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EDITORIAL

ORIGINAL ARTICLES

CASE REPORT

As the new year approaches, we are delighted to share with you the final issue of the year. This issue brings together five original research articles and one case report, offering contemporary scientific contributions spanning a broad spectrum—from public health to clinical pharmacology, from primary care to basic sciences. The common thread uniting these studies is their capacity to inform both the advancement of clinical practice and the holistic evaluation of healthcare services. Produced by researchers from diverse institutions and countries, this collection aims to foster stronger collaboration in health policy, clinical decision-making, and medical education.

The first article in the issue presents the work of Kaya et al., who investigated the prevalence of postpartum depression in primary care. Their findings reveal that postpartum depression is more common than expected, with psychiatric history, premenstrual mood changes, and limited social support emerging as key determinants of risk. The study underscores that women's mental health cannot be viewed solely as an individual phenomenon but must be understood within familial, environmental, and social contexts.

Emphasizing a similar societal dimension, Sari et al. examined environmental factors influencing diarrheal risk among infants and young children. Their results show that inadequate toilet infrastructure and poor waste management significantly increase the disease burden. This research strongly highlights the impact of environmental conditions on public health and reiterates the importance of preventive health policies.

Continuing this public health perspective, the third article by Ustaömer and Sancar evaluates psychotropic medication use in older adults. The authors identified many drug interactions and a marked increase in anticholinergic burden, demonstrating the need for more cautious, individualized, and holistic pharmacotherapy in the elderly population.

Addressing another essential public health topic, Saltıkalp Sert et al. explored healthcare workers' knowledge and attitudes regarding childhood vaccinations. While high knowledge levels were noted in certain groups, hesitancy toward mandatory vaccinations persists. This study highlights the pivotal role of healthcare workers in implementing vaccination policies and underscores the importance of ongoing education.

Bridging basic science and clinical application, Yücel et al. investigated the measurable effects of smoking on phonation duration. Their findings show that smoking significantly impairs vocal health, emphasizing the need to consider individual behaviors in both clinical assessments and public health interventions.

The issue concludes with a case report addressing one of the more delicate aspects of clinical practice. The authors present an infant with a foreign body aspiration, initially undiagnosed, who later experienced spontaneous expulsion of the foreign material. The case highlights the necessity of vigilance, suspicion, and systematic evaluation in pediatric emergencies.

Taken together, this issue reflects both the broad scope of public health research and the fine detail of clinical inquiry, underscoring the diversity of the health sciences and the essential role of interdisciplinary collaboration. We sincerely thank all the authors for their valuable scientific contributions, the reviewers for their meticulous evaluations, and the editorial and production teams for their dedicated efforts.

We wish you an enjoyable, inspiring, and insightful reading experience.

We look forward to meeting again in the spring…

Prof. Can Öner, MD

Editor-in-Chief

ANATOL J FAMILY MED

Original Article

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Postpartum Depression and its Risk Factors: A Primary Care Study from Samsun, Turkiye

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ABSTRACT

Objectives: This study aims to assess the risk of postpartum depression (PPD) and identify sociodemographic, psychiatric, and psychosocial factors that influence this risk.

Methods: This cross-sectional, descriptive study examined 400 mothers who visited the Pediatric Health and Diseases outpatient clinics at Samsun Training and Research Hospital between July 1 and September 30, 2023, and who had 1-year-old infants. Data were collected through face-to-face interviews using a sociodemographic information form and the Edinburgh Postnatal Depression Scale (EPDS). A score of ≥13 on the EPDS was considered indicative of PPD risk. Data were analyzed using Statistical Package for the Social Sciences 23.0 software.

Results: PPD risk was detected in 19.8% of participants. Statistically significant relationships were found between PPD risk and the following factors: İndividual psychiatric history ($p<0.001$), previous postpartum psychiatric problems ($p<0.001$), premenstrual emotional symptoms ($p<0.001$), low marital satisfaction ($p=0.023$), and insufficient social support (spouse, family, and spouse's family support). No significant relationships were found with other variables, such as educational status, income level, marital status, and tobacco use.

Conclusion: PPD is a complex mental health issue shaped by psychosocial interactions rather than individual factors. In primary healthcare, it is important to assess marital relationships, psychiatric history, and social support levels for the early diagnosis and referral of at-risk mothers.

Keywords: Postpartum depression, preventive medicine, primary health care

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INTRODUCTION

Postpartum depression (PPD) is a prevalent mental health condition affecting new mothers. The significance of PPD lies not only in its characteristic onset as a major depressive episode within the 1st year following childbirth but, crucially, in its considerable and serious influence on maternal health and subsequent infant development. Therefore, understanding and addressing PPD is of paramount importance.[1]

The postpartum period is a delicate phase in which physiological, psychological, and social transformations may precipitate depressive symptoms. PPD affects approximately 10–20% of women worldwide after childbirth. It is also one of the most common morbidities associated with childbirth.[2,3] To define the global dimension of the problem, the pooled prevalence of PPD is generally accepted to be approximately 14% globally. A multi-country meta-analysis revealed a significant disparity, with PPD prevalence typically around 10% in developed coun-

tries but reaching up to 30% in developing countries.[2] Translating to the national context, a multicenter systematic review and meta-analysis conducted in Turkey reported that the prevalence of PPD varies widely (6–50%). More specifically, when rates were examined, the rate was approximately 21.2% in developed cities and 25.0% in developing cities.[4] This phenomenon is influenced by a multitude of factors, including cultural, socioeconomic, and healthcare delivery aspects, which play a role in the onset and diagnosis of PPD.[5] Hormonal changes and psychosocial factors have been identified as potential contributors to the development of PPD.[6] Risk factors for PPD include unplanned pregnancy, low socioeconomic status, marital problems, and inadequate social support.[7-9]

Given the significant global and national differences, it is crucial to examine the specific local data in Samsun province to accurately assess the PPD burden. This study aims to determine PPD prevalence and risk factors in Samsun to guide local intervention development.

METHOD

This study is cross-sectional in nature. It was conducted between July 1 and September 30, 2023, at the Samsun Training and Research Hospital Pediatric Health and Diseases Outpatient Clinics.

The study population comprised mothers with infants under 1 year of age who visited the relevant outpatient clinics during the study period. The minimum sample size was manually calculated to be 360 using the sample size calculation formula with a 5% margin of error, 95% confidence level, and 50% probability value, given the known population size. A random sampling method was used to reach 400 participants who met the criteria. Each mother was included in the study only once.

The following criteria must be met to be considered for inclusion:

- The age requirement is 18 years of age or older
- The occurrence of a new birth within the initial 12-month period
- The application to the outpatient clinic has been submitted
- The act of participating voluntarily is of particular interest in this context.

The following criteria were used to determine exclusion from the study:

- To avoid potential confusion between maternal blues and PPD diagnosis, mothers in the first 2 weeks postpartum were excluded from the study.

The following instruments are to be utilized for the purpose of data collection:

The data were collected using a 68-item sociodemographic data form. This form was prepared by reviewing the literature and the Edinburgh postnatal depression scale (EPDS). The EPDS was developed by Cox et al.[10] and validated and reliability tested in Turkish by Aydin et al.[11] In the evaluation of the scale, all questions are scored on a scale of 0–3, and the maximum score that can be obtained on the scale is 30. Questions 1, 2, and 4 are scored on a 0-1-2-3 scale, while questions 3, 5, 6, 7, 8, 9, and 10 are scored on a 3-2-1-0 scale. The scale's cutoff point is 13. In the Turkish validity and reliability study of the EPDS conducted by Aydin et al.[11], the Cronbach's alpha value was found to be 0.79. The form and scale were administered by the first researcher using the face-to-face interview method, and the average response time of the participants was 20 min. A score of 13 or higher on the scale is considered an indicator of PPD risk. Individuals identified as being at risk were referred to the relevant healthcare unit.

The present study was reviewed and approved by the Samsun University Clinical Research Ethics Committee on May 24, 2023, with the reference number SÜKAEK-2023/10/2. Written informed consent was obtained from the participants.

The data were analyzed using IBM Statistical Package for the Social Sciences V23 software. The normality of the distribution was assessed using the Kolmogorov-Smirnov and Shapiro–Wilk tests. When appropriate, the Mann–Whitney U, Yates-corrected Chi-square, Fisher's exact, Pearson Chi-square, and Bonferroni-corrected Z tests were used. Analysis: The results are presented as frequency (percentage), mean±standard deviation, and median (min–max). The statistical significance was set at $p<0.05$.

RESULTS

A total of 400 mothers with infants aged 0–12 months were included in the study. The mean age of the participants was 29.88±5.51 years. The mean age at marriage was 23.34±4.31 years. Thirty-eight percent of participants had a high school diploma. The highest percentage of participants were housewives. 92.8% of mothers had health insurance. The largest percentage of monthly income was in the 8,500–20,000 TL range. 49.8% of participants live in rented accommodations, and 97.3% are married. The most common household size was two people. 62.3% of mothers stated that they have never smoked. Regarding alcohol

consumption, 91.0% of participants stated that they have never consumed alcohol. The sociodemographic characteristics of the participants are presented in Table 1.

When the feeding practices of the babies of mothers participating in the study were examined, it was found that 59.8% of babies under 6 months of age were exclusively breastfed. For babies older than 6 months, the most common feeding practice was the combined use of breast milk and complementary foods. 78% of women received support from their partners during and after pregnancy, while 85% received support from their own families. Data on infant feeding practices and social support status are presented in Table 2.

Table 1. Demographic data of participants

	Number Percentage n (%)
Age range	
18–24	71 (17.8)
25–30	159 (39.8)
31–35	86 (21.5)
36 and above	84 (21.3)
Age of marriage	
Under 18	51 (12.8)
18–24	213 (53.3)
25–29	104 (26.0)
30 and above	32 (8.1)
Education level	
Primary education	48 (12.1)
Middle school	86 (21.5)
High school	153 (38.3)
University	113 (28.2)
Working status	
Housewife	322 (80.5)
Civil servant	37 (9.5)
Private sector	41 (10.3)
Monthly income	
≤8500 TL	88 (22.0)
8500–20000 TL	181 (45.3)
20000–30000 TL	93 (23.3)
30000–40000 TL	18 (4.5)
>40000 TL	20 (5.0)
Number of persons living in the household	
2	140 (35.0)
3	110 (27.5)
4 and above	150 (37.5)

The EPDS was used to assess the level of PPD of the participants, and the total mean score was 7.90±5.68. Of the participants, 19.8% scored 13 or higher on the scale (considered at risk for depression), with an average score of 16.7±3.61. Cronbach's alpha was calculated as 0.833 for the scale in this study.

This study examined in detail the relationships between PPD risk and various sociodemographic and behavioral variables. A significant relationship was found between PPD risk and the number of people living in the same household, marital satisfaction, and whether the baby affected the marriage. However, no statistically significant relationship was found between PPD and other variables, such as educational level, employment status, health insurance, income level, marital status, age group, tobacco, and alcohol use. These findings suggest that an individual's social environment and marital dynamics may be decisive in the development of PPD. Detailed data are presented in Table 3.

Table 2. Nutritional status of ınfants and social support status of mothers participating in the study

	Number Percentage n (%)
Nutrition for ınfants under 6 months	
Only breast milk	150 (59.8)
Only formula	25 (10.0)
Formula, in addition to breast milk, complementary foods	76 (30.3)
Nutrition for babies aged 6 months and older	
Breast milk only	4 (2.7)
Breast milk, formula, and complementary foods	113 (75.9)
Formula and complementary foods	32 (21.4)
Is there anyone who helps you care for your baby?	
Yes	195 (48.8)
No	205 (51.2)
Support from your spouse during pregnancy and after childbirth	
Supportive	313 (78.3)
Somewhat supportive	76 (19.0)
Not supportive	11 (2.8)
Support from your own family during pregnancy and after childbirth	
Yes	340 (85.0)
Support from your spouse's family during pregnancy and after childbirth	
Yes	286 (71.5)

Table 3. Relationship between demographic characteristics and risk of PPD

	PPD risk		p
	No	Yes	
Age	29.79±5.46	30.22±5.76	0.500
Age group			
18–24	57 (80.3)	14 (19.7)	0.759[x]
25–30	130 (81.8)	29 (18.2)	
31–34	69 (80.2)	17 (19.8)	
35–40	55 (75.3)	18 (24.7)	
40 and above	10 (90.9)	1 (9.1)	
Education level			
Primary education	33 (10.2)	15 (10.0)	0.051[x]
Middle school	75 (23.4)	11 (13.9)	
High school	120 (37.4)	33 (41.8)	
University	93 (29)	20 (25.3)	
Working status			
Housewife	257 (80.1)	65 (82.3)	0.930[x]
Civil servant	31 (9.7)	6 (7.6)	
Private sector	33 (10.2)	8 (10.2)	
Health insurance coverage			
No	24 (7.5)	5 (6.3)	0.912[y]
Yes	297 (92.5)	74 (93.7)	
Monthly income			
≤8500 TL	66 (20.6)	22 (27.8)	0.440[x]
8500–20000 TL	145 (45.2)	36 (45.6)	
20000–30000 TL	80 (24.9)	13 (16.5)	
30000–40000 TL	14 (4.4)	4 (5.1)	
>40000 TL	16 (5)	4 (5.1)	
Do you rent the house you live in?			
Yes	159 (49.5)	40 (50.6)	0.861[z]
No	162 (50.5)	39 (49.4)	
Marital status			
Married	312 (97.2)	77 (97.5)	0.847[x]
Divorced. other	8 (2.8)	2 (2.5)	
Marriage age			
18 and under	35 (10.9)	16 (20.3)	0.135[x]
18–24	177 (55.1)	36 (45.6)	
25–29	85 (26.5)	19 (24.1)	
30 and over	24 (7.5)	8 (10.3)	
Form of marriage			
By agreement	263 (82.9)	67 (84.8)	0.526[x]
Traditional marriage	53 (16.5)	12 (15.2)	
Virtual world/Social media	5 (1.6)	0 (0)	
Number of marriages			
1	306 (95.3)	74 (93.7)	0.565[a]
2 and above	15 (4.7)	5 (6.3)	

Table 3. Relationship between demographic characteristics and risk of PPD (Cont.)

	PPD risk		p
	No	Yes	
Consanguinity status			
Yes	35 (10.9)	10 (12.7)	0.808[y]
No	286 (89.1)	69 (87.3)	
Number of people living in the household			
2	119 (37.1)	21 (26.6)	0.026[z]
3	85 (26.5)	25 (31.6)	
4	70 (21.8)	12 (15.2)	
5 and above	47 (14.6)b	21 (26.6)c	
Smoking status			
I currently smoke	40 (12.5)	13 (16.5)	0.827[z]
I used to smoke, but quit	42 (13.1)	10 (12.7)	
I have smoked a few times in my life	37 (11.5)	9 (11.4)	
I have never smoked	202 (62.9)	47 (59.5)	
Alcohol consumption			
I have consumed alcohol a few times in my life	30 (9.3)	6 (7.6)	0.710[x]
I have never consumed alcohol	291 (90.7)	73 (92.4)	

[x]Fisher-Freeman-Halton; [y]Yates correction; [z]Pearson Chi-square test; [a]Fisher's Exact test; PPD: Postpartum depression.

17% of participating mothers had previously been diagnosed with psychiatric problems. Regarding premenstrual syndrome symptoms, 28.2% of mothers reported depression, 68% reported irritability and tension, and 52.5% reported sensitivity, irritability, and crying spells during the premenstrual period. The risk of PPD and the relationship between individuals' psychiatric history and emotional symptoms experienced during the premenstrual period were examined in detail. A statistically significant relationship was found between PPD risk and having previously experienced any psychiatric disorder or postpartum psychiatric disorder. Furthermore, a significant relationship was found between PPD and emotional symptoms experienced during the premenstrual period. A significant relationship was also found between PPD and sensitivity, irritability, and crying spells. Findings suggesting that an individual's psychiatric history and emotional state during the premenstrual period may play an important role in PPD risk are summarized in Table 4.

Analysis of participants' spouses' educational characteristics revealed that the largest proportion were high school graduates and that the average age of spouses was 32.6±5.86. Most participants described their communication with their spouses as good or very good, and more than half reported being very satisfied with their marriage. Approximately half of the mothers stated that having a baby had a positive effect on their marital relationship. A statistically significant relationship was found between PPD risk and marital satisfaction. Similarly, mothers who believed that the birth of their baby had a positive effect on their marriage had a significantly lower risk of PPD. Support received from the spouse was also significantly associated with a lower risk of PPD. No other marital or family variable showed a statistically significant relationship with PPD risk. These findings suggest that the quality of marital relationships and perceived emotional and practical support from close family members play a protective role against postpartum depressive symptoms. Detailed results are presented in Table 5.

