ANKARA MEDICAL JOURNAL

Vol. 25 / Num. 3, 2025
www.ankaramedj.com
e-ISSN: 2148-4570

Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

Organization, Preparation and Correspondence
- Ankara Yıldırım Beyazıt University, Faculty of Medicine, Department of Family Medicine, 06800 Bilkent / Ankara / TURKEY

Date of Issue: 29.09.2025

Ankara Medical Journal is an international peer-reviewed journal and is published quarterly. The responsibility of the published articles belongs to the authors.

Ankara Medical Journal is indexed / abstracted in Scopus, DOAJ, ULAKBIM TR Index, Google Scholar, Index Copernicus, ROAD, ResearchBib, SHERPA/RoMEO, Turkish Citation Index and Turkish Medline.

From the Editor

Dear Readers,

We are pleased to present the third issue of 2025, which encompasses a carefully curated selection of articles designed to address the professional interests of healthcare providers, with particular emphasis on primary care. This issue includes 12 original research articles and 2 case reports, each highlighting recent developments in critical domains of healthcare. Our primary aim is to provide practitioners with a reliable and informative resource that supports both clinical practice and scholarly engagement.

As Türkiye's leading journal devoted to primary care, we take pride in our role and recognize the responsibility of serving as a credible source of scientific knowledge for healthcare professionals within our region. We remain grateful for your continued readership and engagement, and we reaffirm our commitment to disseminating current research and evidence-based perspectives that contribute meaningfully to the advancement of primary care.

We invite you to engage with the diverse contributions featured in this issue, which we believe will stimulate scholarly reflection, foster innovative approaches, and enrich clinical practice. Your ongoing support and active participation are essential to the journal's mission of promoting knowledge dissemination and advancing innovation in the field of primary care.

We also look forward to sharing our forthcoming issue, which will continue our efforts to provide a comprehensive and intellectually enriching body of work for the academic and professional community.

Prof. Dr. Ahmet Keskin

ANKARA MEDICAL JOURNAL

Contents

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):220-234 // 10.5505/amj.2025.78379

UTILIZATION OF PRIMARY HEALTH CARE SERVICES AMONG ADULTS IN URBAN AND RURAL MARGIBI COUNTY LIBERIA

Ayouba Fofana[1], Nimetcan Mehmet Orhun[2]

[1]Health Policy and Global Health Department, Public Health Institute, Ankara Yıldırım Beyazıt University, Türkiye

[2]Public Health Department, Faculty of Medicine, Ankara Yıldırım Beyazıt University, Türkiye

Correspondence:

Nimetcan Mehmet Orhun (e-mail: nametjan@gmail.com)

Submitted: 25.04.2025 // Accepted: 06.08.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine

Department of Family Medicine

ANKARA MEDICAL JOURNAL

Abstract

Objectives: This study examines factors influencing Primary Health Care (PHC) utilization in Margibi County, Liberia, with a focus on urban-rural disparities.

Materials and Methods: A cross-sectional survey was conducted among 900 adults (urban: 49.7%, rural: 50.3%) who had lived in the county for at least two years. Data were collected using a two-stage cluster sampling technique and structured interviews, then analyzed using descriptive and inferential statistics.

Results: Findings revealed significantly higher PHC utilization in urban areas (79.6%) than in rural areas (62.5%), with 29% of participants not accessing PHC services. Key determinants included residential location, age, employment, income, media exposure, and proximity to health facilities. Rural residents faced barriers such as long travel distances and lower income, leading to reduced vaccination rates, poorer maternal health, and a higher disease burden.

Conclusion: Addressing these disparities requires targeted policies to strengthen healthcare infrastructure and service delivery, particularly in rural areas. Improving PHC accessibility is essential for reducing health inequities and enhancing overall health outcomes in Margibi County.

Keywords: Unequal access, primary health care, urban health, rural health, Liberia.

Introduction

Primary Health Care (PHC) is rooted in a commitment to social justice, equity, solidarity, and participation.[1] PHC Primary Health Care is the first point of contact with health services, facilitating access to the broader health system and addressing most health needs.[2] The importance of primary health care services becomes even more evident for populations with increased health needs, as these services provide accessible, comprehensive, and cost-effective preventive and therapeutic care.[3] However, significant inequalities persist in healthcare delivery, both within and across nations.[4] PHC aligns with universal health coverage goals, aiming to provide safe, effective, and affordable services for all.[5] Despite its importance, PHC utilization in Africa remains low,[6], the greatest MMR, 510 maternal deaths per 100,000 live births, has been reported from Sub-Saharan Africa. [7] Liberia ranks 162 out of 169 on the Human Development Index, with one of the world's highest maternal mortality rates. Infrastructure challenges and limited healthcare access contribute to high morbidity and mortality, particularly in rural areas.[8] Nationally, 70.3% of Liberia's population has access to healthcare. [9] Liberia delivers primary health care through a structured tier system guided by its Essential Package of Health Services (EPHS)[10] and supported by the National Community Health Assistant Program. Clinics and health centers serve as the first points of contact, while community health assistants (CHAs) trained, supervised, and paid extend services to remote populations (>5 km from facilities).[11] These CHAs provide health education, malaria testing and treatment, family planning, and referrals, and are integrated into the formal health system with regular supervision by Community Health Services Supervisors. The poor health outcomes in Liberia reflect challenges in primary health care that extend beyond implementation to the policy level.[12] This study aims to examine the factors affecting Primary Health Care (PHC) utilization in Margibi County, Liberia, with a particular focus on the urban-rural disparities in healthcare access. It seeks to identify the key determinants of PHC utilization and explore the barriers that hinder equitable access to health services in both urban and rural areas.

Materials and Methods

Study design

This cross-sectional study examined factors influencing unequal access to Primary Health Care (PHC) services in urban and rural areas of Margibi County, Liberia, focusing on urban-rural differences in utilization.

Study Area and Population

Conducted in Margibi County, divided into four districts (Kakata, Firestone, Gibi, Mamba Kaba), the study targeted adults aged 18+ residing in the area. The study was conducted in Liberia, where the definition of rural

and urban areas follows a national classification system. Rural areas in Liberia are typically characterized by low population density, limited access to urban infrastructure (such as healthcare, education, and transportation), and economic activities primarily based on agriculture. Urban areas, on the other hand, are those with higher population density and access to more developed infrastructure, primarily concentrated around major cities like Monrovia. For this study, we classified the population based on Liberia's administrative divisions. We included participants from rural counties, which are designated as areas outside the major urban centers. To further refine the classification, rural areas with populations of fewer than 5,000 people were identified based on the census data.[13]

Sampling and sample selection

The quantitative study included individuals aged 18 years and above residing in Margibi County. The sample size was calculated using a formula for comparing two population proportions[14], assuming a 10% difference in PHC utilization between urban (60%) and rural (50%) populations, with 95% confidence and 80% power. The required sample size was 384 per group, which was increased to 450 per group (total n = 900) to account for a 17% non-response rate. Using a two-stage cluster sampling method, 900 participants were selected, 450 from urban areas (266 from Kakata, 184 from Harbel) and 450 from rural villages with and without health facilities. The sample size assumed a 10% difference in PHC utilization, with adjustments for non-response rates. The study includes individuals aged 18 years and above who reside in Margibi County. Participation is limited to those who agree to be part of the survey. Additionally, only adults who either permanently reside in the study area or have lived there for at least two years are eligible. Individuals with severe mental conditions that prevent them from providing informed consent are excluded. Very elderly individuals are also not included in the study. Additionally, children are excluded due to consent-related issues and their inability to independently decide on health-seeking behaviors.

Data Collection Tool

Data were collected using a structured questionnaire adapted from validated instruments in previous studies [15,16] and pre-tested for reliability (Cronbach's alpha = 0.735). The questionnaire consisted of four main sections: 1) Sociodemographic and Socioeconomic Characteristics: This section included items on place of residence, gender, age, educational attainment, marital status, employment status, household income and its sources, family size, media exposure, length of residency, primary water source and purification methods, time required to obtain water, availability of latrines, hygiene practices, access to electricity, and type of housing, 2) Perception of Health and Health-Seeking Behavior: This section assessed participants' self-perceived health status, presence and types of chronic conditions, stage of illness prompting care-seeking, consultation and decision-making processes, preferred sources of care for minor illnesses, discontinuation of medication due to

cost, proximity to health facilities, mode of transportation, recent illness episodes, and related treatment-seeking behaviors, 3) Primary Health Care (PHC) Utilization**:** This section explored awareness of PHC services, mode of transport to PHC facilities, travel time and cost, number of PHC visits in the past six months, reasons for visiting or not visiting PHC facilities, and use of PHC services prior to hospital care, 4)Satisfaction with PHC Services: This section evaluated satisfaction indicators such as involvement in treatment decisions, explanation of side effects and medication adherence, availability of services on weekends, continuity of care, provider attentiveness, out-of-pocket payment for services, provision of lifestyle counseling, and access to prescribed medications.

Data Collection Procedure

Data were gathered through face-to-face interviews conducted by the researcher and assistants from March to May 2022, using systematic random sampling within selected urban and rural communities.

Ethical Considerations:

Ethical approval for this study was obtained from Ankara Yildirim Beyazit University Ethics Committee under the code number (2022-671). Approval from the Margibi County Health Team, which represents the Ministry of Health in the County, was also obtained. Participants received a consent form with the questionnaire, which stated the purpose of the study and their freedom to participate or decline participation.

Data Analysis

Data were analyzed using SPSS (version 20). Descriptive statistics and cross-tabulations summarized the data, while bivariate and multivariate logistic regression assessed correlations and differences in PHC utilization, with a significance level of $p < 0.05$.

Results

Descriptive Statistics

The study included 900 participants, with a near-equal distribution between urban (447, 49.7%) and rural (453, 50.3%) areas. The sample consisted of slightly more males (53%) than females (47%). Most respondents were in the 29-38 age group (48.9%), while 11.8% were 49 years or older. The illiteracy rate was 33.6% overall, with significant urban-rural differences (19.0% in urban areas and 47.9% in rural areas). Rural females had higher illiteracy rates (52.3%) compared to rural males (42.9%). In terms of education, 27.2% of participants completed senior secondary school, primarily from urban areas. Only a small portion had completed higher

education. Over half of the participants were unmarried, and only 1.4% were divorced. The unemployment rate was high (76.1%), with urban areas having a lower rate (64.9%) compared to rural areas (87.2%). Only 16.8% of participants were employed, and 12.8% of those were from rural areas. Female employment in rural areas was lower (10%) than that of males (11.5%). Regarding income, 75.4% of participants earned less than 4500 Liberian dollars (LD), which is equivalent to less than $1 USD per day, placing most respondents below the international poverty line[19]. A significant proportion (62.5%) of rural residents practiced farming, while 49.9% of urban dwellers engaged in business. Over 80% of participants used radio as their main source of information, with fewer using TV (1.1%) or newspapers (1.1%). A substantial proportion (10.2%) did not use any media sources, predominantly from rural areas. (Table 1).

Awareness and Access to Primary Health Care (PHC)

Most participants (82.4%) were aware of the existence of PHC facilities within their health districts, with a larger portion of those unaware residing in rural areas. Transportation to these facilities was typically by motorcycle (72.2%), though a significant portion (27.5%) walked, particularly in rural areas. The majority (52.4%) could reach the PHC facility within 30 minutes, but 8.8% from rural areas reported travel times of more than an hour. Transportation costs were mostly below 150 LD ($1 USD). Regarding PHC visits, 71.0% of respondents had visited a PHC facility in the last six months. A higher percentage of urban residents (79.6%) visited PHCs compared to rural residents (62.5%). The primary reason for visits was treatment for illness (86.8%), while a few visited for checkups, vaccinations, or to collect bed nets. When asked about where they would go first for health issues, nearly half (46%) preferred PHC over hospitals (Table 2).

Table 1. Distribution of the socio-demographic characteristics of the participants (n=900)

Variable	Categories	Area of Residency				Total	
		Urban		Rural			
		n	%	n	%	n	%
	18-28	144	32.2	25	5.5	169	18.8
Age	29-38	197	44.1	243	53.6	440	48.9
	39-48	58	13.0	127	28.0	185	20.6
	49 and above	48	10.7	58	12.8	106	11.8
Gender	Male	265	59.3	212	46.8	477	53.0
	Female	182	40.7	241	53.2	423	47.0
	Illiterate	85	19.0	217	47.9	302	33.6
	Literate/Primary	39	8.7	35	7.7	74	8.2
Education level	Junior secondary	128	28.6	98	21.6	226	25.1
	Senior Secondary	150	33.6	95	21.0	245	27.2
	Undergrad and Postgrad	45	10.1	8	1.8	53	5.9
Marital Status	Single	263	58.8	212	46.8	475	52.8
	Married	104	23.3	153	33.8	257	28.6
	Cohabitating	75	16.8	80	17.7	155	17.2
	Divorced	5	1.1	8	1.8	13	1.4
	Formally employed	93	20.8	58	12.8	151	16.8
	Not Employed	293	65.5	395	87.2	688	76.4
Employment	Student	61	13.6	---	---	61	6.8
	Less than 4500 LD	287	64.2	392	86.5	679	75.4
	More than 4500LD	42	9.4	31	6.8	149	16.6
Income	No income	42	9.4	30	6.6	72	8.0
	Formal work	68	15.2	20	4.4	88	9.8
	Casual work	110	24.6	104	23.0	214	23.8
Source of income	Business	223	49.9	38	8.4	261	29.0
	Farming	37	8.3	283	62.5	320	35.5
	Other(carpenter	9	2.0	8	1.8	17	1.9
Number of family	1 to 5	344	77.0	348	76.8	692	76.9
members	6 to 10	76	17.0	93	20.5	169	18.8
	11 and above	27	6.0	12	2.6	39	4.3
	Radio	365	81.7	367	81.0	732	81.3
Media Source for	Internet	60	13.4	6	1.3	66	7.3
Information	TV&Newspaper	8	1.8	2	0.4	10	1.1
	Nothing	14	3.1	78	17.2	92	10.2

Table 2. Distribution of PHC Utilization (n=900)

Variable	Categories	Area of Residency				Total	
		Urban		Rural			
		n	%	n	%	n	%
Aware of PHC	Yes	398	89.0	344	75.9	742	82.4
Existence	No	49	11.0	109	24.1	158	17.6
	Public transportation	333	83.7	203	59.0	536	72.2
Mode of transport	Taxi	2	0.5	---	---	2	0.3
	Foot	63	15.8	141	41.0	204	27.5
	0- 30 minutes	330	82.9	59	17.2	389	52.4
	31-60 minutes	68	17.1	220	64.0	288	38.8
Time to reach	more than one hour	---	---	65	18.9	65	8.8
	less than 150 LD	376	94.5	211	61.3	587	79.1
Transport cost	more than 150 LD	22	5.5	133	38.7	155	20.9
PHC visit (last 6	Yes	356	79.6	283	62.5	639	71.0
month)	No	91	20.4	170	37.5	261	29.0
	treatment for illness	282	79.2	273	96.4	555	86.8
	Check-up (Pregnancy)	56	15.7	10	3.5	66	10.3
	Other(Bed net, Vaccine)	18	5.0	---	---	18	2.8
Reason of visit							
PHC before hospital	Yes	226	50.6	188	41.5	414	46.0
	No	221	49.4	265	58.5	486	54.0

Reasons for Non-Utilization of PHC

Among the 261 respondents who did not utilize PHC services, the most common reasons were unavailability of drugs (34.5%) and delays in service provision (20.7%). In rural areas, geographic distance (16.9%) and lack of money (13.4%) were also significant barriers. Only a small proportion (1.1%) cited the absence of a resident doctor as a reason, and 10.7% of respondents mentioned the lack of laboratory services (Table 3).

Table 3. Reasons for non-utilizing PHC (n=261)

Why not utilize PHC?	Residency				Total	
	Urban		Rural			
	n	%	n	%	n	%
Insufficient medicine there	21	18.2	69	47.2	90	34.5
No Doctor	2	1.7	1	0.6	3	1.1
Transport cost unaffordable	5	5.5	30	20.5	35	13.4
Low-quality service	2	1.7	2	1.3	4	1.5
Distance	---	---	44	30.1	44	16.9
No Lab test	4	3.4	24	14.1	28	10.7
Delay	54	46.9	---	---	54	20.7
It is only for pregnant women	1	0.8	---	---	1	0.1
No time	2	1.7	---	--	2	0.8

Factors Associated with PHC Utilization

There were significant differences between urban and rural areas in terms of PHC utilization (p=0.001), as well as in age (p=0.005), literacy (p=0.001), marital status (p=0.016), employment status (p=0.009), income (p=0.001), source of income (p=0.001), household size (p=0.003), and media exposure (p=0.001). Transportation access to PHCs (p=0.001), decision-making regarding healthcare (p=0.011), and health worker visits (p=0.011) were also statistically significant factors. No relationship was found between PHC utilization and gender or years of residence (Table 4).

Multivariate Logistic Regression

Binary logistic regression analysis identified several factors that significantly predicted PHC utilization. Rural dwellers were less likely to use PHC compared to urban residents (OR=0.562, CI=0.323-0.978, p=0.042). Participants aged 29-38 years were also less likely to use PHC (OR=0.447, CI=0.236-0.850, p=0.014). Those not employed had 2.9 times higher odds of utilizing PHC compared to employed participants (OR=2.941, CI=1.074-8.058, p=0.036). Respondents with higher monthly incomes (above 4500 LD) were 3.0 times more likely to use PHC (OR=3.017, CI=1.332-6.834, p=0.008). Lack of media exposure was a major barrier, with those who did not use any media being 90.8% less likely to use PHC (OR=0.092, CI=0.032-0.264, p<0.001). Households visited by service providers in the last six months were 2.5 times more likely to use PHC (OR=2.599, CI=1.698-3.980, p<0.001). Participants who reported a walking distance of more than 40 minutes to the nearest healthcare facility were less likely to use PHC (AOR=0.621, CI=1.800-17.550, p=0.003) (Table 5).

Table 4. The association between independent variables and PHC utilization (n=900)

Variable	Categories	PHC VISIT				P – value
		Yes		No		
		n	%	n	%	
Residency	Urban	356	55.7	91	34.9	0.001*
	Rural	283	44.3	170	65.1	
Age	18-28	137	21.4	32	12.3	0.005*
	29-38	295	46.2	145	55.6	
	39-48	136	21.3	49	18.8	
	49- and above	71	11.1	35	13.4	
Gender	Male	334	52.3	143	54.8	0.492
	Female	305	47.7	118	45.2	
Education level	Illiterate	178	27.9	124	47.5	0.001*
	Literate/Primary	45	7.0	29	11.1	
	Junior Secondary	165	25.8	61	23.4	
	Senior Secondary	207	32.4	38	14.6	
	Undergrad and Postgrad	44	6.9	9	3.4	
Marital Status	Single	341	53.4	134	51.3	0.016*
	Married	190	29.7	67	25.7	
	Cohabitating	96	15.0	59	22.6	
	Divorced	12	1.9%	1	0.4	
Employment	Employed	121	18.9	30	11.5	0.009*
	Not employed	471	73.7	217	83.1	
	Student	47	7.4	14	5.4	
Income	Less than 4500L D	464	72.6	215	82.4	0.001*
	More than 4500LD	131	20.5	18	6.9	
	No income	44	6.9	28	10.7	
Source of income	Formal Work	208	32.6	53	20.3	0.001*
	Casual work	150	23.5	64	24.5	
	Business	10	1.6	7	2.7	
	Farming	196	30.7	123	47.1	
	Other	10	1.6	7	2.7	
Number of family members	1 to 5	472	73.9	220	84.3	0.003*
	6 to 10	134	21.0	35	13.4	
	11 and above	33	5.2	6	2.3	
Media Source for Information	Nothing	17	2.7	75	28.7	0.001*
	Radio	556	87.0	176	67.4	
	TV& Newspaper	9	1.4	1	0.4	
	Internet	57	8.9	9	3.4	
Years of residency	1 to 5 years	188	29.4	70	26.8	0.421
	6 to 10 years	214	33.5	82	31.4	
	11years and above	237	37.1	109	41.8	
Transportation to the health facility	It is difficult	384	60.1	188	72.0	0.001*
	It is easy to find	255	39.9	73	28.0	
Who chooses	Husband	62	9.7	28	10.7	0.011*
	Myself	523	81.8	194	74.3	
	Suggestion by	54	8.5	39	14.9	
Health worker visit	Yes	527	82.5	151	57.9	0.001*
	No	112	17.5	110	42.1	
Nearest healthcare facility (by walk)	< 20 min	45	7.0	20	7.7	0.001*
	21-40min	268	41.9	89	34.1	
	>40min	320	50.1	124	47.5	
	I don't know	6	0.9	28	10.7	

*Significant relationship, $p < 0.05$

ANKARA MEDICAL JOURNAL

Table 5. Multivariate analyses of the association between independent variables and PHC utilization (n=900)

Independent	Categories	Dependent Variable (PHC utilized, PHC non-utilized)		
		OR	95%CI	P- value
Residency	Rural	0.562	0.323-0.978	0.042*
	Urban (Ref)			
Age	18-28	0.869	0.394-1.916	0.727
	29-38	0.447	0.236-.850	0.014*
	39-48	0.733	0.364-1.476	0.384
	49- and above(Ref)			
Education level	Illiterate	0.834	0.326-2.133	0.705
	Literate/Primary	0.657	0.233-1.853	0.427
	Junior Secondary	0.806	0.318-2.045	0.650
	Senior Secondary	1.642	0.642-4.199	0.301
	Undergrad and			
Marital Status	Single	1.623	0.988-2.667	0.056
	Married	1.535	0.907-2.598	0.110
	Divorced	4.998	0.566-44.158	0.148
	Cohabitating(Ref)			
Employment	Employed	2.129	0.867-5.230	0.099
	Non-Employed	2.941	1.074-8.058	0.036*
	Student (Ref)			
Income	less than 4500L D	1.485	0.751-2.935	0.256
	More than 4500LD	3.017	1.332-6.834	0.008*
	No income (Ref)			
Source of income	Casual work	1.502	0.436-5.170	0.519
	Farming	1.019	0.298-3.491	0.976
	Formal Work	0.677	0.346-5.136	1.332
	Business	1.606	0.467-5.524	0.452
	Other(Ref)			
Number of family members	1 to 5	0.494	0.180-1.355	0.170
	6 to 10	0.976	0.335-2.844	0.964
	11 and above(Ref)			
Media Source for Information	Radio	0.623	0.259-1.501	0.292
	TV&Newspaper	1.111	0.114-10.816	0.928
	Nothing	0.092	0.032-0.264	0.001*
	Internet(Ref)			
Transportation	It is difficult	1.184	0.742 1.888	0.479
	It is easy to find(Ref)			
Who chooses	Husband	1.319	0.611-2.848	0.481
	myself	0.103	0.909-2.856	0.103
	Suggestion by others(Ref)			
Health worker visit	Yes	2.599	1.698-3.980	0.001*
	No(Ref)			
Nearest healthcare facility (by walk)	<20min	3.401	0.944-12.245	0.061
	21-40min	0.621	1.800-17.550	0.003*
	>40min	8.583	2.788-26.425	0.101
	I don't know (Ref)			

*Significant relationship, $p < 0.05$

Discussion

The findings of this study indicate a higher prevalence of Primary health care utilization in the Urban region (79.6%) compared to the rural region (62.5%). It also suggests that Primary Health care utilization is influenced by the social demographic characteristics of individuals. There is a dependence between socioeconomic factors and primary healthcare utilization, as supported by a study conducted in Riyadh.[17] The study established that younger adults aged 29-38 were less likely to utilize Primary health care compared with older people. This finding is in line with a study conducted in Jordan that indicated a high utilization rate of PHC services among older adults.[18]

The current study suggests that the unemployed population is 2.941 times more likely to consume PHC services as compared to their employed counterparts, with narrow variation. This is supported by a study conducted in Gaza [19], which reported high use of PHC by unemployed participants compared to the employed. Whereas the study conducted in Syria revealed that employed participants were more likely to utilize health care services than the unemployed.[20] This study also indicates that males were more likely to utilize primary health care, 52.3% more than females, 47.7%, though the association between gender and PHC utilization was not statistically significant.

