2003;24(11):987-1003. **[Crossref]**

19. Kültürsay H. Results of the rosuvastatin studies in Turkey. Arch Turk Soc Cardiol. 2007;35(1):24-30.

20. Grundy SM, Cleeman JI, Merz CNB, et al. Implications of recent clinical trials for the National Cholesterol Education Program Adult Treatment Panel III Guidelines. J Am Coll Cardiol. 2004;44(3):720-732. **[Crossref]**

21. Onat A, Senocak MS, Surdum-Avci G, Ornek E. Prevalence of coronary heart disease in Turkish adults. Int J Cardiol. 1993;39(1):23–31. **[Crossref]**

22. Uzunlulu M, Oğuz A, Tigen K. High-density lipoprotein cholesterol in coronary artery disease patients: is it as low as expected? Anadolu Kardiyol Derg. 2005;5(4):268-270.

23. Kızılırmak P, Öngen Z, Kayıkçıoğlu M, Tokgözoğlu L. Evaluation of statin use on LDL cholesterol levels in Turkey: a systematic review. Turk Kardiyol Dern Ars. 2020;48(2):137-148. **[Crossref]**

24. Baigent C, Keech A, Kearney PM, et al. Efficacy and safety of cholesterol-lowering treatment: prospective meta-analysis of data from 90,056 participants in 14 randomised trials of statins. Lancet. 2005;366(9493):1267-1278. **[Crossref]**

25. Ridker PM, Danielson E, Fonseca FAH, et al. Rosuvastatin to prevent vascular events in men and women with elevated C-reactive protein. N Engl J Med. 2008;359(21):2195-2207. **[Crossref]**

26. Yusuf S, Bosch J, Dagenais G, et al. Cholesterol lowering in ıntermediate-risk persons without cardiovascular disease. N Engl J Med. 2016;374(21):2021-2031. **[Crossref]**

27. Strandberg TE, Kovanen PT, Lloyd-Jones DM, et al. Drugs for dyslipidaemia: the legacy effect of the Scandinavian Simvastatin Survival Study (4S). The Lancet. 2024;404(10470):2462–2475. **[Crossref]**

28. Sabatine MS, Giugliano RP, Wiviott SD, et al. Efficacy and safety of evolocumab in reducing lipids and cardiovascular events. N Engl J Med. 2015;372(16):1500-1509. **[Crossref]**

29. Rosano GMC, Spoletini I, Vitale C. Cardiovascular disease in women, is it different to men? The role of sex hormones. Climacteric. 2017;20(2):125-128. **[Crossref]**

30. Onat A, Karadeniz Y, Tusun E, Yüksel H, Kaya A. Advances in understanding gender difference in cardiometabolic disease risk. Expert Rev Cardiovasc Ther. 2016;14(4):513-523. **[Crossref]**

31. Lebeau JP, Cadwallader JS, Aubin-Auger I, et al. The concept and definition of therapeutic inertia in hypertension in primary care: a qualitative systematic review. BMC Fam Pract. 2014;15:130. **[Crossref]**

32. Khunti K, Gomes MB, Pocock S, et al. Therapeutic inertia in the treatment of hyperglycaemia in patients with type 2 diabetes: a systematic review. Diabetes Obes Metab. 2018;20(2):427-437. **[Crossref]**

33. Costa RR, Vieira AF, Coconcelli L, et al. Statin use improves cardiometabolic protection promoted by physical training in an aquatic environment: a randomized clinical trial. Arq Bras Cardiol. 2021;117(2):270-278. **[Crossref]**

34. Bayram F, Sonmez A, Haymana C, et al. Utilization of statins and LDL-cholesterol target attainment in Turkish patients with type 2 diabetes - a nationwide cross-sectional study (TEMD dyslipidemia study). Lipids Health Dis. 2020;19(1):237. **[Crossref]**

35. Şen T, Dinç Asarcıklı L, Güven S, et al. Adherence to current dyslipidemia guideline in patients utilizing statins according to risk groups and gender differences: the AIZANOI study. Anatol J Cardiol. 2024;28(6):273-282. **[Crossref]**

36. Banach M, Reiner Ž, Surma S, et al. 2024 Recommendations on the optimal use of lipid-lowering therapy in established atherosclerotic cardiovascular disease and following acute coronary syndromes: a position paper of the International Lipid Expert Panel (ILEP). Drugs. 2024;84(12):1541-1577. **[Crossref]**

37. Seo YH, Hong JY, Kim YK, Kim KH, Kwon TG, Bae JH. Therapeutic inertia in statin therapy for secondary prevention after percutaneous coronary intervention: a nationwide population-based cohort study. BMC Cardiovasc Disord. 2025;25(1):595. **[Crossref]**

38. Cosín Sales J, Escobar Cervantes C, Gómez-Barrado JJ, et al. Impact of therapeutic inertia in lipid-lowering therapy in patients at very high cardiovascular risk. Clin Investig Arterioscler. 2025;37(6):500773. **[Crossref]**

39. Mefford MT, Zhou H, Li K, et al. Lipid-lowering therapy utilization, adherence, and outcomes among adults with and at-risk for atherosclerotic cardiovascular disease in an ıntegrated healthcare delivery system in Southern California. Am J Cardiol. 2025;255:55-63. **[Crossref]**

40. Usherwood T. Therapeutic inertia. Aust Prescr. 2024;47(1):15-19. **[Crossref]**

Turk J Fam Pract 2026;30(1):53-56
DOI: 10.54308/TJFP.2026.899

Case Report

Diagnosis of metastatic prostate cancer in patient applying with drug prescription request: window of opportunity in primary care

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ABSTRACT

Family Medicine healthcare centers are the primary point of contact for addressing all health issues of individuals. Comprehensive medical histories and physical assessments are crucial for the prompt identification and treatment of various illnesses. This study presents a case of metastatic malignancy without active symptoms. During the patient's visit to the family medicine outpatient clinic, laboratory tests were conducted, tests from another medical facility were analyzed, and a prescription for a medication that was frequently taken was obtained.

Keywords: Family medicine, prostate cancer, periodic health examinations

Introduction

Family Medicine is the first point of application for all health problems of individuals. Prescribing the medications used in the treatment of chronic diseases has an important place among the reasons for application. A good anamnesis and physical examination, if necessary, are of great importance in the early diagnosis and treatment of diseases that may be overlooked. Regardless of the reason for admission to primary care, the physician should make a detailed assessment of the course of existing diseases, the presence of any complaints, the correctness and continuity of medication use for each patient. At the same time, all screenings including periodic health examinations applied in primary care should be questioned at each application, informing those who have not been screened at the appropriate interval and ensuring that all screenings compatible with age/gender are completed is of great importance in secondary prevention within the scope of preventive medicine of family medicine. Studies show that screening rates based on risk factors are still extremely low among individual applicants, despite the fact that prostate cancer screening is not part of Türkiye's national cancer screening program. Prostate examination

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Received: 20.08.2025 **Accepted:** 04.02.2026 **Published:** 29.03.2026

and PSA testing rates among men over 40 are 9.3% and 6.7%, respectively, according to data from earlier studies; these rates rise to 36.2% and 23.9% among men over 60.[1] In this study, we present a case of metastasized malignancy with no active complaints who applied to the Family Medicine Outpatient Clinic for evaluation of laboratory tests performed in another health center and for prescription of the medication.

Case

A 71-year-old male patient came to our outpatient clinic to have his laboratory tests, which were performed at another health center, evaluated and to have his proton pump inhibitor medication for gastritis prescribed. The patient had no active complaints. However, upon further questioning, he reported intermittent abdominal bloating and vague, short-term, non-spreading, spontaneous pain in the right upper quadrant that had persisted for about one to two months. When asked about additional symptoms, the patient did not report nausea or vomiting with the pain, nor was fever present. However, he stated that there was discharge from the anal area during straining while defecating. A review of the patient's medical history demonstrated that he has been under follow-up and treatment for benign prostatic hyperplasia since 2021 and has been prescribed alfuzosin (1×1) for this condition, along with pantoprazole (1×1) for the management of gastritis. No other comorbid conditions were identified, and the family history was unremarkable.Vital signs upon admission: blood pressure: 125/75 mmHg; pulse: 79 beats per minute; body temperature: 36.7°C.