DISCUSSION

This study, conducted in a tertiary hospital in Samsun Province, aimed to evaluate PPD risk and associated factors in 400 mothers of infants aged 2 weeks to 12 months. Using the EPDS, the PPD risk rate was found to be 19.8%. This rate is similar to, yet different from, national and international literature. A large-scale analysis by Hahn-Holbrook et al.[4] including 291 studies found a global prevalence of 17.7%. In Turkey, the prevalence was 28%,[12,13] and in a study by Shorey et al.,[2] the prevalence was 17%. It was 26% in a Middle Eastern study[14] and up to 74% in Norhayati et al.'s[15] review of developing countries. These discrepancies

Table 4. Relationship between psychiatric illness and premenstrual symptoms and the risk of PPD

	PPD risk		p
	No	Yes	
Previous history of any psychiatric problems			
Yes	39 (12.1)	29 (36.7)	<0.001[b]
No	282 (87.9)	50 (63.3)	
History of psychiatric problems after previous births*			
Yes	13 (7.0)	15 (30.0)	<0.001[b]
No	173 (93.0)	35 (70.0)	
A history of psychiatric illness in the family			
Yes	54 (16.8)	18 (22.8)	0.284[b]
No	267 (83.2)	61 (77.2)	
The presence of postpartum psychiatric problems in the family			
Yes	10 (3.1)	4 (5.1)	0.490[b]
No	311 (96.9)	75 (94.9)	
A condition of experiencing emotional distress during the premenstrual period			
Yes	74 (23.1)	39 (49.4)	<0.001[b]
No	247 (76.9)	40 (50.6)	
Feeling irritable and tense before menstruation			
Yes	205 (63.9)	67 (84.8)	0.001[b]
No	116 (36.1)	12 (15.2)	
Premenstrual sensitivity, excessive emotionality, and crying spells			
Yes	148 (46.1)	62 (78.5)	<0.001[c]
No	173 (53.9)	17 (21.5)	

*Those who have given birth before have answered. [a]Fisher's Exact test; [b]Yates correction; [c]Pearson Chi-square test; PPD: Postpartum depression.

may be attributed to the use of different cutoff points and targeted postpartum periods.

This study carefully analyzed the relationships between PPD risk and sociodemographic variables. No statistically significant association was found between PPD and maternal age, education level, employment status, income level, health insurance, or marital status. These findings are consistent with several studies reporting that sociodemographic characteristics alone may not be strong predictors of PPD.[16-18] However, other studies have identified certain demographic factors – particularly low educational attainment and younger maternal age at first pregnancy – as potential risk enhancers for PPD.[15,19,20] The differences between the present findings and those of previous research may be explained by variations in sample characteristics, cultural context, and social support structures. In the present study, most participants reported adequate family and spousal support, as well as moderate-to-high socioeconomic stability, which may have mitigated the potential influence of demographic risk factors. Moreover, the relatively homogeneous sample in terms of educational and economic background could have limited the detection of significant associations. These contextual factors should be considered when interpreting the results, as they may partly explain the divergence from studies conducted in populations with greater social or economic disparities.

A significant relationship was found between the number of people living in the same household and the risk of PPD. Some studies have similarly suggested that larger household size or extended family living arrangements may increase the risk of PPD by contributing to higher caregiving demands, reduced personal space, and potential interpersonal conflicts.[18,21] However, the nature of this relationship may vary across cultural contexts. In societies where family cohesion and intergenerational support are strong, living with a larger number of household members can serve as an important source of emotional and practical support for new mothers. In contrast, in settings where traditional gender roles or familial expectations are dominant, cohabitation with extended family members may lead to increased

Table 5. Relationship between marital status and PPD risk

	PPD risk		p
	No	Yes	
Marriage age			
18 and under	35 (10.9)	16 (20.3)	0.135[c]
18–24	177 (55.1)	36 (45.6)	
25–29	85 (26.5)	19 (24.1)	
30 and over	24 (7.5)	8 (10.1)	
Form of marriage			
By agreement	263 (82.9)	67 (84.8)	0.526[c]
Traditional marriage	53 (16.5)	12 (15.2)	
Virtual world/Social media	5 (1.6)	0 (0)	
Number of marriages			
1	306 (95.3)	74 (93.7)	0.565[a]
2 and above	15 (4.7)	5 (6.3)	
Consanguinity status			
Yes	35 (10.9)	10 (12.7)	0.808[b]
No	286 (89.1)	69 (87.3)	
Your spouse's education status			
Elementary school	31 (9.6)	7 (8.8)	0.052[c]
Middle school	72 (22.4)	27 (34.2)	
High school	117 (36.4)	29 (36.7)	
University	101 (31.5)	16 (20.3)	
Your spouse's age			
18–24	19 (5.9)	3 (3.8)	0.962[c]
25–30	111 (34.6)	28 (35.4)	
31–34	83 (25.9)	22 (27.8)	
35–40	70 (21.8)	16 (20.3)	
40 and above	38 (11.8)	10 (12.7)	
How would you describe your communication with your spouse?			
Very good	192 (59.8)	42 (53.2)	0.087[c]
Good	103 (32.1)	25 (31.6)	
Average	19 (5.9)	12 (15.2)	
Poor	5 (1.6)	0 (0)	
Very poor	2 (0.6)	0 (0)	
How is your relationship with your spouse's parents?			
Good	290 (90.3)	70 (88.6)	0.388[c]
Average	24 (7.5)	5 (6.3)	
Poor	7 (2.2)	4 (5.1)	
Do you live in the same city as your parents?			
Yes	213 (66.4)	54 (68.4)	0.735[y]
No	108 (33.6)	25 (31.6)	
Marital satisfaction			
Very satisfied	188 (58.6)[y]	34 (43.0)[z]	0.023[c]
Satisfied	126 (39.3)[y]	41 (51.9)[z]	
Not satisfied	7 (2.2)	4 (5.1)	

Table 5. Relationship between marital status and PPD risk (Cont.)

	PPD risk		p
	No	Yes	
Do you think your baby has affected your marriage?			
No	142 (44.2)[y]	45 (57.0)[z]	<0.001[c]
Yes (positive)	174 (54.2)[y]	26 (32.9)[z]	
Yes (negative)	5 (1.6)[y]	8 (10.1)[b]	
Is there anyone who can help with the baby?			
Yes	155 (48.3)	40 (50.6)	0.709[y]
No	166 (51.7)	39 (49.4)	
Did your partner support you during and after pregnancy?			
It was helpful	259 (80.7)[y]	54 (68.4)[z]	0.006[c]
Moderately helpful	57 (17.8)	19 (24.1)	
Not helpful	5 (1.6)[y]	6 (7.6)[z]	

PPD: Postpartum depression.

stress or perceived loss of autonomy, thereby heightening vulnerability to depressive symptoms. In the present study, the observed association may reflect the latter dynamic, as mothers living in crowded households could have experienced greater environmental stress or limited privacy during the postpartum period. These findings underscore the importance of considering both the quantitative and qualitative aspects of family structure when evaluating the social determinants of PPD.

In our study, a history of psychiatric illness was identified as a strong risk factor for PPD, both at the individual level and in relation to previous pregnancies. This finding aligns with the results of Sünter et al.,[13] who also emphasized the significant influence of psychiatric history on postpartum depressive symptoms. Similarly, Gülnar et al.[17] and Kolukırık et al.[21] reported that a previous psychiatric diagnosis or history of depressive episodes was a strong predictor of PPD development. The consistency of these findings across studies reinforces the well-established understanding that underlying vulnerability to mood disorders substantially increases the likelihood of PPD. However, minor differences in the magnitude of association reported in the literature may be attributed to variations in the assessment of psychiatric history, diagnostic criteria, and the timing of postpartum evaluation. In the present study, psychiatric history was self-reported, which may have led to underreporting of mild or undiagnosed conditions, potentially moderating the observed strength of association. Nonetheless, the overall pattern supports the view that early identification and proactive management of women with a prior psychiatric history are crucial for effective prevention and early intervention in PPD.

Mood changes associated with premenstrual syndrome were found to be strongly related to PPD risk, which is consistent with evidence suggesting a shared hormonal and emotional regulation vulnerability between the two conditions. Moreover, the negative association between marital satisfaction and PPD risk, as well as the higher PPD rates among women who perceived that having a baby negatively affected their marriage, align with prior research highlighting the importance of relational dynamics in the postpartum period.[16,18,21] The similarity of these findings may reflect the universal psychological impact of marital stress on maternal mental health. However, subtle differences across studies could be attributed to variations in social support systems, gender roles, and cultural expectations regarding parenting and spousal responsibilities. These factors may influence how marital satisfaction and the transition to parenthood interact to affect the risk of PPD.

Examining social support factors revealed that women who did not receive support from their spouse, family, or in-laws were found to have a significantly higher risk of PPD. These results are consistent with those of Durukan et al.,[18] Aydın et al.,[11] and Kolukırık et al.[21] Interestingly, no significant association was found between having a helper with infant care and PPD. This may be related to the quality of the relationship with the support provider or the source of stress.[17]

Our study found no significant relationship between smoking, alcohol use, and PPD. However, some international studies have indicated that smoking and alcohol use may

trigger depressive symptoms.[22-24] This difference may be due to sociocultural differences.

The internal consistency of the EPDS used in this study was quite high (α = 0.833). This result supports the reliability of the Turkish version of the scale for use with postpartum mothers.[14]

One strength of this study is its large sample size and the fact that data were collected through face-to-face interviews. The study was conducted in Samsun, one of Turkey's major cities, which enabled meaningful conclusions to be drawn about women living in urban centers. However, the cross-sectional design of the study prevents causal inferences from being made. Furthermore, since the study was conducted in a tertiary healthcare facility, the results only apply to individuals who use healthcare services frequently, limiting the study's generalizability. Another limitation is recall bias, as participants' past psychiatric histories and emotional states were based on their own reports.

In conclusion, this study demonstrates that PPD is influenced by numerous social, psychological, and relational factors, particularly psychiatric history, marital satisfaction, and social support. Identifying these risk factors in primary care settings is critical for early intervention and referral.

CONCLUSION

This study revealed that PPD is related not only to individual and socioeconomic variables, but also to psychosocial factors, such as psychiatric history, marital relationships, and social support.

These findings highlight the importance of family physicians using a comprehensive approach to assess women's mental health during the postpartum period. In this context, identifying at-risk mothers early on in primary healthcare settings and providing them with the necessary psychological support or referrals is a critical public health intervention.

Disclosures

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REFERENCES

1. Payne JL, Maguire J. Pathophysiological mechanisms implicated in postpartum depression. Front Neuroendocrinol 2019;52:165–80.
2. Shorey S, Chee CYI, Ng ED, Chan YH, Tam WWS, Chong YS. Prevalence and incidence of postpartum depression among healthy mothers: A systematic review and meta-analysis. J Psychiatr Res 2018;104:235–48.
3. Hutchens BF, Kearney J. Risk factors for postpartum depression: An umbrella review. J Midwifery Womens Health 2020;65(1):96–108.
4. Hahn-Holbrook J, Cornwell-Hinrichs T, Anaya I. Economic and health predictors of national postpartum depression prevalence: A systematic review, meta-analysis, and meta-regression of 291 studies from 56 countries. Front Psychiatry 2018;8:248.
5. Ceulemans M, Foulon V, Ngo E, Panchaud A, Winterfeld U, Pomar L, et al. Mental health status of pregnant and breastfeeding women during the COVID-19 pandemic-a multinational cross-sectional study. Acta Obstet Gynecol Scand 2021;100(7):1219–29.
6. Sarıkaya D. Gebelik ve lohusalık döneminde sık görülen psikiyatrik hastalıklar. In Arıca S, Zeren Öztürk G, eds. Pratik Aile Hekimliği Serisi - Kadın Sağlığı Hastalıkları ve Doğum. 1st ed. İstanbul: Ema Tıp Kitabevi; 2022, p. 300–4.
7. Akdağ EM. Doğum ardı başlangıcı depresyonun tanınması ve tedavi yönetiminde birinci basamak hekimlerine yönelik öneriler. In Gündüz N, ed. Aile Hekimliği ve Acil Serviste Ruhsal Bozuklukların Yönetimi. 1st ed. Ankara: Akademisyen Yayınevi; 2019, p. 211–26.
8. Karaçam Z, Çoban A, Akbaş B, Karabulut E. Status of postpartum depression in Turkey: A meta-analysis. Health Care Women Int 2018;39(7):821–41.
9. Demir İ. Lohusa izlem ve sık sorunlar. In Arıca S, Zeren Öztürk G, eds. Pratik Aile Hekimliği Serisi - Kadın Sağlığı Hastalıkları ve Doğum. 1st ed. İstanbul: Ema Tıp Kitabevi; 2022, p. 117.
10. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh postnatal depression scale. Br J Psychiatry 1987;150:782–6.
11. Aydin N, Inandi T, Yigit A, Hodoglugil NN. Validation of the Turkish version of the Edinburgh postnatal depression scale among women within their first postpartum year. Soc Psychiatry Psychiatr Epidemiol 2004;39(6):483–6.
12. Özcan NK, Boyacıoğlu NE, Dinç H. Postpartum depression prevalence and risk factors in Turkey: A systematic review and meta-analysis. Arch Psychiatr Nurs 2017;31(4):420–8.
13. Sünter AT, Güz H, Canbaz S, Dündar C. Postpartum depression in Turkey; Prevalence and related factors. Uz Sonr Eğt Güncel Derg 2006;3(1):26–31.
14. Halbreich U, Karkun S. Cross-cultural and social diversity of prevalence of postpartum depression and depressive symp-

toms. J Affect Disord 2006;91(2–3):97–111.
15. Norhayati MN, Hazlina NH, Asrenee AR, Emilin WM. Magnitude and risk factors for postpartum symptoms: A literature review. J Affect Disord 2015;175:34–52.
16. Arslantaş H, Ergin F, Balkaya NA. Postpartum depression prevalence and related risk factors in Aydin province. ADU Tıp Fak Derg 2009;10(3):13–22. [Article in Turkish]
17. Gülnar D, Sunay D, Çaylan A. Psychosocial factors in the development of postpartum depression; a case control study. J Clin Obstet Gynecol 2010;20(3):141–8.
18. Durukan E, İlhan MN, Bumin MA, Aycan S. Postpartum depression frequency and quality of life among a group of mothers having a child aged 2 weeks-18 months. Balkan Med J 2011;2011(4):385–93. [Article in Turkish]
19. Inandi T, Elci OC, Ozturk A, Egri M, Polat A, Sahin TK. Risk factors for depression in postnatal first year, in eastern Turkey. Int J Epidemiol 2002;31(6):1201–7.
20. Lanzi RG, Bert SC, Jacobs BK; Centers for the Prevention of Child Neglect. Depression among a sample of first-time adolescent and adult mothers. J Child Adolesc Psychiatr Nurs 2009;22(4):194–202.
21. Kolukırık Ü, Şimşek H, Ergör A. Factors related with depressive symptoms among postpartum mothers: A community-based, cross-sectional. DEU Tıp Derg 2019;33(1):1–8. [Article in Turkish]
22. Lin PY, Chiu TH, Ho M, Chang JPC, Chang CHC, Su KP. Major depressive episodes during pregnancy and after childbirth: A prospective longitudinal study in Taiwan. J Formos Med Assoc 2019;118(11):1551–9.
23. Lee YJ, Yi SW, Ju DH, Lee SS, Sohn WS, Kim IJ. Correlation between postpartum depression and premenstrual dysphoric disorder: Single center study. Obstet Gynecol Sci 2015;58(5):353–8.
24. Filha MMT, Ayers S, da Gama SGN, do Carmo Leal M. Factors associated with postpartum depressive symptomatology in Brazil: The Birth in Brazil National Research Study, 2011/2012. J Affect Disord 2016;194:159–67.

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Environmental and Behavioral Determinants of Diarrheal Risk in Toddlers

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ABSTRACT

Objectives: Diarrhea remains a major public health issue and is defined by the World Health Organization as passing loose or watery stools three or more times per day, or more often than usual for an individual. It is a leading cause of death in children under five, accounting for about 9% of global fatalities in this age group. This study aimed to assess the relationship between environmental and behavioral factors and diarrhea occurrence among toddlers in two primary health care centers.

Methods: This cross-sectional study (March–June 2024) included 108 parents or caregivers of toddlers visiting two health centers. Data were obtained through interviews and analyzed using univariate statistics and the Chi-square test, with statistical significance set at $p<0.05$.

Results: Environmental factors showed significant associations with diarrheal risk. The absence or poor condition of family toilet facilities (p=0.006, odds ratio [OR]=3.18; 95% confidence interval [CI]=1.43–6.92) and inadequate waste disposal systems (p=0.018, OR=3.64; 95%CI=1.66–7.98) were associated with higher diarrhea prevalence. In contrast, housing components (p=0.902, OR=0.88; 95% CI=0.41–1.90) were not significantly related. Among behavioral factors, handwashing with soap did not show a significant association (p=0.239, OR=0.59; 95% CI=0.27–1.26).

Conclusion: Findings indicate that environmental conditions, particularly toilet facilities and waste disposal, play an important role in diarrhea risk among toddlers. Strengthening sanitation infrastructure in low-resource primary care settings may help reduce the burden of diarrheal diseases among children.