A study conducted in Saudi Arabia[21] supports this finding. The current study confirmed the association between the time involved in traveling to health care facilities and PHC utilization.[22,23] It also established that rural residents have more transportation difficulties and usually travel long distances to health care facilities. It suggests that 90.7% of rural residents had transportation difficulties, and 30.1% reported distance as a barrier to PHC utilization. This is supported by research conducted in Ghana, [24] which reports that distance harms utilization.

Another study conducted in the rural area of Pakistan reported that both men and women who resided more than three kilometers from the health unit were less likely to be high users of PHC compared to those living within less than one kilometer away.[25]

Quality primary health care service delivery requires resources like laboratory, drugs, finances, and modes of transport such as ambulances.[26] This study revealed that the process of healthcare delivery and its organizational structure affect the outcome. Inavailability of drugs and laboratory services was reported by 34.5% of the population as a constraint to PHC utilization. Many people go to health facilities to get drugs. If they can not get drugs, they see going to a health facility as a waste of time. As a result, they end up going to the pharmacy and drugstore for treatment. Furthermore, most of the urban and rural PHC facilities do not have a laboratory, which is required in a PHC facility. Additionally, this study identified laboratory absence as a

hindrance to PHC utilization; 10.7% of non-utilizers reported it as a barrier. A study conducted in Nigeria and Malawi [27,28] reported a positive association between Laboratory availability and PHC performance at the primary care level. Laboratory helps to reduce unnecessary referrals and overload in secondary and tertiary care. Health care costs also influence health-seeking behaviour. This study identified a link between non-use of primary health care (PHC) services and financial barriers, with 13.4% of respondents reporting financial difficulties as a reason for not accessing PHC; this finding is supported by a study conducted in Nigeria.[28] Majority of non utilizers especially from rural area reported dfficulty in undertaking the cost of drugs and service at PHC facilities Service providers play a major role in increasing the PHC utilization rate. This study revealed that Community health care providers' visits in the various communities, raising awareness on the importance of PHC utilization , encouraging defaulters and undecisive population to go to PHC as well as taking PHC services to them such as family planning increases PHC utilization rate. This is supported by a commentary written by A. Witmer et al on the health system of United states [29] which states that Community health workers play important role to make health system function effecientlly as well as primary care. The finding of a reviewed of 26 studies done by Lassi et al revealed community based interventions decrease women and babies morbidity and mortality it also improves care related outcomes especially in low and middle income countries.[30]

A key strength of this study is its use of advanced data collection methods, including community-based interviews conducted by experienced researchers and field assistants. Participants were randomly selected from both urban and rural areas, enhancing the study's representativeness. However, the cross-sectional design limits the ability to establish causality. Additionally, since responses were self-reported, there is a potential risk of recall bias.

In conclusion, in Margibi County, Liberia, significant disparities in Primary Health Care (PHC) utilization were observed, with urban areas demonstrating higher access to healthcare services than rural areas. Key factors such as limited media exposure, long distances to healthcare facilities, and socioeconomic barriers primarily affected rural residents, exacerbating inequalities in healthcare access. Additionally, factors like income level, employment status, and proximity to healthcare providers influenced PHC utilization. Active engagement by healthcare workers, including awareness campaigns and community outreach, emerged as critical in improving PHC access. To reduce these urban-rural health disparities, policymakers need to prioritize strengthening PHC infrastructure, particularly in rural areas. Tailored interventions and targeted healthcare delivery models are necessary to ensure equitable access to essential health services across all communities in Liberia.

ANKARA MEDICAL JOURNAL

Ethical Considerations: Ethical approval for this study was obtained from the Ethics Committee of Ankara Yildirim Beyazit University (Approval Code: 2022-671). In addition, authorization was granted by the Margibi County Health Team, representing the Ministry of Health at the county level.

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

References

1. World Heath Organization. Primary health care [Internet]. World Health Organization. 2023 [cited 2025 Feb 13]. Available from: https://www.who.int/news-room/fact-sheets/detail/primary-health-care
2. Halcomb E, Ashley C. Primary Health Care. In: Handbook of Social Sciences and Global Public Health. Cham: Springer International Publishing; 2023. p. 181–202.
3. Aksungur A, Özturk Emiral G, Bağcı HH. Awareness adult syrian refugee women on family planning methods. Ankara Med J. 2024;24(1):28–39.
4. Action PP. Forster T, Kentikelenis A, Bambra C. Healh inequalities in Europe: setting the stage for progressi-ve policy action. FEPS-TASC, 2018.
5. van Weel C, Kidd MR. Why strengthening primary health care is essential to achieving universal health coverage. Can Med Assoc J. 2018 Apr 16;190(15):E463–6.
6. Nwokoro UU, Ugwa OM, Ekenna AC, Obi IF, Onwuliri CD, Agunwa C. Determinants of primary healthcare services utilisation in an under-resourced rural community in Enugu State, Nigeria: a cross-sectional study. Pan Afr Med J. 2022;42.
7. World Health Organization. Trends in Maternal Mortality: 1990 to 2013 Estimates by WHO, UNICEF, UNFPA. Geneva World Heal Organ. 2014;1–68.
8. Kruk ME, Rockers PC, Tornorlah Varpilah S, Macauley R. Population Preferences for Health Care in Liberia: Insights for Rebuilding a Health System. Health Serv Res. 2011 Dec 21;46(6pt2):2057–78.
9. Republic of Liberia Health Equity and Social Determinants of Health Assessment. 2023;
10. Ministry of Health Republic of Liberia. Essential Package of Health Services for Universal Health Coverage. Minist Heal Repub Lib. 2022;
11. Liberia Ministry of Health, L. Revise National Community Health Services Policy. MINISTRY OF HEALTH Monrovia, Liberia. 2021.
12. Dadzie JE, Kanagasabai U. A Policy Analysis of the Primary Health Care Approach in Liberia. Hygiene. 2022 Feb 13;2(1):44–62.
13. LISGIS. Final Results: 2022 Liberia Population and Housing Census. Liberia Institute of Statistics and Geo-Information Services. 2023.
14. S. K. Lwanga and S. Lemeshow. Sample size determination in health studies : a practical manual. WHO; 1991. p. 1 and 25.
15. Rahman SA. Utilization of Primary Health Care Services in Rural Bangladesh : University of London; 2001.
16. MOUHOUMED HM. Barriers in Primary Healthcare Service Utilization among Adults in Borama in the Northwestern Awdal Region of Somaliland. Ankara Yıldırım Beyazıt University; 2020.

17. Alsubaie AM, Almohaimede KA, Aljadoa AF, Jarallah OJ, Althnayan YI, Alturki YA. Socioeconomic factors affecting patients' utilization of primary care services at a Tertiary Teaching Hospital in Riyadh, Saudi Arabia. 2016;
18. Alkhawaldeh A, Holm MB, Qaddumi J, Petro W, Jaghbir M, Al Omari O. A Cross-sectional study to examine factors associated with primary health care service utilization among older adults in the irbid governorate of jordan. Curr Gerontol Geriatr Res. 2014;2014.
19. Abu-Mourad T, Alegakis A, Shashaa S, Koutis A, Philalithis A. Individual determinants of primary healthcare utilisation in Gaza Strip, Palestine. J Epidemiol Community Health. 1979;62(8):701–7.
20. Ballout K, Mehmet Orhun N. Accessibility to Health Care Services and Treatment for People with Noncommunicable Diseases in Northwest Syria. Int J Soc Determ Heal Heal Serv. 2024 Oct 1;54(4):441–53.
21. Alghamdi K, Aljohani A, Taha J, Qari L, Demyati M, Alzahrani S, et al. Awareness and Utilization of the Primary Health Care Services in Al-Madinah, Saudi Arabia. WORLD Fam Med EAST J Fam Med. 2020;18(2):33–41.
22. Rolle R. Ahuru IJO. Predictors of Antenatal Care Utilization in Primary Healthcare Centers in Eight Rural Communities in Delta State , Nigeria . Background : We examined the socio-demographic factors that influence early timing and an adequate number of ANC visits in Primary. 2019;8(June):1–22.
23. Perry B, Gesler W. Physical access to primary health care in Andean Bolivia. Soc Sci Med. 2000;50(9):1177–88.
24. Buor D. Distance as a predominant factor in the utilisation of health services in the Kumasi metropolis, Ghana. GeoJournal. 2002;56:145–57.
25. Panezai S, Ahmad MM, Saqib SE. A Gender-Based Assessment of Utilization of Primary Health Care Services and Associated Factors in Pakistan. PONTE Int Sci Res J. 2020;76(1):82.
26. Mediterranean WHORO for the E. Quality improvement in primary health care : a practical guide. 2004. (WHO Regional publications, Eastern Mediterranean Series (26), 2004).
27. Dacombe RJ, Squire SB, Ramsay AR, Banda HT, Bates I. Essential medical laboratory services: their role in delivering equitable health care in Malawi. Malawi Med J. 2007 Oct;18(2):33–5.
28. Sule SS, Ijadunola KT, Onayade AA, Fatusi AO, Soetan RO, Connell FA. Utilization of primary health care facilities: Lessons from a rural community in southwest Nigeria. Niger J Med. 2008 Apr;17(1):98–106.
29. Witmer A, Seifer SD, Finocchio L, Leslie J, O'neil EH. Commentary Community Health Workers: Integral Members of the Health Care Work Force.
30. Lassi ZS, Bhutta ZA. Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes. Cochrane Database Syst Rev. 2015 Mar;2015(3).

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):235-244 // 10.5505/amj.2025.75044

WOMEN AUTONOMY IN HEALTH AND FAMILY PLANNING MATTERS: A CROSS-SECTIONAL STUDY OF URBAN JABALPUR, MADHYA PRADESH

Shashi Prabha Tomar[1], Anusree Jayamohan[1]

[1]Department Of Community Medicine, Nscb Medical College, Jabalpur, Madhyapradesh

Correspondence:
Shashi Prabha Tomar (e-mail: tomarshashi13@gmail.com)

Submitted: 03.10.2024 // Accepted: 27.06.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

ANKARA MEDICAL JOURNAL

Abstract

Objectives: The process of empowerment gives people the ability to take command, develop self-assurance, increase awareness, increase mobility, and make decisions. Getting women's voices heard when making decisions that affect them, their families, and the community is essential to improving women's quality of life. According to an Indian study, women in both age groups have higher levels of education, are more progressive in their viewpoints, and have more influence over decisions made in the home.

Materials and Methods: For the study, 200 Indian women in Jabalpur, Madhya Pradesh, were surveyed to find out if they were involved in healthcare decisions. The multistage random sampling technique was used. To provide information, the family's female head filled out a semi-structured questionnaire. The study was conducted in accordance with the protocol approved by the Institutional Ethics Committee.

Results: A study in Jabalpur, MP, found that 42.5% of families make decisions on contraception, with women making more independent decisions about health care, shopping, and purchasing clothing and jewellery. Women's involvement in social and private affairs was low, with only 32.7% actively participating in health care decisions.

Conclusion: The study reveals that 85% of women have reduced autonomy in healthcare decision-making, despite having the right to participate. The findings suggest that educated partners and small families could improve women's decision-making autonomy in maternal health service use and family planning.

Keywords: Women, healthcare, contraception, autonomy.

Introduction

Empowerment is a process and outcome that empowers individuals to take charge, grow self-assured, raise awareness, improve mobility and choice, strengthen control over resources, and make decisions.[1] Decision-making is a vital part of women's empowerment, and India is one of the world's least gender-equal countries. The Global Gender Gap report placed India 127th out of 146 countries in the world, with lower rankings in health and survival, political empowerment, educational attainment, and economic participation and opportunity.[2]

Involving women in decision-making processes helps societies undergo positive transformations through changes in institutions, laws, policies, services, and social norms. To improve the quality of life for women at all societal levels, it is crucial to ensure their opinions are heard when making decisions that impact their own, families', and the community. Women must participate in decision-making in all spheres and have equal authority and representation to men. Society must guarantee equal access to all levels of decision-making and institutions that represent a diverse range of individuals and communities.[3]

According to a study done in India, women's place in the home has a moderate overall decision-making index score (75%). The findings show that women in both the younger and older age groups have more progressive views, have more say in decisions made in the home, and have significantly higher levels of education, all of which raise the empowerment indices of women.[4]This study will facilitate a more thorough examination of the barriers that prevent women from exercising their fundamental right to make decisions about their health and household affairs. The goal of the study is to determine how much women participate in social issues and healthcare decision-making, look into the factors that influence this involvement, and provide a foundation for future research.

Materials and Methods

The study was conducted in Urban Jabalpur, Madhya Pradesh, using a cross-sectional design. The sample size was calculated using the formula $n = z^2 \frac{pq}{l^2}$

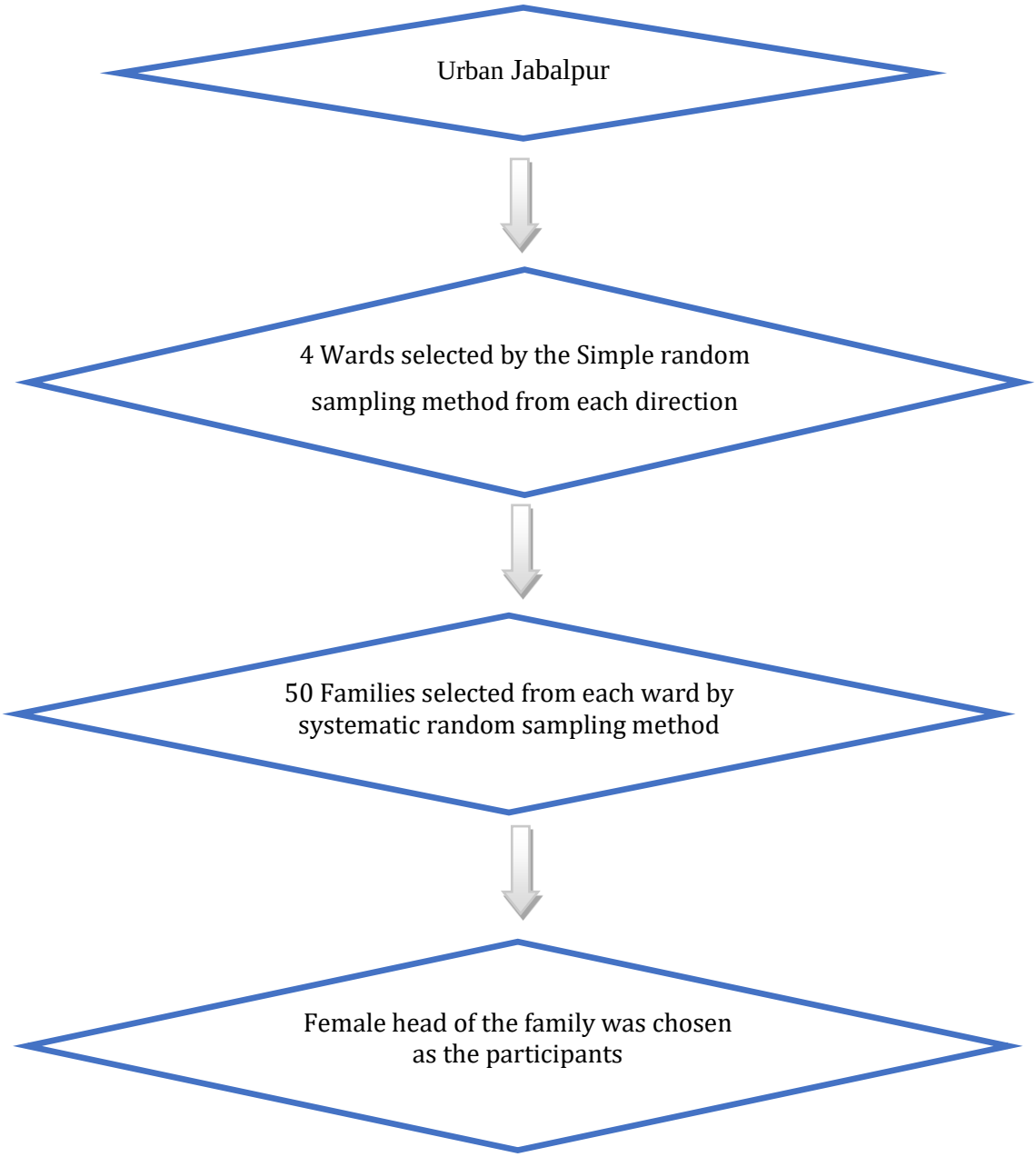
Where n is the desired sample,

p = Decision making index =0.75,

q = 1- p = 1-0.75 = 0.25,

l=10 % relative error = 0.075,

n = (4* 0.75 * (1-0.75)) / 0.0056=134. The minimum sample size was 148, and a sample of 200 was chosen. Multistage random sampling was used, with the selection of wards in the first stage and families from wards in the second stage.



Data included socio-demographic information, decision scores regarding four items: purchasing clothes and jewelry, going to markets, owning healthcare, and decision-making about contraceptives. We used a pretested interviewer-administered questionnaire to obtain the data from the female head of the family.

The decision-making index (DMI) was calculated by giving a score of 1 to matters where decisions were solely taken by women and 0 to those taken by others or in combination.

Calculation of the DMI score of individual respondents = Matters in which decision was taken by women/ total no of matters in which decisions were taken in percentage. The DMI score of individual respondents ranged from 0 to 100 and was grouped as low (0-40), medium (40-70), and high (70-100) based on the DMI score. The study followed the protocol approved by the Institutional Ethics Committee, obtained informed consent from participants, and informed them of the voluntary nature of their participation. Data analysis included descriptive statistics of the main variables and statistical analysis using SPSS version 23. Chi-square test was used to find the association.

Results

This research is based on a field study that involved 200 families in Jabalpur, MP. In the majority of families, or 42.5%, both the husband and the wife decide on contraception. A comparatively greater proportion of wives were discovered to be capable of making decisions about their own health care (40%), going to the market (42%), and buying clothing and jewellery (35.5%) (Table 1).

Table 1. Distribution of decision-making

Decision Making	Wife alone (%)	Husband alone (%)	Husband and wife (%)	Others (%)	N/A (%)
Go to a social function	42	10	43	5	0
Purchase of clothes and jewelleries	35.5	5	59.5	0	0
Go to market	42	1.5	56	0.5	0
Own health care	40	5	54	1	0
Use of contraception	3	1.5	42.5	0.5	52.5

The DECISION-MAKING INDEX (DMI) revealed that the majority of women, or 85% fell into the low category, 10.5% into the medium category, and 4.5% into the high category (Figure 1).

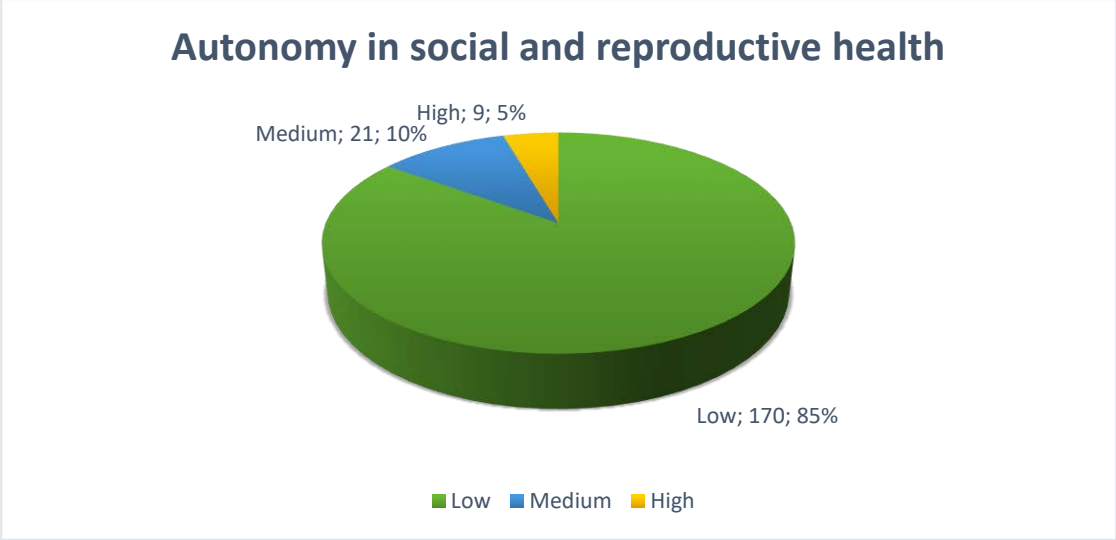


Figure 1. Decision-making index

We also inquired about the women's level of involvement in various social and private affairs (Table 2).