Abdominal examination revealed normoactive bowel sounds and a palpable mass measuring approximately 8x10 cm with clear borders extending under the right 12th rib. A dull sound was obtained with percussion of the mass. Other system examinations were normal. Given the preliminary diagnosis of hepatomegaly, biochemical tests and a abdominal ultrasound were ordered to visualize the mass. The laboratory test results obtained from the patient are summarized in Table 1.

Enzyme-linked immunosorbent assay (ELISA tests were normal. Abdominal ultrasonography result "There are several adjacent lesions in the liver, the largest of which is 6 cm in size, slightly hyperechoic with a halo around it, which may belong to the lesion. A 3 cm cyst was observed in liver segment 4."

B symptoms were questioned after the patient returned with the test results, but no noteworthy findings were found. The patient was referred to Urology and General Surgery for further

Table 1. The laboratory test results

Test	Result	Minimum – Maximum Reference
Urea (mg/dL)	68 mg/dL	19 - 44
Creatinine (mg/dL)	2.6 mg/dL (baseline: 1 mg/dL)	0.7 - 1.2
ALT (U/L)	17 U/L	0 - 41
AST (U/L)	23 U/L	15 - 40
GGT (U/L)	290 U/L	10 - 71
ALP (U/L)	277 U/L	40 - 129
LDH (U/L)	403 U/L	135 - 225
Hemoglobin (g/dL)	10.1 g/dL	13.4 - 17.6
Fecal occult blood (ng/dL)	Positive (150 ng/dL)	0 - 100

ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, GGT: Gamma-Glutamyl Transferase, ALP: Alkaline Phosphatase, LDH: Lactate Dehydrogenase.

examination and treatment. During the follow-up, it was discovered that Urology requested uroflowmetry and prostate imaging with the preliminary diagnosis of "Postrenal Acute Kidney Injury (AKI)?" As a result of the general surgery consultation, a mass in the rectum was detected during a digital rectal examination, and further imaging was recommended with the prediagnosis of "primary or metastatic malignancy?" A Transurethral Resection of the Prostate (TURP) biopsy was performed, showing that the prostate was adherent to the bladder wall. The pathology result showed a Gleason pattern of 4+4=8. General Surgery evaluated the liver lesions in favor of metastasis, and Positron Emission Tomography–Computed Tomography (PET-CT) was decided upon to locate the primary malignancy focus. Endo-colonoscopy was also planned due to occult blood positivity in stool. The PET-CT examination of the patient was reported as follows: "The prostate gland invades the bladder, rectum, and bilateral seminal vesicles, exhibiting marked pathological increased F-18 Fluorodeoksiglukoz (FDG) uptake. Pathological increased F-18 FDG uptake is observed in multiple subcentimeter soft tissue density areas (lymph nodes?) in the periprostatic and pararenal areas. Pathological increased F-18 FDG uptake is also observed in multiple hypodense lesion areas in the liver." Written and verbal informed consent was obtained from the patient for the publication and use of all relevant clinical data.

Discussion

Cancer is a major public health problem in the 21st century. It is responsible for nearly one in six (16.8%) deaths worldwide and almost one in four (22.8%) deaths due to noncommunicable diseases. According to the GLOBOCAN 2022 study, prostate cancer is the most commonly diagnosed cancer in men in 118 countries.[2] According to Death and Cause of Death Statistics published by the Turkish Statistical Institute in 2023, tumors ranked second among the causes of death in Türkiye with a rate of 14%.[3] The Ministry of Health database shows that prostate cancer was the second most common type of cancer in men in 2020.[4] A retrospective study by Gandaglia et al., which reviewed 74,826 metastatic prostate cancer cases, found that the mean age of the patients was 74 years. The sites of metastasis were bone (84%), distant lymph nodes (10.6%), liver (10.2%), thorax (9.1%), brain (3.1%), and digestive system (2.7%).[5] The results of the European Randomized PSA Screening Study (ERSPC Study) show that prostate cancer mortality decreased by 21% in men who underwent PSA screening compared to those who did not.[6] In a case series evaluating the impact of atypical clinical presentations on delayed diagnosis of prostate cancer, it was reported that patients presenting with gastrointestinal symptoms and systemic manifestations were diagnosed at advanced stages due to prostate cancer not being initially considered in the differential diagnosis, representing missed opportunities for timely screening and early detection.[7] Similarly, in the present case, prostate malignancy was identified only after advanced diagnostic evaluation. According to the national cancer screening program in our country, men should be examined regularly by a urologist and have a prostate-specific antigen (PSA) blood test starting at age 50, or age 40 if they have a family history of prostate cancer, to enable early diagnosis.[8] Patients should be informed and referred to a urologist for early diagnosis and prevention.[9]

This case highlights that, in family medicine practice, every patient encounter—including visits for prescription renewals—should be viewed as an opportunity for comprehensive and ongoing patient assessment, regardless of the presenting complaint. Periodic health examinations performed in primary care are of vital importance in the early diagnosis of cancer and are accepted as an effective tool for reducing morbidity and mortality.[10,11] Family physicians should meticulously question patients about

their personal and family history and previous screening tests, and refer them to the relevant branch for further examination and treatment when necessary. They play a critical role in these screening and referral processes because they are the community's primary point of contact in the health system. Thus, enhancing family physicians' comprehensive patient assessment skills and their effective use of protocols for early diagnosis will improve the health system's effectiveness in combating cancer.

Ethical approval

Ethical approval has not been obtained from the institution. Written and verbal informed consent was obtained from the patient for the publication and use of all relevant clinical data.

Author contribution

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

Source of funding

The authors declare the study received no funding.

Conflict of interest

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

References

1. Tayhan A, Özmen D. Relationship between knowledge levels of men about prostate cancer screenings and their health literacy. Cukurova Med J. 2019;44:233-240. **[Crossref]**
2. Bray F, Laversanne M, Sung H, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74(3):229-263. **[Crossref]**
3. Turkish Statistical Institute. Cause of death and death statistics, 2021. News Bulletin. 2023. Available at: https://veriportali.tuik.gov.tr/en/press/45715
4. Ministry of Health, General Directorate of Public Health. Turkey cancer statistics. 2020. Available at: https://hsgm.saglik.gov.tr/depo/birimler/kanserdb/Dokumanlar/Istatistikler/Turkiye_Kanser_Istatistikleri_2020.pdf (Accessed on July 10, 2025).
5. Gandaglia G, Abdollah F, Schiffmann J, et al. Distribution of metastatic sites in patients with prostate cancer: a population-based analysis. Prostate. 2014;74(2):210-216. **[Crossref]**
6. Schröder FH, Hugosson J, Roobol MJ, et al. Screening and prostate-cancer mortality in a randomized European study. N Engl J Med. 2009;360(13):1320-1328. **[Crossref]**
7. Oyortey MA, Adanu KK, Ali MA. The effect of unusual presentation on delayed diagnosis of prostate cancer: a case series. J Med Case Rep. 2024;18(1):256. **[Crossref]**
8. T.C. Sağlık Bakanlığı Türkiye Halk Sağlığı Kurumu. Aile hekimliği uygulamasında önerilen periyodik sağlık muayeneleri ve tarama testleri. Ankara; 2015. Available at: https://hsgm.saglik.gov.tr/depo/birimler/kronik-hastaliklar-ve-yasli-sagligi-db/Dokumanlar/Kitaplar/Periyodik_Muayene_Rehberi.pdf (Accessed on July 10, 2025).
9. Ministry of Health General Directorate of Public Health. Cancer department. Available at: http://kanser.gov.tr/kanser/kanser-turleri/52-prostat-kanseri. html (Accessed on July 10, 2025).
10. Emery JD, Shaw K, Williams B, et al. The role of primary care in early detection and follow-up of cancer. Nat Rev Clin Oncol. 2014;11(1):38-48. **[Crossref]**
11. Fenton JJ, Cai Y, Weiss NS, et al. Delivery of cancer screening: how important is the preventive health examination? Arch Intern Med. 2007;167(6):580-585. **[Crossref]**

Turk J Fam Pract 2026;30(1):57-67
DOI: 10.54308/TJFP.2026.898

Review Article

Polypharmacy in the elderly populations: frequency, outcomes and prevention approaches

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ABSTRACT

Advancements in medical technologies, expanded access to healthcare services, and improvements in living conditions have significantly increased the average life expectancy worldwide. This demographic shift, coupled with declining fertility rates, has led to a rapid rise in the proportion of elderly individuals within populations. The increase in the prevalence of chronic diseases is leading to the widespread use of multiple medications and making the importance of appropriate medication use more visible in primary health care.