Keywords: Diarrhea, hand hygiene, home environment, preschool child, primary health care, sanitation

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INTRODUCTION

Diarrhea remains a significant public health concern affecting communities worldwide. The World Health Organization defines diarrhea as the passage of loose or watery stools three or more times per day, or more frequently than is normal for an individual.[1] Based on its duration, diarrhea is classified into two types: acute and chronic. Acute diarrhea refers to the sudden onset of loose or watery stools lasting for 14 days or less, whereas chronic or persistent diarrhea is defined as diarrhea lasting for more than 14 days.[2]

According to the United Nations Children's Fund (UNICEF), diarrhea is the leading cause of death in children globally, contributing to around 9% of all deaths in children under the age of five. This figure is equivalent to nearly 1,200 child deaths every day, or more than 444,000 child deaths every year, even though health services are available.[3] In Indonesia itself, data show that the prevalence of diarrhea among children was 10.9%, with a higher occurrence in rural areas (11.53%) compared to urban settings (10.07%).[4]

Understanding both the global and national burden of diarrhea is essential for identifying the underlying environmental and behavioral determinants that contribute to its persistence in different settings. Numerous studies have shown that diarrheal diseases are closely linked to environmental and hygiene-related factors, such as inadequate sanitation facilities, unsafe water storage, poor hand hygiene, and the presence of disease vectors near food and water sources. A study by Birhan et al. in the South Gondar region of Ethiopia reported a diarrhea prevalence of 29% among toddlers, with significant risk factors including irregular cleaning of toilets and drinking-water sources, unsafe water storage, and contamination from nearby vectors.[5] Similarly, a case–control study involving 315 toddlers in Ethiopia identified major determinants of acute diarrhea, including low family income (AOR=6.22), poor handwashing habits using only water (AOR=3.75), improper disposal of infant feces (AOR=11.01), untreated drinking water (AOR=9.36), and consumption of leftover food stored at room temperature (AOR=5.52).[6] In Indonesia, Manik et al. found a diarrhea incidence of 68.18% among toddlers in Aceh, with almost half of the mothers demonstrating poor hygiene practices and limited knowledge of disease prevention. The study revealed a significant relationship between inadequate clean and healthy living behaviors and the occurrence of diarrhea (p=0.008 and p=0.003).[7]

Although several international and national studies have investigated the determinants of diarrhea, limited research has specifically examined these factors in the Serang region of Banten Province, Indonesia. This area faces diverse challenges related to household sanitation, waste management, and hygiene behavior that may differ from other regions. Therefore, a localized study is essential to better understand how environmental and behavioral conditions influence diarrheal risk among toddlers in Serang. The findings can provide valuable evidence for primary health care programs and community-based sanitation initiatives, supporting targeted interventions to reduce diarrheal incidence and improve child health outcomes.

This study aimed to evaluate the relationship between environmental and behavioral factors, particularly sanitation conditions and handwashing habits, and the occurrence of diarrhea among toddlers in the working areas of the Ciracas and Unyur Primary Health Centres, Serang City, Banten Province, Indonesia. Family physicians and primary health care workers play a crucial role in community-based diarrhea prevention through health education and sanitation surveillance.

METHOD

This study employed a cross-sectional design to examine the relationship between environmental and behavioral factors and the occurrence of diarrhea among toddlers attending the Ciracas and Unyur Primary Health Centres in Serang, Banten Province, Indonesia. The study was conducted between March and June 2024.

The target population consisted of parents or caregivers who visited the primary health centers and their affiliated integrated health posts. The accessible population included those who brought toddlers to the facility according to the midwife's service schedule. Participants were eligible if they lived within the working area of the primary health center and had children aged 2–5 years. Exclusion criteria included parents or caregivers who could not communicate in Indonesian or who did not live in the same household as the toddler.

A purposive sampling technique was used, yielding a total of 108 respondents. The minimum required sample size was calculated using a 95% confidence level, 80% power, a 10% margin of error, and an expected diarrhea prevalence of 30%, resulting in a minimum of 96 respondents; the final sample exceeded this number.

Data were collected using a structured questionnaire adapted from the Standard Household Sanitation Survey of the Indonesian Ministry of Health. The questionnaire was pre-tested among 15 respondents to ensure clarity and validity. Reliability testing produced a Cronbach's alpha of 0.82, indicating good internal consistency. Data processing and analysis were performed using IBM Statistical Package for the Social Sciences version 23.

The study protocol was approved by the Institutional Review Board of the Faculty of Medicine and Health Sciences, Sultan Ageng Tirtayasa University (IRB No. 61/UN.43.20/KEPK/2024). Primary data were collected from toddlers and their parents or companions at Ciracas and Unyur Primary Health Centres in Serang City, Indonesia. All information was kept strictly confidential, with participants' identities protected and the data used solely for research purposes. An informed consent form was attached to the questionnaire, as confirmed (or waived) by the IRB. Completion of this form indicated the respondent's voluntary agreement to participate in the study.

The study evaluated two main groups of variables, such as environmental factors (including family toilet facilities, waste disposal systems, and housing components) and

behavioral factors (particularly the habit of handwashing with soap). Environmental health classifications followed the Ministry of Health's sanitation standards which require healthy toilet facilities to be equipped with a goose-neck structure, septic tank, and adequate ventilation. Proper waste disposal was used of closed waste containers with regular collection. Healthy housing components were constructed with materials that are easy to clean, unlike unfinished cement or soil floors, which are considered less hygienic.

Univariate analysis was performed to describe respondents' characteristics and diarrhea prevalence. Bivariate analysis using the Chi-square test was employed to assess the association between independent variables (environmental and behavioral factors) and the dependent variable (diarrhea occurrence). Statistical significance was set at $p<0.05$. The odds ratio (OR) and 95% confidence interval (CI) were used to measure the strength of associations.

RESULTS

Data collection was assisted by trained midwives and local integrated service post cadres. Initially, 126 respondents were recruited; however, 108 met the inclusion and exclusion criteria and were included in the final analysis. The characteristics of toddlers, parents, and environmental and behavioral factors are summarized in Table 1. More than half of the toddlers were male (52.8%), and 51.9% had experienced diarrhea. The mean age, weight, and height of the toddlers were 3.5 years, 15.1 kg, and 98.8 cm, respectively. The mean ages of mothers and fathers were 31.0 years and 29.0 years. About half of the mothers had an education level below high school (50.9%), while most fathers had completed at least high school or higher (68.5%).

Regarding environmental and behavioral conditions, approximately half of the households had healthy toilet facilities (50.9%) and adequate waste disposal systems (54.6%). Slightly more than half of the mothers (52.8%) reported regular handwashing with soap before feeding and after defecation. In contrast, 59.3% of homes had less healthy structural components, such as unfinished cement or soil floors, which may hinder optimal hygiene.

As shown in Table 2, this study found a significant association between the presence of a family toilet and the occurrence of diarrhea in toddlers (p=0.006, OR=3.18; 95% CI=1.43–6.92). Toddlers living in households without proper toilet facilities were more likely to experience diarrhea (66.7%) compared to those with adequate facilities. Similarly, a significant relationship was observed between the waste disposal system and diarrhea (p=0.018, OR=3.64; 95%CI=1.66–7.98), where 65.3% of households with inadequate waste disposal reported diarrheal cases among toddlers.

In contrast, no significant associations were found between diarrhea and housing components (p=0.902, OR=0.88; 95% CI=0.41–1.90) or handwashing habits (p=0.239, OR=0.59; 95% CI=0.27–1.26). The results also showed no significant differences based on toddler gender (p=0.239, OR=0.59; 95% CI=0.27–1.26) or parental education levels (mother: p=0.994; father: p=0.194).

Table 1. Characteristics of respondents, respondents' parents/guardians, and variables studied (n=108)

	n (%)
Age (years) (mean±SD)	3.4±1.0
Weight (kg) (mean±SD)	15.1±1.9
Height (cm) (mean±SD)	98.8±6.8
Gender	
Male	57 (52.8)
Female	51 (47.2)
Diarrheal occurrence	
Diarrheal	56 (51.8)
No Diarrheal	52 (48.2)
Mother's Age (years) (mean±SD)	30.5±7.8
Father's Age (years) (mean±SD)	29.2±8.1
Mother's Education	
<High school/equivalent	55 (50.9)
>High School/equivalent	53 (49.0)
Father's education	
<High school/equivalent	34 (31.5)
>High school/equivalent	74 (68.5)
Family toilet facilities	
Unhealthy	51 (49.1)
Healthy	57 (50.9)
Waste disposal facilities	
Not Good	49 (45.4)
Good	59 (54.6)
House components	
Not Good	64 (59.3)
Good	44 (40.7)
Washing hands with soap	
Not Good	51 (47.2
Good	57 (52.8)

Table 2. Relationship between the variables studied and diarrhea in toddlers (n=108)

Variable	Diarrhea		p	OR (95% CI)
	Yes n (%)	No n (%)		
Family toilet facilities				
Unhealthy	34 (66.7)	17 (33.3)	0.006	3.18 (1.43–6.92)
Healthy	22 (38.6)	35 (61.4)		
Waste disposal facilities				
Unhealthy	32 (65.3)	17 (34.7)	0.018	3.64 (1.66–7.98)
Good	24 (40.7)	35(59.3)		
House components				
Unhealthy	34 (53.1)	30 (46.9)	0.902	0.88 (0.41–1.90)
Good	22 (50.0)	22 (50.0)		
Hand washing with soap				
Unhealthy	30 (58.8)	21 (41.2)	0.239	0.59 (0.27–1.26)
Good	26 (45.6)	31 (54.4)		
Toddler gender				
Male	26 (45.6)	31 (54.4)	0.239	0.59 (0.27–1.26)
Female	30 (58.8)	21(41.2)		
Mother's education				
<High school/equivalent	28 (50.9)	27 (49.1)	0.994	1.08 (0.51–2.30)
>High school/equivalent	28 (52.8)	25 (47.2)		
Father's education				
<High school/equivalent	14 (41.2)	20 (58.8)	0.194	1.88 (0.82–4.27)
>High school/equivalent	42 (65.6)	32(34.4)		

Values are presented as odds ratio (95% confidence interval).

DISCUSSION

This study revealed that environmental conditions play a critical role in the occurrence of diarrhea among toddlers in Serang City. The availability and quality of family toilet facilities and waste disposal systems were both significantly associated with diarrheal risk. Households lacking proper sanitation infrastructure had a markedly higher prevalence of diarrhea. In contrast, housing components and handwashing behavior were not significantly related to diarrhea occurrence. Likewise, no significant associations were found between diarrhea and child gender or parental education level. These findings highlight that structural environmental factors exert a stronger influence on diarrheal risk than individual behavioral or demographic factors in this population.

Diarrhea is more often experienced by children under 2 years of age, with a peak incidence in the 6–11-month age group. This is caused by several factors such as a decrease in antibodies from the mother, a less-than-optimal active immune system in infants, and the introduction of additional foods that may have been contaminated by bacteria from feces.[8] In addition, the phase in which infants begin to crawl increases the possibility of direct contact with human and animal feces. A study in Aceh Province, Indonesia, revealed that children aged 0–24 months have a 1.63-fold higher risk of developing diarrhea compared with those aged 25–59 months.[9] The younger the toddler, the higher the risk of experiencing diarrhea, because their immune system has not developed optimally.[4] Meanwhile, one study noted that most cases of diarrheal were found in children aged 24–41 months, which was 55.9%.[10] Therefore, the demographics of children with diarrhea in this study are not in line with previous results, possibly because this study only involved children aged between 2 and <5 years according to the inclusion criteria.

Death from diarrhea is generally triggered by dehydration, which begins with various levels of symptoms and weight loss. The level of dehydration is greatly influenced by the

cause of diarrhea, which will determine the frequency and consistency of bowel movements.[2] A high frequency of diarrhea increases the risk of dehydration, which is characterized by weight loss. This occurs because a toddler's body is composed mostly of water, so fluid loss directly affects cellular function. If not managed promptly with adequate rehydration, weight loss will worsen.[11] Therefore, monitoring weight is very important in treating toddlers with diarrhea. In addition, children with diarrhea tend to lose their appetite, which reduces nutritional intake and disrupts nutrient absorption. As a result, body weight decreases gradually, and height growth can also be impaired.[12]

A prospective cohort study conducted in Brazil showed that toddlers who frequently experience diarrhea between 0 and 2 years of age are at risk of long-term growth disturbances up to 5 years later.[13] High frequency of diarrhea in early life may increase the risk of stunting, emphasizing the need for timely and adequate nutritional management.[14] The findings of this study also demonstrate a significant relationship between family toilet facilities and diarrhea in toddlers. These results are consistent with previous studies showing that toilet quality is directly related to diarrheal occurrence.[15,16] Inadequate toilets allow the proliferation of pathogenic bacteria such as Escherichia coli, Shigella, Salmonella, and Staphylococcus enterocolitica, which thrive in unhygienic environments and can contaminate water and food sources, thereby increasing infection risk.[17,18] From an environmental health perspective, proper toilets are essential to interrupt disease transmission originating from human waste.[19] Toilets that fail to meet sanitation standards facilitate diarrhea transmission because unmanaged feces can contaminate water, food, and serve as breeding sites for disease vectors.[20,21]

Improper waste disposal practices also contribute to the spread of diarrheal diseases. Observations showed that many households used open, non-waterproof trash containers, which serve as breeding grounds for flies and rodents, both of which can transmit enteric pathogens.[22,23] Regarding house components, this study found no significant association between floor type and diarrhea, in contrast with studies reporting that non-waterproof floors increase diarrheal risk.[24-26] Similarly, handwashing behavior was not significantly associated with diarrhea, likely due to inconsistencies in reported practices or self-reporting bias. In many households, handwashing may be performed without soap or at incorrect times, limiting its protective effect.[27] Nonetheless, handwashing with soap remains a well-documented preventive measure, capable of reducing diarrheal mortality by nearly 50% when practiced consistently.[28,29]

In terms of gender, male toddlers were more likely to experience diarrhea than females, consistent with evidence suggesting higher susceptibility to infection among boys due to greater physical activity and potentially higher pathogen exposure.[30,31] Parental education also plays a crucial role; mothers with higher education levels tend to have better health literacy, which translates into healthier household practices such as improved hygiene, safer food handling, and cleaner living environments.[32]

This study has several limitations. As a cross-sectional study, causal relationships cannot be established, and reporting bias may be present. Data collection was conducted with the assistance of midwives, and not all were directly supervised by the researcher, which may have affected response accuracy. Environmental variables, such as toilet facilities and waste disposal systems, were self-reported rather than observed directly. Future studies should include direct home observations and assess additional confounding variables, such as septic tank distance, immunization status, and exclusive breastfeeding practices.

These findings underscore the vital role of family physicians and primary health care providers in diarrhea prevention and control. Family doctors are often the first point of contact for families and can play a pivotal role in health education, sanitation advocacy, and early detection of diarrheal diseases in children. Strengthening collaboration between community health workers and family physicians can ensure regular household sanitation monitoring, promote consistent hand hygiene practices, and facilitate timely interventions for at-risk families. Integrating these preventive measures into routine primary care services supports a holistic, community-based approach that aligns with the principles of family medicine.

CONCLUSION

This study highlights the importance of community-based efforts to reduce diarrhea among young children. Improving household sanitation should remain a top priority through the use of proper goose-neck toilets and effective waste disposal systems. Collaboration between health authorities and government agencies is needed to ensure regular supervision of household sanitation. Community health centers should also provide ongoing education for families about hygiene and waste management using culturally appropriate methods.

For family doctors and primary care providers, these findings emphasize the need to strengthen preventive care at the community level. Family physicians can play an active role in educating parents about hygiene, safe food prepa-

ration, and sanitation during routine visits. They can also work with community health workers to identify at-risk families, monitor child growth, and provide early interventions to prevent diarrhea. Strengthening these preventive roles in primary care can help reduce diarrhea cases and improve child health outcomes. Improving sanitation, promoting hygiene, and fostering collaboration between communities and health services are key steps to reduce the burden of diarrhea in early childhood.