It was discovered that women generally accompanied their husbands to social events and the market. Most of the time, women made independent decisions about what jewellery and clothing to buy for themselves. However, it was discovered that certain groups of women did not fully enjoy independence, including women of joint families (27%), women of the scheduled caste/scheduled tribe category (6.1%), Hindus (33%), and non-working women (32.3%). According to our study, only 32.7% of women in the general category actively participated in choosing their own health care, and most of the time, the husband and wife made this decision together. A comparable situation was observed in families with Muslim members (20%), working women (31.7%), and joint families (27%). Second, family planning decisions were made jointly by the husband and wife, and it was discovered that the wife's contribution was extremely low—it never exceeded 15% overall, except for Christian women, who participated at a rate of 50%. Middle-aged women were found to be more decisive. Overall, women were more likely to purchase clothing, jewellery, go shopping, take care of their own health, and make fewer decisions when it comes to using contraception.

ANKARA MEDICAL JOURNAL

Table 2. Decision regarding social and healthcare

Variables		Go to a social function	Purchase of clothes and jewelleries	Go to market	Own health care	Use of contraception
Religion	Hindu	22(11.83)	63(33.87)	82(44.09)	76(40.86)	5(2.639)
	Muslim	0(0)	7(70)	0(0)	2(20)	0(0)
	Christian	2(100)	2(100)	1(50)	1(50)	1(50)
	Others	0(0)	0(0)	0(0)	0(0)	0(0)
	P value	*0.050*	0.108	0.359	0.910	0.126
Educational status of husband	Illiterate	1(14.2)	0(0)	3(42.86)	5(71.43)	0(0)
	Primary	5(20)	1(4)	16(64)	18(72)	2(8)
	Secondary	2(6.06)	8(24.24)	13(39.39)	13(39.39)	2(6.06)
	Higher secondary	5(15.63)	15(46.88)	9(28.13)	12(37.5)	1(3.13)
	Graduation	6(10.71)	24(42.86)	23(41.07)	20(35.71)	1(1.79)
	Post graduation	4(11.11)	19(52.78)	15(41.67)	10(27.78)	0(0)
	Professional	1(9.09)	5(45.45)	4(36.36)	1(9.09)	0(0)
	P value	0.572	*0.002*	*0.003*	*0.001*	0.282
Educational status of wife	Illiterate	5(22.73)	1(4.55)	10(45.45)	13(59.09)	0(0)
	Primary	1(3.57)	3(10.71)	14(50)	17(60.71)	2(7.14)
	Secondary	3(10)	13(43.33)	12(40)	9(30)	1(3.33)
	Higher secondary	5(16.13)	12(38.71)	11(35.48)	16(51.61)	2(6.45)
	Graduation	6(9.84)	27(44.26)	25(40.98)	17(27.87)	0(0)
	Post graduation	4(16.67)	14(58.33)	9(37.5)	7(29.17)	1(4.17)
	Professional	0(0)	2(50)	2(50)	0(0)	0(0)
	P value	0.654	*0.001*	0.753	*0.014*	0.115
Income status per capita	>=5113	24(13.19)	72(39.56)	82(45.05)	72(39.56)	5(2.75)
	1257-5112	0(0)	0(0)	1(8.33)	5(41.67)	1(8.33)
	1553-2556	0(0)	0(0)	0(0)	2(50)	0(0)
	3767-1532	0(0)	0(0)	0(0)	0(0)	0(0)
	<767	0(0)	0(0)	0(0)	0(0)	0(0)
	P value	0.114	0.181	0.435	0.209	0.678
Type of family	Nuclear	18(12.24)	52(35.37)	61(41.5)	62(42.18)	3(2.04)
	Joint	2(5.41)	10(27.03)	11(29.73)	10(27.03)	2(5.41)
	Three Generation	4(25)	10(62.5)	11(68.75)	7(43.75)	1(6.25)
	P value	0.055	0.124	0.077	*0.004*	*0.032*
Working status	Employed	7(11.67)	26(43.33)	23(38.33)	19(31.67)	2(3.33)
	Non employed	17(12.14)	46(32.86)	60(42.86)	60(42.86)	4(2.86)
	P value	0.177	0.331	0.456	0.063	0.699
Age of marriage	10-19 years	13(16.88)	13(16.88)	40(51.95)	45(58.44)	6(7.79)
	20-29 years	10(9.01)	53(47.75)	39(35.14)	31(27.93)	0(0)
	30 and above	1(10)	5(50)	3(30)	3(30)	0(0)
	P value	0.759	*0.002*	0.517	*0.010*	0.355
Age of the woman	10-19	0(0)	0(0)	0(0)	0(0)	0(0)
	20-29	1(2.94)	4(11.76)	14(41.18)	16(47.06)	1(2.94)
	30-39	5(7.25)	26(37.68)	23(33.33)	26(37.68)	0(0)
	40-49	12(17.65)	25(36.76)	33(48.53)	29(42.65)	3(4.41)
	50-59	6(26.09)	12(52.17)	11(47.83)	7(30.43)	2(8.7)
	60=+	0(0)	5(83.33)	2(33.33)	1(16.67)	0(0)
	P value	0.204	*0.003*	0.640	0.682	0.541
Age of first conception	NA	0(0)	3(60)	4(80)	2(40)	0(0)
	10-19	8(25)	5(15.63)	20(62.5)	22(68.75)	5(15.63)
	20-29	14(9.33)	59(39.33)	55(36.67)	51(34)	1(0.67)
	30-39	2(16.67)	4(33.33)	3(25)	4(33.33)	0(0)
	40-49	0(0)	1(100)	1(100)	0(0)	0(0)
	50+	0(0)	0(0)	0(0)	0(0)	0(0)
	P value	0.559	0.220	0.258	0.158	*0.003*

*p value < 0.05- significant, Chi-square test was employed to find the association

Table 3. DMI of individual variables

	Go to a social function	Purchase of clothes and jewelleries	Go to market	Own healt care	Use of contraception
Mean DMI	12.77	37.07	39.70	36.78	4.27
SD	14.86	23.67	18.60	17.14	8.12

Discussion

The emphasis on freedom of movement as a human right is found in Article 13 of the Universal Declaration of Human Rights. However, unsafe environments and cultural practices limit women's freedom. Due to the limitations on their educational and career options, they follow tradition by getting married, becoming stay-at-home mothers, and accepting domestic roles. This has a significant impact on women's empowerment, and finding a solution requires more thoughtful discussion. [4] Compared to the extreme age groups, women in the mid-age range think more progressive ideas and participate in decision-making.[4] There are studies where older women often have greater autonomy in healthcare decision-making due to their life experiences and past decisions [5–7]. However, it might be due to the newlywed women's status in the household. Because they have less decision-making authority as a newlywed daughter-in-law, they defer to the main decision-makers. In addition, younger women face more stringent gender norms than older women, including pressure to have children. As a result, as they age, they gain authority with more and bigger responsibilities and the ability to make their own decisions.[6]

According to this study, there is no correlation between a husband's educational background and women's empowerment. It is a well-known fact that education gives women the ability to rise from positions of weakness and exert control over various aspects of life, including the reduction of gender inequality. [8,9]

In our study, over 83% of respondents are Hindu, making it unfair to compare women's autonomy with faith. Further exploration of determinants of women's autonomy among Muslim, Christian, and other religious women is recommended. We found that the Indian culture's ingrained preference for sons may be the reason for women's low regard for their freedom to choose how many children to have; in India, the husband and his family typically make this decision [4] Decision-making authority was frequently subordinated to the influence of customs and culture. Moreover, women had to make decisions during childbirth, but their husbands and families also had an impact. [10] This was also the scenario of Nigeria as we went through the literature.[11] Low

levels of autonomy can result in low uptake of delivery care services even for women who have sufficient financial resources, education, or both.[12,13] Since achieving women's economic empowerment is essential to achieving gender equality and women's rights, women may use health services more frequently as their economic status rises and they gain more financial autonomy. Research carried out in developing nations has revealed that women's economic status has an impact on their independence in making decisions and using their power for their own advantage.[6] We observed in our study that DMI was not improved with levels of education or employment.

According to a study by Yogendra Rajah (2013), getting health care had a positive moderate relationship with empowerment (<0.50).[14] Research has indicated that there may be a strong conceptual overlap between mental health and empowerment, and that there may be mutually reinforcing pathways in the realisation of these concepts. As a result, community-building development initiatives may also advance mental health and well-being. [15]

According to a summary of the findings, women most frequently chose not to participate in interventions aimed at improving their health because they felt unsupported by their husbands and families.[7] Support networks have been associated with better physical and mental health outcomes and are an essential part of social cohesion, the biggest social determinant of health.

Even though every woman has the right to participate in her healthcare decision making, 85% women have diminished autonomy in decision making regarding their health service use and social participation. This study concludes that well-educated partners and small family size could lead to women’s decision-making autonomy on maternal health service use and family planning. The discussion calls for comprehensive strategies that go beyond simplistic solutions, fostering inclusive dialogue and addressing the root causes of inequality to move towards a more equitable future.

Ethical Considerations: The study was approved by the Ethics Committee at the Netalji Subhash Chandra Bose Medical College, Jabalpur (Date: 17.12.2019; No: IEC/2019/10108)

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

References

1. Lassi ZS, Ali A, Meherali S. Women's Participation in Household Decision Making and Justification of Wife Beating: A Secondary Data Analysis from Pakistan's Demographic and Health Survey. Int J Environ Res Public Health. 2021 Sep 23;18(19).
2. UNFPA, Statistics M of, Implementation P, Sample Registration System (SRS) 2018-2020, Survey-5 2019-2021 NFH, Survey NA, et al. Update on the context and situation of children [Internet]. 2023 p. 1 of 9. Available from: https://www.unicef.org/media/152691/file/India-2023-COAR.pdf
3. Secretariat LS. Participation of women in decision making in India [Internet]. Available from: https://www.mospi.gov.in/sites/default/files/publication_reports/women-men22/ParticipationDecisionMaking22.pdf
4. Misra R, Srivastava S, Mahajan R, Thakur R. Decision Making as a Contributor for Women Empowerment: A Study in the Indian Context. Journal of Comparative Asian Development. 2021 Jan;18:79–99.
5. Idris IB, Hamis AA, Bukhori ABM, Hoong DCC, Yusop H, Shaharuddin MAA, et al. Women's autonomy in healthcare decision making: a systematic review. BMC Women's Health. 2023 Dec 2;23(1):643.
6. Nepal A, Dangol SK, Karki S, Shrestha N. Factors that determine women's autonomy to make decisions about sexual and reproductive health and rights in Nepal: A cross-sectional study. PLOS Glob Public Health. 2023;3(1):e0000832.
7. Arun A, Prabhu MP. Social determinants of health in rural Indian women & effects on intervention participation. BMC Public Health. 2023 May 19;23(1):921.
8. Osamor PE, Grady C. Women's autonomy in health care decision-making in developing countries: a synthesis of the literature. International Journal of Women's Health. 2016;8:191–202.
9. Gailits N, Mathias K, Nouvet E, Pillai P, Schwartz L. Women's freedom of movement and participation in psychosocial support groups: qualitative study in northern India. BMC Public Health. 2019 Jun 10;19(1):725.
10. Nyakang'o SB, Booth A. Women's perceived barriers to giving birth in health facilities in rural Kenya: A qualitative evidence synthesis. Midwifery. 2018;67:1–11.
11. Osamor P, Grady C. Factors associated with women's health care decision-making autonomy: empirical evidence from Nigeria. J Biosoc Sci. 2018 Jan;50(1):70–85.
12. Ntenda PAM. Women's status within the household as a determinant of institutional delivery in Malawi. Midwifery. 2019;74:44–56.
13. Rizkianti A, Afifah T, Saptarini I, Rakhmadi MF. Women's decision-making autonomy in the household and the use of maternal health services: An Indonesian case study. Midwifery. 2020;90:102816.

14. Yogendrarajah R. Women Empowrment through Decision Making. International Journal for Economics and Business Management. 2013 Jan;Volume 3:P75.
15. Kermode M, Herrman H, Arole R, White J, Premkumar R, Patel V. Empowerment of women and mental health promotion: a qualitative study in rural Maharashtra, India. BMC Public Health. 2007 Aug 31;7:225.

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):245-259 // 10.5505/amj.2025.26125

EXPLORING THE RELATIONSHIP BETWEEN METABOLIC SYNDROME AND DEMENTIA IN A POST-COVID CLINICAL POPULATION

Furkan Bektaş[1], Cüneyt Ardıç[1]

[1]Department of Family Medicine, Recep Tayyip Erdoğan University, Rize, Türkiye

Correspondence:
Furkan Bektaş (e-mail: furkan-bektas@windowslive.com)

Submitted: 23.03.2025 // Accepted: 30.08.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

ANKARA MEDICAL JOURNAL

Abstract

Objectives: This study aimed to assess the cognitive functions and dementia risk among individuals with and without metabolic syndrome who had previously contracted COVID-19, using Mini-Mental State Examination (MMSE) scores. It also aimed to support early and effective interventions for those at risk of dementia or metabolic syndrome in accordance with clinical guidelines.

Materials and Methods: This descriptive cross-sectional study included 375 participants aged 18 years and older who visited the COVID-19 follow-up clinic. During the clinic visit, the MMSE was administered, and participants underwent blood pressure measurement, anthropometric assessment, and laboratory testing.

Results: A statistically significant association was found between dementia frequency and factors such as age, education level, and female gender in the post-COVID population (95% CI; OR=1.039, p=0.001; OR=2.937, p=0.004; OR=1.793, p=0.038, respectively). Although dementia was more common among individuals with metabolic syndrome compared to those without, this relationship was not statistically significant (OR=1.347, p=0.266).

Conclusion: In line with the principles of family medicine, which emphasize early recognition and community health responsibility, we recommend cognitive screening for at-risk individuals. Tools such as the MMSE, which offer valuable insights into cognitive decline, should be used proactively to improve public health outcomes.

Keywords: Metabolic Syndrome, dementia, mini-mental state examination.

Introduction

Metabolic syndrome is characterized by a cluster of metabolic disorders, including high blood pressure, hyperglycemia, central obesity, and dyslipidemia. [1,2] Metabolic syndrome is thought to be a risk factor for coronary heart disease, other cardiovascular diseases, stroke, and type 2 diabetes. [3,4] Approximately 25% of the Western population shows some characteristics of insulin resistance syndrome. [5] In a study conducted to determine the prevalence of metabolic syndrome in Turkey, metabolic syndrome was detected in one-fourth of men and one-third of women. [6]

The incidence of metabolic syndrome generally parallels the incidence of obesity and type 2 diabetes. As a result of the global obesity study conducted in 195 countries in 2015, obesity was found in 604 million adults and 108 million children. Since 1980, the prevalence of obesity has doubled in 73 countries, and increases have been observed in many other countries. Of even greater concern is the rate of growth in childhood obesity, which is even higher. [7]

The importance of examining insulin resistance alongside the more easily measured features of the syndrome is unknown. In addition, although no formal definition of metabolic syndrome includes glycated hemoglobin (A1c), abnormal A1c (5.7 to 6.4 percent) is increasingly considered appropriate and is used to characterize impaired glycemia in patients with metabolic syndrome. [8]

Dementia is an acquired disorder characterized by a decline in cognition involving one or more cognitive domains (learning and memory, language, executive function, complex attention, perceptual-motor, and social cognition). [9,10] These must represent a decline from the previous level of function and be severe enough to interfere with daily function and independence. As the global population ages, the prevalence of dementia is expected to increase significantly over the next few decades, particularly in low- and middle-income countries. [11]

The Lancet Commission estimates that around 35% of dementia cases are attributable to a combination of nine potentially modifiable risk factors: Low education level, midlife hypertension, midlife obesity, hearing loss, senile depression, diabetes, physical inactivity, smoking, and social isolation. [12]

Age remains the most important risk factor for dementia, especially Alzheimer's disease. The incidence of Alzheimer's disease approximately doubles with each decade after age 60. Overall, about 85% of dementia cases occur in adults aged 75 and older. [13,14]

This study aims to examine the relationship between metabolic syndrome and dementia in patients attending a post-COVID follow-up clinic.

Cognitive and behavioral assessments are designed to distinguish between normal and abnormal performance in several conditions. The Mini-Mental State Examination is the most commonly used screening test for dementia. [15]

Although there is some evidence linking metabolic syndrome and dementia, longitudinal cohort studies have yielded different results. In the French Three-City study, metabolic syndrome was associated with a modest increase in the risk of cognitive decline. [16] In the Honolulu-Asian Aging Study, metabolic syndrome was weakly associated with vascular dementia but not Alzheimer's. [17] In the Italian longitudinal study on aging, several individual components of the metabolic syndrome were associated with the risk of developing dementia and mild cognitive impairment. [18]

Although the study was conducted among individuals who had previously contracted COVID-19, it did not directly evaluate the impact of the infection on metabolic syndrome or dementia. Instead, the focus of the study was the post-COVID status of patients. This study aims to explore the association between metabolic syndrome and dementia among post-COVID patients. The innovative contribution of this study lies in its focus on a clinical population in Türkiye recovering from COVID-19, addressing the long-term cognitive implications that have received limited attention in the existing literature. However, this population may experience lingering inflammatory responses, chronic metabolic changes, and cognitive dysfunction that persist after the acute phase of infection.

Materials and Methods

Data source and study population

It consists of patients aged 18 and over who applied to the COVID-19 follow-up clinic within the department of family medicine of a university hospital in Türkiye between 03.01.2022, when patient admissions started, and 01.05.2023. In the G power analysis, the power of the study was determined as 94% and the sufficient sample size was defined as 370 people with α=0.05, X parm π=0.2, critical z=1.95 values , and 95% confidence interval.

The Ethics Committee of Recep Tayyip Erdogan University, with decision number 2022/189, deemed our study scientifically and ethically appropriate during a meeting held on October 27, 2022.

Rize Provincial Health Directorate's Scientific Research Application Review Commission approved our study's conduct in a letter dated May 27, 2022, numbered E-64247179-799.

The Scientific Research Platform of the Ministry of Health (Türkiye) evaluated our conduct of this study as appropriate in its letter dated April 28, 2022.

All patients were informed about the study, and written consent was obtained. The study adhered to the ethical principles of the Declaration of Helsinki.

The assessments, particularly the administration and scoring of the Mini-Mental State Examination, were conducted by trained professionals who were blinded to the participants' metabolic syndrome status to minimize assessment bias.

Inclusion Criteria

• Having a positive Covid-19 PCR test result

• COVID-19 follow-up clinics have been opened in certain centers across the country by the Republic of Turkey Ministry of Health to follow up on patients who had COVID-19. In our hospital, the task of managing this polyclinic has been undertaken by our department. Other units were also informed and asked to refer patients who had Covid-19 to our polyclinic for follow-up. Patients who have attended the COVID-19 follow-up clinic, since it is the unit where we can collect the data of patients who had COVID-19 and apply it to our hospital most comprehensively.

• Being 18 years of age or older

Exclusion Criteria

• Individuals diagnosed with dementia or Alzheimer's

• Pregnants

• Individuals without the requested laboratory tests

The study was completed with 375 patients, considering the inclusion and exclusion criteria, and the data were analyzed.

In our descriptive cross-sectional study, the Mini-Mental State Test, standardized according to the patients' education levels, was administered face-to-face during the examination, and all sections in the Public Health Management System COVID-19 Tracking Module were filled out. The MMSE was administered only to patients who met the inclusion criteria and were eligible for cognitive assessment. The choice of MMSE version was adjusted according to each participant's education level to ensure accuracy. Specifically, lower-educated patients received a simplified MMSE version, while higher-educated patients received the full version. This ensured the cognitive load was appropriate for each participant.

The Mini-Mental State Test, which measures mental status, is a scale that evaluates cognitive functions in five different parts (orientation, recall, attention and calculation, and language). The total score is 30. Those with scores of 24 and below ought to be examined for dementia. [19,20]

It has been reported to be highly correlated with similar screening tests, including the standardized and more comprehensive Wechsler Adult Intelligence Scale (WAIS) and the Modified Blessed Test, which assess cognitive functions. [21,22]

In our study, the Mini-Mental State Test was administered to individuals with five years or more of education, and the Mini-Mental State Test, designed for the uneducated, was administered to individuals with less than five years of education. 24-30 points are normal, 18-23 points are compatible with mild dementia, and 17 points and below are compatible with severe dementia.

Following the algorithm of the Republic of Turkey Ministry of Health for patients applying to the COVID-19 follow-up Polyclinic, fasting blood sugar, urea, creatinine, eGFR, uric acid, total cholesterol, triglyceride, HDL, LDL, non-HDL, VLDL, alt, ast, sodium, potassium, calcium, iron, iron-binding, magnesium, phosphorus, total iron binding capacity, CRP, HbA1c, hemogram, free T4, TSH, ferritin, vitamin B12, folate, aPTT, PT, INR, fibrinogen, d-dimer, chest X-ray and electrocardiography tests were performed on the patients.