Polypharmacy is a natural consequence of the burden of age-related chronic diseases, but it can also introduce additional risks during treatment processes. Studies report that the prevalence of polypharmacy varies widely. Among older adults, polypharmacy is associated with numerous adverse clinical and economic outcomes, including drug interactions, inappropriate medication use, poor treatment adherence, adverse drug reactions, increased risk of falls, functional decline, and higher rates of hospitalization.

Prescription review programs, the implementation of guidelines that support appropriate medication use (Beers, STOPP/START, TIME, etc.), and patient-centered education approaches play an important role in preventing polypharmacy. Family physicians working in primary health care play a central role in the early detection and appropriate management of polypharmacy, thanks to their ability to conduct long-term monitoring of elderly individuals and establish continuous physician-patient relationships. Additionally, AI-powered clinical decision support systems can enhance treatment safety by facilitating the detection of drug interactions and potentially inappropriate medication use. Strengthening collaboration between physicians and pharmacists in primary healthcare services, increasing awareness of medication management among older adults, and improving health literacy are among the key elements that support the effectiveness of the process.

The aim of this review is to evaluate the frequency of polypharmacy in older adults, its economic and health outcomes, and prevention approaches based on current literature.

Keywords: Polypharmacy, drug interactions, chronic disease, drug misuse, elderly

Introduction

Advances in healthcare have led to longer life expectancy and an increase in the proportion of elderly people in society.[1] According to the World Health Organization (WHO), the number of people aged 80 years and over is expected to triple between 2020 and 2050, reaching 426 million.[2] On a global scale, the aging population, together with the increase in the burden of disease, puts economic

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Received: 21.08.2025 **Accepted:** 06.01.2026 **Published:** 29.03.2026

pressure on health services.[3-4] In Europe, chronic conditions are the main source of illness and disability and account for a large proportion of health care expenditure. The presence of multiple chronic conditions complicates the care process for older adults, necessitating long-term and comprehensive treatment approaches.[5]

WHO generally defines elderly individuals as 60 years and older in developing countries and 65 years and older in developed countries.[6] In Türkiye, the number of individuals aged 65 years and over, defined as the elderly population, was 7 million 550 thousand 727 people in 2019 and reached 9 million 112 thousand 298 people in 2024, showing an increase of 20.7% in the last five years. The proportion of the elderly population in the total population increased from 9.1% in 2019 to 10.6% in 2024.[7] Aging is a continuous process marked by gradual changes in health status over time, affecting the physical, mental, and social capacity of the individual. Healthy aging is defined as the process of preserving and improving the functional capacity of an elderly individual.[2]

The higher prevalence of chronic diseases in older adults has led to the widespread use of multiple medications in treatment processes. This situation is defined in the literature as polypharmacy. Although there is no universally accepted single definition for polypharmacy, it is generally defined as the simultaneous use of five or more medications.[8-10] Concurrent use of ten or more medications per day has been expressed with the concept of "intensive polypharmacy.[1] In individuals with chronic health problems, five or more medications may need to be prescribed to manage diseases effectively; this situation is defined as "appropriate polypharmacy" in the literature.[11] However, exposure to a large number of medications may be harmful in some cases; especially the continued use of medications that have ceased to be medically necessary is characterised as "inappropriate polypharmacy.[12]

The aim of this review is to evaluate the prevalence of polypharmacy in older adults, its health and economic impacts, and approaches to its prevention in line with the current literature, and to contribute to safe and effective medication management, particularly in primary care.

Frequency of polypharmacy

The prevalence of polypharmacy varies between 10% and 90% depending on the definition used, the age group, and the healthcare setting in which the study was conducted.[13] The fact that polypharmacy is not clearly defined and handled in different ways makes it difficult both to determine its prevalence and to evaluate the effects of the health problems related to it.[14] Polypharmacy can be observed not only in elderly individuals but also in young individuals with multiple diseases.[12] In the study conducted by Ye et al., it was found that polypharmacy was more prevalent in elderly individuals, those living alone, and those with more than one disease, and the risk of drug-related problems was also higher in these groups.[15]

In a large-scale study conducted in Sweden, 822,619 individuals aged 75 years and older were analyzed, and the prevalence of polypharmacy (≥5 drugs used) in this age group was found to be 45%.[16] In a cohort study conducted in Italy with the participation of 5,631 elderly individuals, 29% of the participants were found to have chronic polypharmacy.[17] In a study conducted in China, polypharmacy was observed in 91.30% of 276 individuals aged 65 years and older; it was also reported that the number of prescribed drugs increased with increasing age.[18] In a national cohort study conducted by Chang et al., a significant association was found between polypharmacy and hospitalisations in Korean elderly individuals.[19] In a cross-sectional analysis including seventeen European countries and Israel, polypharmacy rates in individuals over 65

years of age were found to vary between 26.3% and 39.9%. The highest rates of polypharmacy were found in Portugal (36.9%), Israel (37.5%) and Czech (39.9%), while the lowest rates were found in Switzerland (26.3%), Croatia (27.3%) and Slovenia (28.1%).[20] In a comprehensive population-based study involving more than 7.36 million individuals aged 65 years and older in South Korea, the prevalence of continuous polypharmacy among medications prescribed in outpatient care was reported as 41.9% for ≥90 days and 38% for ≥180 days.[21] In a study conducted on 404 patients admitted to a cardiology service in the United States of America, polypharmacy was found in 95% and hyperpolypharmacy in 69% of the patients.[22] In a study conducted in Qatar, 5,639 elderly individuals were analyzed and 75% of these individuals were found to be exposed to polypharmacy.[23] In a study conducted in Spain involving 21841 individuals aged 65 years and older, the prevalence of polypharmacy was found to be 23.2%.[24] In another study conducted in the United States of America, 81,295 patients aged 65 years and older were analyzed and the prevalence of polypharmacy was found to be 42%.[25] In a study conducted between 2013 and 2016 on a total of 1.62 million people aged ≥65 years in Asia, Australia and the United Kingdom, the country with the highest prevalence of polypharmacy was Hong Kong with 46.4%, followed by Taiwan (38.8%), South Korea (32.0%), the United Kingdom (23.5%) and Australia (20.1%).[26]

Various studies on the prevalence of polypharmacy in elderly individuals in Türkiye report varying rates depending on different definitions and sample groups. In an analysis conducted by Aydos et al. in 2020 using National Prescription Information System data, the rates of continuous polypharmacy (≥90 days) and cumulative polypharmacy (four or more prescriptions per year) were 41.9% and 38%, respectively, in individuals aged 65 years and older.[27] In a study conducted on 515 outpatient elderly women in Istanbul, the rate of individuals using more than five medications was found to be 47.6%.[28] In a study conducted by Albayrak et al., the rate of polypharmacy in elderly patients hospitalised in oncology wards of a university hospital in Türkiye was found to be 74.3%.[29] In this cross-sectional study conducted by Korkmaz et al. with 585 individuals aged 65 and over living in a district in western Türkiye, the prevalence of polypharmacy was found to be 24.1%. It was determined that 51.6% of the elderly used at least one non-prescription drug, 52.1% used herbal products, and 12.1% used alternative treatment methods. In addition, it was determined that individuals with four or more chronic diseases were exposed to polypharmacy approximately 9 times more than those with 1–3 chronic diseases.[30] In a cross-sectional study conducted by Gümüştakım et al. in Karaman province, Türkiye, among 300 individuals aged 65 years and older in primary care family medicine practice, the prevalence of polypharmacy (use of ≥4 medications) was reported to be 58.3%.[31] In a study conducted by Yayın et al. in primary care family medicine practice, it was found that individuals aged 65 and over who use multiple medications have insufficient knowledge about rational medication use. This suggests that polypharmacy is a widespread and noteworthy problem in primary care among the elderly population.[32] In a study conducted by Sayın et al., in a pharmacy in Istanbul, 158 patients were examined, and polypharmacy was found in 69% of these patients[33] (Table 1).