Disclosures

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REFERENCES

1. Viegelmann GC, Dorji J, Guo X, Lim HY. Approach to diarrhoeal disorders in children. Singapore Med J 2021;62(12):623–9.
2. Nemeth V, Pfleghaar N. Diarrhea. Treasure Island: StatPearls Publishing; 2025. p. 1–11.
3. United Nations Children's Fund (UNICEF). Diarrhoea. 2024. p. 1–6. Available at: https://data.unicef.org/topic/child-health/diarrhoeal-disease/. Accessed Nov 26, 2025.
4. Yunitawati D, Khairunnisa M, Mulyantoro DK, Ashar H, Latifah L. Diarrhea among children under-five: Comparing risk factors in urban and rural areas in Indonesia. Clin Epidemiol Glob Health 2025;35:102136.
5. Birhan TA, Bitew BD, Dagne H, Amare DE, Azanaw J, Genet M, et al. Prevalence of diarrheal disease and associated factors among under-five children in flood-prone settlements of Northwest Ethiopia: A cross-sectional community-based study. Front Pediatr 2023;11:1–7.
6. Derseh BT, Tafese NM, Panari H, Bilchut AH, Dadi AF. Behavioral and environmental determinants of acute diarrhea among under-five children from public health facilities of Siyadebirena Wayu district, north Shoa zone, Amhara regional state, Ethiopia: Unmatched case-control study. PLoS One 2021;16:1–14.
7. Hambali M, Vera Nazhira A, Radhiah Z. Factors associated with the incidence of diarrhea in toddlers in the working area of Suro Health Center, Suro District, Aceh Singkil Regency in 2022. InsoLOGI J Sains dan Teknol 2022;1(6):723–30. [Article in Indonesian]
8. Mogharab V, Rajput S. Factors associated with diarrhea in children under 12 years of age referred to Ostad Motahari hospital of Jahrom in 2020. J Fam Med Prim Care 2022;11(10):6170–6.
9. Adawiah R, Susanna D. Analysis of environmental and sociodemographic factors with the incidence of diarrhea in toddlers in Aceh Province in 2023. J Kesehat 2024;17(3):267–79.
10. Iskandar WJ, Sukardi I Wayan, Soenarto Y. Risk of nutritional status on diarrhea among under five children. Paediatr Indones 2015;55(4):235–8.
11. Daley SF, Avva U. Pediatric dehydration. Available at: https://www.ncbi.nlm.nih.gov/books/NBK436022/. Accessed Nov 26, 2025.
12. Bhutta ZA, Berkley JA, Bandsma RHJ, Al E. Severe childhood malnutrition. Eur PMC Funders Group, Author Manuscr 2017;21(3):17067.
13. Olieman JF, Penning C, Spoel M, Ijsselstijn H, Hoonaard TL van den, Escher JC, et al. Long-term impact of infantile short bowel syndrome on nutritional status and growth. Br J Nutr 2012;107(10):1489–97.
14. Goudet SM, Bogin BA, Madise NJ, Griffiths PL. Nutritional interventions for preventing stunting in children (birth to 59 months) living in urban slums in low- and middle-income countries (LMIC): A systematic review. Cochrane Database Syst Rev 2019;(6):CD011695.
15. Kurniawati DP, Arini SY, Awwalina I, Pramesti N. Poor basic sanitation impact on diarrhea cases in toddlers. J Kesehat Lingkung 2021;13(1):41–7.
16. Kriswanto K, Musyarofah S, Mushidah M. The relationship between environmental sanitation and the incidence of diarrhea in toddlers. Proc Int Conf Nurs Heal Sci 2021;2(2):133–42.
17. Abney SE, Bright KR, McKinney J, Ijaz MK, Gerba CP. Toilet hygiene—review and research needs. J Appl Microbiol 2021;131(6):2705–14.
18. Todd ECD. Foodborne diseases: Overview of biological hazards and foodborne diseases. Encycl Food Saf 2014;1:221–42.
19. Mock CN, Nugent R, Kobusingye O, Smith KR. Water supply, sanitation, and hygiene. In Injury Prevention and Environmental Health. 3rd ed. Washington: The International Bank for Reconstruction and Development; 2017. p. 1–34.
20. Bauza V, Ye W, Liao J, Majorin F, Clasen T. Interventions to improve sanitation for preventing diarrhoea. Cochrane Database Syst Rev 2023;1(1):CD013328.
21. Abney SE, Higham CA, Wilson AM, Ijaz MK, McKinney J, Reynolds KA, et al. Transmission of viruses from restroom use: A quantitative microbial risk assessment. Food Environ Virol 2024;16(1):65–78.
22. Omang DI, John GE, Inah SA, Bisong JO. Public health implication of solid waste generated by households in Bekwarra local government area. Afr Health Sci 2021;21(3):1467–73.
23. Krystosik A, Njoroge G, Odhiambo L, Forsyth JE, Mutuku F,

LaBeaud AD. Solid wastes provide breeding sites, burrows, and food for biological disease vectors, and urban zoonotic reservoirs: A call to action for solutions-based research. Front Public Health 2020;7:1–17.
24. Sahiledengle B, Kumie A, Atlaw D, Tekalegn Y, Woldeyohannes D, Zenbaba D, et al. The role of household flooring on childhood diarrhea among children 0 to 23 months of age in Ethiopia: A nationally representative cross-sectional study using a multi-level mixed effect analysis. Environ Health Insights 2021;15:11786302211064423.
25. Legge H, Pullan RL, Sartorius B. Improved household flooring is associated with lower odds of enteric and parasitic infections in low- and middle-income countries: A systematic review and meta-analysis. PLOS Glob Public Health 2023;3(12):1–21.
26. Rashid T, Vonville H, Hasan I, Garey KW. Mechanisms for floor surfaces or environmental ground contamination to cause human infection: A systematic review. Epidemiol Infect 2017;145(2):347–57.
27. Luby SP, Halder AK, Huda T, Unicomb L, Johnston RB. The effect of handwashing at recommended times with water alone and with soap on child diarrhea in rural Bangladesh: An observational study. PLoS Med 2011;8(6):e1001052.
28. Fatmawati DA, Sumardiyono S, Murti B. Meta-analysis the effects of hand washing behavior using soap and latrine availability on the diarrhea incidence in children under five. J Heal Promot Behav 2024;9(2):119–31.
29. Noguchi Y, Nonaka D, Kounnavong S, Kobayashi J. Effects of hand-washing facilities with water and soap on diarrhea incidence among children under five years in Lao People's Democratic Republic: A cross-sectional study. Int J Environ Res Public Health 2021;18(2):1–15.
30. Jarman AF, Long SE, Robertson SE. Gender differences in acute pediatric diarrhea: A secondary analysis of the DHAKA study. J Epidemiol Glob Health 2018;8(1–2):42–7.
31. Morales F, Montserrat-de la Paz S, Leon MJ, Rivero-Pino F. Effects of malnutrition on the immune system and infection and the role of nutritional strategies regarding improvements in children's health status: A literature review. Nutrients 2024;16(1):1–16.
32. Rezaeizadeh G, Mansournia MA, Keshtkar A, Farahani Z, Zarepour F, Sharafkhah M, et al. Maternal education and its influence on child growth and nutritional status during the first two years of life: A systematic review and meta-analysis. eClinicalMedicine 2024;71:102574.

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Evaluation of Psychotropic Drug Interactions and Inappropriate Use in Older Adults: A Cross-sectional Study

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ABSTRACT

Objectives: Polypharmacy is common in older patients, and psychotropic medications prescribed to treat psychiatric disorders are an important cause of it. This study aimed to find out the potential drug–drug interactions that can happen when older outpatients take psychotropic medications along with other medications and to assess the changes in the anticholinergic burden (ACB) score.

Methods: This cross-sectional study was conducted in a community pharmacy between January 30 and March 30, 2024. Older patients who visited the pharmacy between these dates, had at least one psychotropic medication in their prescription, and had been using at least one medication for the last month were included in this study. The Lexicomp® database was used to determine the interactions of psychotropics, the 2023 Beers Criteria® were used to evaluate medication suitability, and the ACB Calculator® was used for the ACB score.

Results: The sample received 278 psychotropic medications on 211 prescriptions, and the most commonly prescribed was escitalopram. A total of 815 medication interactions were detected, 10 of which were at the X level and 88 at the D level. When psychotropics prescribed to older adults were evaluated according to the 2023 Beers criteria®, 16 different psychotropics prescribed were found to be potentially inappropriate according to 166 criteria. The ACB scores of the patients increased significantly after a psychotropic medication prescription ($p<0.001$).

Conclusion: Given the high frequency of interactions and the increased ACB caused by psychotropic medications, it is important to evaluate their prescription for older patients with geriatric criteria. The results of the present study led us to suggest that all physicians should consider other medications and geriatric criteria when prescribing psychotropic medication to older patients.

Keywords: Anticholinergic burden score, Beers criteria®, Drug interactions, Older patients, Psychotropic medication

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INTRODUCTION

More than 80% of older adults experience neuropsychiatric disorders.[1] While some conditions have only a low presentation, for instance, the Centers for Disease Control and Prevention estimates that the prevalence of major depressive disorder in older adults varies between 1% and 5%; these rates increase with comorbidities or according to health care. These neuropsychiatric disorders often require psychotropic medication for management. Psychotropic medications include antipsychotics, antidepressants, and anticholinergic medications with psychotropic side effects. The use of psychotropic medications increases with age.[2-4]

Pharmacokinetic changes, such as changes in the absorption, distribution, and clearance of medication, and pharmacodynamic changes, such as changes in the response to the medication, are observed with the aging process. Due to these physiological changes, older adults are the most sensitive patient group to drug interactions.[5]

The use of psychotropic medications on their own or in combination with other medications may lead to unexpected drug interactions and adverse reactions. It is known that more than 30% of adverse reactions are caused by drug interactions, leading to significant morbidity each year. In a study in the literature, it was shown that 47.6% of the potential drug–drug interactions (pDDIs) detected in patients were psychotropic drug interactions. Although the number of potential psychotropic drug interactions did not differ significantly between older and younger adults, it was higher in older patients. Most studies in the literature focus on pDDIs between psychotropic medications prescribed to inpatients. However, data on pDDIs between psychotropic medications prescribed in outpatient settings and other previously regularly used medications are scarce.[6-10]

Increased health costs because of adverse drug reactions resulting from potentially inappropriate medication (PIM) use constitute an important public health problem. PIM use in older adults increases morbidity and mortality rates.[11-13] Researchers developed criteria such as Beers, START/STOPP, and TIME-to-START/TIME-to-STOPP to evaluate drug use in older adults. These criteria should be used to determine the appropriateness of medication use in older adults.

The prevalence of potentially inappropriate psychotropic (PIP) use in older adults is reported to be approximately 30%, and almost half of the patients receiving psychotropics have used at least one PIP. The *Beers criteria*® include additional caveats regarding the use of psychotropic medications in older adults, and prescriptions for older adults taking psychotropic medications should be screened against the *Beers criteria*®. Psychotropic medications continue to be prescribed for a wide range of medical conditions despite some evidence of their efficacy and side effects in geriatric adults. Such behavior raises concerns about the inappropriate prescribing of psychotropics. Few studies have evaluated the prevalence of PIM in older adults.[14,15]

Psychotropic medications cause an increase in anticholinergic burden (ACB). Consequently, using potentially inappropriate medications (PIPs) in older adults has been linked to a higher occurrence of side effects, including loss of psychomotor function, cognitive function decline, and falls.[16-18]

To ensure the appropriate use of psychotropic medications in older patients, it is important to consider the demographic characteristics, medications, drug interactions, and ACB scores of the patients and to evaluate them with geriatric criteria.[19]

This study aimed to identify pDDIs that may occur when older outpatients take psychotropic medications in combination with other medications, to evaluate changes in the ACB score, and to determine whether pharmacists are using psychotropic medications appropriately.

METHOD

This cross-sectional study was conducted in a community pharmacy in Trabzon, Turkey. Between January 30 and March 30, 2024, all patients aged 65 and older who applied to this pharmacy were screened, and those with at least one psychotropic medication in their prescription and who had been using any medication in the last month were included in this study. Patients with five or more medications were considered subject to polypharmacy.

Patients aged 65 years and over with a prescription for at least one psychotropic medication and who had been taking any medication for the last month were included in this study. Patients who did not have psychotropic medication on their medication and were under the age of 65 years. Patients who applied to the pharmacy with a prescription and had used no medication for the last month were excluded from the study. If the same patient was prescribed the same medication or group of medications again within the last month, only the most recent prescription was taken into account.

Data were collected between January 30 and March 30, 2024. A pharmacist screened all patients aged 65 years a week through the prescription registration system. Patients aged 65 years and over who had a prescription for psychotropic medication and who had used any medication in the last month were included in the study.

Demographic information of the patients, such as gender and age, diagnostic information, drug doses prescribed by the doctor, and frequencies of doses in the three prescriptions included in this study, were recorded on the patient profile form. Lexicomp® identified potential interactions between the psychotropic medications prescribed to these patients and the medications they had been taking for the last month. Lexicomp® classifies pDDIs into five categories according to clinical significance: A (interaction of no clinical significance), B (intervention not required), C (further monitoring required), D (treatment intervention required),

and X (contraindicated use). Drug interactions in categories D and X were considered clinically significant.

In addition, we determined PIP utilization using the American Geriatrics Society 2023 *Beers Criteria®*. The *Beers Criteria®* is the most appropriate assessment tool for a pharmacy-based study. 'The *Beers Criteria®* has five main parts: potentially inappropriate medications for use in geriatric adults, potentially inappropriate medications for use in certain diseases or syndromes, drugs that should be used with caution in geriatric adults, potentially clinically important drug–drug interactions that should be avoided in geriatric adults, and medications that require dose adjustment according to renal function in geriatric adults.[20]

The ACB Calculator® was used to determine the potential risk of anticholinergic effects (such as falls, fracture risk, confusion, and cognitive impairment) that may be caused by medications. The ACB Calculator® states that individuals with an ACB score of three or higher are at greater risk of confusion, falls, and death.

The sample size was calculated with a calculator according to a 95% confidence interval. According to the data obtained from the provincial population directorate, the population of the neighborhood where the study was conducted was taken as 8.000, and the older adult population rate was taken as 14%. Therefore, this study required the analysis of at least 181 prescriptions. This study included prescriptions from all patients who met the inclusion criteria and applied to the pharmacy within the 2-month study.

Our study was conducted under the Declaration of Helsinki. A health sciences scientific research ethics committee (number: E-13562490-050.01.04-472830, date: 30.01.2024) approved this study.

Data analyzed with Statistical Package for the Social Sciences Statistics V 23.0 (IBM, Armonk, New York, USA). According to the Kolmogorov-Smirnov test, the data were not normally distributed. The continuous variables are presented as medians (interquartile ranges, IQRs), and ordinal and nominal values are presented as n (%). Spearman's correlation analysis was done to see how the change in ACB related to the *Beers criteria®* inappropriateness, patient comorbidity, and medication use. All the data were considered statistically significant at a $p<0.05$.

RESULTS

Among the 5.374 recorded prescriptions, we evaluated 211 prescriptions that belonged to 211 patients who met the inclusion criteria. The median age of the patients was 71 IQR (68–79) years, and 151 (71.6%) of the patients were female. The median comorbidity value per patient was 3.

Table 1. Patient medication use information

Age (years), median (IQR)	71 (68–79)
Gender	
Male, n (%)	151 (71.6)
Female, n (%)	60 (28.4)
Number of comorbidities, median (IQR)	3 (1–4)
Polypharmacy, n (%)	167 (79.1)
Number of medications used in the last month, median (IQR)	7 (5–10)
Number of psychotropic medications, median (IQR)	1 (1–2)
Number of psychotropic medications prescribed inappropriate of the Beers criteria®, median (IQR)	0 (0–2)

IQR: Interquartile range; n: Number of patients.

The most common comorbidities were hypertension (n=158), hyperlipidemia (n=75), and type 2 diabetes mellitus (n=66), respectively. Table 1 presents the medication use information of the patients.

A total of 278 psychotropic medications were included in 211 prescriptions. When the prescriptions were classified according to the International Classification of Diseases, 10th Revision codes, it was observed that these medications were prescribed with the most common diagnosis of major depressive disorder. While the SSRI group of antidepressants constituted the majority of psychotropic medications, escitalopram (n=66, 23.7%) was the most frequently prescribed medication (Fig. 1a and b). We determined that the parameters that could affect patients' treatment were unaffected by gender ($p>0.05$).

The evaluation using the 2023 *Beers Criteria®* found 221 instances of inappropriate *Beers Criteria®*, with 166 of these linked to psychotropic medicines (Table 2).

A total of 815 potential interactions were detected using Lexicomp® between the psychotropic medications prescribed to the patients and those they had taken for the last month. We identified 10 of these as X, 88 as D, 605 as C, and 112 as B. The X and D interactions, which happen often between prescribed psychotropic medications and other medications, are listed in Table 3a and b because they are important and may require changes in treatment or should be avoided.

In this study, we calculated the ACB before and after the prescription of psychotropic medication for each patient. The prescription of psychotropic medication significantly increased the ACB score compared to the medications the

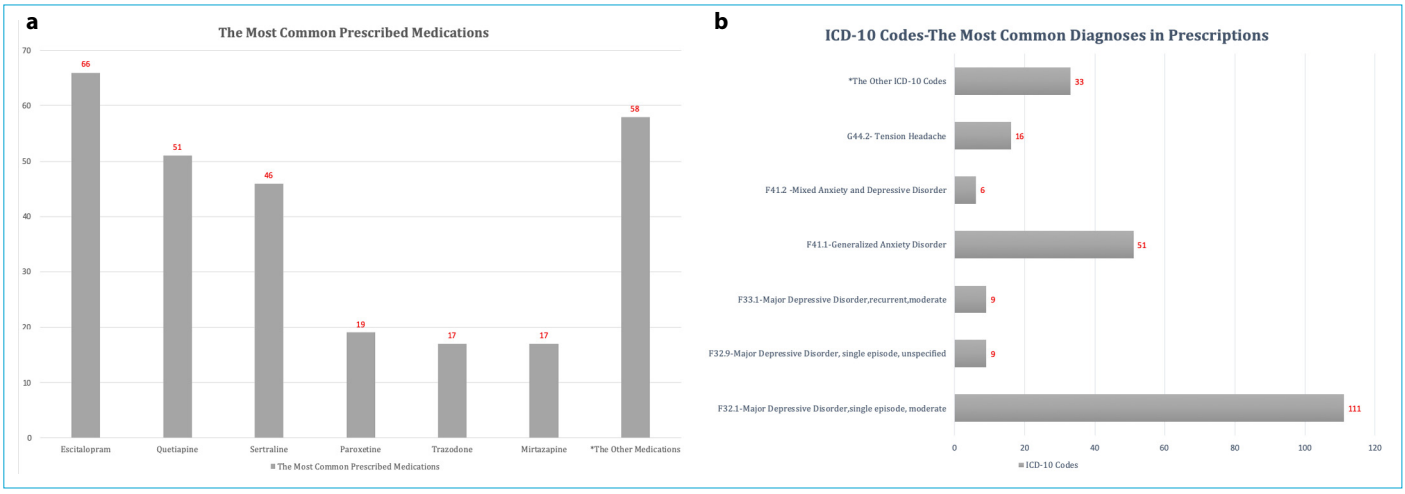

Figure 1. (a) Prescription diagnoses and medications prescribed to patients. *Duloxetine, citalopram, vortioxetine, venlafaxine, amitriptyline, olanzapine, haloperidol, hyoscine n-butyl bromide-medazepam, hydroxyzine, sodium valproate. **(b)** Prescription diagnoses of patients. *Multi-infarct dementia, schizophrenia, bipolar affective disorder, depressive disorder, recurrent depressive disorder, other specified anxiety disorders, anxiety disorder - unspecified, mixed disorders of conduct and emotions, other specified extrapyramidal and movement disorders, other Alzheimer's disease, tension-type headache, other sleep disorders.

patients took in the previous month (ACB before prescription [median (IQR)] 1 [0–2], ACB after prescription [median (IQR)] 3 [1–5], p<0.001). The relationship between the increase in ACB score and the number of inappropriate *Beers Criteria*® was looked at using the independent variables as shown in Table 4.