The demographic information section in the Covid Tracking Module consists of questions about the patient's marital status, educational status, whether they have children, the number of children, who they live with, body weight, and blood type. The vaccination section includes information on how many doses of which COVID-19 vaccine the patient has received. In the habits section, the patient's smoking, alcohol, drug use, and exercise status were questioned. In the physical examination section, patients' vital signs, anthropometric measurement data, and all physical examination findings were recorded.

In the chronic diseases section, we questioned the patients about their chronic diseases, medications, and surgeries before and after the COVID-19 infection and recorded the answers.

In the IDF guideline, different threshold values for central obesity were accepted for different races, unlike the WHO and NCEP-ATP III guidelines (Table 1). We used the International Diabetes Federation (IDF) guideline for the diagnosis of metabolic syndrome in our research in terms of its suitability for our country.

We obtained the HDL, fasting blood glucose, and triglyceride parameters used to evaluate the metabolic syndrome of the patients from their examinations at the COVID-19 follow-up clinic.

Participants' anthropometric and blood pressure measurements were taken by the researcher and the nurse on duty at the COVID-19 follow-up clinic during the outpatient clinic visit.

Statistical Analysis

The SPSS 25.0 program was used for statistical analyses. While evaluating the study data, descriptive statistics (mean, standard deviation, median, minimum, maximum, difference between values, frequency, proportion) as well as the Kolmogorov-Smirnov test were used to check the conformity of continuous and discrete variables, including age, BMI, and mini-mental state test to normal distribution. Variables conforming to a normal distribution are presented with mean and standard deviation. One-way ANOVA test was used to compare three or more groups of normally distributed variables, the Bonferroni test was used to determine the group causing the difference, and the Student t-test was used in evaluations according to two groups. Variables that do not conform to a normal distribution are presented with median and standard deviation. The Kruskal-Wallis test was used to compare variables that did not show normal distribution between groups, the Dunn test was used to determine the group causing the difference, and the Mann-Whitney U test was used in evaluations according to two groups. The Pearson Chi-Square test was used to compare qualitative data in evaluating the relationships between variables. In chi-square analyses, the groups were combined when the expected value in the cells was below 5. (Dementia levels such as mild/severe dementia and normal, not using alcohol, such as using/quitting alcohol). In analyses comparing more than one group, post-hoc analyses were applied for the group that revealed the difference. The significance level was determined as $p<0.05$.

Primary variables affecting dementia were determined by Logistic Regression. Primary variables related to dementia were determined by applying Logistic Regression to gender, education level, employment status, alcohol grams, age, and metabolic syndrome, which were found to be associated with dementia at the $p < 0.20$ level in one-way analyses. Age grouping was made as follows: under 30 years old, 30-49 years old, 50-64 years old, 65 years old and above.

Results

The frequency of metabolic syndrome in women was 42.6% (n=104), and in men it was 55.0% (p=0.022). According to marital status, the prevalence of metabolic syndrome was 27.4% (n=17) in singles, 50.2% (n=150) in married individuals, and 64.3% (n=9) in divorced individuals (p=0.002). The frequency of metabolic syndrome according to age groups was 15.2% in those under 30, 35.5% in the 30-49 age group, 68.9% in the 50-64 age group, and 57.7% in the 65 and over age group. (p=0.0001) (Table 1)

Table 1. Distribution of metabolic syndrome frequency according to sociodemographic characteristics

	With Metabolic Syndrome		**Without Metabolic Syndrome**		**Total**		**p**
Gender	**n**	**%**	**n**	**%**	**n**	**%**	
Female	104	42.6	140	57.4	244	100.0	**0.022**
Male	72	55.0	59	45.0	131	100.0	
Marital status							
Single	17	27.4	45	72.6	62	100.0	**0.002**
Married	150	50.2	149	49.8	299	100.0	
Divorced	9	64.3	5	35.7	14	100.0	
Age							
Under 30	7	15.2	39	84.8	46	100.0	**0.0001**
30-49	55	35.5	100	64.5	155	100.0	
50-64	84	68.9	38	31.1	122	100.0	
65 and over	30	57.7	22	42.3	52	100.0	
Total	176	46.9	199	53.1	375	100.0	

The mean age of those with metabolic syndrome is 53.40±11.87, while it is 43.55±14.27 in those without metabolic syndrome. (p=0.0001). Table 2 shows the distribution of dementia levels by gender. The frequency of severe dementia is 5.0% in women and 0.0% in men. The frequency of mild dementia in women was 24.5%, while it was 22.5% in men (p=0.028). Severe dementia has begun to be seen in the 50 and above age group, while mild dementia has been seen in all age groups. (p=0.001) (Table 2)

Table 2. Level of dementia frequency distribution according to sociodemographic characteristics

	Severe Dementia		Mild Dementia		Normal		Total		p
Gender	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Female	12	5.0	59	24.5	170	70.5	241	100.0	**0.028**
Male	0	0.0	29	22.5	100	77.5	129	100.0	
Age									
Under 30	0	0.0	7	15.6	38	84.4	45	100.0	**0.001**
30-49	0	0.0	30	19.5	124	80.5	154	100.0	
50-64	6	5	28	23.3	86	71.7	120	100.0	
65 and over	6	11.8	23	45.1	22	43.1	51	100.0	
Total	12	3.2	88	23.8	270	73.0	370	100.0	

The frequency of dementia was 24.2% (n=15) in single, 27.2% (n=80) in married, and 35.7% (n=5) in widowed/divorced. (p=0.673). As the level of education increased, the prevalence of dementia decreased. The frequency of dementia was 68.0% (n=17) in those with no education, and 9.9% in those with university or higher education. (p=0.0001). The frequency of dementia in employees was 18.6% (n=32), while it was 34.3% (n=68) in unemployed individuals. (p=0.001) (Table 3)

Table 3. Frequency of dementia according to sociodemographic characteristics

	Dementia		Normal		Total		p
	n	**%**	**n**	**%**	**n**	**%**	
Marital status							
Single	15	24.2	47	75.8	62	100.0	
Married	80	27.2	214	72.8	294	100.0	0.673
Widow/Divorced	5	35.7	9	64.3	14	100.0	
Education							
No	17	68.0	8	32.0	25	100.0	**0.0001**
Primary/Secondary	43	27.7	112	72.3	155	100.0	
High school	30	33.7	59	66.3	89	100.0	
University/Higher	10	9.9	91	90.1	101	100.0	
Employment status							
Unemployed	68	34.3	130	65.7	198	100.0	**0.001**
Employee	32	18.6	140	81.4	172	100.0	
Total	100	23.8	270	73.0	370	100.0	

The frequency of metabolic syndrome was 56.0% in those with chronic diseases and 30.3% in those without chronic diseases. (p=0.0001). 30.9% of the participants have hypertension. The frequency of metabolic syndrome among individuals with hypertension is 68.1% and 37.5% in those without hypertension. (p=0.0001). 14.4% of participants have diabetes. The prevalence of metabolic syndrome was 88.9% among those with diabetes and 39.9% among those without diabetes. (p=0.0001). 4.8% of participants have cardiovascular disease. The frequency of metabolic syndrome among those with cardiovascular disease (83.3%) is significantly higher than the prevalence of metabolic syndrome among those without cardiovascular disease (45.1%). (p=0.002). Dementia was found in 27% of the participants. The frequency of metabolic syndrome was identified as 50% among those with dementia and 45.9% among those without dementia. (p=0.486) (Table 4)

Table 4. Frequency of metabolic syndrome according to disease status

		Metabolic Syndrome		Without Metabolic Syndrome		Total		p
		n	%	n	%	n	%	
Chronic disease								
	No	40	30.3	92	69.7	132	100.00	**0.0001**
	Yes	136	56.0	107	44.0	243	100.00	
Hypertension								
	No	97	37.5	162	62.5	259	100.00	**0.0001**
	Yes	79	68.1	37	31.9	116	100.00	
Diabetes								
	No	128	39.9	193	60.1	321	100.00	**0.0001**
	Yes	48	88.9	6	11.1	54	100.00	
Cardiovascular disease								
	No	161	45.1	196	54.9	357	100.00	**0.002**
	Yes	15	83.3	3	16.7	18	100.00	
Dementia								
	No	124	45.9	146	54.1	270	100.00	0.486
	Yes	50	50	50	50	100	100.00	
Total		176	46.9	199	53.1	375	100.00	

The severity of COVID-19 infection, hospitalization status, and symptom duration were not evaluated, which may limit interpretation regarding the impact on metabolic or cognitive status.

Although individuals with a previous diagnosis of dementia were excluded, cases of mild and severe cognitive impairment detected via the Mini-Mental State Examination during post-COVID follow-up were classified and analyzed as dementia for this study.

In the logistic regression analysis, the prevalence of dementia was identified as 2.9 times higher in non-university graduates. (p=0.004). Dementia is 1.8 times more common in women. (p=0.038). Each unit increase in age increases the risk of dementia by 1.039 times. (p=0.001) (Table 5)

Table 5. Primary variables associated with the presence of dementia (Logistic regression)

	B	SE	p	OR	%95 CI
Age	0.038	0.010	0.001	1.039	1.019-1.060
Not being a university graduate	1.094	0.377	0.004	2.937	1.427-6.252
Female gender	0.584	0.281	0.038	1.793	1.033-3.112
Metabolic syndrome	0.298	0.267	0.266	1.347	0.797-2.275

Discussion

We found a statistically significant relationship between age, education level, female gender, and the prevalence of dementia. (%95 CI, respectively OR:1.039; p=0.001, OR=2.937; p=0.004, OR=1.793; p=0.038).

Although the prevalence of dementia was higher in individuals with metabolic syndrome, the relationship was not statistically significant. (OR=1.347; p=0.266). Although a potential association was observed between metabolic syndrome and dementia, this finding did not reach statistical significance and should be interpreted cautiously.

In a study conducted in China with 9004 participants, the prevalence of dementia in women was identified as higher than in men, with a rate of 61.87%. (Zhou ve diğerleri, 2022).

A cohort study by the Mayo Clinic also showed that the risk of dementia was almost twice as high in women who had bilateral oophorectomy before menopause and that there was no increased risk of Alzheimer's in those who used hormone replacement therapy until at least the age of natural menopause. [23]

The reason for the higher frequency of dementia in women might be that dementia increases with age and the longer average lifespan of women, and may also be related to the hormonal decrease in estrogen after menopause. [24]

A study conducted at the University of Toronto comparing older adults aged 65 and over with younger adults aged 18 to 30 showed that older adults, especially those with higher levels of education, use the frontal cortex as an alternative pathway to aid cognition, and the higher the level of education, the more such asly they are to use the frontal cortex, resulting in better memory performance. [25]

In prospective cohort studies conducted on 1298 individuals in the United States and 1260 individuals in Spain, an increase in all dementia subtypes was observed with age. [26,27]

Because dementia is caused by diseases that damage the brain, including Alzheimer's disease or vascular diseases, it can take a long time to develop, and therefore, aging becomes a risk factor for dementia. Age also poses a risk for dementia, as older adults are more likely to have conditions including high blood pressure, damaged, twisted, or blocked brain vessels, increased risk of stroke, a weaker immune system, a slower ability to heal, and brain cells that are not as active as those of younger people. [28]

Previous studies investigating the association between metabolic syndrome and dementia have reported inconsistent results.

In a study conducted in South Korea with 84,144 individuals with 8 years of follow-up, metabolic syndrome was identified as associated with Alzheimer's (OR 11.48, 95% CI 9.03, 14.59, $p<0.0001$), but no association was found with vascular dementia (OR 1.17, %95 GA 0.94, 1.47, $p=0.158$). [29]

In the French Three-City cohort study conducted on 7807 people, it was found that metabolic syndrome increased the risk of vascular dementia ($p=0.01$) but did not increase the risk of Alzheimer's ($p=0.39$). [30]

The associations between metabolic syndrome and cognitive impairment varied according to the characteristics of the study population, the various criteria used to define metabolic syndrome, the different approaches used to assess cognitive function, and the different follow-up periods.

In conclusion, it should also be remembered that metabolic syndrome, which has turned into a global epidemic, may increase the prevalence of dementia. According to the principles of family medicine of assuming responsibility for the community and seeing problems at early/undifferentiated stages, we consider and recommend that necessary measurements be made in every patient applying to the outpatient clinic and that tests including the mini-mental status test, which could be performed in a short time but which can also reveal the risk of disease to a significant extent, be applied to patients to improve the health of the community and to provide material and moral benefits for the public good. As the level of education increases, the prevalence of both metabolic syndrome and dementia decreases. This indicates that raising an educated society can significantly reduce the burden on the health system. In this regard, the importance of providing at least an individual health and awareness education to society and practices aimed at increasing the level of general education is clearly felt.

Limitations

A major limitation of this study is the absence of detailed information regarding the severity of the participants' COVID-19 infections. Factors such as symptom duration, hospitalization, and treatment were not systematically recorded and could have influenced the outcomes. These should be explored in future research.

Ethical Considerations: This study was conducted with the approval of the Ethics Committee of Recep Tayyip Erdogan University (Date: 07.11.2022; No: 2022/189), and necessary institutional permissions were obtained.

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

This study was presented at the 13th International Family Medicine Congress (AHEKON), held in Antalya, Turkey, on November 1–5, 2023.

References

1. Cai H, Huang J, Xu G, et al. Prevalence and determinants of metabolic syndrome among women in Chinese rural areas. PLoS One. 2012;7(5). doi:10.1371/JOURNAL.PONE.0036936
2. Isomaa B, Almgren P, Tuomi T, et al. Cardiovascular morbidity and mortality associated with the metabolic syndrome. Diabetes Care. 2001;24(4):683-9. doi:10.2337/diacare.24.4.683
3. Martínez-Hernández A, Córdova EJ, Rosillo-Salazar O, et al. Association of HMOX1 and NQO1 Polymorphisms with Metabolic Syndrome Components. PLoS One. 2015;10(5). doi:10.1371/JOURNAL.PONE.0123313
4. Rochlani Y, Pothineni NV, Mehta JL. Metabolic syndrome: Does it differ between women and men? Cardiovasc Drugs Ther. 2015;29(4):329-38. doi:10.1007/S10557-015-659–6/METRICS
5. Wang Y, Mi J, Shan XY, Wang QJ, Ge KY. Is China facing an obesity epidemic and the consequences? The trends in obesity and chronic disease in China. Int J Obes (Lond). 2007;31(1):177-88. doi:10.1038/SJ.IJO.0803354
6. Abaci A, Kiliçkap M, Göksülük H, et al. [Data on prevalence of metabolic syndrome in Turkey: Systematic review, meta-analysis and meta-regression of epidemiological studies on cardiovascular risk factors]. Turk Kardiyol Dern Ars. 2018;46(7):591-601. doi:10.5543/TKDA.2018.00878
7. Afshin A, Forouzanfar MH, Reitsma MB et al. Health Effects of Overweight and Obesity in 195 Countries over 25 Years. N Engl J Med. 2017;377(1):13-27. doi:10.1056/NEJMOA1614362
8. James B Meigs, MD M. Metabolic syndrome (insulin resistance syndrome or syndrome X). UpToDate. Published online 2021. Accessed June 6, 2023. https://www.uptodate.com/contents/metabolic-syndrome-insulin-resistance-syndrome-or-syndrome-x?search=metabolic syndrome&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1#H3
9. American Psychiatric Association. DIAGNOSTIC AND STATISTICAL MANUAL OF DSM-5 TM. Published online 2013.
10. McKhann GM, Knopman DS, Chertkow H, et al. The diagnosis of dementia due to Alzheimer's disease: recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. Alzheimers Dement. 2011;7(3):263-9. doi:10.1016/J.JALZ.2011.03.005
11. Larson EB. Risk factors for cognitive decline and dementia - UpToDate. UpToDate. Published online 2022. Accessed June 7, 2023. https://www.uptodate.com/contents/risk-factors-for-cognitive-decline-and-dementia?search=dementia and insulin resiztance syndrome&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1
12. Livingston G, Sommerlad A, Orgeta V, et al. Dementia prevention, intervention, and care. Lancet (London, England). 2017;390(10113):2673-2734. doi:10.1016/S0140-6736(17)3136–6

13. Carone M, Asgharian M, Jewell NP. Estimating the lifetime risk of dementia in the Canadian elderly population using cross-sectional cohort survival data. J Am Stat Assoc. 2014;109(505):24-35. doi:10.1080/01621459.2013.859076
14. Niu H, Álvarez-Álvarez I, Guillén-Grima F, Aguinaga-Ontoso I. Prevalence and incidence of Alzheimer's disease in Europe: A meta-analysis. Neurologia. 2017;32(8):523-32. doi:10.1016/J.NRL.2016.02.016
15. Tsoi KKF, Chan JYC, Hirai HW, Wong SYS, Kwok TCY. Cognitive Tests to Detect Dementia: A Systematic Review and Meta-analysis. JAMA Intern Med. 2015;175(9):1450-8. doi:10.1001/JAMAINTERNMED.2015.2152
16. Raffaitin C, Féart C, Le Goff M, et al. Metabolic syndrome and cognitive decline in French elders: the Three-City Study. Neurology. 2011;76(6):518-25. doi:10.1212/WNL.0B013E31820B7656
17. Kalmijn S, Foley D, White L, et al. Metabolic cardiovascular syndrome and risk of dementia in Japanese-American elderly men. The Honolulu-Asia aging study. Arterioscler Thromb Vasc Biol. 2000;20(10):2255-60. doi:10.1161/01.ATV.20.10.2255
18. Solfrizzi V, Scafato E, Capurso C, et al. Metabolic syndrome and the risk of vascular dementia: the Italian Longitudinal Study on Ageing. J Neurol Neurosurg Psychiatry. 2010;81(4):433-40. doi:10.1136/JNNP.2009.181743
19. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12(3):189-98. doi:10.1016/0022-3956(75)9002–6
20. Güngen C, Ertan T, Eker E, Yaşar R, Engin F. Standardize Mini Mental Test'in Türk Toplumunda Hafif Demans Tan›s›nda Geçerlik ve Güvenilirliği Türk Psikiyatri Dergisi 2002; 13(4):273-281. Türk Psikiyatr Derg. 2002;13(4):273-81. Accessed June 18, 2023. http://www.turkpsikiyatri.com/c13s4/standardizemini.pdf
21. Fillenbaum GG, Heyman A, Haynes CS. Comparison of two screening tests in Alzheimer's disease. The correlation and reliability of the Mini-Mental State Examination and the modified Blessed test. Arch Neurol. 1987;44(9):924-7. doi:10.1001/ARCHNEUR.1987.00520210026014
22. Horton AM, Slone DG, Shapiro S. Neuropsychometric correlates of the Mini-Mental State Examination: preliminary data. Percept Mot Skills. 1987;65(1):64-6. doi:10.2466/PMS.1987.65.1.64
23. Rocca WA, Bower JH, Maraganore DM, et al. Increased risk of cognitive impairment or dementia in women who underwent oophorectomy before menopause. Neurology. 2007;69(11):1074-83. doi:10.1212/01.WNL.0000276984.19542.E6
24. Mielke MM, Vemuri P, Rocca WA. Clinical epidemiology of Alzheimer's disease: assessing sex and gender differences. Clin Epidemiol. 2014;6(1):37-48. doi:10.2147/CLEP.S37929
25. Springer M V, McIntosh AR, Winocur G, Grady CL. The relation between brain activity during memory tasks and years of education in young and older adults. Neuropsychology. 2005;19(2):181-92. doi:10.1037/0894-4105.19.2.181

26. Ganguli M, Dodge HH, Chen P, Belle S, DeKosky ST. Ten-year incidence of dementia in a rural elderly US community population: the MoVIES Project. Neurology. 2000;54(5):1109-16. doi:10.1212/WNL.54.5.1109
27. López-Pousa S, Vilalta-Franch J, Llinàs-Regla J, Garre-Olmo J, Román GC. Incidence of dementia in a rural community in Spain: the Girona cohort study. Neuroepidemiology. 2004;23(4):170-7. doi:10.1159/000078502
28. Cooper C, Llewellyn D, Ranson J. Risk factors for dementia. Published online 2021. Accessed June 21, 2023. https://www.alzheimers.org.uk/sites/default/files/pdf/factsheet_risk_factors_for_dementia.pdf
29. Kim YJ, Kim SM, Jeong DH, Lee SK, Ahn ME, Ryu OH. Associations between metabolic syndrome and type of dementia: analysis based on the National Health Insurance Service database of Gangwon province in South Korea. Diabetol Metab Syndr. 2021;13(1). doi:10.1186/S13098-020-0062–5
30. Raffaitin C, Gin H, Empana JP, et al. Metabolic syndrome and risk for incident Alzheimer's disease or vascular dementia: the Three-City Study. Diabetes Care. 2009;32(1):169-74. doi:10.2337/DC08-0272

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):260-270 // 10.5505/amj.2025.51196

MENTAL HEALTH AMONG MEDICAL STUDENTS: AN EXAMINATION OF EATING ATTITUDES, BODY IMAGE, AND DEPRESSION

Gizem Gencan[1], Samet Can Demirci[2]

[1]Department of Pediatrics, Lokman Hekim University Faculty of Medicine, Ankara, Türkiye

[2]Department of Child and Adolescent Psychiatry, Lokman Hekim University Faculty of Medicine, Ankara, Türkiye

Samet Can Demirci (e-mail: sametcandemirci@gmail.com)

Submitted: 26.05.2025 // Accepted: 29.08.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

Abstract

Objectives: This study aimed to investigate eating attitudes, body image perceptions, and depression levels among medical students, a population known to face considerable mental health challenges due to the rigorous nature of medical training.

Materials and Methods: A cross-sectional study was conducted with 359 students (205 females and 154 males) enrolled at Yozgat Bozok University's Faculty of Medicine. Participants completed self-report questionnaires assessing depressive symptoms, body image satisfaction, and eating behaviors. Sociodemographic data were also collected to explore potential risk factors.