Health and economic consequences of polypharmacy

Polypharmacy may lead to issues such as cognitive impairment, dosing and usage errors, poor medication adherence, drug interactions, and adverse health events in homebound individuals[3]; it also increases treatment costs.[34] Patients exposed to polypharmacy are at higher risk for various adverse outcomes such as

misuse of medication, medication-related errors, low treatment adherence, inadequate disease management, and death.[35]

Studies conducted in primary care and family medicine practices have reported that regular medication reviews and prescription renewal processes are associated with the frequency of polypharmacy. Studies covering elderly individuals registered at Family Health Centers have shown that a significant portion of prescription renewals are arranged at the primary care level and that this situation places family physicians in a central position in monitoring polypharmacy.[36] It has been reported that drug reviews conducted at the primary care level can identify potentially inappropriate medications and reduce prescription burden; rational drug use approaches implemented in family medicine settings have been associated with reductions in prescription volume and medication costs.[33,37] A study conducted by Gharekhani et al., it was reported that overweight and obesity were significant factors contributing to the prevalence of polypharmacy.[38] In a study conducted by Kutty et al., it was found that polypharmacy was significantly associated with an increased risk of postoperative complications.[39] In another study by Bayrak et al., it was observed that polypharmacy posed a high risk of falls in geriatric patients.[40]

The use of multiple medications may lead to various adverse outcomes, such as falls, drug-related harms, loss of function, hospitalisations, and even death, by increasing the risk of exposure to potentially inappropriate drugs or drug interactions. This may also increase the economic burden on the healthcare system.[20-41] In a study conducted in a hospital in the UK, it was reported that 18.4% of hospitalisations were due to adverse drug reactions, which cost the healthcare system approximately £2.1 billion.[42]

When the risks of side effects of a drug outweigh its expected benefits, it is classified as a potentially inappropriate drug.[43] Elderly patients often have complex treatment regimens involving more than five medicines and potentially inappropriate prescribing has been reported to be common in these patients.[33] Potentially inappropriate prescribing is recognised as one of the major causes of hospital-acquired complications and ranks third among the reasons for hospitalisation.[44] Prevention of polypharmacy and potential inappropriate drug use plays an important role in reducing health system costs and alleviating the burden of disease in elderly patients.[45] According to 2023 data, while the USA ranked first with a drug expenditure of $2,142 per capita, this amount exceeded $750 in countries such as Switzerland, Canada, Germany, and Austria. The OECD average was $528. However, with a per capita drug expenditure of only 119 USD, Türkiye was one of the OECD countries with the lowest level after Mexico and Colombia.[46]

Polypharmacy prevention approaches

The effectiveness and quality of the drug prescribing process depend on many factors. These factors include determining whether the drug is necessary, selecting the most appropriate drug, ensuring that the drug is administered in the correct dose and form, avoiding potentially inappropriate drugs, monitoring adverse drug effects and preventing possible interactions between drugs or between drugs and chronic diseases.[47] The prescription dispensing process requires the assessment of the total risk arising from the coexistence of multiple drugs and diseases and the identification of drug-drug interactions.[48]

A major barrier to identifying successful interventions targeting inappropriate polypharmacy is the complexity of treating patients with polypharmacy due to multiple diseases.[12] There are numerous screening tools designed to detect inappropriate polypharmacy. Among these, widely used guidelines, Beers criteria[49], Screening Tool of Older Persons' Prescriptions (STOPP) and

Table 1. Summary of studies on the prevalence of polypharmacy in elderly people in different countries

Authors	Research location	Study type	Number of samples	Sample age group (years)	Findings (prevalence of polypharmacy) (%)
Wastesson et al. (2018) [16]	Sweden	Cross-sectional	822619	≥75	45
Costanzo et al. (2024)[17]	Italy	Cohort	5631	≥65	29
Zhu et al. (2024)[18]	China	Cross-sectional	276	≥65	91.3
Cho et al. (2022)[21]	South Korea	Cohort	7.36 million	≥65	41.9
Dahshan et al. (2020)[23]	Qatar	Cross-sectional	5639	≥65	75
Cebrino et al. (2023)[24]	Spain	Cross-sectional	21841	≥65	23.2
Nguyen et al. (2023)[25]	USA	Cross-sectional	81295	≥65	42
Lee et al. (2023)[26]	Taiwan	Cohort	253627	≥65	38.8
	Hong Kong	Cohort	52760	≥65	46.4
	United Kingdom	Cohort	819476	≥65	23.5
	Australia	Cohort	353106	≥65	20.1
Bahat et al. (2014)[29]	Türkiye	Cohort	515	≥65	47.6

Screening Tool to Alert to Right Treatment (START) criteria[50], Turkish Inappropriate Medication use in the Elderly (TIME) criteria[51], Fit fOR The Aged (FORTA) criteria[52], EU (7)-PIM[53] lists, which are aimed to establish specific criteria for the elderly in Türkiye, are among the potential inappropriate drug use criteria accepted in various European countries (Table 2). These criteria can guide physicians in prescribing and non-prescribing practices and may provide an important basis for future clinical studies and interventions aimed at improving the quality of drug prescribing in older individuals.[54]

In a study by Dautzenberg et al., it was shown that the implementation of medication review in combination with medication reconciliation, patient education and vocational training reduced the risk of rehospitalisation within 30 days compared to usual care.[55] It is reported that a decrease in drug use was observed with the introduction of the PharmaCloud program in Taiwan in 2014. PharmaCloud is used to improve medication management by enabling healthcare providers such as physicians, pharmacists and nurses to access the patient's medication information through a secure internet portal with the patient's consent. With the use of this program, the average number of prescribed drugs and medical expenditures have been reported to decrease.[41] In Japan, following the implementation of the "Guidelines on Appropriate Medication for Older Adults" and incentives for medical institutions in 2016 and 2018, respectively, and the subsequent revision of the definition of "older adult", it has been reported that a significant reduction in polypharmacy rates was achieved nationwide in individuals aged 75 years and older in four years (April 2015-March 2019). Especially in the 75-89 age group, a 19.3% decrease in polypharmacy rates was observed.[56] The Home Medical Integrated Program was initiated in 2016 within the scope of the restructuring of home health services in Taiwan and is a new model aiming to improve the quality of care. With this system, it was ensured that physicians visited patients at least once every three months, and as a result of this practice, a significant decrease in potential inappropriate drug use was observed. This system made it possible to monitor patients' drug use more closely and manage the treatment process more effectively.[57]

Table 2. Comparison of criteria assessing inappropriate drug use in the elderly

Criterion name	Scope	Country/ region of development	Objective	Advantages	Limitations
Beers Criteria[49]	Systematic list of potentially inappropriate medicines (PIM)	USA	Preventing the use of PIM in the elderly	Widely used, constantly updated	Does not take into account the clinical situation; not individualised
STOPP/START[50]	Identification of inappropriate medicines (STOPP) and incomplete treatments (START)	Europe (Ireland)	Discontinuation of medication and initiation of necessary treatments	Sensitive to clinical context, also indicates treatment deficiencies	Requires training, long implementation time
FORTA Criteria[52]	Classification of drugs in terms of efficacy and safety	Germany	Appropriate drug selection according to the benefit-to-benefit ratio	Provides clear categories, facilitates drug selection	Dependent on the physician in the decision-making process
TIME Criteria[51]	Potential inappropriate and incomplete treatment criteria specific to Türkiye	Türkiye	To identify PIM and under-treatment in Turkish elderly individuals	Suitable for national conditions, offers a unique list	Limited international recognition
EU(7)-PIM List[53]	Common list of potentially unsuitable medicines across Europe	European Union (7 countries)	Establishing a standardised list for the European elderly population	Based on polycentric consensus	May not adequately cover local differences

PIM: Potentially Inappropriate Medication, STOPP: Screening Tool of Older Persons' Prescriptions, START: Screening Tool to Alert to Right Treatment, FORTA: Fit fOR The Aged, TIME: Turkish Inappropriate Medication use in the Elderly.