DISCUSSION

The main goal of this study was to find out if there are any pDDIs between psychotropic medications and other medications when given to older outpatients and to check how these medications affect the ACB score. In the study, researchers found 166 PIMs and 815 drug interactions related to psychotropic medications, and they noticed that the ACB score for older adults increased after they were prescribed psychotropic medications, changing from a median of 1 (0–2) to 3 (1–5).

Of the 452 prescriptions recorded for adults aged 65 and over, 32.5% contained at least one psychotropic medication. The results in the literature show that the rate of prescribing at least one psychotropic medication to older adults varies between 35.9% and 50.1%, similar to this study.

Anxiolytics (31–33.5%) and antidepressants (12–33.3%) are the most commonly prescribed psychotropic medications in patients with depressive syndrome. SSRIs account for 42.2% of antidepressants and are prescribed as a suitable option for older patients.[21-25] In this study, SSRIs accounted for 84.7% of antidepressants, while escitalopram was the most commonly prescribed psychotropic medication (23.7%). In this study, the number of benzodiazepine prescriptions, such as hyoscine n-butyl bromide-medazepam (3.6%), was quite low compared to all the prescriptions filled at the pharmacy.

Previous studies have only evaluated the interactions between psychotropic medications.[10] The present investigation is the first study to evaluate the interactions between psychotropic medications prescribed to older adults presenting to the pharmacy and the medications they had been taking in the last month and to identify combinations of psychotropic medications that should be avoided or modified. A total of 1705 interactions were detected between the prescribed medications and those used in the last month, 47.8% of which were between psychotropic medications and others. The majority, 74.1%, were C-level interactions requiring follow-up, while the percentages of clinically significant X- and D-level interactions were 2.5% and 9.1%, respectively. These led to the identification of drug combinations with psychotropic medications that need avoidance or modification. In this study, the most common psychotropic medication causing D-level interactions was escitalopram, while quetiapine was the most common at the X-level.

ACB scores usually increase with psychotropic medication prescriptions, but some psychotropic medications, such as duloxetine, do not affect ACB, according to the

Table 2. Top twenty PIMs among prescribed psychotropics according to the 2023 Beers criteria®

Number of inappropriate Beers criteria® 2023	PIPs	Inappropriate beers criteria® 2023
22	Quetiapine	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
19	Paroxetine	Highly anticholinergic, sedating, and causing orthostatic hypotension; the safety profile of low-dose doxepin (≤6 mg/day) is comparable to that of placebo
18	Escitalopram	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
15	Sertraline	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
13	Quetiapine	Increased risk of stroke and greater rate of cognitive decline and mortality in persons with dementia. Additional evidence suggests an increased risk due to the association between antipsychotic medication and mortality, independent of dementia
10	Hyoscine N-butyl bromide-medazepam	Highly anticholinergic, uncertain effectiveness
9	Trazodone	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
8	Olanzapine	Highly anticholinergic, uncertain effectiveness
8	Paroxetine	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
7	Hyoscine N-butyl bromide - medazepam	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
6	Mirtazapine	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
4	Amitriptyline	Highly anticholinergic, uncertain effectiveness
4	Haloperidol	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
4	Venlafaxine	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
3	Hydroxyzine	Highly anticholinergic; clearance reduced with advanced age, and tolerance develops when used as a hypnotic; risk of confusion, dry mouth, constipation, and other anticholinergic effects or toxicity.
3	Olanzapine	Increased risk of stroke and greater rate of cognitive decline and mortality in persons with dementia. Additional evidence suggests an increased risk due to the association between antipsychotic medication and mortality, independent of dementia
2	Hydroxyzine	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
2	Olanzapine	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
2	Olanzapine	Dopamine-receptor antagonists with the potential to worsen Parkinsonian symptoms. Exceptions: Clozapine, pimavanserin, and quetiapine appear to be less likely to precipitate the worsening of Parkinson's disease than other antipsychotics
2	Vortioxetine	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
1	Amitriptyline	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
1	Duloxetine	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents

Table 2. Top twenty PIMs among prescribed psychotropics according to the 2023 Beers criteria® (Cont.)

Number of inappropriate Beers criteria® 2023	PIPs	Inappropriate beers criteria® 2023
1	Haloperidol	Increased risk of stroke and greater rate of cognitive decline and mortality in persons with dementia. Additional evidence suggests an increased risk due to the association between antipsychotic medication and mortality, independent of dementia
1	Risperidone	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents
1	Sulpiride	Increased risk of falls and fractures with the concurrent use of ≥3 CNS-active agents

PIPs: Potentially inappropriate psychotropics, PIM: Potentially inappropriate medication, CNS: Central nervous system.

ACB Calculator®. Even though 10 patients did not show a change in their ACB score due to reasons like having used the same medication before or taking a medication that does not affect the ACB score, the overall analysis of all patients showed a significant increase in ACB after they were prescribed psychotropic medications (from a median of 1 (0–2) to 3 (2–5), $p<0.001$). In the results of this study, 110 patients (52.1%) had an ACB score of three or higher after psychotropic prescription, while a study published in the literature found that 64% of older patients prescribed anticholinergic medications had an ACB score of three or higher. This rate is quite low according to this study because ACB caused by psychotropic medications prescribed for older adults has not been evaluated.[26] The increase in ACB is positively correlated with age, the number of comorbidities, the number of psychotropic medications, and the number of medications used in the last month, and the correlation increases with the number of psychotropic medications, the number of comorbidities, and the number of medications used in the last month.

We evaluated patients in this study using the *Beers criteria®* for both their psychotropics and all medications. A total of 221 inappropriate medications with the *Beers criteria®* were identified, 166 (75.1%) of which were caused by psychotropic medications. The results indicate that psychotropics, when prescribed to older patients, constitute a significant portion of potentially inappropriate medication use. In parallel with the literature, this study determined the prevalence of PIPs to be 38.4% according to the 2023 *Beers Criteria®*.[22,27] The most commonly prescribed PIP is quetiapine, which is prescribed with three or more medications that act on the central nervous system and increase the risk of stroke and mortality in patients with dementia, followed by paroxetine, which causes a high ACB in older patients. The literature ranks antipsychotics, prescribed for patients with dementia, as the second group of medications not eligible for the *Beers criteria®*. Despite the special warnings for older adults, studies in the literature show that they are still prescribed to patients in this age category for dementia, sleep disorders, and non-psychotic depression conditions.[10,22,27]

Against that background, it is important to evaluate the use of psychotropic medications in older patients.

This study has several limitations, which should be recognized. First, this descriptive study had a small sample size for its assessment of the use of psychotropic medication and its identification of potential drug interactions. The small sample size in this study is primarily due to practical constraints, such as limited access to participants and available resources. Despite this limitation, appropriate methodological rigor was maintained to ensure the validity of the findings. While generalizability may be limited, the results offer helpful conclusions about the studied context. We encourage readers to interpret the findings, considering the study's scope and exploratory nature.

Second, we evaluated the possible interactions of psychotropic medications prescribed to older adults with other medications and determined if they were appropriate according to the *Beers Criteria®*. We could also not assess whether patients were taking the appropriate medication or dosage based on their kidney function, as we could not access patients' laboratory data. Therefore, we may have underestimated the number of criteria deemed inappropriate according to the *Beers criteria®*. Third, another limitation of this study is that payment conditions possibly excluded some psychotropic medications from patients' prescriptions for certain conditions.

Table 3a. The most common pDDIs of prescribed psychotropic medications

Psychotropic-Psychotropic medication combination	Psychotropic-Psychotropic pDDI frequency n, (%)	Severity class (Lexicomp®)	Mechanism of pDDI
Escitalopram-Quetiapine	15 (15.3)	D level	SSRIs may increase the adverse/toxic effects of antipsychotics QT prolongation may be observed when antipsychotics and antidepressants with QT prolongation potential are used simultaneously
Citalopram-Quetiapine	8 (8.2)	X level	QT-prolonging agents may enhance the QTc-prolonging effect of citalopram
Haloperidol-Quetiapine	5 (5.7)	D level	QT-prolonging agents may enhance the QTc-prolonging effect of haloperidol
Olanzapine-Sulpiride	1 (1.2)	X level	Antipsychotic agents may enhance the adverse/toxic effects of sulpiride
Haloperidol-Sulpiride	1 (1.2)	X level	Antipsychotic agents may enhance the adverse/toxic effects of sulpiride

Table 3b. The most common pDDIs of prescribed psychotropic medications

Psychotropic-Other medication combination	Psychotropic-Other pDDI frequency n, (%)	Severity class (Lexicomp®)	Mechanism of pDDI
Sertraline-Diclofenac	7 (7.14)	D level	SSRIs may increase the antiplatelet effect of NSAIDs, while NSAIDs may decrease the therapeutic effect of SSRIs
Escitalopram-Dexketoprofen	5 (5.1)	D level	SSRIs may increase the antiplatelet effect of NSAIDs, while NSAIDs may decrease the therapeutic effect of SSRIs
Sertraline-Enoxaparine	5 (5.01)	D level	Antiplatelets may increase the anticoagulant effect of enoxaparin, and bleeding may occur.
Quetiapine-Pramipexole	5 (5.1)	D level	Antipsychotics reduce the effectiveness of anti-Parkinson medications
Ipratropium/Salbutamol-Quetiapine	4 (4.8)	X level	Anticholinergic medications may increase the anticholinergic effect of antipsychotics
Paroxetine-Diclofenac	3 (3.6)	D level	SSRIs may increase the antiplatelet effect of NSAIDs, while NSAIDs may decrease the therapeutic effect of SSRIs
Sertraline-Ibuprofen	3 (3.6)	D level	SSRIs may increase the antiplatelet effect of NSAIDs, while NSAIDs may decrease the therapeutic effect of SSRIs
Citalopram-Naproxen	2 (2.4)	X level	SSRIs may increase the antiplatelet effect of NSAIDs, while NSAIDs may decrease the therapeutic effect of SSRIs
Tramadol-Gabapentin	2 (2.4)	D level	CNS depressant medications may increase the effect of opioid agonists on the CNS

pDDIs: Potential drug–drug interactions; CNS: Central nervous system; SSRIs: Selective serotonin reuptake inhibitors; NSAIDs: Nonsteroidal anti-inflammatory drugs; X levels: Avoid combinations; D levels: Modify regimen.

CONCLUSION

Psychotropic medication prescriptions for older adults are associated with increased drug interactions and ACB. Careful assessment using geriatric criteria is recommended to ensure safer prescribing practices. We hope that this study will enable the improvement of the treatment process for older adults by taking into account PIMs, pDDIs, and ACB. The findings of this study highlight the need for all healthcare professionals to be aware of the need for caution when prescribing psychotropic drugs to older patients.

Table 4. Correlation of the difference in anticholinergic burden and the inappropriate use of medication with patient comorbidities and medication use

	Inappropriate Beers Criteria® for psychotropic medications (Correlation coefficient)	Anticholinergic burden difference before and after prescription (Correlation coefficient)
Age	0.116	0.150*
	p=0.091	p=0.031
Number of co-morbidities	0.014	0.014
	p=0.844	p=0.837
Number of psychotropic medications	0.716**	0.632**
	p=0.000	p=0.000
Number of medications used in the last month	0.150*	0.173*
	p=0.030	p=0.013

*Spearman's correlation is significant at the 0.05 level (two-tailed); **Spearman's correlation is significant at the 0.001 level (two-tailed).

Disclosures

Ethics Committee Approval: Ethical approval for the study was obtained from the Karadeniz Technical University Health Sciences Scientific Research Ethics Committee (Approval date: January 30, 2024; File number: 2023/136).

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REFERENCES

1. Zuidema S, Koopmans R, Verhey F. Prevalence and predictors of neuropsychiatric symptoms in cognitively impaired nursing home patients. J Geriatr Psychiatry Neurol 2007;20(1):41–9.
2. Balaram K, Balachandran S. Psychopharmacology in the elderly: Why does age matter? Psychiatr Clin North Am 2022;45(4):735–44.
3. Centers for Disease Control and Prevention (CDC). Depression is not a normal part of growing older. Available at: https://www.cdc.gov/aging/depression/index.html. Accessed Dec 24, 2023.
4. Tierney J. Practical issues in geriatric psychopharmacology. J Indian Med Assoc 1999;97(4):145–7.
5. World Health Organization (WHO). Gender and health. Available at: https://www.who.int/health-topics/gender#tab=tab_1. Accessed Mar 30, 2024.
6. Smeets CH, Smalbrugge M, Gerritsen DL, Nelissen-Vrancken MH, Wetzels RB, van der Spek K, et al. Improving psychotropic drug prescription in nursing home patients with dementia: Design of a cluster randomized controlled trial. BMC Psychiatry 2013;13:280.
7. Iyer SV, Harpaz R, LePendu P, Bauer-Mehren A, Shah NH. Mining clinical text for signals of adverse drug-drug interactions. J Am Med Inform Assoc 2014;21(2):353–62.
8. Létinier L, Cossin S, Mansiaux Y, Arnaud M, Salvo F, Bezin J, et al. Risk of drug-drug interactions in out-hospital drug dispensings in France: results from the DRUG-Drug Interaction Prevalence Study. Front Pharmacol. 2019;10:265.
9. Pasina L, Novella A, Cortesi L, Nobili A, Tettamanti M, Ianes A. Drug prescriptions in nursing home residents: An Italian multicenter observational study. Eur J Clin Pharmacol 2020;76(7):1011–9.
10. Zapelini do Nascimento D, Marques GM, Schuelter-Trevisol F. Potential psychotropic drug interactions among drug-dependent people. J Psychoactive Drugs 2021;53(2):168–76.
11. Fialová D, Onder G. Medication errors in elderly people: Contributing factors and future perspectives. Br J Clin Pharmacol 2009;67(6):641–5.
12. Guaraldo L, Cano FG, Damasceno GS, Rozenfeld S. Inappropriate medication use among the elderly: A systematic review of administrative databases. BMC Geriatr 2011;11:1–10.
13. He D, Zhu H, Zhou H, Dong N, Zhang H. Potentially inappropriate medications in Chinese older adults: A comparison of two updated Beers criteria. Int J Clin Pharm 2021;43:229–35.
14. Arnold I, Straube K, Himmel W, Heinemann S, Weiss V, Heyden L, et al. High prevalence of prescription of psychotropic drugs for older patients in a general hospital. BMC Pharmacol Toxicol 2017;18(1):76.
15. Croke L. Beers criteria for inappropriate medication use in older patients: an update from the AGS. Am Fam Physician 2020;101(1):56–7.

16. Fraser LA, Liu K, Naylor KL, Hwang YJ, Dixon SN, Shariff SZ, et al. Falls and fractures with atypical antipsychotic medication use: A population-based cohort study. JAMA Intern Med 2015;175(3):450–2.
17. Payne RA, Abel GA, Simpson CR, Maxwell SR. Association between prescribing of cardiovascular and psychotropic medications and hospital admission for falls or fractures. Drugs Aging 2013;30:247–54.
18. Vidal X, Agustí A, Vallano A, Formiga F, Moyano AF, García J, et al. Elderly patients treated with psychotropic medicines admitted to hospital: associated characteristics and inappropriate use. Eur J Clin Pharmacol 2016;72:755–64.
19. Téllez-Lapeira J, López-Torres Hidalgo J, García-Agua Soler N, Gálvez-Alcaraz L, Escobar-Rabadán F, García-Ruiz A. Prevalence of psychotropic medication use and associated factors in the elderly. Eur Psychiatry 2016;30(3):183–94.
20. American Geriatrics Society Beers Criteria® Update Expert Panel. The American Geriatrics Society's 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. J Am Geriatr Soc 2023;71(7):2052–81.
21. Baldoni ADO, Ayres LR, Martinez EZ, Dewulf NDLS, Dos Santos V, Pereira LRL. Factors associated with potentially inappropriate medication use by the elderly according to Beers criteria 2003 and 2012. Int J Clin Pharm 2014;36:316–24.
22. Prudent M, Drame M, Jolly D, Trenque T, Parjoie R, Mahmoudi R, et al. Potentially inappropriate use of psychotropic medications in hospitalized elderly patients in France: Cross-sectional analysis of the prospective, multicenter SAFEs cohort. Drugs Aging 2008;25:933–46.
23. Alexopoulos GS, Streim J, Carpenter D, Docherty JP. Using antipsychotic agents in older patients. J Clin Psychiatry 2004;65:95–9.
24. Lebert F. Serotonin reuptake inhibitors in depression of Alzheimer's disease and other dementias. Presse Med 2003;32(25):1181–6.
25. Rikala M, Korhonen MJ, Sulkava R, Hartikainen S. Psychotropic drug use in community-dwelling elderly people—characteristics of persistent and incident users. Eur J Clin Pharmacol 2011;67:731–9.
26. Group E, Rifel J. Anticholinergic burden and most common anticholinergic-acting medicines in older general practice patients. Zdr Varst 2018;57(3):140–7.
27. Şahin EK, Hamurcu HD, Çayköylü A, Ensari H. Evaluation of potentially inappropriate psychotropic use in elderly psychiatric patients. Turk J Geriatr 2021;24(4):510–7.