Results: Depression levels were significantly higher among female students ($p<0.001$) and those originating from rural areas ($p<0.001$). A considerable proportion (42.9%) of students reported dissatisfaction with their physical appearance, and 55.4% stated that others' opinions influenced their body image. Furthermore, 79.9% indicated that their emotional states affected their eating behaviors. However, statistical analysis revealed no significant correlations between eating attitudes, body image perceptions, and depression scores.

Conclusion: Although no direct relationships were observed between eating attitudes, body image, and depression, the high prevalence of psychological distress and body dissatisfaction—particularly among female and rural-background students—highlights the need for targeted mental health interventions. Addressing these issues within medical education may help enhance students' psychological resilience and well-being, ultimately benefiting their future clinical practice.

Keywords: Eating attitudes, body image dissatisfaction, depression, medical students, mental health

Introduction

The number of individuals with inadequate and unbalanced nutrition is steadily increasing. Numerous studies indicate that university students often exhibit negative eating behaviors or attitudes, such as skipping meals and consuming fast food. [1,2] Changes in eating habits encountered during this period are thought to potentially have adverse effects on students' post-graduation lives. Negative eating behaviors and attitudes have been shown to lead to distorted body image perceptions and depressive symptoms. [1,3]

Medical school is one of the most demanding and challenging academic fields due to its heavy theoretical workload, difficult working conditions, rigorous examinations, and intense working hours. [4] Consequently, medical students are at a higher risk of developing negative eating behaviors and experiencing related physiological or psychological issues. [5]

While negative eating behaviors are common among university students in general, medical students are believed to be more vulnerable to these issues due to the intense stress they experience during their education. [6] However, research specifically focusing on eating behaviors, body image, and mental health among medical students remains limited.

Therefore, this study aims to evaluate eating attitudes, body image, depression, and associated factors in medical students, a high-risk group. Such research is crucial for understanding the unique challenges faced by medical students and for informing potential interventions to address these issues.

Materials and Methods

The population of the study is students studying at Yozgat Bozok University Faculty of Medicine. The sample of the study consisted of a total of 359 volunteer university students, 205 women, and 154 men.

Sociodemographic questionnaire, Eating Attitude Test (EAT), Body Image Scale (VAS), and Beck Depression Inventory (BDI) were used as data collection tools.

Eating Attitude Test (EAT): It was developed by Garner and Garfinkel (1979) [7] as a self-assessment scale to measure the symptoms of anorexia nervosa and was adapted into Turkish by Savaşir and Erol (1989). [8]

EAT has been adapted to Turkish, and validity/reliability studies have been conducted; it has been frequently used on university students and various demographic groups. Studies show that EAT is an important tool in the early diagnosis of eating disorders and psychological evaluations. [9]

Body Image Scale (BIS): It was developed by Secord and Jourard (1953) to measure individuals' satisfaction with body parts and functions. The Turkish adaptation of BIS was made by Hovardaoğlu (1992), and the Cronbach Alpha coefficient of the scale was determined as 0.91. This scale consists of a total of 40 questions in a 5-point Likert-type scale about various parts and functions of the body (I don't like it at all = 1, I don't like it = 2, I'm undecided = 3, I like it = 4, and I like it very much = 5). The lowest score can be 40, and the highest score can be 200 from the answers given to these questions. [10]An increase in the score indicates that individuals' body satisfaction increases, and a decrease in the score indicates that satisfaction decreases. [10,11]

Beck Depression Inventory (BDI): It is a self-rating scale widely used to measure symptoms of depression. This inventory, first developed by Aaron T. Beck in 1961, is used to determine individuals' depression levels. BDI is a 21-item inventory, and each item assesses various symptoms of depression (e.g., sadness, hopelessness, loss of self-esteem). Each item is rated from 0 to 3, and the total score indicates the individual's level of depression. [12]

In conclusion, BDI is widely used as a reliable and valid tool for assessing symptoms of depression and provides important data in various psychological studies.

Sample Size Calculation

The required sample size for this study was determined using GPower version 3.1 [13]. Assuming a medium effect size (Cohen's $f^2 = 0.15$), an alpha level of 0.05, and a desired statistical power of 0.80 for multiple regression analysis with up to five predictors, the minimum sample size required was calculated as 92 participants. Our final sample of 359 students exceeded this threshold, ensuring adequate power to detect medium or larger effect sizes.

Statistical Analysis

IBM SPSS Statistics version 22.0 was used to analyze the data. Descriptive data were shown as mean ± standard deviation for continuous variables and as numbers and percentages for categorical variables. Chi-square test was used to analyze categorical variables. A value of $p<0.05$ was considered statistically significant.

Results

The average age of medical school students participating in the study was 22.6 years. 205 (57.1%) students were female, and 357 (99.4%) were single. 338 (94.2%) people lived in the city. The income level of 78% was medium, and 17% was low. 83.6% of the students were not working in any additional job.

27.3% of the students had a history of psychological illness. 18.4% people were currently on a diet. The rate of those who had a history of plastic surgery before was 8.4%, and the rate of those considering having plastic surgery was quite high at 38.4%. 42.9% of the students did not like their bodies aesthetically.

55.4% of the students stated that other people's opinions affect their attitudes towards themselves. 79.9% stated that their emotional state affected the act of eating. 20.1% of the students were doing sports regularly (Table 1).

Table 1. Demographic Characteristics of the Research Participants

Characteristic	
Age (Years)	22.6±1.6
Gender	
Male	154 (42.9%)
Woman	205 (57.1%)
Marital Status	
Married	2 (0.6%)
Single	357 (99.4%)
Living Space	
Village	5 (1.4%)
Town	16 (4.5%)
City	338 (94.2%)
Income Rate	
Low	61 (17.0%)
Middle	280 (78.0%)
High	18 (5.0%)
Working Status	
Working	59 (16.4%)
Not Working	300 (83.6%)
Psychosocial, Aesthetic, and Lifestyle Variables	
History Of Previous Psychological İllness	98 (27.3%)
Currently On A Diet	66 (18.4%)
History Of Previous Plastic Surgery	30 (8.4%)
Considering Plastic Surgery	138 (38.4%)
Satisfied With Body Aesthetics	205 (57.1%)
Other People's Opinions Affect Attitudes Towards	199 (55.4%)
Emotions Affect Eating	287 (79.9%)
Doing Sports Regularly	72 (20.1%)

According to BDI results, 27% of medical school students had moderate mood disorders. 7.5% had clinical depression, 11.7% had moderate depression, 4.5% had severe depression, and 0.3% had major depression. Currently, 24% of the students have depression (Table 2).

Table 2. Beck Depression Inventory Results of the Study Participants

Beck Depression Inventory	**n**	**%**
Normal	176	49.0
Moderate Mood Disorder	97	27.0
Clinical Depression	27	7.5
Moderate Depression	42	11.7
Severe Depression	16	4.5
Major Depression	1	0.3
Total	**359**	**100.0**

BDI scores were found to be statistically significantly higher in female students (p<0.001). No relationship was found between marital status, income status, and employment status and BDI scores. However, the BDI score of people living in villages was found to be statistically significantly higher compared to those living in cities (p<0.001) (Table 3).

Table 3. Relationship between Beck Depression Inventory Scores and Demographic Data

BDI Scores			
	n (%)	**Mean ± SD**	***p***
Gender			
Male	154 (42.9%)	8.6±5.8	<0.001
Woman	205 (57.1%)	14.9±9.1	
Marital Status			
Married	2 (0.6%)	24.0±0.0	0.050
Single	357 (99.4%)	12.1±8.4	
Living Space			
Village	5 (1.4%)	35.2±6.8	
Town	16 (4.5%)	9.9±5.1	<0.001
City	338 (94.2%)	12.0±8.1	
Income Rate			
Low	61 (17.0%)	11.8±6.5	
Middle	280 (78.0%)	12.2±8.9	0.614
High	18 (5.0%)	14.0±6.4	
Working Status			
Working	59 (16.4%)	14.3±11.7	0.038
Not Working	300 (83.6%)	11.8±7.6	

No relationship was found between EAT scores and gender, marital status, place of living, income levels, or employment status. No statistically significant relationship was found between EAT scores and depression status (Table 4).

Table 4. Relationship Between Eating Attitude Test Scores and Demographic Data

EAT Scores			
	n (%)	**Mean ± SD**	***p***
Gender			
Male	154 (42.9%)	129.7±35.3	0.917
Woman	205 (57.1%)	129.3±28.1	
Marital Status			
Married	2 (0.6%)	129.0±0.0	0.982
Single	357 (99.4%)	129.5±31.5	
Living Space			
Village	5 (1.4%)	136.8±4.9	
Town	16 (4.5%)	117.0±41.9	0.237
City	338 (94.2%)	129.9±31.0	
Income Rate			
Low	61 (17.0%)	135.7±30.7	
Middle	280 (78.0%)	128.9±31.5	0.062
High	18 (5.0%)	116.5±28.9	
Working Status			
Working	59 (16.4%)	119.5±33.9	0.007
Not Working	300 (83.6%)	131.4±30.5	
Depression State			
None	273 (76.1%)	132.0±31.5	0.005
There İs	86 (23.9%)	121.3±31.3	

Body Image Scale (BIS) scores did not show a statistically significant relationship with any of the examined demographic variables (gender, marital status, place of residence, income level, and employment status), nor with the presence of depression or eating attitudes (Table 5).

Table 5. Relationship of Body Image Scale (BIS) scores with Demographic Characteristics, Depression, and Eating Attitudes

BDI Scores			
Variable	**n (%)**	**Mean ± SD**	**p**
Gender			
Male	154 (42.9%)	108.4±31.5	0.396
Woman	205 (57.1%)	105.5±30.9	0.396
Marital Status			
Married	2 (0.6%)	66.5±26.1	0.067
Single	357 (99.4%)	107.0±31.1	0.067
Living Space			
Village	5 (1.4%)	98.5±17.5	0.689
Town	16 (4.5%)	109.5±25.4	0.689
City	338 (94.2%)	106.8±31.6	0.689
Income Rate			
Low	61 (17.0%)	108.3±30.6	0.434
Middle	280 (78.0%)	107.0±31.5	0.434
High	18 (5.0%)	98.727.3	0.434
Working Status			
Working	59 (16.4%)	112.4±27.4	0.126
Not Working	300 (83.6%)	105.6±31.8	0.126
Depression State		106.5±31.9	
None	273 (76.1%)	106.6±31.9	0.868
There Is	86 (23.9%)	107.2±28.9	0.868
Beck Depression Inventory and EAT Scores			
	BIS	**n (%)**	**Mean ± SD**
BDI Scores	High (≥135)	67 (18.7%)	11.9±8.0
BDI Scores	Low (<135)	292 (81.3%)	12.3±8.6
EAT Scores	High (≥135)	67 (18.7%)	131.1±31.5
EAT Scores	Low (<135)	292 (81.3%)	129.1±31.4

Discussion

This study assessed eating attitudes, body image, and depression levels among medical students, exploring potential relationships between these factors. Our findings revealed significantly higher depression levels in female students and those from rural areas. However, no meaningful associations were detected between eating attitudes, body image, and depression levels. Although the absence of significant associations between eating attitudes, body image, and depression contradicts much of the existing literature [4,14,15], several factors may explain this finding. First, the homogeneity of our sample drawn from a single medical faculty may have reduced variability in socioeconomic and cultural backgrounds, limiting the detection of associations.[16] Second, social desirability bias may have influenced self-reported measures, particularly on sensitive topics such as

body image and eating behaviour. [17] Third, medical students' heightened health awareness could have mitigated the severity or reporting of disordered eating attitudes, thereby weakening correlations with depressive symptoms. [6] Lastly, the cross-sectional design precludes any causal inference, and the temporal relationship between these variables may require longitudinal investigation to be fully understood. These findings warrant further analysis in the context of the existing literature to better understand the underlying dynamics.

Consistent with previous research, female students exhibited significantly higher depression scores than their male counterparts (p<0.001). Studies by Liao et al. (2010) and Abed et al. (2015) similarly demonstrated that women are more vulnerable to the psychological pressures associated with medical education, reporting elevated risks of both depression and eating disorders. [18-20] This increased susceptibility may stem from gender-related societal expectations, differences in coping mechanisms, and the cumulative stress of academic and social responsibilities.

The elevated depression scores observed in students from rural areas (p<0.001) align with findings from previous research, including studies by Bayram et al. (2008) and Lian et al. (2023). [16,21] These studies highlighted the heightened vulnerability of rural-origin students to depression, often attributed to factors such as social isolation, limited access to academic resources, geographic dislocation, and cultural adaptation challenges. Rural students may face additional psychological burdens stemming from reduced support networks, socioeconomic disparities, and the stress of transitioning to urban academic environments.

Interestingly, no significant associations were identified between Eating Attitudes Test (EAT) scores and gender, income level, or depression levels in our study. This contrasts with findings from Jahrami et al. (2024), who reported a heightened prevalence of eating disorders among medical students. [5,22] The absence of such a relationship in our sample could stem from several factors. Participants may have provided socially desirable responses, especially on sensitive topics like eating behaviors. Additionally, the study's limited scope, restricted to a single university, may have introduced homogeneity in socioeconomic and cultural characteristics. Furthermore, medical students' heightened awareness of health-related behaviors might influence their eating habits, potentially mitigating risks associated with disordered eating.

Body image scores showed no significant association with gender, income level, or depression. However, 42.9% of participants expressed dissatisfaction with their physical appearance, and 55.4% reported being influenced by others' opinions. While literature often links body image dissatisfaction with depression and eating disorders (Mohamed et al., 2023; Manaf et al., 2016), this relationship might not have emerged in our study due to cultural differences, sample homogeneity, or medical students' health awareness. [14,15] Social desirability

bias may have also influenced responses. Further research with diverse samples and qualitative methods is needed for deeper insight.

Our findings underscore the high prevalence of depression among medical students, with female students and those from rural backgrounds identified as particularly vulnerable groups. These results emphasize the urgent need for effective student support programs within medical education. Initiatives aimed at developing stress management skills, enhancing emotional resilience, and providing targeted interventions for high-risk groups could play a crucial role in mitigating these challenges.The inconclusive results regarding eating attitudes and body image suggest a need for further investigation. Future studies should consider the influence of cultural factors, academic stress, and institutional differences on these variables to provide more nuanced insights.

Various programs and support mechanisms can be developed to improve the body image and eating attitudes of students who are under intense stress and pressure during medical education. Such studies highlight the importance of interventions and counseling services necessary to support the mental health of medical students. The mental health of current medical students is indicative of the mental health of future doctors. Therefore, depression and eating disorders seen in medical school students deserve attention and require the implementation of public health policies.

This study has several limitations that should be acknowledged. First, the sample was restricted to a single university, which limits the generalizability of the findings. Second, the reliance on self-reported data may have introduced social desirability bias. Lastly, the cross-sectional design prevents any conclusions about causal relationships between the studied variables.

Future studies should employ larger, multi-center, and longitudinal designs to better understand the interplay between eating attitudes, body image, and depression among medical students. The effects of socioeconomic factors, cultural influences, and academic pressure warrant more detailed examination. Universities should prioritize implementing structured mental health support programs, with tailored interventions for female students and those from rural backgrounds to address their unique challenges effectively.

Ethical Considerations: The ethics committee file of this study was approved by the local Clinical Research Ethics Committee (approval number: 2017-KAEK-189_2023.04.14_4)

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

References

1. Alhaj OA, Fekih-Romdhane F, Sweidan DH, et al. The prevalence and risk factors of screen-based disordered eating among university students: a global systematic review, meta-analysis, and meta-regression. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity.* 2022;27(8):3215-43.
2. Pengpid S, Peltzer K. Risk of disordered eating attitudes and its relation to mental health among university students in ASEAN. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity.* 2018;23:349-55.
3. Antonopoulou M, Mantzorou M, Serdari A, et al. Evaluating Mediterranean diet adherence in university student populations: Does this dietary pattern affect students' academic performance and mental health? *The International journal of health planning and management.* 2020;35(1):5-21.
4. Jahrami H, Alkaabi J, Trabelsi K, et al. The worldwide prevalence of self-reported psychological and behavioral symptoms in medical students: an umbrella review and meta-analysis of meta-analyses. *Journal of psychosomatic research.* 2023:111479.
5. Jahrami H, Saif Z, Trabelsi K, Ghazzawi H, Pandi-Perumal SR, Seeman MV. An Umbrella Review and a Meta-analysis of Meta-analyses of Disordered Eating Among Medical Students. *Alpha Psychiatry.* 2024;25(2):165.
6. Jahrami H, Sater M, Abdulla A, Faris MeA-I, AlAnsari A. Eating disorders risk among medical students: a global systematic review and meta-analysis. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity.* 2019;24:397-410.
7. Garner DM, Garfinkel PE. The Eating Attitudes Test: An index of the symptoms of anorexia nervosa. *Psychological medicine.* 1979;9(2):273-9.
8. Savaşır I. Erol N. *Yeme tutumu testi: Anoreksiya nevroza belirtileri indeksi Psikoloji Dergisi.* 1989;7(23):19-25.
9. Usta E, Sağlam E, Şen S, Aygin D, Sert H. Hemşirelik öğrencilerinin yeme tutumları ve obsesif-kompulsif belirtileri. *Sağlık Bilimleri ve Meslekleri Dergisi.* 2015;2(2):187-97.
10. Hovardaoğlu S. Body perception scale: Psychiatry, psychology. *Journal of Psycho-pharmacology (3P).* 1992.
11. Yalman E, Gürsan K. Spor Bilimleri Fakültesinde Öğrenim Gören Öğrencilerin Sağlık Okuryazarlığı Düzeyinin Beden Algısına Etkisi. *Avrasya Spor Bilimleri ve Eğitim Dergisi.* 2023;5(1):23-37.
12. Altun ÖŞ, Okursoy G, Olçun Z, Karakaş SA, Özlü ZK. ERGENLERDE DEPRESYON VE BENLİK SAYGISI ARASINDAKİ İLİŞKİ. *Ebelik ve Sağlık Bilimleri Dergisi.*1(1):8-13.
13. Faul F, Erdfelder E, Lang A-G, Buchner A. G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior research methods.* 2007;39(2):175-91.

14. Mohamed BAA, Idrees MHD. Body image dissatisfaction and its relation to body mass index among female medical students in Sudan: across-sectional study 2020-2021. *BMC Women's Health.* 2023;23(1):593.
15. Manaf NA, SArAvANAN C, ZuhrAh B. The prevalence and inter-relationship of negative body image perception, depression and susceptibility to eating disorders among female medical undergraduate students. *Journal of clinical and diagnostic research: JCDR.* 2016;10(3):VC01.
16. Bayram N, Bilgel N. The prevalence and socio-demographic correlations of depression, anxiety and stress among a group of university students. *Social psychiatry and psychiatric epidemiology.* 2008;43:667-72.
17. Latner JD, Durso LE, Mond JM. Health and health-related quality of life among treatment-seeking overweight and obese adults: associations with internalized weight bias. *Journal of Eating disorders.* 2013;1(1):3.
18. Liao Y, Knoesen NP, Castle DJ, et al. Symptoms of disordered eating, body shape, and mood concerns in male and female Chinese medical students. *Comprehensive psychiatry.* 2010;51(5):516-23.
19. Abed HA, El-Raouf A, Salah M. Stress, anxiety, depression among medical undergraduate students at Benha university and their socio-demographic correlates. *The Egyptian Journal of Hospital Medicine.* 2021;86(1):27-32.
20. Vijayalakshmi P, Thimmaiah R, Gandhi S, BadaMath S. Eating attitudes, weight control behaviors, body image satisfaction and depression level among Indian medical and nursing undergraduate students. *Community Mental Health Journal.* 2018;54(8):1266-73.
21. Lian Y, Yan Y, Ping W, Dou Z, Wang X, Yang H. Knowledge and coping style about depression in medical students: A cross-sectional study in China. *Plos one.* 2023;18(10):e0293511.
22. Rostampour N, Naderi M, Kheiri S, Safavi P. The relationship between body mass index and depression, anxiety, body image, and eating attitudes in adolescents in Iran. *Advanced Biomedical Research.* 2022;11(1):51.

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):271-286 // 10.5505/amj.2025.23682

EVALUATION OF HEALTH SYSTEM PERFORMANCE IN THE CONTEXT OF PUBLIC HEALTH; AN APPLICATION WITH THE ORGANIZATION OF TURKIC STATES

Memiş Karaca[1]

[1]Kayseri State Hospital, Kayseri, Türkiye

Memiş Karaca (e-mail: memis.karaca.38@gmail.com)

Submitted: 25.06.2025 // Accepted: 27.08.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

ANKARA MEDICAL JOURNAL

Abstract

Objectives: Based on the ultimate goals of health services and the importance of public health, health system performance evaluation should be carried out at the regional, national, or international level, the difference between expected health performance and desired health performance should be revealed, and necessary improvements should be provided. This study aims to evaluate the health system performance in the Organization of Turkic States.

Materials and Methods: The LOPCOW method, one of the multi-criteria decision-making techniques, was used in the study for weighting the criteria and ranking the countries, and the CoCoSo method was used to reveal the rankings on the basis of countries.

Results: When the LOPCOW results are analyzed, it is determined that the most important criterion is K6 (Under Five Mortality Rate) with a value of 0.1755, the least important criterion is K3 (Number of Physicians) with a value of 0.0836, while the country with the best health system performance with the integration of CoCoSo method is Hungary, Uzbekistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Turkiye, Turkmenistan, respectively.

Conclusion: As a result of the results of the study, it is recommended that health policy makers, planners, managers, practitioners, researchers, and service demanders gain a different perspective and determine health policy and public health strategies for these situations.