The SPPiRE (Supporting Prescribing in Older Adults with Multimorbidity in Irish Primary Care) study, conducted in primary care, reported that individualized medication reviews and deprescribing interventions implemented by general practitioners resulted in a significant reduction in the number of medications among community-dwelling older adults.[58] In multidisciplinary deprescribing studies conducted in primary care settings, medication review processes have been reported to be planned and implemented under the leadership of general practitioners.[59]

In the study conducted by Toklu et al., the role of physicians and pharmacists in improving patient compliance in the rational use of medication was examined; it was emphasized that non-compliance with treatment becomes more pronounced with an increase in the number of medications, particularly in patients using multiple medications. The study stated that inadequate information and lack of coordination increase the risk of incorrect medication use and treatment failure associated with polypharmacy.[60] The Pharmacist Consultant Program implemented in Slovenia reduced medication-related problems, improved adherence to treatment guidelines and was cost-effective in older people with multiple diseases. The active involvement of pharmacists in the treatment process not only reduces the risk

of polypharmacy, but also improves the quality of treatment and cost-effectiveness of health care. In the first three months of the pilot project, a total of 189 patients were served in 51 shifts, and the average number of drugs per patient decreased from 12.5 to 9.9 after drug review.[61] Prescription discontinuation networks established to reduce polypharmacy brought together experts and volunteers to share knowledge, experience and resources, and created positive effects at both individual and collective levels by supporting policy initiatives.[62] In a study conducted by Gudi et al., it was shown that pharmacist-led home medication reviews identified very important drug-related problems such as drug-drug interactions, serious drug side effects, inappropriate drug use, non-compliance, overdoses and use of expired drugs. These reviews stand out as an effective strategy for improving medication management and reducing potential health risks in elderly

Table 3. Polypharmacy prevention approaches

Authors	Research location	Prevention approaches	Findings
Dautzenberg et al. (2021)[55]	Switzerland	Drug review, drug reconciliation, patient and professional education	Reduced risk of rehospitalisation within 30 days
Meng et al. (2023)[41]	Taiwan	With PharmaCloud, launched in 2014, healthcare staff can access patients' medication information and reduce the rate of polypharmacy	Reduction in the number of prescribed medicines and medical expenditure
Ishıda et al. (2022)[56]	Japan	Reducing the rate of polypharmacy through prescription discontinuation incentive policies in 2016	19.3% reduction in polypharmacy rates in individuals over 75 years of age
Ho et al. (2024)[57]	Taiwan	Physician visit every 3 months with home medical integrated plan system	Reduced polypharmacy and inappropriate medicines
Stuhec et al. (2021)[61]	Slovenia	Reducing medication problems, improving guideline adherence and cost-effectiveness in older people with multiple diseases	Average number of drugs per patient decreased from 12.5 to 9.9
McDonald et al. (2024)[62]	Canada	Overcoming barriers by bringing together experts in prescription dispensing	Information, experience and resources were shared
Als et al. (2025)[64]	Denmark	Improving patient satisfaction through pharmacist review	Patients reported positive experiences of medication review with the pharmacist
Gama et al. (2025)[65]	Brazil	Clinical pharmacist integration in older people with cardiovascular disease	Better health outcomes and improved quality of life
Mustamıng et al. (2018)[66]	United Kingdom	Increasing knowledge of polypharmacy and understanding of drug therapy	32.5% improvement was achieved
Akyon et al. (2023)[47]	Türkiye	Interaction detection time with web application usage	Detection time per patient decreased from 2,278 seconds to 33.8 seconds

individuals.[63] In a study conducted in Denmark, pharmacists' review of medicines of patients taking multiple medications and patients' perspectives on this issue were investigated. The interviewees stated that they generally had positive experiences with medication review with a pharmacist.[64] In a study conducted in Brazil, the effect of clinical pharmacists on improving medication use in hospitalised elderly patients diagnosed with cardiovascular disease was evaluated. In the study, it was reported that the integration of clinical pharmacists into healthcare teams contributed to better health outcomes and improved quality of life in elderly individuals.[65] It was determined that health education for patients and their relatives significantly increased their knowledge about polypharmacy and provided an improvement of 32.5% in their understanding of drug treatment.[66] It has been reported that a high level of education in patients is associated with less polypharmacy, potentially inappropriate drug use, and unplanned hospitalisation compared to those with low literacy levels.[67]

Artificial intelligence can successfully detect polypharmacy patterns in elderly individuals with chronic diseases and thus can make important contributions in public health monitoring and clinical decision processes.[68] In a study conducted by Akyon et al., while the time required for a physician to detect interactions per patient was 2.278 seconds on average without a web application, this time decreased to 33.8 seconds on average per patient with the proposed web application and this difference was found to be statistically significant[47] (Table 3).

Conclusion and Recommendations

Polypharmacy continues to be a significant problem in society, both clinically and economically. Drug reviews, prescription renewals, and rational drug use practices carried out in primary health care services are effective in reducing potentially inappropriate drug use. Multidisciplinary approaches, contributions from clinical pharmacists, and strengthening physician-pharmacist collaboration increase the effectiveness of polypharmacy management. Improving health literacy among older adults and caregivers, and the use of prescription monitoring systems and clinical decision support technologies are emerging as key strategies that can reduce the adverse effects of polypharmacy.

Additionally, national awareness campaigns and community-based rational drug use and management programs can be implemented to protect public health.

Author contribution

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

Source of funding

The authors declare that the study received no funding.

Conflict of interest

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

References

1. Oliveira PCD, Silveira MR, Ceccato MDGB, Reis AMM, Pinto IVL, Reis EA. Prevalence and factors associated with polypharmacy among the elderly treated in Primary Healthcare in Belo Horizonte, State of Minas Gerais, Brazil. Cien Saude Colet. 2021;26(4):1553-1564. **[Crossref]**
2. World Health Organization (WHO). World Health Organization ageing and health. Available at: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health/ (Accessed on July 15, 2025).

3. Hagiwara S, Komiyama J, Iwagami M, et al. Polypharmacy and potentially inappropriate medications in older adults who use long-term care services: a cross-sectional study. BMC Geriatr. 2024;24(1):696. **[Crossref]**

4. Drusch S, Le Tri T, Ankri J, Zureik M, Herr M. Decreasing trends in potentially inappropriate medications in older people: a nationwide repeated cross-sectional study. BMC Geriatr. 2021;21(1):621. **[Crossref]**

5. Piccoliori G, Mahlknecht A, Sandri M, et al. Epidemiology and associated factors of polypharmacy in older patients in primary care: a Northern Italian cross-sectional study. BMC Geriatr. 2021;21(1):197. **[Crossref]**

6. World Health Organization. Health statistics and health information systems: definition of an older or elderly person. Available at: https://www.scribd.com/document/190077600/WHO-Definition-of-an-Older-or-Elderly-Person/ (Accessed on Aug 4, 2025).

7. Turkish Statistical Institute. Available at: https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Yaslilar-2024-54079/ (Accessed on May 10, 2025).

8. Roitto HM, Aalto UL, Öhman H, et al. Association of medication use with falls and mortality among long-term care residents: a longitudinal cohort study. BMC Geriatr. 2023;23(1):375. **[Crossref]**

9. Akin S, Durmus NŞ, Soysal T, Özer FF, Gökçekuyu BM, Zararsiz GE. Polypharmacy and falls-risk-increasing drugs in community-dwelling older adults. European Journal of Geriatrics and Gerontology. 2024;6(1):65-72. **[Crossref]**

10. Hung A, Kim YH, Pavon JM. Deprescribing in older adults with polypharmacy. BMJ. 2024;385:e074892. **[Crossref]**

11. Daunt R, Curtin D, O'Mahony D. Optimizing drug therapy for older adults: shifting away from problematic polypharmacy. Expert Opin Pharmacother. 2024;25(9):1199-1208. **[Crossref]**

12. Delara M, Murray L, Jafari B, et al. Prevalence and factors associated with polypharmacy: a systematic review and Meta-analysis. BMC Geriatr. 2022;22(1):601. **[Crossref]**

13. Khezrian M, McNeil CJ, Murray AD, Myint PK. An overview of prevalence, determinants and health outcomes of polypharmacy. Ther Adv Drug Saf. 2020;11:2042098620933741. **[Crossref]**

14. Pazan F, Wehling M. Polypharmacy in older adults: a narrative review of definitions, epidemiology and consequences. Eur Geriatr Med. 2021;12(3):443-452. **[Crossref]**

15. Ye L, Yang-Huang J, Franse CB, et al. Factors associated with polypharmacy and the high risk of medication-related problems among older community-dwelling adults in European countries: a longitudinal study. BMC Geriatr. 2022;22(1):841. **[Crossref]**

16. Wastesson JW, Cedazo Minguez A, Fastbom J, Maioli S, Johnell K. The composition of polypharmacy: a register-based study of Swedes aged 75 years and older. PLoS One. 2018;13(3):e0194892. **[Crossref]**

17. Costanzo S, Di Castelnuovo A, Panzera T, et al. Polypharmacy in older adults: the hazard of hospitalization and mortality is mediated by potentially inappropriate prescriptions, findings from the moli-sani study. Int J Public Health. 2024;69:1607682. **[Crossref]**