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Knowledge and Attitudes of Healthcare Professionals toward Childhood Vaccination: A Cross-Sectional Study from Istanbul

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ABSTRACT

Objectives: Sustainability of health systems and protection of public health around the world depend on effective management of epidemics. However, vaccines have become a controversial issue in some circles. This study aimed to evaluate the knowledge level and behavior of doctors and healthcare professionals working in a training and research hospital in Istanbul regarding childhood vaccines.

Methods: This descriptive cross-sectional study was conducted among physicians and healthcare professionals working at Sultangazi Haseki Training and Research Hospital. The survey included 33 items divided into 3 sections: Demographics, vaccination behavior, and Likert-type knowledge questions. The vaccine knowledge score was calculated for each participant. The Cronbach's alpha coefficient for the Likert-type items was 0.789, indicating good internal consistency.

Results: A total of 340 participants were included. Specialist physicians and those working in pediatric units had a significantly higher vaccine knowledge level. In response to whether routine vaccines should be legally mandatory, 10.1% of physicians and 30.4% of allied health professionals disagreed.

Conclusion: Vaccine knowledge and attitudes differed by profession and workplace. Specialists and pediatric staff exhibited more positive views toward vaccination.

Keywords: Attitude of health personnel, health personnel, immunization programs, preventive health services, vaccination

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INTRODUCTION

Vaccination remains one of the most effective and cost-efficient public health interventions for preventing infectious diseases.[1] Beyond individual protection, high immunization coverage ensures herd immunity, thereby reducing disease transmission in the community.[2] However, despite its success, vaccines have increasingly become a subject of controversy in recent years, leading to vaccine hesitancy worldwide.

Vaccination refusal increases the risk of vaccine-preventable diseases in unvaccinated individuals.[3] Unvaccinated children are at higher risk of contracting vaccine-preventable diseases, such as measles, chickenpox, and pertussis, than their vaccinated peers.[4,5] The risks of delaying vaccination are not well studied.[6] As a rule, vaccine-preventable diseases (e.g., pertussis, influenza) are more severe in infants and young children than in older children. Delaying vaccination prolongs the period of vulnerability in these young children.

Vaccination refusal increases the risk of outbreaks of vaccine-preventable diseases in the general population.[3] The World Health Organization considers vaccine hesitancy a threat to global health.[7] Since healthcare workers are typically considered to be among the most reliable sources of medical information, their hesitancy or scepticism about vaccination may negatively affect vaccination coverage.[8,9] In our country, healthcare workers are vaccinated against many diseases. However, their vaccination status does not fully reflect their confidence in vaccination and their readiness to recommend vaccination to their patients, especially when faced with anti-vaccine sentiment. Based on the existing literature, it was emphasized that physicians and healthcare workers who have higher educational levels and work in child health-related units would demonstrate significantly higher vaccine knowledge scores and more positive attitudes toward vaccination compared to other professional groups.[10,11]

Therefore, the aim of this study is to assess healthcare professionals' knowledge, attitudes, and behaviors regarding childhood vaccinations, identify factors associated with high vaccine knowledge scores, and examine the impact of professional and sociodemographic characteristics on this outcome. In this context, the study hypothesizes that there is no significant difference between the knowledge levels and attitudes toward childhood vaccinations of physicians and other healthcare professionals working at Sultangazi Haseki Training and Research Hospital.

METHOD

This was a descriptive study conducted among doctors and healthcare professionals working at Sultangazi Haseki Training and Research Hospital between August 09 and September 09, 2023. The sample size was calculated at 50% incidence, 5% margin of error, and 90–99% confidence levels among 1295 employees working at Sultangazi Haseki Training and Research Hospital. The number of random samples to be included in our study was calculated with a power analysis linear regression test and it was planned to study with 297 participants with 95% confidence level and a total of 340 people were reached.

Participants were asked 33 questions, consisting of 3 sections online via Google Forms. The questions were delivered to healthcare professionals by sending the link via QR code during face-to-face interviews and by sending the link from common social media accounts. During the process of creating the questions, the questions created as a result of research conducted on various articles were evaluated with family medicine and pediatrics specialists. Cronbach's Alpha value of the questions was 0.789 for Likert-type questions, and accordingly, it can be said that the survey questions were reliable and valid. In the 1st section of the survey questions, 6 questions were asked to the participants regarding their demographic information, such as age, number of children, occupational group, years of service in the profession, the units they work in, and the specialty they work in. In the 2nd section, participants were asked Yes/No/Undecided questions about their vaccination behaviors, and this section consisted of 3 questions. In the 3rd section, participants were asked 24 5-point Likert-type questions, and these questions were used as "Vaccine Knowledge Level." Questions numbered 10-11-12-13-15-16-17-18-19-20-21-22-23-24-29-30-33 were scored directly proportionally. Questions numbered 14-25-26-27-28-31-32 were scored inversely proportionally. In direct proportional scoring, "Strongly agree" was scored as 5 points, while the points were decreased by one point and "Strongly disagree" was scored as 1 point. In inverse proportional scoring, "Strongly agree" was scored as 1 point and the points were increased by one point and "Strongly disagree" was scored as 5 points. While the minimum score possible was 24 points, the maximum score possible was 120 points.

The obtained data were analyzed in the Statistical Package for the Social Sciences 25.0 program. The conformity of the data to normal distribution was evaluated with the Kolmogorov-Smirnov test. In presenting descriptive statistics, number, percentage, and median and interquartile range (25–75) were used for data that did not show normal distribution. Chi-Square test was used for categorical variables to examine the differences between the groups and Mann–Whitney U, a non-parametric test, was used to compare numerical variables. $p<0.05$ was considered significant. This study was evaluated by the Health Sciences University Haseki Training and Research Hospital Ethics Committee. It received ethical approval with the decision number 133-2023 dated August 09, 2023.

RESULTS

A total of 340 people participated in our study. The median age of the participants was 32 (30–35) years. The median length of service of the participants in our study was 7 (5–10) years. 274 (80.6%) of the participants had children, with a median of one child. The majority worked in adult internal medicine units with 35.9%, followed by the family medicine unit with 25.9%. Regarding professional distribution, specialist physicians 47.1%, assistant physicians 37.4%, general practitioners 8.8%, nurses 5%, midwives 1.2%, and technicians 0.6%. The distribution of participants according to their specialties is shown in Figure 1.

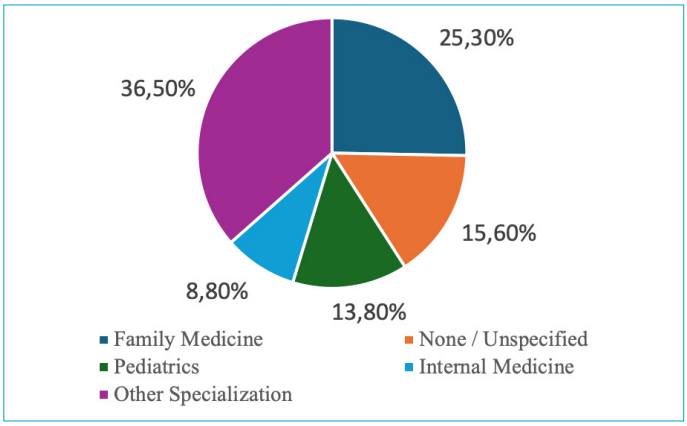

Figure 1. Distribution of participants according to their specialties.

The participants' vaccine knowledge scores ranged from 41 to 113, with a median of 96. When the participants were divided into two groups based on the median score (≤96 and >96), no statistically significant differences were observed in age, number of children, or years of service (Table 1). However, a significantly higher proportion of specialist physicians was found in the group with vaccine knowledge scores above 96 (p=0.036). Similarly, participants working in pediatric internal medicine and pediatric surgery departments were significantly more represented in the >96 group compared to those with scores ≤96 (p<0.001) (Table 1).

The distribution of vaccine knowledge levels did not differ significantly between participants with and without children (p=0.796). In the group with vaccine knowledge scores >96, all participants responded "yes" to the statement "I had my child vaccinated/if I had a child, I would have them vaccinated," whereas the rate was 96.7% among those with scores ≤96; this difference was statistically significant (p=0.021). Nearly all participants (all but one) were aware of the existence of paid vaccines outside the routine vaccination schedule. In addition, 99.4% of participants in the >96 group indicated that they would have their child vaccinated with these paid vaccines, compared to 88.9% in the ≤96 group, a difference that was also statistically significant (p<0.001) (Table 2).

Regarding whether vaccines in the routine vaccination schedule should be made legally mandatory, 10.1% of physicians and 30.4% of allied health personnel disagreed (p=0.009). In response to the statement "I have doubts about the effectiveness of vaccines," 13.2% of physicians and 43.5% of allied health personnel agreed, a statistically significant difference (p=0.001). Similarly, concerns about potential vaccine side effects were more common among allied health personnel, with 52.2% agreeing compared to 31.9% of physicians (p=0.046). When asked whether chemical components in vaccines are harmful, 18.6% of physicians and 43.5% of allied health personnel agreed (p=0.012). Belief in the possibility of natural protection from diseases also differed significantly, with 54.6% of physicians versus 30.4% of allied health personnel disagreeing (p=0.025). Finally, 17.4% of allied health personnel and only 0.9% of physicians reported preferring to avoid vaccination for religious or philosophical reasons, a highly significant difference (p<0.001) (Table 3, Table 4).

Table 1. Comparison of participants' age, years of service, number of children, and vaccination knowledge levels

	Vaccine knowledge Level ≤96 % (n=180)	Vaccine knowledge level >96 % (n=160)	p
Age (Median IQR [25-75])	32.0 (30.0–35.0)	32.0 (30.0–35.0)	0.318*
Number of children (Median IQR [25–75])	1.0 (1.0–2.0)	1.0 (1.0–1.0)	0.206*
Years of service (Median IQR [25–75])	7.0 (5.0–10.0)	7.0 (5.0–10.0)	0.374*
Job‡			
Specialist physician	74 (41.1)	86 (53.8)	0.036†
Assistant physician - physician	90 (50.0)	67 (41.9)	
Allied health personnel	16 (8.9)	7 (4.4)	
Units where participants work‡			
Family medicine	51 (29.0)	37 (23.9)	<0.001†
Pediatric internal/Surgical unit	17 (9.7)	42 (27.1)	
Adult internal/Surgical unit	108 (61.4)	76 (49)	

*Mann- Whitney U; †Chi-square test; ‡9 cases missing; IQR: Interquartile range.

Table 2. Comparison of participants' vaccine knowledge levels according to their occupational groups and the unit they work in (n=340)

	Vaccine Knowledge Level ≤96		Vaccine Knowledge Level >96		p
	n	%	N	%	
Job					
Specialist Physician	74	41.1	86	53.8	0.036
Assistant Physician - Physician	90	50	67	41.9	
Allied Health Personnel	16	8.9	7	4.4	
Total	180	100	160	100	
Units Where Participants Work					
Family Medicine	51	29	37	23.9	<0.001
Pediatric Internal/Surgical Unit	17	9.7	42	27.1	
Adult Internal/Surgical Unit	108	61.4	76	49	
Total	176	100	155	100	

*Chi-Square Test.

Table 3. Comparison of healthcare workers' vaccination status and vaccination knowledge levels (n=340)

	Vaccine knowledge level		p
	≤96 n	>96 n	
Child status			
Yes	146 (81.1)	128 (80.0)	0.796*
No	34 (18.9)	32 (20.0)	
I have had my child's vaccinations done/If I had a child, I would get them vaccinated			
Yes	174 (96.7)	160 (100)	0.021*
No/UD†	6 (3.3)	0 (0.0)	
I know that there are paid vaccines other than routine vaccines			
Yes	179 (99.4)	160 (100)	0.529*
No	1 (0.6)	0 (0.0)	
I would also have my child receive vaccines that are not in the routine vaccination schedule but recommended by my doctor (e.g., rotavirus, meningococcal vaccines).			
Yes	160 (88.9)	159 (99.4)	<0.001*
No/UD†	20 (11.1)	1 (0.6)	

*Chi-Square Test; †No and Undecided choices were combined.

DISCUSSION

This study examined the factors affecting the vaccine knowledge level and behaviors of doctors and healthcare professionals working at Haseki Education and Research Hospital. The percentage of vaccine knowledge levels below 96 is 53.0%, and the percentage above is 47.0%.

The examination of employees according to their professional groups showed that the vaccine knowledge levels of specialist doctors are significantly higher than other groups. This result is consistent with studies in the literature. In a study,[12] it was determined that doctors are generally more likely to exhibit positive attitudes, beliefs, and behaviors toward vaccination compared to nurses. Possible

Table 4. Comparison of participants' responses to questions about vaccines

	Physician (n=317) n	Allied health personnel (n=23) n	p
Vaccinations in the routine vaccination schedule should be made mandatory by law			
I agree	285 (89.9)	16 (69.6)	0.009
I disagree	32 (10.1)	7 (30.4)	
Vaccinations in the routine vaccination schedule should be given on a voluntary basis			
I agree	55 (17.4)	8 (34.8)	0.050*
I disagree	262 (82.6)	15 (65.2)	
I have doubts about the effectiveness of vaccines			
I agree	42 (13.2)	10 (43.5)	0.001*
I disagree	275 (86.8)	13 (56.5)	
I have concerns about the potential side effects of vaccines			
I agree	101 (31.9)	12 (52.2)	0.046*
I disagree	216 (68.1)	11 (47.8)	
I think the chemical components in vaccines are harmful			
I agree	59 (18.6)	10 (43.5)	0.012*
I disagree	258 (81.4)	13 (56.5)	
I believe that natural ways to protect from diseases are also possible			
I agree	144 (45.4)	16 (69.6)	0.025*
I disagree	173 (54.6)	7 (30.4)	
I choose to avoid vaccination for religious and philosophical reasons			
I agree	3 (0.9)	4 (17.4)	<0.001*
I disagree	314 (99.1)	19 (82.6)	

*Chi-square test.

reasons for this may be related to the fact that doctors have received more formal education and continuous exposure to vaccine-related updates secondary to this education. Similar patterns have been reported internationally. A 2024 global scoping review found that physicians consistently show lower vaccine hesitancy rates compared to nurses or allied health personnel, mainly due to differences in scientific training and access to up-to-date information.[13] Similarly, Roberts et al.[14] observed that nurses in Southern California were significantly more reluctant to receive or recommend COVID-19 vaccines compared to doctors, citing safety and misinformation concerns. These findings mirror our results, indicating that education level and professional role play a decisive role in shaping vaccine confidence among healthcare workers.

The vaccine knowledge levels of the employees also differed according to the units they worked in. In particular, it was observed that the vaccine knowledge levels of the employees working in the pediatric internal medicine and pediatric surgery departments were higher than those working in other units. In another study,[15] the knowledge level of pediatricians was generally found to be higher than that of family physicians. The underlying reasons for this difference may be that those working in child health units, who routinely witness the consequences of vaccine-preventable diseases, value vaccination more.

When vaccine knowledge levels were evaluated according to child status, no difference was found. It was observed that vaccine knowledge levels were similar in both groups. Similarly, no difference was found according to the age of the workers and the years of service in the profession. In a study,[16] it was shown that having children did not affect the attitudes and knowledge of physicians. Similarly, other studies[12,16] found that having children, age, and length of service in the profession did not affect the knowledge and approval status of healthcare workers regarding vaccination. Consistent with our findings, several recent studies have shown that demographic variables, such as age, gender, and parental status are not major determinants of vaccine acceptance among healthcare professionals. Instead,

cognitive and psychosocial factors, such as perceived safety, trust in authorities, and exposure to misinformation are stronger predictors.[17] During the post-pandemic period, the abundance of conflicting online information – often referred to as the "infodemic" has been shown to reduce confidence in vaccines even among healthcare workers.[17] This highlights that knowledge alone is not sufficient; continuous communication and transparent information sharing are critical to counter hesitancy.