Keywords: Health system performance, public health, LOPCOW, CoCoSo, MCDM

Introduction

The World Health Organization (WHO) defines the term health as not only the absence of disease or disability but also a state of complete physical, mental, and social well-being.[1] The health status of individuals, social health indicators, directly affect the health status of countries. In recent years, it has been emphasized that significant progress has been made in human health in developed and developing countries.[2] It is very important to support this significant progress with statistical data. In this case, it would be more accurate to look at the situation of the world rather than countries. In this context, life expectancy at birth was 69.16 in 2005, 72.04 in 2015, and 72.93 in 2019. The under-5 mortality rate was 62.9 in 2005, 43.1 in 2015, and 37.1 in 2022. In 2005, the number of hospital beds per 1000 people was 2.73, in 2015 it was 2.86, and in 2020 it was 3.28.[3] However, despite these improvements, the health systems of countries have become increasingly complex. It is a very difficult process to compare health systems that include many elements such as public health, health management, health financing, health technology, health resources, health organizations, and health policies.[4]

Despite this complexity, one of the reasons why health indicators are so important is that economic, cultural, and social differences between countries vary, while periodic changes and policies can clearly reveal the current situation of a country.[5] In short, the multidimensional and complex structure of the health sector, the fact that it is under the influence of many factors and stakeholders, and that economic, social, and environmental factors also play a role, make it difficult to evaluate the health systems and performance of countries. However, if countries do not know their health performance and cannot make comparisons with similar countries, they may produce incomplete and wrong policies without fully understanding their current situation when formulating new policies and plans. To find solutions to such problems, multi-criteria decision-making (MCDM) methods can be used, which allow the evaluation of a large number of alternatives by considering multiple criteria. Thanks to these methods, countries can assess their health indicators, expenditures, equipment, etc., and make comparisons.

Health indicators help us understand public health, factors affecting health, effectiveness, efficiency, planning, monitoring of processes, and proper allocation of resources. Among the key health indicators included in the "Reference List of 100 Key Health Indicators" published by the World Health Organization (WHO) in 2018 and frequently used in academic studies such as[6-9] there are many indicators such as the share of gross domestic product allocated to health, infant mortality rate, newborn mortality rate, maternal mortality rate, life expectancy at birth, under-five mortality rate, adult mortality rate between the ages of 15-60, average length of stay and population per health personnel.

The study aims to evaluate the performance of the health system in the organization of the Turkish States by making comparisons over the health data of the countries due to the multidimensional and complex structure of the health sector, the fact that it is under the influence of many factors and stakeholders, and that economic, social, and environmental factors also play a role. The LOPCOW (Logarithmic Percentage Change-driven Objective Weighting) method, one of the multi-criteria decision-making techniques, was used in the study in order to realize the purpose of weighting and ranking the criteria, and the CoCoSo (Combined Compromise Solution) method was used to reveal the rankings on the basis of countries.

In this study, the inclusion or exclusion of the family medicine system in the selection of countries within the Turkish states was also taken into consideration. In this context, although family medicine is a main branch of medical faculties, the health system adopted in countries is effective. Countries in Asia do not have a family medicine system due to the adoption of the semasko model. The criteria in question were selected within this scope in terms of public health.

To the best of our knowledge, this study is the first study using the LOPCOW-CoCoSo method, which is one of the CCS techniques, to evaluate the performance of the health system in the Organization of the Turkic States, and the originality of the study is emphasized.

Literature Review

In this section, both the studies conducted using multi-criteria decision-making methods, the studies conducted using the methods used in our study, and the studies conducted in the field of health, especially in the field of health service delivery performance evaluation studies, will be mentioned in Table 1.

Table 1. Studies in the literature

AUTHOR	SUBJECT	METHOD
Kahreman[10]	It is about measuring the economic performance of the G20 countries, which cover about 85% of the world economy, during the 2008 crisis period.	LOPCOW-CoCoSo
Nisel and Nisel[11]	They presented a new approach to assessing and ranking nations according to their innovation capabilities.	LOPCOW-CoCoSo
Dhruva[12]	Provides a decision framework for cloud computing vendor selection in healthcare centers that addresses the challenges of uncertainty, expert hesitation, and conflicting criteria	LOPCOW-CoCoSo
Kar and Özer[13]	It is stated that the health service performances of the geographical regions in TURKİYE are evaluated with the VIKOR method, and the Health Statistics Yearbook 2016 data are used as a data source.	VIKOR
Aydin[14]	It is stated that the performances of geographical regions in TURKİYE between 2012 and 2018 were evaluated using the statistics of the Ministry of Health and CRITIC and TOPSIS methods.	CRITIC and TOPSIS
Başdeğirmen and Çal[15]	They evaluated the performance of city hospitals.	ENTROPY and MAUT
Erkilic[16]	Based on 15 health criteria for 2020, the performance of TURKİYE's Statistical Regional Units Classification Level 1 regions was evaluated.	CRITIC and TOPSIS
Murat and Güzel[17]	Health performance of SAARC and OECD countries They have been evaluated.	ARAS and WASPAS
Altintas[18]	They assessed the marine health performance of Mediterranean countries.	CRITIC and MARCOS
Rod[19]	The health tourism potentials of metropolitan cities in TURKİYE have been evaluated.	CRITIC and WASPAS
Ortíz-Barrios et al.[20]	They used a fuzzy hybrid FCDM approach to evaluate emergency department performance during the COVID-19 pandemic.	AHP-DEMATEL-CoCoSo
Selamzade et al.[21]	Efficiency levels in combating the COVID-19 pandemic in different periods in OECD countries, DEA, and CRM	TOPSIS, EDAS, CODAS
Pan et al.[22]	Countries were ranked to determine their public health performance.	AHP and TOPSIS
Erdogan and Ayyildiz[23]	In the study evaluating the performance of hospitals, they conducted research using quality criteria taken from SERVPERF.	CRITIC-TOPSIS
Hasani and Mokhtari[24]	The sustainability factors for the management and success of the health system among the identified hospitals in Iran were addressed and evaluated with the relevant methodology.	DEMATEL

Materials and Methods

LOPCOW Management

The LOPCOW method is an innovative method that determines the criteria weights objectively without the need for subjective opinions of the decision maker. This method has the advantage of being able to utilize the negative performance values of alternatives and to work efficiently with a large number of criteria and alternatives. LOPCOW was developed to deal with large variations in the performance of alternatives, especially in large decision matrices and in the presence of negative values.[25]

This method, developed by Ecer and Pamucar [26], calculates the standard deviation of each criterion and its percentage value with a logarithmic function depending on the number of alternatives. In this way, it presents the importance levels of the criteria in a more balanced way, showing the differences between the most important and less important criteria at a more reasonable level. The solution stages of the LOPCOW method used in the study are shown below: [25,26]

Stage 1: For the solution of the decision problem, the Decision Matrix should be formed according to Equation 1 for m alternatives and n criteria.

$$IDM = \begin{bmatrix} X_{11} & X_{12} & \dots & X_{1n} \\ X_{21} & X_{22} & \dots & X_{2n} \\ \dots & \dots & \vdots & \vdots \\ X_{m1} & X_{m2} & \dots & X_{mn} \end{bmatrix} \quad (1)$$

Stage 2: Using the linear normalization technique, the IDM matrix is normalized according to the maximum and minimum values of the criteria. If the criterion is cost-oriented, i.e., if the value of this criterion is to be reduced to the lowest possible level, the formula determined by Equation 2 is applied. On the other hand, if the criterion is benefit-oriented, i.e., the value of this criterion should be maximized, the formula of Equation 3 is used. There are different normalization methods for these two cases, and the conditions for using each of them are determined by the characteristics of the criterion.

$$r_{ij} = \frac{X_{max} - X_{ij}}{X_{max} - X_{min}} \quad (2)$$

$$r_{ij} = \frac{X_{ij} - X_{min}}{X_{max} - X_{min}} \quad (3)$$

Stage 3: In this stage of the analysis, the percentage value for each criterion is determined using Equation 4. In this process, the percentage of the standard deviations of each criterion is calculated, and the mean square

value is used to calculate a calculation that eliminates gaps due to the size of the series. This method more accurately reflects the variability in the data and ensures an accurate evaluation of the criteria.

$$PV_{ij}= \left| In \left(\frac{\sqrt{\frac{\sum_{i=1}^{m} r_{ij}^2 \pi}{\mathrm{m}}}}{\sigma} \right) .100 \right| \quad (4)$$

Stage 4: Finally, the objective weights for each criterion are determined with the help of Equation 5.

$$W_j= \frac{PV_{ij}}{\sum_{i=1}^{n} PV_{ij}} \quad (5)$$

CoCoSo Method

The CoCoSo (Combined Compromise Solution) method is one of the multi-criteria decision-making methods introduced to the literature by Yazdani et al. This approach is an integrated method that combines exponentially weighted product and simple additive weighted product models to produce a combined compromise solution. The method proposes to reconcile the simple additive weighting (SAW) and the exponential weighted.

Sum (EWP) model. [28] CoCoSo first determines the utility values of the decision alternatives from various perspectives using different combinations and aggregation operators. Then, the utility values of each alternative are combined using the aggregation function to obtain a compromise solution, and the optimal solution is found. In this context, the solution stages of the method are shown below: [27,28]

Step 1: First, the decision matrix needs to be created. This step is done with the help of equation 6.

$$\mathrm{D} = X_{ij} = \begin{bmatrix} X_{11} & X_{12} & \dots & X_{1j} \\ X_{21} & X_{12} & \dots & X_{2j} \\ \vdots & \vdots & \vdots & \vdots \\ X_{i1} & X_{i2} & \dots & X_{ij} \end{bmatrix} \quad (6)$$

Step 2: Normalization of the decision matrix is performed. Equations 7 and 8 are used in this context.

$$r_{ij} = \frac{X_{ij} - minx_{ij}}{makx_{ij} - minx_{ij}} \quad (7)$$

$$r_{ij} = \frac{makx_{ij} - X_{ij}}{makx_{ij} - minx_{ij}} \quad (8)$$

Step 3: The weighted sum of comparability $S_{(i)}$ is calculated with the help of equation 9, and the sum of the power weights of the comparability sequences for each alternative P_i is calculated with the help of equation 10.

$$S_i = \sum_{j=1}^{n}(w_i r_{ij}) \quad (9)$$

$$P_i = \sum_{j=1}^{n}(r_{ij})^{wj} \quad (10)$$

Step 4: In this step, the relative weights of the alternatives need to be calculated. This calculation is calculated using equations 11, 12, and 13.

$$k_{ia} = \frac{P_i + S_i}{\sum_{i=1}^{m}(P_i + S_i)} \quad (11)$$

$$k_{ib} = \frac{S_i}{\min S_i} + \frac{P_i}{min P_i} \quad (12)$$

$$k_{ic} = \frac{\lambda(S_i)+(1-\lambda)(P_i)}{\lambda(\text{mak}S_i)+ (1-\lambda)(\text{mak}P_i)}; 0 \leq \lambda \leq 1 \quad (13)$$

The value of λ is a value that the decision maker can take, provided that $0 \leq \lambda \leq 1$.

Step 5: The last step is the ranking of the alternatives. It is revealed with the help of Equation 14.

$$k_{ia} = (k_{ia}\, k_{ib} k_{ic})^{1/3} + \frac{1}{3}(k_{ia}\, k_{ib} k_{ic}) \quad (14)$$

With Equation 14, sensitivity (k_i) results are obtained, and these results are ranked from largest to smallest. Thus, the ranking is performed from best to worst.

Criteria and Data to be Used in the Study

The criteria to be used in the study are the number of hospital beds, life expectancy at birth, number of doctors per capita, number of nurses per capita, number of midwives per capita, health expenditures, under-five infant mortality rate, maternal mortality rate, suicide rates, among the basic health indicators included in the Reference List of 100 Key Health Indicators published by the World Health Organization (WHO) in 2018 and frequently used in most academic studies such as. [6-9]

Data on countries under the specified criteria were obtained from the World Bank.[3]

The data on the criteria mentioned above by the World Bank are used in the model based on the average of the last ten years since the most recent year of publication. The criteria to be used in the study are shown below in Table 2.

Table 2. Criteria to be used in the study

Sequence No.	***Code***	***Criteria Name***	***Criterion Direction***
1	**K1**	Number of Hospital Beds (per 1000 inhabitants)	Maximum
2	**K2**	Life Expectancy at Birth	Maximum
3	**K3**	Number of Physicians Per Capita (1000 Persons)	Maximum
4	**K4**	Number of Nurse Midwives Per Capita 1000	Maximum
5	**K5**	Health Expenditures	Maximum
6	**K6**	Under Five Infant Mortality Rate (1000)	Minimum
7	**K7**	Maternal Mortality Rate (100,000)	Minimum
8	**K8**	Suicide Rates (100,000)	Minimum

K: Abbreviation for the selected criterion.

This study did not require ethics committee approval as it did not involve human participants or sensitive personal data and used secondary data.

Results

In this section, the findings obtained by using LOPCOW and CoCoSo methods are presented with their stages. Firstly, the LOPCOW method is used to determine the weights of the criteria used in our study. The results of this method are calculated separately using equations 1-5 shown in the previous sections, and the decision matrix is shown in Table 1 below.

Implementation with LOPCOW

The decision matrix is shown in Table 3.

Table 3. Decision Matrix

Criteria Aspects	max	max	max	max	max	min	min	min
Countries	K1	K2	K3	K4	K5	K6	K7	K8
AZERBAIJAN	4,053	71,328	3,267	6,468	4,138	23,270	29,500	4,220
HUNGARY	6,949	75,691	3,256	6,683	6,980	4,550	14,800	20,830
KAZAKHSTAN	5,852	72,176	3,945	7,511	3,146	11,130	13,700	23,900
KYRGYZSTAN	4,485	71,216	2,229	5,892	6,401	20,120	57,200	9,680
TURKMENISTAN	4,036	68,899	2,147	4,301	5,104	42,280	6,000	6,680
TURKİYE	2,739	76,906	1,823	2,750	4,340	11,960	19,000	2,300
UZBEKISTAN	4,512	70,782	2,405	11,320	5,500	17,440	32,100	8,710
Mak	6,949	76,906	3,945	11,320	6,980	42,280	57,200	23,900
Min	2,739	68,899	1,823	2,750	3,146	4,550	6,000	2,300

Then, using Equations 2 and 3, a normalized decision matrix was created. The normalized decision matrix is shown in Table 4.

Table 4. Normalized Decision Matrix

Criteria Aspects	max	max	max	max	max	min	min	min
Countries	K1	K2	K3	K4	K5	K6	K7	K8
AZERBAIJAN	0,3120	0,5771	0,3430	0,8831	0,2356	0,5038	0,5410	0,9111
HUNGARY	1,0000	1,6134	0,3404	0,9341	0,9107	1,0000	0,8281	0,1421
KAZAKHSTAN	0,7395	0,7784	0,5040	1,1309	0,0000	0,8256	0,8496	0,0000
KYRGYZSTAN	0,4147	0,5503	0,0965	0,7463	0,7731	0,5873	0,0000	0,6583
TURKMENISTAN	0,3081	0,0000	0,0770	0,3683	0,4652	0,0000	1,0000	0,7972
TURKİYE	0,0000	1,9019	0,0000	0,0000	0,2836	0,8036	0,7461	1,0000
UZBEKISTAN	0,4212	0,4474	0,1383	2,0356	0,5591	0,6584	0,4902	0,7032

After the normalized decision matrix, using Equations 4 and 5, the percentage value matrix (PV), standard deviation values$\sigma\sigma$, percentage values (Pvij), and weight degrees of the criteria, in short, Wj values showing how effective they are on health system performance, are shown in Table 5.

Table 5. Percentile Matrix, Other Values, and Weight Values of Criteria

Decision Matrix								
Criteria	**max**	**max**	**max**	**max**	**max**	**min**	**min**	**min**
Countries	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**K7**	**K8**
AZERBAIJAN	0,097	0,333	0,1177	0,7799	0,0555	0,2539	0,2927	0,8301
HUNGARY	1,000	2,602	0,1159	0,8726	0,8293	1,0000	0,6858	0,0202
KAZAKHSTA	0,546	0,605	0,2540	1,2790	0,0000	0,6816	0,7218	0,0000
KYRGYZSTAN	0,172	0,302	0,0093	0,5570	0,5977	0,3450	0,0000	0,4334
TURKMENIST	0,094	0,000	0,0059	0,1357	0,2164	0,0000	1,0000	0,6356
TURKİYE	0,000	3,617	0,0000	0,0000	0,0804	0,6458	0,5567	1,0000
UZBEKISTAN	0,177	0,200	0,0191	4,1437	0,3126	0,4334	0,2403	0,4945
Total	2,088	7,662	0,5219	7,7679	2,0920	3,3597	3,4973	3,4138
M(number of	8	8	8	8	8	8	8	8
Total/m	0,261	0,957	0,0652	0,9710	0,2615	0,4200	0,4372	0,4267
roottotal/m	0,510	0,978	0,2554	0,9854	0,5114	0,6480	0,6612	0,6532
Std. deviation	0,324	0,676	0,1830	0,6396	0,3173	0,3216	0,3321	0,3828
Roottotalmm	1,577	1,447	1,3961	1,5405	1,6117	2,0150	1,9906	1,7063
Pvij	45,55	36,99	33,3658	43,212	47,7264	70,0613	68,8460	53,4351
Wj	0,114	0,092	0,0836	0,1082	0,1196	0,1755	0,1725	0,1339
Sorting	5	7	8	6	4	1	2	3

When Table 5 is analyzed, it is determined that the most important criterion is K6 (Under Five Mortality Rate) with a value of 0.1755 and the least important criterion is K3 (Number of Physicians) with a value of 0.0836.

Application with CoCoSo

The process of ranking the alternatives in the evaluation of the health system performance of the countries in the specific case of the organization of Turkic states was applied using the CoCoSo method. Table 3 decision matrix and Table 4 normalized decision matrix in the application part of the LOPCOW method were used in the solution of this method since they are the same equality formulas.

By using the weights obtained in the LOPCOW method in this method, weighted comparability Si and Pi values were obtained with the help of Equations 9 and 10. The obtained Si value is presented in Table 6 and Pi value is presented in Table 7.

Table 6. Weighted Comparability Si Value

Countries	K1	K2	K3	K4	K5	K6	K7	K8	Si
AZERBAIJAN	0,036	0,028	0,057	0,047	0,031	0,088	0,093	0,122	0,502
HUNGARY	0,114	0,079	0,056	0,050	0,120	0,176	0,143	0,019	0,756
KAZAKHSTAN	0,084	0,038	0,084	0,060	0,000	0,145	0,147	0,000	0,557
KYRGYZSTAN	0,047	0,027	0,016	0,040	0,102	0,103	0,000	0,088	0,423
TURKMENISTAN	0,035	0,000	0,013	0,020	0,061	0,000	0,173	0,107	0,408
TURKİYE	0,000	0,093	0,000	0,000	0,037	0,141	0,129	0,134	0,534
UZBEKISTAN	0,048	0,022	0,023	0,108	0,073	0,116	0,085	0,094	0,569

Table 7. Weighted Comparability Pi Value

Country/Criteria	K1	K2	K3	K4	K5	K6	K7	K8	Pi
AZERBAIJAN	0,876	0,895	0,968	0,914	0,851	0,887	0,899	0,988	7,277
HUNGARY	1,000	0,985	0,968	0,919	1,000	1,000	0,968	0,770	7,610
KAZAKHSTAN	0,966	0,921	1,000	0,938	0,000	0,967	0,972	0,000	5,764
KYRGYZSTAN	0,904	0,891	0,871	0,897	0,981	0,911	0,000	0,946	6,401
TURKMENISTAN	0,874	0,000	0,855	0,831	0,923	0,000	1,000	0,970	5,453
TÜRKİYE	0,000	1,000	0,000	0,000	0,870	0,962	0,951	1,000	4,783
UZBEKISTAN	0,906	0,874	0,898	1,000	0,943	0,929	0,884	0,954	7,389

The weighted comparability Si and Pi values of the countries are used in Equations (11), (12), and (13) to calculate the relative weights of the alternatives (Kia, Kib, and Kic). The calculated weighted comparability Kia, Kib, and Kic values are used in Equation (14) to obtain the ki value indicating the health system performance ranking of the countries. The relative weights (Kia, Kib, and Kic) and country performance rankings are presented in Table 8.

Table 8. Results of the Relative Performance of Alternatives

Country/Criteria	kia	kib	kic	which	Sorting
AZERBAIJAN	0,161	2,753	0,930	1,704	3
HUNGARY	0,173	3,444	1,000	1,863	1
KAZAKHSTAN	0,131	2,572	0,756	1,597	4
KYRGYZSTAN	0,141	2,374	0,816	1,584	5
TURKMENISTAN	0,121	2,140	0,701	1,497	7
TÜRKİYE	0,110	2,308	0,636	1,504	6
UZBEKISTAN	0,164	2,939	0,951	1,748	2

Discussion

As health systems are dynamic and open to change and development, it is not correct to make a statement as the best or the most accurate health system, and it may not be appropriate to serve with the same health system all the time. It varies according to the culture, economic structure, historical development, ideological thinking, and lifestyles of each country. Therefore, the responses of health systems, which change and adapt to different circumstances, to the crises they face also differ. Likewise, the World Health Organization has also mentioned that the health systems of countries are shaped according to the norms and values adopted by society. For these reasons, health systems around the world vary. Therefore, countries generally do not consider a single financing style and a fixed health service provider as ideal, and may tend to change policies as time progresses.

Due to the multidimensional and complex structure of the health sector, the fact that it is under the influence of many factors and stakeholders, and the fact that economic, social and environmental factors also play a role, in our study on the evaluation of the health system performance in the organization of the Turkish states by making comparisons over the health data of the countries; LOPCOW method, one of the multi-criteria decision-making techniques, was used in the study to realize the purpose of weighting and ranking the criteria, and CoCoSo method was used in an integrated manner to reveal the rankings based on countries. When the LOPCOW results are analyzed, it is determined that the most important criterion is K6 (Under Five Mortality Rate) with a value of 0.1755, the least important criterion is K3 (Number of Physicians) with a value of 0.0836, and with the integration of CoCoSo method, it is understood that the country with the best health system performance is Hungary, Uzbekistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Turkiye, Turkmenistan, respectively.