18. Zhu X, Zhang F, Zhao Y, Zhang W, Zhang Y, Wang J. Evaluation of potentially inappropriate medications for the elderly according to beers, STOPP, START, and Chinese criteria. Front Pharmacol. 2024;14:1265463. **[Crossref]**

19. Chang TI, Park H, Kim DW, et al. Polypharmacy, hospitalization, and mortality risk: a nationwide cohort study. Sci Rep. 2020;10(1):18964. **[Crossref]**

20. Midão L, Giardini A, Menditto E, Kardas P, Costa E. Polypharmacy prevalence among older adults based on the survey of health, ageing and retirement in Europe. Arch Gerontol Geriatr. 2018;78:213-220. **[Crossref]**

21. Cho HJ, Chae J, Yoon SH, Kim DS. Factors related to polypharmacy and hyper-polypharmacy for the elderly: a nationwide cohort study using National Health Insurance data in South Korea. Clin Transl Sci. 2023;16(2):193-205. **[Crossref]**

22. Sheikh-Taha M, Asmar M. Polypharmacy and severe potential drug-drug interactions among older adults with cardiovascular disease in the United States. BMC Geriatr. 2021;21(1):233. **[Crossref]**

23. Al-Dahshan A, Al-Kubiasi N, Al-Zaidan M, Saeed W, Kehyayan V, Bougmiza I. Prevalence of polypharmacy and the association with non-communicable diseases in Qatari elderly patients attending primary healthcare centers: a cross-sectional study. PLoS One. 2020;15(6):e0234386. **[Crossref]**

24. Cebrino J, Portero de la Cruz S. Polypharmacy and associated factors: a gender perspective in the elderly Spanish population (2011-2020). Front Pharmacol. 2023;14:1189644. **[Crossref]**

25. Nguyen K, Subramanya V, Kulshreshtha A. Risk factors associated with polypharmacy and potentially ınappropriate medication use in ambulatory care among the elderly in the united states: a cross-sectional study. Drugs Real World Outcomes. 2023;10(3):357-362. **[Crossref]**

26. Lee H, Baek YH, Kim JH, et al. Trends of polypharmacy among older people in Asia, Australia and the United Kingdom: a multinational population-based study. Age Ageing. 2023;52(2):afad014. **[Crossref]**

27. Aydos TR, Emre Aydingöz S, Lux KM, Efe OE, İşli F, Aksoy M, et al. Polypharmacy prevalence among geriatric patients in primary healthcare settings across Türkiye: a cross-sectional analysis through the nationwide prescription information system. Turk Geriatri Derg. 2020;23(2):169-179. **[Crossref]**

28. Bahat G, Tufan F, Bahat Z, et al. Comorbidities, polypharmacy, functionality and nutritional status in Turkish community-dwelling female elderly. Aging Clin Exp Res. 2014;26(3):255-259. **[Crossref]**

29. Albayrak A, Erbay B, Kayıkçıoğlu E. Assessment of polypharmacy, potentially inappropriate medications, and drug-drug interactions in older patients with cancer. J Oncol Pharm Pract. 2025;31(5):693-699. **[Crossref]**

30. Korkmaz EA, Yalçın-Gürsoy M. Polypharmacy prevalence in rural-living older adults: a cross-sectional study. Turkiye Klinikleri J Health Sci. 2023;8(2):300-307. **[Crossref]**

31. Gümüştakım S, Başer DA. Multiple drug use in elderly in primary care. Turk J Fam Pract. 2019;23(1):2-8. **[Crossref]**

32. Yayın E, Yayın HE. 65 yaş ve üzeri çoklu ilaç kullanımı olan bireylerin akılcı ilaç kullanımı bilgi düzeyleri. Turk J Fam Pract. 2023;27(2):29-35. **[Crossref]**

33. Sayın Z, Sancar M, Özen Y, Okuyan B. Polypharmacy, potentially inappropriate prescribing and medication complexity in Turkish older patients in the community pharmacy setting. Acta Clin Belg. 2022;77(2):273-279. **[Crossref]**

34. Cook EA, Duenas M, Harris P. Polypharmacy in the homebound population. Clin Geriatr Med. 2022;38(4):685-692. **[Crossref]**

35. Ebrahimoghli R, Janati A, Gharaee H, Aghaei MH. Polypharmacy pattern in Iran: a comprehensive analysis of a large prescription database. Iran J Pharm Res. 2023;21(1):e131304. **[Crossref]**

36. Ketenci S, Akpınar NG. Aile hekimliği yaşlı hasta izlemi kapsamında polifarmasinin değerlendirilmesi. Uludag Univ Tip Fak Derg. 2022;48(3):279-285. **[Crossref]**

37. Ersoy S, Engin VS. Risk factors for polypharmacy in older adults in a primary care setting: a cross-sectional study. Clin Interv Aging. 2018;13:2003-2011. **[Crossref]**

38. Gharekhani A, Somi M, Ostadrahimi A, et al. Prevalence and predicting risk factors of polypharmacy in azar cohort population. Iran J Pharm Res. 2022;21(1):e126922. **[Crossref]**

39. Kutty S, Funnell JP, Hanrahan JG, Williams SC, Allison I, Toma AK. Evaluating the impact of polypharmacy in elderly patients undergoing neurosurgery: a retrospective study. Br J Neurosurg. 2025;27:1-10. **[Crossref]**

40. Bayrak M, Kaşali K, Güner M, Cadirci K, Kılıç AF, Binici DN. Risk factors influencing fall risk in geriatric patients with type 2 diabetes: a comprehensive analysis. Aging Male. 2025;28(1):2469614. **[Crossref]**

41. Meng LC, Kojima T, Suzuki Y, et al. Medication overload: a closer look at polypharmacy and potentially inappropriate medications among older people in Taiwan and Japan. Arch Gerontol Geriatr. 2023;115:105100. **[Crossref]**

42. Osanlou R, Walker L, Hughes DA, Burnside G, Pirmohamed M. Adverse drug reactions, multimorbidity and polypharmacy: a prospective analysis of 1 month of medical admissions. BMJ Open. 2022;12(7):e055551. **[Crossref]**

43. By the 2023 American Geriatrics Society Beers Criteria Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria for potentially inappropriate medication use in older adults. J Am Geriatr Soc. 2023;71(7):2052-2081. **[Crossref]**

44. Tian F, Chen Z, Zhang J, Zhang Y, Feng Q. Prevalence and factors with potentially inappropriate prescribing among older surgical outpatients in China: a nationwide cross-sectional study in 100 hospitals. J Epidemiol Glob Health. 2025;15(1):39. **[Crossref]**

45. Krustev T, Milushewa P, Tachkov K. Impact of polypharmacy, drug-related problems, and potentially inappropriate medications in geriatric patients and its implications for Bulgaria-narrative review and meta-analysis. Front Public Health. 2022;10:743138. **[Crossref]**

46. Akbil Ş, Cebeci Z. Türkiye pharmaceutical sector report. 2024. Available at: https://www.aifd.org.tr/ (Accessed on Aug 9, 2025).

47. Akyon SH, Akyon FC, Yılmaz TE. Artificial intelligence-supported web application design and development for reducing polypharmacy side effects and supporting rational drug use in geriatric patients. Front Med (Lausanne). 2023;10:1029198. **[Crossref]**

48. Daunt R, Curtin D, O'Mahony D. Polypharmacy stewardship: a novel approach to tackle a major public health crisis. Lancet Healthy Longev. 2023;4(5):e228-e235. **[Crossref]**

49. Beers MH, Ouslander JG, Rollingher I, Reuben DB, Brooks J, Beck JC. Explicit criteria for determining inappropriate medication use in nursing home residents. UCLA Division of Geriatric Medicine. Arch Intern Med. 1991;151(9):1825-1832.