In our study, almost all participants were aware of the fact that there are paid vaccines outside the routine vaccination calendar, but as the level of vaccine knowledge decreases, they became hesitant about having these vaccines. In the studies conducted,[18] the main reason physicians refrained from recommending paid vaccines was their exclusion from the national schedule and lack of reimbursement, while another important reason is that these vaccines are paid. This is followed by hesitation due to the possible side effects of the vaccine, not having enough information about the vaccines, and not believing in the protection of the vaccine. Although other studies in the literature are consistent with this situation, the reason for this may be that it is not included in the national vaccination calendar. In general, as the level of knowledge about private vaccines decreases, the frequency of recommending them to patients and requesting that they be included in the national vaccination calendar also decreases.[19] Therefore, increasing the knowledge of physicians about vaccines not included in the national vaccination calendar will also contribute to social immunity. A similar pattern has been observed globally, where economic barriers and unclear policy inclusion reduce the likelihood of recommending optional vaccines.[20]

The limitations of the study were that the data obtained through the survey were about declarations. Future studies could incorporate qualitative interviews to explore the psychological and institutional dimensions of vaccine hesitancy in greater depth, as suggested by recent international literature.[21]

Beyond identifying factors associated with hesitancy, recent literature emphasizes actionable interventions to address it. Systematic reviews indicate that multi-component approaches – combining education, workplace-based vaccination access, leadership endorsement, and peer modeling – are the most effective strategies to increase vaccine uptake among healthcare workers.[21] For instance, ensuring easy access to vaccination at the workplace, promoting visible vaccination among senior clinicians, and maintaining open channels for staff to express concerns have all been associated with improved acceptance rates.[17] Incorporating such strategies could strengthen institutional vaccine confidence and sustain public trust in immunization programs.

CONCLUSION

Our findings suggest that physicians, particularly those working in pediatric units (pediatrics and family medicine), had higher levels of knowledge about vaccines and exhibited more positive attitudes toward them. No significant relationship was found between demographic factors and vaccine knowledge. Approximately one-third of allied health personnel expressed concerns about the safety and effectiveness of vaccines, emphasizing the need for targeted educational interventions.

Consequently, increasing vaccine literacy among all healthcare personnel through ongoing education and communication-based strategies can increase overall vaccine confidence and support national vaccination efforts.

Disclosures

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Conflict of Interest: None declared.

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Ethics Committee Approval: The study was approved by the İstanbul Haseki Training and Research Hospital Local Ethics Committee on 09.08.2023 with decision number 133-2023.

Authorship Contributions: Concept – Z.S.S., M.R.D.; Design – A.S., E.A.; Supervision – M.R.D.; Materials – Z.S.S., A.S.; Data collection and/or processing – Z.S.S.; Analysis and/or interpretation – E.A.; Literature search – Z.S.S., A.S.; Writing – Z.S.S., M.R.D.; Critical review – Z.S.S., M.R.D.

REFERENCES

1. Maciosek MV, LaFrance AB, Dehmer SP, McGree DA, Flottemesch TJ, Xu Z, et al. Updated priorities among effective clinical preventive services. Ann Fam Med 2017;15(1):14–22.
2. Meissner HC. Why is herd immunity so important? AAP News 2015;36(5):14.
3. Davis MM. Toward high-reliability vaccination efforts in the United States. JAMA 2016;315(11):1115–7.
4. Glanz JM, McClure DL, Magid DJ, Daley MF, France EK, Hambidge SJ. Parental refusal of varicella vaccination and the associated risk of varicella infection in children. Arch Pediatr Adolesc Med 2010;164(1):66–70.
5. Feikin DR, Lezotte DC, Hamman RF, Salmon DA, Chen RT, Hoffman RE. Individual and community risks of measles and pertussis associated with personal exemptions to immunization. JAMA 2000;284(24):3145–50.
6. Omer SB, Salmon DA, Orenstein WA, deHart MP, Halsey N. Vac-

cine refusal, mandatory immunization, and the risks of vaccine-preventable diseases. N Engl J Med 2009;360(19):1981–8.
7. WHO. Ten threats to global health in 2019. Available at: https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019. Accessed Mar 04, 2024.
8. Hesse BW, Nelson DE, Kreps GL, Croyle RT, Arora NK, Rimer BK, et al. Trust and sources of health information: the impact of the Internet and its implications for health care providers: Findings from the first Health Information National Trends Survey. Arch Intern Med 2005;165(22):2618–24.
9. Verger P, Collange F, Fressard L, Bocquier A, Gautier A, Pulcini C, et al. Prevalence and correlates of vaccine hesitancy among general practitioners: A cross-sectional telephone survey in France, April to July 2014. Euro Surveill 2016;21(47):30406.
10. Verger P, Botelho-Nevers E, Garrison A, Gagnon D, Gagneur A, Gagneux-Brunon A, et al. Vaccine hesitancy in health-care providers in Western countries: A narrative review. Expert Rev Vaccines 2022;21(7):909–27.
11. Aksu SB, Özmen Sever S, Gelmez Taş B, Demir İ, Zeren Öztürk G. Healthcare personnel on the frontline of immunization: barriers to vaccination and the path to full coverage. Hum Vaccin Immunother 2025;21(1):2525618.
12. Picchio CA, Carrasco MG, Sagué-Vilavella M, Rius C. Knowledge, attitudes and beliefs about vaccination in primary healthcare workers involved in the administration of systematic childhood vaccines, Barcelona, 2016/17. Euro Surveill 2019;24(6):1800117.
13. Christodoulakis A, Bouloukaki I, Aravantinou-Karlatou A, Zografakis-Sfakianakis M, Tsiligianni I. Vaccine hesitancy and associated factors amongst health professionals: A scoping review of the published literature. Vaccines 2024;12(12):1411.
14. Roberts LR, Dubov A, Distelberg B, Peteet B, Abdul-Mutakabbir JC, Montgomery S, et al. Original research: COVID-19 vaccine hesitancy among Southern California nurses. Am J Nurs 2022;122(11):22–31.
15. Alfaqih MA, Ababneh EY, Almansi GA, Marashdeh SA, Khazandar AA, Said AM, et al. The attitude and knowledge of pediatricians and family physicians toward COVID-19 vaccination in children: A cross-sectional study. Hum Vaccin Immunother 2023;19(2):2230104.
16. Akar S, Öztürk G. Evaluation of knowledge, attitudes and behaviors of physicians on vaccine and anti-vaccinationflora J Infect Dis Clin Microbiol 2020;25:516–26. [Article in Turkish]
17. Drobniewski F, Ashmi M, Kusuma D, Ahmad R, Naumovas D, Juozapaitė D, et al. Determinants of vaccine hesitancy among healthcare workers in an international multicenter study within the EuCARE project. Sci Rep 2025;15(1):31703.
18. Avcı D, Kuş C, Gümüştakim R, Ayhan Başer D, Eryilmaz ME. Knowledge, attitudes and behaviors of family physicians about childhood vaccinations that are not in the routine vaccination schedule: A cross-sectional study. Prim Health Care Res Dev 2023;24:e2.
19. O'Leary ST, Parashar UD, Crane LA, Allison MA, Stokley S, Beaty BL, et al. Adoption of rotavirus vaccine by U.S. physicians: progress and challenges. Am J Prev Med 2013;44(1):56–62.
20. Baral P, Ahmed T, Amor Fernandez P, Peters MA, Drouard SHP, Muhoza P, et al. Vaccine hesitancy among healthcare workers in low- and middle-income countries during the COVID-19 pandemic: Results from facility surveys across six countries. PLoS One 2023;18(7):e0288124.
21. de Koning R, Gonzalez Utrilla M, Spanaus E, Moore M, Lomazzi M. Strategies used to improve vaccine uptake among healthcare providers: A systematic review. Vaccine X 2024;19:100519.

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Effects of Gender and Smoking on Maximum Phonation Time: A Cross-Sectional Study Among Turkish Adults

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ABSTRACT

Objectives: This study aimed to examine how phonation duration, maximum phonation time (MPT), is affected by factors such as gender and smoking.

Methods: This cross-sectional study included 400 volunteers aged 18 years and older, who spoke Turkish and had no known vocal disorders. Participants' demographic information, smoking status, and MPT were recorded. MPT was measured using a stopwatch as the maximum time to produce the "A" sound in a single breath while sitting in a quiet environment.

Results: Participants were 56.3% male (n=225) and 43.7% female (n=175). Results showed that MPT was significantly longer in males (22.2±5.7 s) than in females (18.9±5.7 s, p<0.001). Smoking significantly shortened MPT (smokers: 17.8±6.0 s; non-smokers: 21.7±5.6 s; p<0.001). A moderate negative correlation was found between duration of smoking and MPT (r=−0.30, p=0.003).

Conclusion: MPT is significantly longer in males than in females. Smoking significantly shortens MPT, and this effect becomes more pronounced as smoking duration increases. These findings highlight the importance of considering individual risk factors in vocal health assessments.

Keywords: Gender, Maximum phonation time, Smoking, Vocal cord, Voice health

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INTRODUCTION

Maximum phonation time (MPT) refers to the length of a vowel or word that can be sustained with a breath during vocal production, and it is an important indicator of vocal health.[1] The length of MPT is related to the coordination of the vocal cords, lungs, and respiratory muscles.[2] Normal MPT may vary depending on the individual's age, gender, general health status, and lifestyle.[3] The relationship between MPT and lung function continues to be investigated. MPT has also been used as a biomarker of lung function impairment in some studies.[4]

Smoking is an important factor that directly affects vocal health.[5] Smoking can impair voice quality and shorten phonation time by causing chronic inflammation of the vocal cords.[6] Toxic substances found in cigarette smoke can reduce the flexibility and vibrating ability of the vocal cords, leading to significant changes in phonation time.[7] Research on the effects of smoking on the voice also reveals gender-specific effects.[8]

Although previous research has investigated MPT and its determinants, studies simultaneously assessing the effects of both gender and smoking within the same population are limited. Research on vocal health and MPT can also contribute to the development of special protection programs for voice-related professional groups (singers, teachers, announcers, etc.).[9,10] this study aimed to examine how MPT is affected by factors such as gender and smoking and to evaluate their effects on vocal health.

METHOD

This cross-sectional study was conducted between January and June 2025 conducted with 400 volunteers from various age groups and professions. Inclusion criteria were the ability to speak Turkish fluently, absence of any self-reported or diagnosed vocal or respiratory disorder, willingness to participate, and over 18 years of age. Individuals with recent upper respiratory tract infection, vocal fold pathology, or a history of speech therapy were excluded.

Participants were included in the study based on voluntary consent forms. Demographic data (age, gender, educational level, smoking status, duration, and daily cigarette consumption) were collected using a structured questionnaire. To measure the MPT, participants were asked to produce a sustained /a/ vowel sound at a comfortable pitch and loudness in a seated position within a quiet room.[11] Timing was performed using a calibrated stopwatch, and the duration was recorded in seconds. Each participant completed three trials with 30 s rest intervals, and the longest value was recorded as the MPT. All measurements were conducted by the same trained examiner to ensure procedural consistency.

This study received ethical approval from Hamidiye Scientific Research Ethics Committee (Approval No: 2025/6/30). The study was conducted in accordance with the principles of the World Medical Association Declaration of Helsinki and the Good Clinical Practice Guidelines.

Research data were analyzed using Statistical Package for the Social Sciences for Windows, 27.0. Descriptive statistics are presented as mean±standard deviation, frequency distribution, and percentage. The Shapiro–Wilk test was used to examine the conformity of variables to a normal distribution.

The Mann–Whitney U test was used for statistical significance between two independent groups for variables found not to be normally distributed, and the Student's t-test was used for variables found to be normally distributed. The relationship between duration of smoking and daily smoking, and phonation time was analyzed using Pearson correlation tests. A $p<0.05$ was considered statistically significant.

RESULTS

Of the 400 individuals who participated in the study, 56.3% were male (n=225) and 43.7% were female (n=175). The largest age group was 18–25 years (n=225, 56.3%) followed by 26–35 years (n=53, 13.3%). Most participants were university graduates (n=288, 72.0%), and students constituted the largest occupational group (n=223, 55.8%).

The mean MPT was significantly longer in males than in females (22.2±5.7 s vs. 18.9±5.7 s; $p<0.001$) (Fig. 1). This finding indicates that males, on average, can sustain phonation

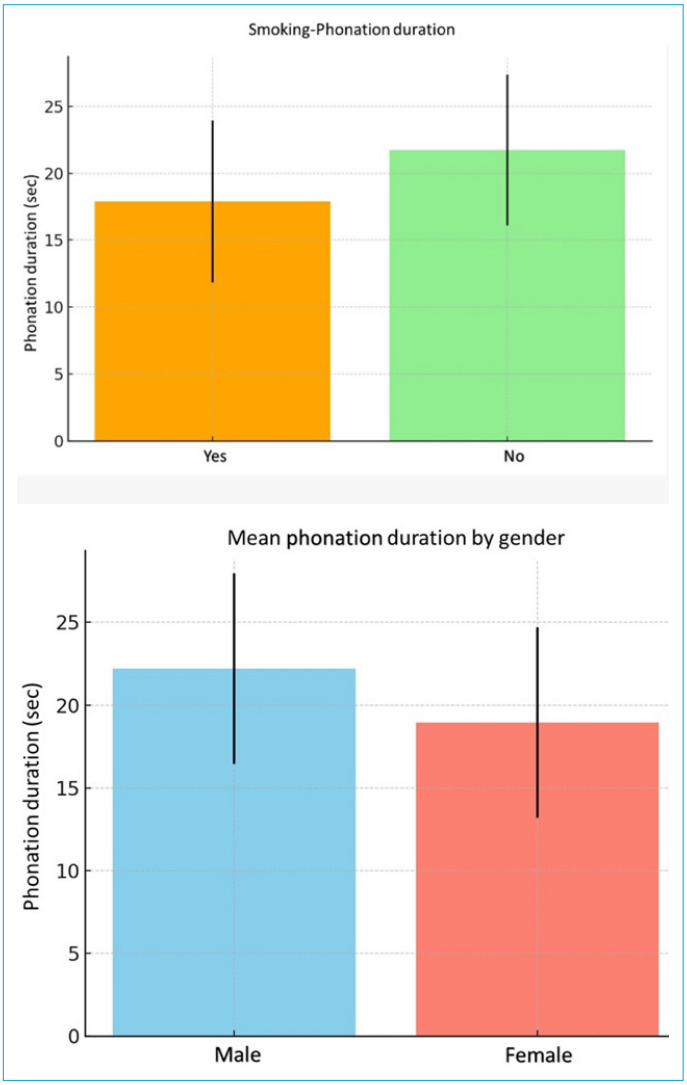

Figure 1. Maximum phonation time by smoking and gender. This illustrates the mean phonation duration (in seconds) for participants, categorized by their smoking status (top panel) and gender (bottom panel). The standard deviation for each group is indicated by the error bars.

approximately 3.3 seconds longer than females. Smokers had a significantly shorter MPT compared with non-smokers (17.8±6.0 s vs. 21.7±5.6 s; p<0.001) (Fig. 1). This result demonstrates a clear negative effect of smoking on phonation duration.

A moderate negative correlation was found between duration of smoking and MPT (r=–0.30, p=0.003). A weak negative correlation was found between the number of cigarettes smoked daily and MPT, but this relationship was not statistically significant (r=–0.12, p=0.24) (Fig. 2).

DISCUSSION

This study demonstrated that MPT was significantly longer in males than in females and that smoking had a negative impact on phonation duration. In addition, a moderate negative correlation was found between smoking duration and MPT, suggesting a cumulative dose–response relationship.

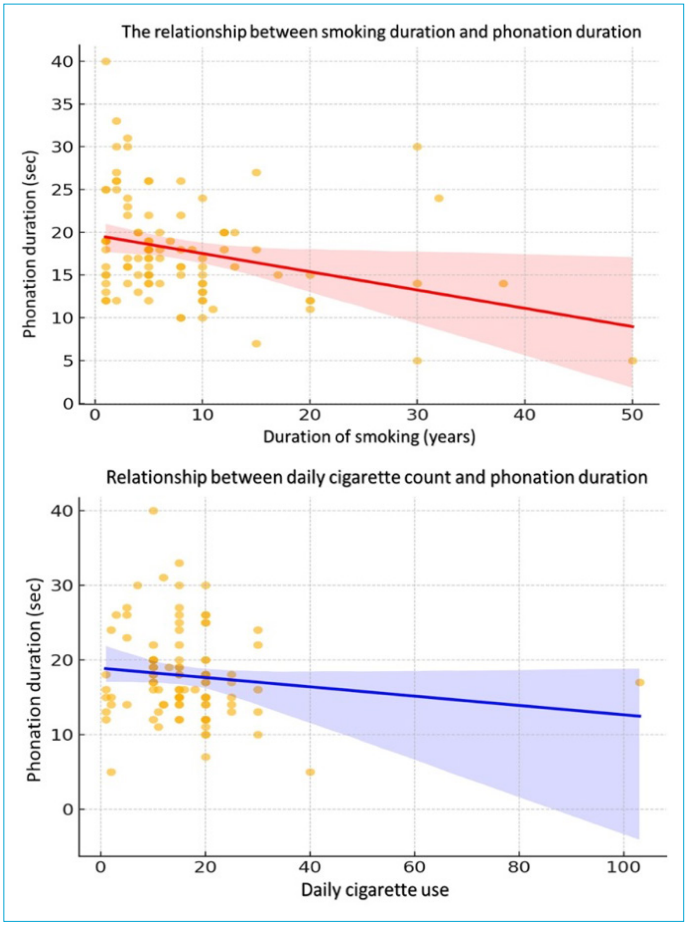

Figure 2. Relationship between smoking duration and daily cigarette count on phonation duration. This presents two scatter plots illustrating the association between different aspects of smoking behavior and phonation duration (in seconds), along with a fitted linear regression line and its 95% confidence interval (shaded area).