In the studies in the literature, [6,8,29,30] studies have been conducted by comparing the organization of Turkish states. However, we are not aware of any study based on objective methods from multi-criteria decision-making techniques. In addition, there is no study evaluating health system performance with the integration of the LOPCOW-CoCoSo method.

This study evaluates the most important criteria and the criteria with the least importance identified in the Turkish states' organizations, and by determining the ratios of these concrete criteria and the maximum and minimum directions of the criteria, it will enable the formulation of health policies and the strengthening of health systems. The study enables Turkish states to identify deficiencies in the concrete criteria within their health systems and plays a significant role in determining their level of development compared to other countries. The best way to prove the level of deficiencies in specific areas is through scientific studies. The study has the characteristic of shedding light on health systems and public health performance.

As a result of the results of the study, health policy makers, planners, managers, practitioners, researchers, and service demanders will gain a different perspective and should determine health policies and strategies for these situations. Future studies can evaluate the performance of the health system in strategic economic communities or regional groupings of countries. In addition, the use of studies that can be updated from multi-criteria decision-making techniques over time will contribute to the literature.

The criteria used in the study were selected from the basic health indicators frequently used in many academic studies, which are included in the "Reference List of 100 Basic Health Indicators" published by the World Health Organization (WHO) in 2018. As recommendations for future studies, it is suggested that the criteria included in the Reference List of 100 Essential Health Indicators be expanded, within the scope of feasibility, to enhance the applicability of the study. Additionally, it is recommended that the study be repeated using methods such as LOPCOW and CoCoSo, which are among the most up-to-date methods in the literature, as well as newer methods that have recently been introduced to the field, alongside more established traditional methods like AHP and TOPSIS.

Ethical Considerations: This study did not require ethics committee approval as it did not involve human participants or sensitive personal data and used secondary data.

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

References

1. WHO. (2020). WHO remains firmly committed to the principles set out in the preamble to the constitution. https: //www.who.int/about/governance/constitution Added on August 2, 2024.
2. Mehta, N. K., Abrams, L. R. ve Myrskylä, M. US life expectancy stalls due to cardiovascular disease, not drug deaths. Proceedings of the National Academy of Sciences, 2020; 117(13), 6998-7000
3. The World Bank. World bank open data. 2024; https: //data.worldbank.org/ Retrieved from on 13.01.2025.
4. Papanicolas, I., Kringos, D., Klazinga, N. S. ve Smith, P. C. Health system performance comparison: New directions in research and policy. Health Policy, 2013; 112(1-2), 1-3.
5. Saygin, Z. ve Kundakci, N. Saglik gostergeleri acisindan OECD ulkelerinin EDAS ve ARAS yontemleri ile degerlendirilmesi. Alanya Akademik Bakis, 2020; 4(3), 911-38.
6. Sener, M., Yesilyurt, O. ve Salamov, F., Turk Devletleri Saglik Sistemlerinin ve Harcamalarinin Karsilastirilarak Degerlendirilmesi. The Journal of Academic Social Science Studies, 2017; 8(61), 511-23.
7. Keles, N. (2023). Turkiye'nin 81 ilinin saglik performansinin guncel karar verme yontemleriyle degerlendirilmesi. Dumlupinar Universitesi Sosyal Bilimler Dergisi, (75), 120-141.
8. Doner, N., & Bulut, S. (2024) Turk Cumhuriyetlerinin Saglik Ekonomisi Kapsaminda Karsilastirmali Analizi. Turkuaz Uluslararasi Turk Dunyasi Bilimsel Arastirmalar Dergisi, 5(2), 74-88.
9. Cam, D., Koca, G., & Egilmez, O. (2025). Turkiye'de Bolgesel Saglik Hizmetlerinin Bazi Saglik Gostergeleri Cercevesinde Aras Yontemi Ile Degerlendirilmesi. Saglik ve Sosyal Refah Arastirmalari Dergisi, 7(1), 12-27.
10. Kahreman, Y. (2023). G20 Ulkelerinin Ekonomik Performanslarinin 2008 Kriz Doneminde LOPCOW-COCOSO Yontemi Ile Degerlendirilmesi. Izmir Iktisat Dergisi, 38 (3), 786-803.
11. Nisel, R., & Nisel, S. (2024). Advancing Global Innovation Metrics: A Comprehensive Country Ranking Using the Novel LOPCOW-CoCoSo Model. In Ethics and Sustainability in Accounting and Finance, Volume IV (pp. 99-118). Singapore: Springer Nature Singapore.
12. Dhruva, S., Krishankumar, R., Zavadskas, E. K., Ravichandran, K. S., & Gandomi, A. H. (2024). Selection of suitable cloud vendors for health centre: a personalized decision framework with fermatean fuzzy set, LOPCOW, and CoCoSo. Informatica, 35(1), 65-98.

13. Kar, A. & Ozer, O. (2020). Turkiye'de Saglik Hizmetleri Altyapi Kaynaklarinin, Hizmet Kullanim Duzeylerinin ve Saglik Sonuclarinin Bolgesel Duzeyde Karsilastirilmasi. Dicle Universitesi Iktisadi ve Idari Bilimler Fakultesi Dergisi, 10(20), 331-50.
14. Aydin, G. Z. (2021). Critic ve Topsis Yontemleriyle Turkiye'de Bolgesel Saglik Hizmetlerinin Degerlendirilmesi. Uluslararasi Saglik Yonetimi Ve Stratejileri Arastirma Dergisi, 7(2), 412-33
15. Basdegirmen, A., & Cal, D. Y. (2021). Sehir hastanelerinin entropi temelli maut yontemi ile kapasite degerlendirmesi. Oguzhan Sosyal Bilimler Dergisi, 3(1), 78-90.
16. Erkilic, C. E. (2022). Kamu Saglik Hizmeti Altyapi Ve Insan Kaynagi Gostergeleri Acisindan Turkiye Istatistiki Bolge Birimleri Siniflandirmasina Gore Duzey 1 Bolgelerinin Karsilastirilmasi. Erciyes Akademi, 36(4), 2006-31.
17. Murat, D., & Guzel, S. (2023). SAARC ve OECD ulkelerinde saglik gostergeleri yeterliliginin ARAS ve WASPAS ile analizi. Afyon Kocatepe Universitesi Iktisadi ve Idari Bilimler Fakultesi Dergisi, 25(1), 53-75.
18. Altintas, F. F. (2023). Akdeniz Ulkelerinin Deniz Sagligi Performanslarinin Analizi: CRITIC Tabanli MARCOS Yontemi Ile Bir Uygulama. Acta Aquatica Turcica, 19(1), 1-20.
19. Cubuk, M. (2022). Turkiye'de buyuksehirlerin saglik turizmi potansiyellerinin CRITIC ve WASPAS yontemleri ile karsilastirilmasi. Bingol Universitesi Iktisadi ve Idari Bilimler Fakultesi Dergisi, 6(2), 147-74.
20. Ortíz-Barrios, M., Jaramillo-Rueda, N., Gul, M., Yucesan, M., Jiménez-Delgado, G., & Alfaro-Saíz, J. J. (2023). A fuzzy hybrid MCDM approach for assessing the emergency department performance during the COVID-19 outbreak. International Journal of Environmental Research and Public Health, 20(5), 4591.
21. Selamzade, F., Ersoy, Y., Ozdemir, Y., & Celik, M. Y. (2023). Health efficiency measurement of OECD countries against the COVID-19 pandemic by using DEA and MCDM methods. Arabian Journal for Science and Engineering, 48(11), 15695-712.
22. Pan, J., Fan, R., Zhang, H., Gao, Y., Shu, Z., & Chen, Z. (2022). Investigating the effectiveness of Government Public Health Systems against COVID-19 by Hybrid MCDM approaches. Mathematics, 10(15), 2678.
23. Erdogan, M., & Ayyildiz, E. (2022). Comparison of hospital service performances under COVID-19 pandemics for pilot regions with low vaccination rates. Expert Systems with Applications, 206, 117773.

24. Hasani, A. A., & Mokhtari, H. (2020). Self-efficiency assessment of sustainable dynamic network healthcare service system under uncertainty: hybrid fuzzy DEA-MCDM method. Sci. Iran.
25. Biswas, S., Bandyopadhyay, G., & Mukhopadhyaya, J. N. (2022a). A multi-criteria framework for comparing dividend pay capabilities: Evidence from Indian FMCG and consumer durable sector. Decision Making: Applications in Management and Engineering, 5(2), 140-75.
26. Ecer, F., & Pamucar, D. (2022). A novel LOPCOW-DOBI multi-criteria sustainability performance assessment methodology: An application in developing country banking sector.Omega,(112), 102690
27. Yazdani, M., Wen, Z., Liao, H., Banaitis, A., & Turskis, Z. (2019). A grey combined compromise solution (CoCoSo-G) method for supplier selection in construction. Management. Journal of Civil Engineering and Management, 25(8), 858-74.
28. Peng, X., & Huang, H. (2020). Fuzzy decision making method based on Cocoso with Critic for financial risk evaluation. Technological and Economic Development of Economy, 26(4), 695-724.
29. Demirtas, Z., & Metintas, S. (2017). Turk Cumhuriyetlerinde Anne Cocuk Sagligi Gostergelerinin Ekonomik ve Dogurganlik Ozellikleri Acisindan Degerlendirilmesi. ESTUDAM Halk Sagligi Dergisi, 2(1), 16-25.
30. Kazanci, B. A., & Luy, B. (2023). Turk Cumhuriyetlerinin Saglik Sektoru Acisindan Rekabet Gucu: Aciklanmis Karsilastirmali Ustunlukler Teorisi (AKU). Politik Ekonomik Kuram, 7(2), 116-27.

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):287-299 // 10.5505/amj.2025.24307

ON THE PATH TO BECOMING A PHYSICIAN: A STUDY ON MEDICAL STUDENTS' PROFESSIONAL VALUES AND ATTITUDES

Fethi Sada Zekey[1], Kübra Uyar Zekey[1]

[1]Yozgat Bozok University Faculty of Medicine, Department of Family Medicine, Yozgat, Türkiye

Correspondence:
Sorumlu Yazar (e-mail: fszekey@yahoo.com)

Submitted: 12.05.2025 // Accepted: 08.08.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

ANKARA MEDICAL JOURNAL

Abstract

Objectives: In this study, medical school students' attitudes toward the profession of medicine, their perceptions of the values of medicine, and the relationship between these concepts were evaluated.

Materials and Methods: This descriptive cross-sectional study was conducted at Yozgat Bozok University Faculty of Medicine. Participants were asked to answer the sociodemographic data form, the medical profession attitude scale, and the medical profession value perception scale.

Results: 567 medical students (79.52% of all students) participated in this study. Of the participants, 58.9% were preclinical and 41.1% were clinical phase students. The mean scores of the medical profession attitude scale and the medical profession value perception scale were statistically significantly higher for those who preferred medical school willingly ($p<0.001$, $p=0.004$). The scores of the medical profession attitude scale and medical profession value perception scale decreased statistically significantly with increasing grade levels in clinical phase medical students ($p<0.001$, $p<0.001$). Statistically significant positive correlation found between the scores of the medical profession attitude scale and the scores of the value perception scale ($p<0.001$).

Conclusion: As a result of this study, positive attitudes towards the medical profession and high perceptions of medical values were higher among those who chose the medical profession willingly. It was found that positive attitudes and value perceptions towards the medical profession decrease as students transition from the preclinical to the clinical phase. The educational processes that lead to changes in attitudes and values during medical education should be reconsidered. The sources of motivation regarding the sustainability of medical education should be evaluated.

Keywords: Medical students, professionalism, attitude, medical education

Introduction

Medical education is a demanding process that equips future physicians with knowledge, skills, and professional competence. Beyond technical training, students develop attitudes and perspectives essential to the practice of medicine. Throughout both the preclinical and clinical phases, educators serve as role models, influencing students' professional identity, clinical reasoning, and attitudes toward patient care.[1,2]

Attitude" refers to an individual's behavioral tendency toward a particular subject or situation. In the context of medicine, it encompasses one's perspectives, beliefs, and values about the profession. Medical students' attitudes are shaped by factors such as voluntary career choice, familial exposure to the profession, duration of medical training, and the perceived social prestige of medicine.[3,4]

The concept of "value" refers to a set of principles considered important in an individual's life. In medicine, value perception encompasses ethical domains such as respect for patient rights, autonomy, and professional conduct. Closely aligned with the concept of professionalism, medical value perception emphasizes qualities expected of physicians, including effective communication, empathy, collaboration, openness to innovation, medical competence, and respect for human dignity.[5,6]

Although attitudes and values toward the medical profession are interrelated, they represent distinct constructs. Medical values form the ethical and humanistic foundation of the profession, whereas attitudes reflect an individual's orientation and behavior toward these values. According to the professional identity formation framework proposed by Cruess et al. (2014), students' attitudes and value perceptions serve as key indicators of their professional identity development. Evaluating these dimensions together provides critical insight into the transformation from layperson to physician.[7,8]

Examining the attitudes and value perceptions of future physicians provides insight into the effectiveness of medical education and helps identify negative attitudes during training. The development of professional attitudes and values during medical school not only contributes to professional competence but also supports the formation of trust-based physician–patient relationships in clinical practice. While previous studies have often explored attitudes and value perceptions separately, this study aims to assess both constructs and examine the relationship between them.

Materials and Methods

Participants

This is a cross-sectional study evaluating the attitudes of medical students towards the medical profession and their perceptions of the value of the medical profession. The study was conducted at Yozgat Bozok University Faculty of Medicine. The population of the study consisted of medical students studying at Yozgat Bozok University Faculty of Medicine in the 2024-2025 academic year. Since it was aimed to reach all students, no sample was selected. The students were interviewed during the time periods when they were available. Before starting the study, informed consent was obtained from the students who volunteered to participate in the study. The volunteer medical students were asked to answer the sociodemographic data form, the medical profession attitude scale (MPAS), and the medical value perception scale (MVPS). Medical students who volunteered to participate in the study were included, while students who did not fill out the consent form and who wanted to withdraw from the study were excluded.

Measures

Sociodemographic data form: This form consists of 13 questions covering participants' sociodemographic information (age, gender, type of high school graduated from, family socioeconomic status, parents' educational background, presence of a healthcare professional in the family, etc.)

Medical profession attitude scale (MPAS): MPAS was developed by Batı et al.[9] in a 5-point Likert-type scale. There are 24 items in the scale, 12 of which are positive and 12 of which are negative. The answers ranged from 'strongly disagree' to 'strongly agree'. The scale has 3 sub-dimensions: 'helpfulness', 'dedication to the profession', and 'willingness'. The lowest score is 24 and the highest score is 120. A high score on the scale indicates a positive attitude towards the profession.

Medical value perception scale (MVPS): MVPS was developed by Gökler et al.[10]. The scale consists of 18 items. There are no negative items in the scale. It is a 5-point Likert-type scale, and the answers ranged from 'strongly disagree' to 'completely agree'. The scale has 3 sub-dimensions named as 'patient-physician relationship', 'physician's empathy ability', and 'physician attitude'. A minimum score of 18 and a maximum score of 90 are obtained from the scale, and higher scores indicate that the person's perception of physician value is more positive.

Data Analysis

The analysis of the research data was performed with SPSS 20 and AMOS 20 programmes. Descriptive information was presented as percentages and frequency. Independent samples t-test, one-way ANOVA, and Kruskal-Wallis test were used to evaluate the relationship between continuous variables and other variables. The relationship between the medical profession attitude scale scores and the medical value perception scale scores was evaluated by Pearson correlation. A post hoc power analysis conducted using G*Power (version 3.1) indicated that with a sample size of 567, the study had a power of over 99% to detect a small-to-moderate correlation ($r = 0.20$) at a significance level of $\alpha = 0.05$.

Results

567 medical students (79.52% of all students) participated in this study. The mean age of the participants was 21.72±2.59 (min: 18-41). Of the participants, 23.1% (n=131) were grade I, 17.8% (n=101) were grade II, 18% (n=102) were grade III, 11.3% (n=64) were grade IV, 14.1% (n=80) were grade V, and 15.7% (n=89) were grade VI students. Of the participants, 8.1% (n=46) stated that their family's monthly expenses were higher than their income, 83.1% (n=471) stated that their income was equal to their expenses, and 8.8% (n=50) stated that their income was higher than their expenses. Of the participants, 44.6% (n=253) graduated from *Anatolian High Schools (Anatolian High Schools are public academic high schools in Türkiye that offer a general education with an emphasis on foreign language instruction)*, 45.9% (n=260) from *Science High Schools (Science High Schools are selective public schools in Türkiye that specialize in mathematics and natural sciences)*, 4.2% (n=24) from *Imam Hatip High Schools (Imam Hatip High Schools are religious vocational high schools in Türkiye that combine a general academic curriculum with Islamic religious education)*, and 5.3% (n=30) from other types of high schools. Of the participants, 89.6% (n=508) stated that they preferred the faculty of medicine willingly, and 88.4% (n=501) did not repeat the semester in medical school. When the mothers of the participants were analysed according to their education levels, 2.1% (n=12) were literate, 30.7% (n=174) were primary school, 33% (n=187) were high school, 29.6% (n=168) were university, and 4.6% (n=26) were postgraduate. When the fathers of the participants were analysed according to their education level, 1.2% (n=7) were literate, 18.3% (n=104) were primary school, 31% (n=176) were high school, 40.4% (n=229) were university, and 9% (n=51) were postgraduate. The families of the participants, 65.3% (n=370) reside in the city centre, 26.5% (n=150) in the district, and 8.3% (n=47) in the village/town. Of the participants, 73.4% (n=416) did not have a health worker in their nuclear family, while 26.6% (n=151) had a health worker in their nuclear family.

The mean score of the MPAS was 94.40±14.88 (min:28-max:120).

The MPAS scores of female students were higher than those of male students and were statistically significant (t(565)=3.83, p<0.001, Cohen's d =0.33). The MPAS scores decreased with increasing age and were statistically significant (F(2, 564)=10.05, p<0.001, η^2=0.034). The total scores of MPAS who preferred medical school willingly were higher and statistically significant (t(565)=11.25, p<0.001, Cohen's d=1.55). A statistically significant relationship was found between the MPAS score and grade level (F(5, 561) = 8.15, p < 0.001, η^2 = 0.068). The highest MPAS score (mean: 99.31±14.44) in preclinical phase students and all grade levels was found in grade 3 students, while the lowest medical profession attitude scale score (mean: 86.65±12.56) in clinical phase students and all grade levels was found in grade 6 students (Table 1).

Table 1. Relationship between the medical profession's attitude scores and various variables

		n (%)	Mean ± sd	Min-Max	%95 CI	p
Gender	Female	354 (62.4)	96.23±15.46	28-120		
	Male	213 (37.6)	91.35±13.35	57-120	[2.46-7.29]	<0.001
Age	18-20 years	186 (32.8)	95.80±15.71	28-120	[93.53-98.07]	
	21-23 years	274 (48.3)	95.68±13.85	28-120	[94.03-97.33]	<0.001
	24 years and above	107 (18.9)	88.68±14.74	50-120	[85.85-91.50]	
Grade level	Grade 1	131 (23.1)	95.89±16.15	28-120	[93.10-98.68]	
	Grade 2	101 (17.8)	95.90±13.96	58-120	[93.14-98.65]	
	Grade 3	102 (18)	99.31±14.44	50-120	[96.47-102.15]	
	Grade 4	64 (11.3)	93.40±14.88	28-117	[89.68-97.12]	<0.001
	Grade 5	80 (14.1)	93.23±13.58	65-120	[90.21-96.25]	
	Grade 6	89 (15.7)	86.65±12.56	53-114	[84.00-89.29]	
Choosing medical school willingly	Yes	508 (89.6)	96.57±13.49	28-120		
	No	59 (10.4)	75.72±13.21	28-105	[17.20-24.48]	<0.001

CI: Confidence Interval

The mean score of the MVPS was 77.32±8.42 (min: 49-90). The total scores of the MVPS who preferred medical school willingly were higher and statistically significant (t(565) = 2.85, p=0.004, Cohen's d = 0.39). A statistically significant relationship was found between the MVPS score and grade level (F(5, 561) = 4.53, p<0.001, η^2 = 0.039). The highest MVPS score (mean: 79.60±8.19) in preclinical phase students and all grade levels was found in grade 3 students, while the lowest MVPS score (mean: 74.51±9.16) in clinical phase students and all grade levels was found in grade 6 students (Table 2).

There was no statistically significant difference between the mean scores' obtained from the MPAS and MVPS with the variables of high school graduated from (p=0.567, p=0.178), repeating a grade in medical school (p=0.207, p=0.770), socioeconomic level of the family (p=0.954, p=0.488), place of residence of the family (p=0.470, p=0.659), presence of health professionals in the nuclear family (p=0.804, p=0.525). The MPAS and MVPS sub-dimension scores are presented in Table 3.

Table 2. Relationship between the medical values perception scale scores and various variables

		n (%)	Mean ± sd	Min-Max	%95 CI	p
Grade level	Grade 1	131 (23.1)	77.01±7.81	53-90	[75.66-78.36]	<0.001
	Grade 2	101 (17.8)	76.77±8.10	54-90	[75.17-78.37]	
	Grade 3	102 (18)	79.60±8.19	54-90	[77.99-81.21]	
	Grade 4	64 (11.3)	79.40±8.30	49-90	[77.33-81.48]	
	Grade 5	80 (14.1)	77.05±8.39	51-90	[75.18-78.91]	
	Grade 6	89 (15.7)	74.51±9.16	53-90	[72.58-76.44]	
Choosing medical school willingly	Yes	508 (89.6)	77.66±8.18	49-90		
	No	59 (10.4)	74.37±9.84	53-90	[1.02-5.55]	0.004

CI: Confidence Interval

Table 3. Mean sub-dimension scores of the medical profession attitude scale and the medical values perception scale

	Sub-dimensions	Mean ± Sd	Min- Max
Medical profession attitude scale	Respectively willingness	60.15±9.26	15-75
	Helping	17.53±4.23	5-25
	Dedication to the profession	16.71±2.42	6-20
Medical value perception scale	Doctor's attitude	31.83±4.42	19-40
	Doctor-patient relationship	27.22±3.11	16-30
	Doctor's ability to empathize	18.25±2.05	9-20

A significant positive correlation was found between the scores obtained from the MPAS and the MVPS (r=.47; p<0.001) (Table 4). The relationship between the sub-dimensions of the MPAS and the MVPS was shown in Table 5. A significant relationship was found between the subscale scores of the MPAS and the MVPS (p<0.001).