50. O'Mahony D, O'Sullivan D, Byrne S, O'Connor MN, Ryan C, Gallagher P. STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. Age Ageing. 2015;44(2):213-218. **[Crossref]**

51. Bahat G, Ilhan B, Erdogan T, et al. Turkish Inappropriate Medication use in the Elderly (TIME) criteria to improve prescribing in older adults: TIME-to-STOP/TIME-to-START. Eur Geriatr Med. 2020;11(3):491-498. **[Crossref]**

52. Pazan F, Weiss C, Wehling M, FORTA. The EURO-FORTA (fit for the aged) list: international consensus validation of a clinical tool for improved drug treatment in older people. Drugs Aging. 2018;35(1):61-71. **[Crossref]**

53. Renom-Guiteras A, Meyer G, Thürmann PA. The EU(7)-PIM list: a list of potentially inappropriate medications for older people consented by experts from seven European countries. Eur J Clin Pharmacol. 2015;71(7):861-875. **[Crossref]**

54. O'Mahony D, Cherubini A, Guiteras AR, et al. STOPP/START criteria for potentially inappropriate prescribing in older people: version 3. Eur Geriatr Med. 2023;14(4):625-632. **[Crossref]**

55. Dautzenberg L, Bretagne L, Koek HL, et al. Medication review interventions to reduce hospital readmissions in older people. J Am Geriatr Soc. 2021;69(6):1646-1658. **[Crossref]**

56. Ishida T, Suzuki A, Nakata Y. Nationwide long-term evaluation of polypharmacy reduction policies focusing on older adults in Japan. Int J Environ Res Public Health. 2022;19(22):14684. **[Crossref]**

57. Ho YC, Wang CT, Weng TC, et al. Impact of the home-based medical integrated program on health outcomes and medical resource utilization in home healthcare patients in Taiwan. Clin Interv Aging. 2024;19:1437-1444. **[Crossref]**

58. McCarthy C, Clyne B, Boland F, et al. GP-delivered medication review of polypharmacy, deprescribing, and patient priorities in older people with multimorbidity in Irish primary care (SPPiRE Study): a cluster randomised controlled trial. PLoS Med. 2022;19(1):e1003862. **[Crossref]**

59. Zechmann S, Senn O, Valeri F, et al. Effect of a patient-centred deprescribing procedure in older multimorbid patients in Swiss primary care - a cluster-randomised clinical trial. BMC Geriatr. 2020;20(1):471. **[Crossref]**

60. Toklu HZ, Akıcı A, Uysal MK, Dülger GA. The role of the doctor and pharmacist in improving patient compliance in the process of rational drug use. Turk J Fam Pract. 2010;14(3):139-145. **[Crossref]**

61. Stuhec M. Clinical pharmacist consultant in primary care settings in Slovenia focused on elderly patients on polypharmacy: successful national program from development to reimbursement. Int J Clin Pharm. 2021;43(6):1722-1727. **[Crossref]**

62. McDonald EG, Lundby C, Thompson W, et al. Reducing potentially inappropriate polypharmacy at a national and international level: the impact of deprescribing networks. Expert Rev Clin Pharmacol. 2024;17(5-6):433-440. **[Crossref]**

63. Gudi SK, Kashyap A, Chhabra M, Rashid M, Tiwari KK. Impact of pharmacist-led home medicines review services on drug-related problems among the elderly population: a systematic review. Epidemiol Health. 2019;41:e2019020. **[Crossref]**

64. Als JG, Thomsen JL, Sørensen SS, Johnsen SP, Merrild CH. 'You would rather not fill your body with pills'-patient perspectives on polypharmacy and medication reviews by pharmacists in general practice. Scand J Prim Health Care. 2025;43(2):411-421. **[Crossref]**

65. Gama RS, Passos LC, Amorim WW, Souza RM, Oliveira MG. Effectiveness of pharmacist interventions in improving medication use in hospitalised older patients diagnosed with cardiovascular diseases: infar before-and-after study. J Eval Clin Pract. 2025;31(4):e70190. **[Crossref]**

66. Mustaming M, Loriana R, Azhari A, Badar B. Improvement of family caregivers' knowledge of polypharmacy in the elderly after health education. Pharmaciana. 2018;8(1):71-76. **[Crossref]**

67. Sarwar MR, Iftikhar S, Sarfraz M. Influence of education level of older patients on polypharmacy, potentially inappropriate medications listed in beer's criteria, and unplanned hospitalization: a cross-sectional study in Lahore, Pakistan. Medicina (Kaunas). 2018;54(4):57. **[Crossref]**

68. Sirois C, Khoury R, Durand A, et al. Exploring polypharmacy with artificial intelligence: data analysis protocol. BMC Med Inform Decis Mak. 2021;21(1):219. **[Crossref]**

Turk J Fam Pract 2026;30(1):68-69
DOI: 10.54308/TJFP.2026.921

Letter to the Editor

Should routine iodine supplementation replace iodine testing in pregnant women in Turkey? A family medicine perspective

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Iodine is an essential element for thyroid hormone synthesis and plays a critical role in maintaining the health of both the mother and the fetus during pregnancy.[1,2] Therefore, monitoring iodine status in populations and ensuring adequate iodine intake during pregnancy are of great importance for public health.[2] The 2007 guideline published by the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), and the Iodine Global Network (IGN) recommends measuring urinary iodine concentration (UIC) to assess the iodine status of populations.[3] According to this guideline, a median urinary iodine concentration below 150 µg/L in pregnant women indicates insufficient iodine intake.[3]

Studies conducted among pregnant women in Türkiye indicate that inadequate iodine intake remains a significant public health concern. In Istanbul, a study involving 3,543 pregnant women found a median UIC of 77 µg/L, with iodine deficiency identified in 90% of participants.[4] In a study conducted in Trabzon involving 864 pregnant women, despite a 90.7% rate of iodized salt consumption, the median UIC was found to be 102 µg/L, and iodine deficiency was identified in 77.9% of the participants.[5] In a retrospective analysis conducted in Ankara, subclinical hypothyroidism was detected in 12.8% of pregnant women, despite their self-reported use of iodized salt.[6] Based on this finding, it has been emphasized that the use of iodized salt alone during pregnancy may not be sufficient to meet the increased iodine requirement, and that iodine supplementation is necessary.[6]

These data indicate that iodine deficiency remains prevalent among pregnant women in Türkiye. Although Türkiye is generally considered an iodine-sufficient country, our country still experiences moderate-to-severe iodine deficiency, particularly among pregnant women. The 2025 Thyroid Disorders Diagnosis and Treatment Guideline of the Turkish Endocrinology and Metabolism Society (TEMD) also reports that iodine deficiency is still common among pregnant women and explicitly recommends providing additional iodine supplementation during pregnancy.[7] Therefore, because individual iodine testing is unreliable and requires multiple samples collected on different days, prophylactic iodine supplementation should be provided to all pregnant women without requiring individual testing as a prerequisite.[7] According to the WHO, UNICEF, and IGN guidelines, the average daily iodine requirement is 250 µg during pregnancy

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Received: 26.10.2025 **Accepted:** 20.12.2025 **Published:** 29.03.2026

and lactation.[3] Considering that the consumption of iodized salt in Türkiye provides an average of 100–150 µg of iodine per day, this amount is generally insufficient. According to the TEMD guideline, it is recommended that 100-300 µg of iodine be taken daily as a supplement.[7]

In conclusion, current evidence indicates that iodine deficiency among pregnant women in Türkiye persists, and that routine iodine supplementation, rather than individual testing, represents a more effective preventive strategy. As the first point of contact in the healthcare system and often the physician whom pregnant women consult first, family physicians play a pivotal role in ensuring the regular implementation of iodine supplementation during antenatal follow-ups. By doing so, they can help prevent potential complications associated with iodine deficiency and contribute to improving maternal and fetal health outcomes.

Source of funding

The authors declare that the study received no funding.

Conflict of interest

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

References

1. Mitka M. Even mild iodine deficiency during gestation may impair brain function in children. JAMA. 2013;309(23):2428. **[Crossref]**
2. Croce L, Chiovato L, Tonacchera M, et al. Iodine status and supplementation in pregnancy: an overview of the evidence provided by meta-analyses. Rev Endocr Metab Disord. 2023;24(2):241-250. **[Crossref]**
3. WHO, UNICEF, ICCIDD. Assessment of iodine deficiency disorders and monitoring their elimination. A guide for programme managers. Geneva: World Health Organization; 2007:1-94.
4. Oral E, Aydogan Mathyk B, Aydogan BI, et al. Iodine status of pregnant women in a metropolitan city which proved to be an iodine-sufficient area. Is mandatory salt iodisation enough for pregnant women? Gynecol Endocrinol. 2016;32(3):188-192. **[Crossref]**
5. Anaforoğlu İ, Algün E, İnceçayır Ö, Topbaş M, Erdoğan MF. Iodine status among pregnant women after mandatory salt iodisation. Br J Nutr. 2016;115(3):405-410. **[Crossref]**
6. Koyuncu K, Turgay B, Söylemez F. Iodine deficiency in pregnant women at first trimester in Ankara. J Turk Ger Gynecol Assoc. 2019;20(1):37-40. **[Crossref]**
7. Türkiye Endokrinoloji ve Metabolizma Derneği. Tiroit hastalıkları tanı ve tedavi kılavuzu. Türkiye Endokrinoloji ve Metabolizma Derneği. 2025. Available at: https://file.temd.org.tr/Uploads/publications/guides/documents/tiroid2025_11042025.pdf (Accessed on Oct 25, 2025).