In the "Healthy Older Adults" study conducted by MPT was found to be longer in males than in females in older adults; this difference becomes more pronounced with age.[4] Another study reported that male's MPT values decreased significantly with age, while in females the effect of age was more limited.[12] The physiological advantage of males in terms of lung capacity and vocal fold length may explain this difference.[13] In addition, male's higher respiratory function test parameters may provide an advantage in terms of the pressure required to occur in the phonation pathways and the sustainability of phonation.[14] In our study, the average phonation time of male participants was found to be significantly longer than that of female participants. However, it should be noted that the factors contributing to this difference are multifactorial. Laryngeal size/laxity, vocal fold structure, neuromuscular control, phonation strategies, and training/voice use also influence MPT. Some studies examine nuances that cannot be generalized simply by classifying males or females.[15]

The effects of smoking on vocal health have been highlighted in many studies. Awan et al. have shown that smoking reduces vital capacity and decreases MPT.[16] Some studies have reported that toxins in cigarette smoke cause edema,[17] inflammation, and mucosal damage in the vocal cords, leading to a shortening of phonation time.[18,19] he reduction in phonation time in smokers is consistent with the literature. Similarly, a meta-analysis by Byeon and Cha[20] showed that smoking significantly reduces phonation time. It was stated that long-term smoking, in particular, significantly reduces voice production capacity.

These findings highlight the importance of early preventive counseling regarding smoking and voice hygiene, particularly for individuals in voice-dependent professions such as teachers, singers, and broadcasters. MPT can serve as a simple, noninvasive clinical screening tool for early detection of subclinical voice impairment in primary care and otolaryngology settings.

Study Limitations

The design and cross-sectional nature of our study may prevent us from clearly assessing the long-term (cumulative) effects of smoking. Long-term follow-up studies are needed to evaluate the results from this perspective. Furthermore, other factors that may affect phonation time (such as age, height, weight, and lung capacity) were not analyzed in detail. A limitation of this study is that MPT was measured using only a stopwatch, without the use of acoustic analysis tools, which may reduce the precision of the measurement. Future studies, including aerodynamic and acoustic measurements, are recommended.

CONCLUSION

This study monitored changes in MPT based on gender and smoking. While MPT was found to be longer in males than in females, it was significantly shorter in smokers. Furthermore, statistically, MPT decreased with increasing duration of smoking.

These findings highlight the importance of considering individual risk factors in vocal health assessments. Understanding the negative effects of smoking on vocal health is particularly important for supporting smoking cessation programs and improving vocal health education.

Future studies, more comprehensive studies that analyze other factors that may influence MPT, will contribute to the expansion of scientific knowledge in the field of vocal health.

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REFERENCES

1. Titze IR, Winholtz WS. Effect of microphone type and placement on voice perturbation measurements. J Speech Hear Res 1993;36(6):1177–90.
2. Ayoub MR, Larrouy-Maestri P, Morsomme D. The effect of smoking on the fundamental frequency of the speaking voice. J Voice 2019;33(5):802.e11–16.
3. Bittencourt MF de QP, Andrada E Silva MA de. Maximum phonation time: Relationship between different measurement methods, sex, and body mass index. J Voice 2025:S0892-1997(24)00350-3.
4. Maslan J, Leng X, Rees C, Blalock D, Butler SG. Maximum phonation time in healthy older adults. J Voice 2011;25(6):709–13.
5. Murphy CH, Doyle PC. The effects of cigarette smoking on voice-fundamental frequency. Otolaryngol Neck Surg Off J Am Acad Otolaryngol Neck Surg 1987;97(4):376–80.
6. Levendoski EE, Leydon C, Thibeault SL. Vocal fold epithelial barrier in health and injury: A research review. J Speech Lang Hear Res 2014;57(5):1679–91.
7. Erickson-DiRenzo E, Singh SP, Martinez JD, Sanchez SE, Easwaran M, Valdez TA. Cigarette smoke-induced changes in the murine vocal folds: A Raman spectroscopic observation. Analyst 2020;145(23):7709–17.
8. Simberg S, Udd H, Santtila P. Gender differences in the prevalence of vocal symptoms in smokers. J Voice 2015;29(5):588–91.
9. Vermeulen R, du Toit M, van Lierde K, van der Linde J. The effect of vocal hygiene education programs on voice quality in professional voice users: A systematic review. J Speech Lang Hear Res 2022;65(12):4700–13.
10. Saeedi S, Baghban K, Seifpanahi MS, Nazari MA, Moshtagh A, Manoosi M, et al. The vocal hygiene treatment programs for singers: A systematic review. J Voice 2023:S0892-1997(23)00349-1.
11. Pinar D, Cincik H, Erkul E, Gungor A. Investigating the effects of smoking on young adult male voice by using multidimensional methods. J Voice 2016;30(6):721–5.
12. Oliveira Alves EL, Silveira Coelho C, Veis Ribeiro V, Dassie Leite AP, Sampaio Santos R. Maximum phonation time and its relation to gender, age and lifestyle in healthy elderly. Distúrb Comun 2015;27(3):530–9.
13. Zhang Z. Mechanics of human voice production and control. J Acoust Soc Am 2016;140(4):2614.
14. LoMauro A, Aliverti A. Sex differences in respiratory function. Breathe (Sheffield, England) 2018;14(2):131–40.
15. Zhang Z. Contribution of laryngeal size to differences between male and female voice production. J Acoust Soc Am 2021;150(6):4511.
16. Awan SN, Alphonso VA. Effects of smoking on respiratory capacity and control. Clin Linguist Phonetics 2007;21(8):623–36.
17. Vincent I, Gilbert H. The effects of cigarette smoking on the female voice. Logoped Phoniatr Vocol 2011;37:22–32.
18. Hamdan AL, Al-Barazi R, Ashkar J, Husseini S, Dowli A, Fuleihan N. Laryngeal findings and acoustic changes in light cigar smokers. Ear Nose Throat J 2015;94(6):231–5.
19. Banjara H, Mungutwar V, Singh D, Gupta A. Objective and subjective evaluation of larynx in smokers and nonsmokers: A comparative study. Indian J Otolaryngol Head Neck Surg Off Publ Assoc Otolaryngol India 2014;66(Suppl 1):99–109.
20. Byeon H, Cha S. Evaluating the effects of smoking on the voice and subjective voice problems using a meta-analysis approach. Sci Rep 2020;10(1):4720.
21. Raghuwanshi N, Mundra A, Dubey NK, Godha S, Mundra R. Multimodal analysis of dysphonia in smokers: A two-year comprehensive study. Indian J Otolaryngol Head Neck Surg Off Publ Assoc Otolaryngol India 2022;74(Suppl 3):4948–53.

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Case Report

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A Case of Delayed Diagnosis and Subsequent Foreign Body Expulsion in an Infant

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ABSTRACT

A 9-month-old female infant presented to the emergency department with a 2-h history of sudden-onset respiratory distress that progressively worsened until presentation. She had been apparently well before the onset of symptoms. Chest X-rays were normal, and an urgent bronchoscopy revealed no foreign body but showed an area of hyperemia in the left main bronchus. The mother later reported that she had given the child a local groundnut cake ("Kuli-Kuli") a few hours before the symptoms began. During admission, the infant developed fever with rhonchi and crepitations and was treated for bronchopneumonia. She was discharged after 5 days following complete resolution of symptoms. Two days later, the mother returned, reporting that the child had suddenly started coughing and expelled crumbs of the groundnut cake.

Keywords: Airway obstruction, choking, foreign bodies, infant

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INTRODUCTION

Foreign body aspiration leading to airway obstruction and subsequent choking is a major cause of morbidity and mortality among children, although it is largely preventable. It commonly occurs in children younger than 5 years, particularly between 1 and 3 years of age.[1-5] This vulnerability is mainly due to the anatomical and developmental characteristics of a young child's airway and the incomplete development of swallowing ability.[6-7] At this age, children also tend to explore their surroundings and frequently place objects into their mouths. Furthermore, molars do not erupt until approximately 1.5 years; however, mature mastication takes longer to develop. Despite having a strong gag reflex, the airway of a young child is more susceptible to obstruction than that of an adult in several ways. Its smaller diameter makes it more prone to complete blockage by small foreign bodies, while mucus and secretions may form a seal around the object, making it harder to expel by coughing. In addition, the force of air generated by a cough in infants or young children is often insufficient to dislodge an obstructing object. The most common aspirated items are food particles, accounting for about 81% of cases, with nuts – particularly peanuts – responsible for nearly one-third. Other frequently aspirated objects include coins, balloons, and small toys.[8-11] Urgent endoscopic removal remains the mainstay of management for foreign bodies in the tracheobronchial tree.

CASE REPORT

A 9-month-old female infant was brought to the emergency department with a 2-h history of sudden-onset difficulty in breathing that progressively worsened before presentation. She had been apparently well before the onset of symptoms. According to the mother, there was no history of force-feeding or choking during meals. However, about 5-h before the onset of symptoms, she had given the child a local groundnut cake ("Kuli-Kuli"), after which the infant coughed and vomited but subsequently appeared well. There was no history of cyanosis, excessive sweating, or pauses during breastfeeding. The child had no known history of asthma or atopy, although the maternal aunt was asthmatic.

Two weeks before this presentation, she had been treated as an outpatient for acute pharyngotonsillitis. She had been exclusively breastfed for the first 4 months of life and was currently on complementary semi-solid diets. Growth and development were appropriate for age, and immunizations were up to date.

On examination, she was a well-nourished but acutely ill-looking infant in respiratory distress, with flaring of the alae nasi, intercostal and subcostal retractions, and xiphisternal in-drawing. She was not pale, icteric, cyanosed, or dehydrated, and there was no pedal edema or lymphadenopathy. Her axillary temperature was 36.7°C. Respiratory rate was 76 breaths/min, and oxygen saturation (SpO_2) on room air was 96%. Chest expansion was equal bilaterally with resonant percussion notes. Vesicular breath sounds were heard with reduced intensity on the left, particularly posteriorly; no added sounds were noted. Other systemic examinations were essentially normal.

A working diagnosis of partial lower airway obstruction secondary to foreign body (local groundnut cake, "Kuli-Kuli") aspiration was made. Chest X-ray revealed no abnormality. The cardiothoracic team was consulted, and a rigid bronchoscopy was performed, which revealed no foreign body but showed mucosal hyperemia in the left main bronchus. Full blood count and electrolyte-urea-creatinine tests were essentially normal. The patient was commenced on parenteral amoxicillin–clavulanate, gentamicin, and hydrocortisone. Supplemental oxygen was administered due to severe respiratory distress.

Two days after admission, respiratory distress persisted, and she developed fever with bilateral rhonchi and crepitations, more pronounced over the left hemithorax. A repeat chest X-ray was unremarkable. She was nebulized with salbutamol, and the medications were continued.

By the day 5 of admission, fever and respiratory distress had resolved, and she was feeding well. She was discharged home in stable condition for follow-up. Two days after discharge, the mother reported that the child had a sudden bout of coughing and expelled a small piece of the groundnut cake (Kuli-Kuli).

DISCUSSION

Spontaneous expulsion of a foreign body from the airway is a rare phenomenon, and only a few cases have been reported worldwide. In 1948, Negus reported an incidence of approximately 2%.[12] Chevalier Jackson described a similar rate of 2–4%.[13] Gupta and Soodlater reported two cases of spontaneous foreign body expulsion: A 2-year-old boy who expelled an aspirated metallic valve from a bicycle tube 4 days after aspiration, and a 20-year-old man who expelled a metallic coin that had lodged in the trachea.[14] In 2014, Jaiswal et al. reported a case from India involving an 18-year-old tailor who spontaneously expelled a pin he had accidentally ingested.[10]

Most of the cases reported in the literature describe spontaneous expulsion either during preparation for endoscopic removal or after an unsuccessful bronchoscopy. In the present case, both radiological evaluation and bronchoscopy were normal at presentation. Haddadi et al., in a 7-year retrospective review of tracheobronchial foreign bodies in children, found that foreign bodies were visualized in only about 72% of cases during bronchoscopy.[15]

The initial event following foreign body aspiration is typically characterized by the sudden onset of violent paroxysms of coughing, choking, gagging, and occasionally complete airway obstruction.[16] This may be followed by an asymptomatic interval during which the foreign body becomes lodged, protective reflexes fatigue, and the immediate irritative symptoms subside. Most children present during this second stage, when the absence of acute symptoms may cause physicians to overlook the diagnosis of foreign body aspiration. This stage is the most deceptive and accounts for a large proportion of delayed or missed diagnoses.[16] Later, secondary complications such as obstruction, infection, or erosion may manifest as cough, fever, hemoptysis, pneumonia, or atelectasis, drawing renewed attention to the possibility of a foreign body.

In the present case, there was no obvious history of choking. The mother only observed a progressive onset of respiratory distress, which was later suspected to be due to aspiration of fragments of the groundnut cake. Radiological evaluation plays an invaluable role in identifying the site of obstruction; approximately 88% of airway foreign bodies

lodge in the bronchi (58% in the right bronchus), while 10% are located in the larynx or trachea.[7,9] Nevertheless, up to 15–30% of cases may have a normal chest radiograph.[17] In this case, both the initial and repeat chest X-rays were unremarkable. An urgent bronchoscopy was performed, but no foreign body was found except for an area of hyperemia in the left main bronchus.

CONCLUSION

A detailed and carefully obtained history remains the cornerstone of diagnosis in suspected foreign body aspiration. A positive history should never be disregarded, while a negative history can sometimes be misleading. In the present case, none of the initial clinical or radiological findings suggested aspiration, and bronchopneumonia was initially suspected. The eventual spontaneous expulsion of the groundnut fragment highlights the importance of maintaining a high index of suspicion for foreign body aspiration in infants presenting with unexplained respiratory distress, even when initial investigations are inconclusive.

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REFERENCES

1. ScienceDaily. Nationwide Children's Hospital. Choking is a leading cause of injury and death among children. Available at: https://www.sciencedaily.com/releases/2010/02/100226212559.htm. Accessed Nov 26, 2025.
2. Chang D, Abdo K, Bhatt I, Huoh K, Pham N, Ahuja G. Persistence of choking injuries in children. Int J Pediatr Otorhinolaryngol 2021;144:110685.
3. Gardner H, Baun C, Dowd M, Durbin D. Prevention of choking among children: Policy statement. Pediatrics 2010;125(3):601–7.
4. Gvetadze P, Chkhaidze I, Baldas S, Comoretto R, Gregori D, Berchialla P. Injuries due to foreign body aspiration in Georgia. Int J Pediatr Otorhinolaryngol 2016;83:84–7.
5. Kliegman RM, Behrman RE, Jenson HB, Stanton BF. Nelson Textbook of Pediatrics. 20th ed. Philadelphia: Elsevier Saunders; 2016. p.1812–3.
6. Dodson H, Cook J. Foreign body airway obstruction. Treasure Island: StatPearls Publishing; 2023.
7. Abdollahi F, Badbam D, Goljanan T. Causes of diagnostic delay in patients with airway foreign body aspiration. J Iran Univ Med Sci 2008;15(59):119–24.
8. Committee on Injury, Violence, and Poison Prevention. Prevention of choking among children. Pediatrics 2010;125(3):601–7.
9. Sidell DR, Kim IA, Coker TR. Food choking hazards in children. Int J Pediatr Otorhinolaryngol 2013;77(12):1940–6.
10. Jaiswal AK, Garg R. Spontaneous expulsion of a foreign body (sewing machine needle). J Clin Diagn Res 2014;8(8):KD01–2.
11. Thome A, Stool S, Rimell F, Reilly J, Rider G, Stool D. Characteristics of objects that cause choking in children. JAMA 1995;274(22):1763–6.
12. Negus VE. Foreign bodies in the air and food passages. Ann R Coll Surg Engl 1948;3(4):299–305.
13. Jackson C. Foreign bodies in the air and food passages. Surg Gynecol Obstet 1954;98(2):123–9.
14. Gupta I, Sood VP. Foreign body in the air passage: Spontaneous expulsion. Indian J Otolaryngol 1967;19(4):173–6.
15. Haddadi S, Marzban S, Shamaei M, Hashemi SM, Khorgami Z, Javadi MR, et al. Tracheobronchial foreign bodies in children: A seven-year retrospective study. Iran J Otorhinolaryngol 2015;27(81):377–85.
16. Farzizadeh A, Hashemian H, Atrkar Roshan Z. Clinical and radiographic findings of foreign body aspiration in children hospitalized in 17 Shahrivar Hospital, Rasht, during 1996–2008. Feiz J 2013;7(5):495–500. [in Persian]
17. Ghafari J, Sahebpour A, Mosavi S, Safar M. Pulmonary foreign body aspiration in children referring to Bu Ali Sina Hospital, Sari, and related factors (2001–2009). J Mazandaran Univ Med Sci 2010;20(75):17–22. [*Article in Persian*]