Turk J Fam Pract 2026;30(1):70-72
DOI: 10.54308/TJFP.2026.923

Letter to the Editor

Teledermatology in Swedish primary care as a blueprint for Türkiye

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To the Editor,

The Swedish experience in teledermatology began with a collaboration between the Department of Dermatology and Venereology at Sahlgrenska University Hospital and Närhälsan Backa Primary Health Care Center in Gothenburg, demonstrating how a pilot project can become a comprehensive regional service (Figure 1). International evidence confirms that teledermatology improves access, reduces waiting times, and proves cost-effective in rural settings when image quality and workflow integration are adequate.[1] A Brazilian study found that over half of patients could be managed with teledermatology support, reducing in-person referrals by 78%.[2] This letter examines key lessons from Sweden and their relevance for Türkiye's teledermatology expansion in rural and home care settings.

The Swedish Model: from pilot to national practice

Sweden's initial pilot used mobile phone multimedia messaging service (MMS) to transmit clinical images from primary care physicians (PCPs) to dermatologists. Two dermatologists reviewed 40 consecutive referrals, achieving correct diagnoses in 78% of cases and providing adequate management recommendations in 98% of cases. Triage decisions were appropriate in 85–95% of cases.[3] Following this success, the project grew through health technology assessments (HTA) and stakeholder engagement. It now includes over 200 primary care centers and offers quick access to specialists, often within hours for urgent cases.

Contextual differences between Swedish and Turkish healthcare systems

While the Swedish teledermatology model offers valuable lessons, direct implementation in Türkiye requires consideration of fundamental system-level differences that may affect feasibility and outcomes. In Sweden's tax-financed healthcare system, PCPs serve as the first point of contact under a semi-formal gatekeeping model. Specialist referrals generally require authorization from a general practitioner (GP).[4] In Türkiye, patients can currently access hospital outpatient services and specialists directly, without PCP referrals.[5] While Türkiye's healthcare system differs substantially from Sweden's, the Swedish experience illustrates that teledermatology can be introduced successfully even in the absence of formal gatekeeping, provided that implementation

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Received: 16.11.2025 **Accepted:** 28.01.2026 **Published:** 29.03.2026

Figure 1. Teledermatology is performed over the phone using the HEINE iC1 set/7 teledermoscopy device in Närhälsan Backa Primary Health Care Center in Gothenburg.

follows a stepwise, region-adapted model with standardized workflows, strong primary care physicians–specialist collaboration, and low-bandwidth technical solutions. These elements are transferable and can support Türkiye in building a scalable national teledermatology framework.

Rural internet connectivity presents another critical implementation barrier. While Sweden maintains a relatively homogeneous broadband infrastructure with near-universal coverage, Türkiye exhibits substantial urban-rural digital disparities.[6,7] This heterogeneous digital landscape necessitates region-specific teledermatology solutions rather than uniform national implementation. However, adopting low-bandwidth solutions such as offline image capture, standardized compression methods, and asynchronous store-and-forward workflows, similar to Sweden's early MMS-based model, may enable effective implementation even in rural regions with limited connectivity.

Geographic and population differences argue for tailored teledermatology. International experience shows programs targeting rural regions, homebound patients, and nursing homes reduce travel burden, maintain diagnostic accuracy, and enhance primary care competence through case-based feedback.[8-10] Positioning teledermatology as a priority for underserved populations, rather than universal entry, may pragmatically improve access while reinforcing PCPs' role.

Opportunities and Challenges for Türkiye

During the COVID-19 pandemic, 64.5% of Turkish dermatologists supported the formal establishment of teledermatology services. Yet, knowledge gaps and reimbursement concerns persist.[11] Patient-assisted teledermatology pilots showed that 81.2% of patients were willing to use teledermatology during the pandemic, but over half would not use it unless fully reimbursed. Both patients and doctors agree that approximately half of dermatological complaints can be managed remotely. However, there are some barriers, including a lack of training, insufficient technical skills, and privacy concerns.[12]

Key recommendations for implementation roadmap

- System Adaptation: Address workflow integration within the existing open-access system through stakeholder engagement.[13]
- Legal Framework: Establish clear data privacy and reimbursement guidelines.
- Infrastructure Investment: Priority should be given to improving broadband internet infrastructure in rural areas. However, this is not a requirement if you are using low-bandwidth solutions.
- Training and Guidelines: Provide comprehensive teledermatology training for primary care and dermatology physicians.[14]
- Structured Pilots should be launched in selected regions by local teledermatology champions, using clearly defined triage categories from the outset to ensure consistent workflows and reliable evaluation.

Sweden's transition from a single-clinic pilot to a region-wide teledermatology service offers a practical roadmap. Türkiye can enhance teledermatology through structured pilot programs and multidisciplinary collaboration, particularly in rural and home healthcare settings.

Ethical approval

Written informed consent was obtained from the patient for publication of the image.

Author contribution

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

Source of funding

The authors declare that the study received no funding.

Conflict of interest

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

References

1. Coustasse A, Sarkar R, Abodunde B, Metzger BJ, Slater CM. Use of teledermatology to improve dermatological access in rural areas. Telemed J E Health. 2019;25(11):1022-1032. **[Crossref]**
2. Giavina-Bianchi M, Santos AP, Cordioli E. Teledermatology reduces dermatology referrals and improves access to specialists. EClinicalMedicine. 2020;29-30:100641. **[Crossref]**
3. Börve A, Holst A, Gente-Lidholm A, Molina-Martinez R, Paoli J. Use of the mobile phone multimedia messaging service for teledermatology. J Telemed Telecare. 2012;18(5):292-296. **[Crossref]**
4. Anell A, Glenngård AH, Merkur S. Sweden health system review. Health Systems in Transition. 2012;14(5), 1-159.
5. Öcek ZA, Çiçeklioğlu M, Yücel U, Özdemir R. Family medicine model in Turkey: a qualitative assessment from the perspectives of primary care workers. BMC Fam Pract. 2014;15:38. **[Crossref]**
6. Janlöv N, Blume S, Glenngård AH, Hanspers K, Anell A, Merkur S. Sweden: health system review. Health Syst Transit. 2023;25(4):1-236.
7. Kara F, Uğur B. The geographical digital divide: urban-rural, regional and gender inequalities of digital transformation in Turkey. Istanbul University Journal of Geography. **[Crossref]**
8. Gibbs J, Hanshaw S. Evaluating the effectiveness of teledermatology for undeserved populations during and post-COVID-19 [medical specialization thesis]. 2025. Available at: https://mds.marshall.edu/etd/1944
9. Ahuja S, Briggs SM, Collier SM. Teledermatology in rural, underserved, and isolated environments: a review. Curr Dermatol Rep. 2022;11(4):328-335. **[Crossref]**
10. Rubegni P, Nami N, Cevenini G, et al. Geriatric teledermatology: store-and-forward vs. face-to-face examination. J Eur Acad Dermatol Venereol. 2011;25(11):1334-1339. **[Crossref]**
11. Altunisik N, Turkmen D, Calikoglu E, Sener S. Views and experiences of dermatologists in Turkey about teledermatology during the COVID-19 pandemic. J Cosmet Dermatol. 2020;19(10):2460-2463. **[Crossref]**
12. Turan Ç, Utlu Z. Investigating the factors enabling the accurate implementation of the patient-assisted teledermatology model during the pandemic in Turkey: a pilot study. Dermatol Ther. 2021;34(2):e14741. **[Crossref]**
13. Marin-Gomez FX, Vidal-Alaball J, Poch PR, Sariola CJ, Ferrer RT, Peña JM. Diagnosis of skin lesions using photographs taken with a mobile phone: an online survey of primary care physicians. J Prim Care Community Health. 2020;11:2150132720937831. **[Crossref]**
14. McCaffrey N, Bucholc J, Ng L, et al. Protocol for a systematic review of reviews on training primary care providers in dermoscopy to detect skin cancers. BMJ Open. 2023;13(12):e079052. **[Crossref]**