To assess the construct validity of the MPAS and the MVPS used in the study, Confirmatory Factor Analysis (CFA) was conducted. The fit indices for the MPAS were found to be χ^2/df = 1.806, CFI = 0.91, GFI = 0.94, and RMSEA = 0.07. For the MVPS the fit indices were χ^2/df = 2.103, CFI = 0.93, GFI = 0.82, and RMSEA = 0.07. These results indicate that both scales demonstrated an acceptable level of model fit. In this study, Cronbach's alpha value of the MPAS was 0.954, and the MVPS was 0.915.

Table 4. Correlation between the medical profession attitude scale scores and the medical values perception scale scores

	Value	**Medical value perception scale**
Medical profession attitude scale	r	0.47
	p	<0.001
	n	567

Table 5. Correlation between sub-dimension scores of the medical profession attitude scale and sub-dimension scores of the medical values perception scale

	Value	**H**	**DP**	**RW**	**DA**	**DPR**	**DAE**
Helping (H)	r p	1	0.674 <0.001	0.808 <0.001	0.323 <0.001	0.304 <0.001	0.284 <0.001
Dedication to profession (DP)	r p		1	0.770 <0.001	0.427 <0.001	0.569 <0.001	0.523 <0.001
Respectively willingness (RW)	r p			1	0.365 <0.001	0.305 <0.001	0.392 <0.001
Doctor's attitude (DA)	r p				1	0.565 <0.001	0.561 <0.001
Doctor-patient relationship (DPR)	r p					1	0.907 <0.001
Doctor's ability to empathize (DAE)	r p						1

Discussion

In this study, medical students' attitudes toward the medical profession, attitudes, and medical value perceptions were assessed. The mean score on the medical profession attitude scale was 94. In comparison, similar studies reported median scores of 93 and 92.[2,3] Considering the scale's maximum score, these findings indicate that students generally hold positive attitudes toward the profession. This aligns with previous research, suggesting a consistent trend across different institutions.

University education aims to develop individuals who can meet the demands of their profession through personal growth and training based on well-defined field-specific competencies. In this sense, profession choice is one of the important decisions and is affected by many factors. These factors are listed as gender, age, personal ability, interest in profession, social status, and socioeconomic level. In this context, the factors affecting people's choice of profession also determine the attitude of the person towards the profession.[11-14]

In this study, the medical profession attitude scale score of female students was found to be higher than that of males, consistent with findings reported in previous studies.[2,14] Studies indicate that women tend to choose medicine due to altruistic motives, whereas men are more influenced by social status and financial prospects.[15,16] Gendered norms related to empathy, caregiving, and self-sacrifice lead female medical students to develop a compassionate, patient-centered professional identity and base their career motivations on altruistic values. These factors may help explain the more positive attitudes of female medical students toward the medical profession.

Consistent with the literature, students who willingly chose the medical profession exhibited significantly more positive attitudes.[3,17] This may be attributed to the fact that students who willingly choose the medical profession are more intrinsically motivated, which has been associated with stronger professional identity formation and more positive attitudes toward the profession. Intrinsic motivation is known to enhance engagement, empathy, and resilience in medical education. [18,19]

Analysis of the relationship between medical profession attitude, age, and socioeconomic status showed that attitude scores did not increase with age. In the preclinical phase, attitudes improved with grade level, whereas in the clinical phase, they declined as students advanced. The literature reveals variability in findings concerning this relationship: while some studies report no significant grade-level differences, others—consistent with the present study—indicate a decline in positive attitudes as students progress.[2,20,21]

In the preclinical phase, the teaching of professional attitudes is often carried out through presentation in the course content or through discussion of case-based scenarios. In the clinical phase, it is learnt through

individual discovery and observation by role modelling of trainers. In clinical internships, students' realisation of real patients, workload, and problems in the health system may lead to a decrease in positive attitude towards the profession of medicine.

In this study, the mean score of the medical value perception scale was 77. In related studies, Öncü et al.[1] and Gökler et al.[10] reported mean scores of 79 and 78, respectively. Variations in medical value perception may result from differences in faculty curricula, teaching approaches, clinical environments, and student grade levels. The relatively lower score in this study may be attributed to institutional differences in how medical values are taught and the varying emphasis placed on ethical and humanistic principles.

As in other professions, willingly choosing medicine is a key factor for professional satisfaction, adaptation, and academic success. It facilitates coping with occupational challenges and positively influences physician–patient communication through increased empathy and positive engagement. High empathy and trust-based relationships—core components of medical value perception—are often natural outcomes of intrinsic motivation. In line with the literature, this study found higher value perception scores among students who chose the profession willingly. [11,23]

Throughout medical education, students' medical value perceptions often evolve. While early motivations are typically altruistic—centered on helping others and addressing health issues—later years see a shift toward extrinsic factors such as job security and income, which may alter their professional outlook.[24,25]

In parallel with the literature, this study found that medical value perceptions increased throughout the preclinical years but declined with the onset of clinical training. One possible reason for this decline during the transition to clinical education is that students are exposed to the challenges faced by their role models in clinical settings—educators and resident physicians—including communication issues with patients and difficulties related to the healthcare system. Witnessing these challenges, including experiences of workplace violence, may negatively impact their perception of professional values. Moreover, hierarchical team dynamics and pressures inherent in the healthcare system may have contributed to the erosion of students' initial perceptions of medical values.

Medicine requires a balance between professionalism and humanistic values, particularly in patient care. Motivation and commitment to the profession enhance physician–patient trust and are reflected in clinical behavior. Studies show that high empathy, effective communication, and a strong helping orientation improve patient satisfaction and adherence.[23,26,27] Consistent with prior research, this study found that stronger medical value perceptions were associated with more positive attitudes toward the medical profession. However, the high correlation observed between attitudes toward the medical profession and medical value perceptions suggests a potential risk of multicollinearity, which may complicate the interpretation of certain findings.

This study offers a novel contribution by examining the relationship between medical students' attitudes and value perceptions, demonstrating a significant correlation. It also emphasizes the influence of voluntary career choice on positive professional orientation—an often underexplored factor. The observed decline in attitudes and values during clinical training further highlights the need to reconsider educational and systemic influences on professional development.

The study concludes that students who willingly choose to pursue medicine exhibit more positive attitudes and stronger medical value perceptions. To sustain these attitudes and foster humanistic values, educators must provide support from the early stages of medical education. Implementing structured mentoring programs is an effective strategy to support this process. Mentorship from experienced physicians can foster professional identity formation and the internalization of humanistic values in medical students.

The study also identified a decline in positive attitudes and medical value perceptions from the preclinical to the clinical phase. To address this, future research should investigate motivational factors in clinical students and develop interventions targeting negative attitudes. Integrating structured reflection sessions into the clinical curriculum may enhance professional development. Additionally, longitudinal and mixed-methods studies are needed to better understand how and why students' attitudes and value perceptions change throughout medical education.

Limitations

This is a cross-sectional study conducted at a single medical school; therefore, its findings cannot be generalized. Due to the cross-sectional design of the study, it is not possible to establish causal relationships between the variables.

The study is also limited by the constructs measured by the instruments used for assessing medical profession attitude and medical value perception. Another limitation of the study is that the measurement tools were validated in a population of Turkish medical students, which may restrict the external validity of the findings.

As the data were collected through self-report scales, there is a potential risk of social desirability bias in participants' responses. The study employed voluntary participation and convenience sampling, which may introduce selection bias.

Ethical Considerations: Before the study, approval was obtained from Yozgat Bozok University Non-Interventional Research Ethics Committee (protocol no: 2024-GOKAEK-2414_2024.12.04_194).

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

References

1. Oncu S, Erel Ö. Medical profession value perceptions of medical students. *Tıp Eğitimi Dünyası*. 2021;20(61):98-105. (doi: 10.25282/ted.890508)
2. Tengiz F, Babaoğlu A, Koç E, Pamuk G. Attitudes of medical students towards medical profession: comparison of pre-clinical and clinical education periods. *Tıp Eğitimi Dünyası.* 2020;19(57):26-36. (doi: 10.25282/ted.617165)
3. Aydoğan S, Pala S, Işıklı B. Attitudes toward medical profession before and after graduation. *Ankara Med J*. 2019;19(1):10-20. (doi: 10.17098/amj.542157)
4. Ajzen I, Albarracin D**.** Predicting and changing behavior: a reasoned action approach In: Ajzen I, Albarracin D, Hornik R, eds. *Prediction and change of health behavior: applying the reasoned action approach*. 1st ed. New York: Psychology Press; 2007: 3-21.
5. García-Esta- J, Cabrera-Maqueda JM, González-Lozano E, Fernández-Pardo J, Atucha NM. Perception of medical professionalism among medical residents in Spain. *Healthcare (Basel).* 2021;9(11):1580. (doi: 10.3390/healthcare9111580)
6. Reimer D, Russell R, Khallouq BB, et al. Pre-clerkship medical students' perceptions of medical professionalism. *BMC Med Educ*. 2019;19(1):239. (doi: 10.1186/s12909-019-1629-4)
7. Selič-Zupančič P, Petek D, Jerala N. Exploring personality traits, values, and attitudes toward professionalism: Implications for the promotion of mental health and functioning in medical students. *Healthcare (Basel)*. 2024;12(17):1732. (doi: 10.3390/healthcare12171732)
8. Cruess RL, Cruess SR, Boudreau JD, Snell L, Steinert Y. Reframing medical education to support professional identity formation. *Acad Med*. 2014;89(11):1446-51. (doi:10.1097/ACM.0000000000000427).
9. Batı AH, Bümen NT. Developing a scale for attitudes towards a medical profession. *Tıp Eğitimi Dünyası*. 2006;23(23):41-50.
10. Gökler ME, Öz F, Metintaş S. Reliability and validity of medical profession value perception scale and results in medical students. *Turk J Public Health.* 2017;15(1):26-36. (doi: 10.20518/tjph.326786)

11. Trinidad J, Raz M, Magsalin I. “More than professional skills:” Student perspectives on higher education’s purpose. *Teaching in Higher Education*. 2021; 28: 1380- 94. (doi: 10.1080/13562517.2021.1891043)
12. Hadiyati M, Astuti B. Student Careers: What factors ınfluence career choice? *Journal of Education Research and Evaluation*. 2023: 7(4): 608-14. (doi: 10.23887/jere.v7i4.61686)
13. Brooks R, Gupta A, Jayadeva S, Abrahams J. Students’ views about the purpose of higher education: a comparative analysis of six European countries. *High Educ Res Dev*. 2020; 40:1375–88. (doi:10.1080/07294360.2020.1830039)
14. Kasarla R, Verma A, Pathak L. Attitudes of MBBS students towards medical profession: A study in a medical school. *Janaki Medical College Journal of Medical Science*.2022; 10(03):18-23. (doi: 10.3126/jmcjms.v10i03.55546)
15. Oner Yalcin S, Celikyurek NA, Senol H, Turker KF, Yavuz O, Kaya MC, Bozdag M. Factors affecting career choice of students in a medical faculty. *Pam Med J*. 2022; 15:37-44. (doi: 10.31362/patd.947292)
16. Tat AN, Borlu A. Investigation of medical success self-efficacy beliefs and attitudes towards the medical profession of intern doctors. *Tıp Eğitimi Dünyası*. 2023;22(68):18-28. (doi: 10.25282/ted.1284425)
17. Çınar Tanrıverdi E. Professional attitudes of third-year medical students: A cross-sectional study. *Van Med J*. 2022 ;29(2):197-206. (doi:10.5505/vtd.2022.21456. doi: 10.5505/vtd.2022.21456)
18. Kusurkar RA, Ten Cate TJ, van Asperen M, Croiset G. Motivation as an independent and a dependent variable in medical education: A review of the literature. *Med Teach*. 2011;33(5):242-62. (doi: 10.3109/0142159X.2011.558539)
19. Iktidar M, Sakib M, Munni U, Rimti F, Yousuf R, Majumder K, et al. Medical students’ career preferences in Bangladesh. *BMC Medical Education 24*. 2024; 81. (doi: 10.1186/s12909-024-05050-9)
20. Kavas MV, Demirören M, Koşan AMA, Karahan ST, Yalim NY**.** Turkish students’ perceptions of professionalism at the beginning and at the end of medical education: A cross-sectional qualitative study. *Med Educ Online.* 2015; 20:26614. (doi: 10.3402/meo.v20.26614. eCollection 2015)

21. Demak I, Sulistiana R, A, Safira S. Perception of Professionalism of Medical Undergraduate Students of Tadulako University by Grade. *Advances in Social Science, Education and Humanities Research*. 2021; 567: 272-6. (doi: 10.2991/assehr.k.210930.051)
22. Scheepers R.Physicians' professional performance: an occupational health psychology perspective. *Perspectives on Medical Education*. 2017; 6(6):425–8. (doi: 10.1007/s40037-017-0382-9)
23. Derksen F, Bensing J, Lagro-Janssen A. Effectiveness of empathy in general practice: a systematic review. *Br J Gen Pract*. 2013;63(606):76-84. (doi: 10.3399/bjgp13X660814)
24. Morley CP, Roseamelia C, Smith JA, Villarreal AL. Decline of medicalstudent idealism in the first and second year of medical school:A survey of pre-clinical medical students at one institution. *Med Educ Online*. 2013; 18:21194. (doi: 10.3402/meo.v18i0.21194)
25. Priyanka, Goel MK, Rasania SK. Perceptions of medical students regarding medical profession: Is there a change during graduation course? *Indian J Community Fam Med.* 2021; 7:100-4. (doi: 10.4103/ijcfm.ijcfm_21_21)
26. Keshtkar L, Madigan C, Ward A, Ahmed S, Tanna V, Rahman I, et al. The effect of practitioner empathy on patient satisfaction. *Ann Intern Med.* 2024; 177:196–209. (doi: 10.7326/M23-2168)
27. Howick J, Moscrop A, Mebius A, Fanshawe T, Lewith G, Bishop F, et al. Effects of empathic and positive communication in healthcare consultations: a systematic review and meta-analysis. *J R Soc Med.* 2018; 111: 240–52. (doi: 10.1177/0141076818769477)

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):300-310 // 10.5505/amj.2025.36675

INVESTIGATION OF AWARENESS OF PROTON PUMP INHIBITOR THERAPY IN ADULTS USING PROTON PUMP INHIBITORS ADMITTED TO PRIMARY CARE

Kübra Kurt[1], Pınar Döner Güner[2]

[1]Department of Family Medicine, Hatay Arsuz State Hospital, Hatay, Türkiye

[2]Department of Family Medicine, Hatay Mustafa Kemal University Tayfur Ata Sökmen Faculty of Medicine, Hatay, Türkiye

Correspondence:

Kübra Kurt (e-mail: kbrkurt0610@gmail.com)

Submitted: 23.03.2025 // Accepted: 07.07.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine

Department of Family Medicine

Abstract

Objectives: Because proton pump inhibitors are effective and well tolerated, their use without an appropriate indication is increasing. This raises concerns about long-term side effects.

Materials and Methods: This cross-sectional survey study was conducted among patients using proton pump inhibitors for any reason in 4 primary care centers in Hatay province. The study included 451 participants. The statistical significance level of the data obtained was interpreted with the "p" value. $p<0.05$ values were considered statistically significant.

Results: In this study, 39.9% of patients were using proton pump inhibitors inappropriately. 38.4% of the patients had been using proton pump inhibitors for more than 2 years. There was also a significant association between use for more than 2 years and the occurrence of side effects ($p=0.001$). 75.4% of the patients stated that they were not informed about the side effects of the drug. In addition, in patient-physician communication, there was a significant correlation between the physician's mention of side effects and inappropriate use of proton pump inhibitors ($p=0.009$).

Conclusion: Inappropriate proton pump inhibitors can be prevented by starting the appropriate dose of proton pump inhibitor in the patient with the necessary indication, informing the patient at the first prescription, creating a physician's plan about when to terminate proton pump inhibitors, and raising awareness of the patient about this issue.

Keywords: Proton pump inhibitors, primary care, inappropriate use.

ANKARA MEDICAL JOURNAL

Introduction

Proton pump inhibitors (PPIs) are the most effective agents for inhibiting hydrochloric acid secretion and are widely used in the treatment and prophylaxis of upper gastrointestinal disorders such as gastroesophageal reflux disease (GERD), Helicobacter pylori (HP) eradication therapy, drug-induced ulcers, and other hypersecretory conditions.[1]

Proton pump inhibitors (PPIs) are the third most widely used drugs in the world after antibiotics and statins.[2] It is also at the forefront of the list of safe medicines prepared by the World Health Organization. It is rare for a patient to discontinue these drugs due to side effects.[2, 3] Therefore, long-term use without an appropriate indication is increasing. According to current literature, inappropriate use of proton pump inhibitors (PPIs) is defined as prescribing omeprazole or esomeprazole in patients receiving clopidogrel, using PPIs in cases of uncomplicated gastroesophageal reflux disease (GERD) and laryngopharyngeal reflux, in the treatment of uncomplicated peptic ulcer, in patients diagnosed solely with gastritis or functional dyspepsia, continuing PPI therapy after completion of Helicobacter pylori eradication, using PPIs as a diagnostic tool, and prolonged use (beyond eight weeks) for stress ulcer prophylaxis in non–intensive care unit (ICU) patients.[4-7]

Looking at the PPI prescription rate in Turkey in general, while the total number of 1-month treatments administered was 13.767.477 in 2006, it increased by approximately 255% in 2011 and reached 35.152.889.[8] In 2012, a total of 31.342.307 PPI prescriptions were written in 1 year, 2.576.080 in 1 month, and 85.869 in 1 day.[2] In addition, it was observed that 25-75% of those who used PPIs for a long time used them without indication.[3] All these cause negative feedback to the health system and the economy.

Therefore, it has become important to draw attention to the inappropriate use of PPIs in primary care, which is the most common referral point of patients and where PPIs are most commonly prescribed, and to increase the awareness of patients on this issue. For this reason, this study aimed to determine the inappropriate use of PPIs and related factors, as well as the side effects associated with the inappropriate use of PPIs.

Materials and Methods

Survey Design

This cross-sectional study was conducted by applying a questionnaire, and the 'PPI use and awareness' questionnaire, which was prepared according to the existing literature, was applied. The questionnaire included 34 questions in total, the first 3 questions were designed to measure demographic information(age, gender, education level), 3 questions were designed to measure patient-physician communication during PPI

use(mentioning side effects, warning about the duration of use of the drug, warning about unconscious use of the drug), 5 questions were designed to measure patients' lifestyle habits(Smoking, alcohol, tea, coffee consumption status and frequency, meal plan), 3 questions were designed to measure the incidence of side effects due to PPI use(if you experience any side effects and what side effects you experience), and the other 20 questions were designed to measure physician and patient attitudes and behaviors regarding PPI use.

Sample Selection and Data Collection

This study was approved by the Ethics Committee for Non-Interventional Clinical Research of Hatay Mustafa Kemal University on November 29, 2021, under decision number 01. All participants signed a consent form that was prepared following the principles of the Declaration of Helsinki. The sample size of the study was determined to be 384 using the online Raosoft sample size calculator, with a 95% confidence level and a 5% margin of error. Adults using PPIs were included in the study voluntarily, and a questionnaire was considered valid for analysis only when 100% of the questions were answered.

The participants of this study were selected voluntarily among patients who used PPIs for any reason (presenting with gastrointestinal complaints, presenting for PPI prescription) who applied to 4 primary care centers in Hatay province. After verbal and written informed consent was obtained, the questionnaire was administered face-to-face. Data were collected by us between December 1, 2021, and February 28, 2022. This cross-sectional study included individuals who met the following inclusion criteria: (1) willingness to participate in the study, (2) current use of proton pump inhibitors (PPIs), and (3) age between 18 and 75 years. Participants who did not meet these criteria or who submitted incomplete responses were excluded from the study. A total of 462 patients volunteered to participate in the study. However, 11 participants were excluded due to incomplete data, resulting in a final sample of 451 individuals included in the analysis.

Statistical Analysis

The collected data were entered into the IBM SPSS Statistics 21 statistical program and analyzed. Descriptive statistics were expressed as mean ± standard deviation for continuous variables and as number of cases (none) and (%) for nominal variables. Chi-square, Kruskal-Wallis, and Fisher's Exact tests were used to determine the relationship between categorical variables. The statistical significance level of the obtained data was interpreted with the “p” value. $p<0.05$ values were considered statistically significant.

Results

A total of 451 patients, 228 females (50.6%) and 223 males (49.4%), aged between 16 and 96 years and using PPIs, were included in the study. The mean age of the patients was calculated as 54.29±18 years. While 14.2% (n=64) of the patients were illiterate, 45.2% (n=204) were primary school graduates, 25.7% (n=116) were high school graduates, and 14.9% (n=67) were undergraduate/graduate graduates. Sociodemographic data and lifestyle habits of the patients are shown in Table 1.

Table 1. Sociodemographic data and lifestyle habits of patients

		None	%
Sex	Woman	228	50.6
	Man	223	49.4
Education Status	İlliterate	64	14.2
	Primary school graduate	204	45.2
	High school graduate	116	25.7
	Undergraduate/graduate	67	14.9
Do you smoke or use tobacco?	Yes, 1 pack or less per day	108	23.9
	Yes, more than 1 pack per day	25	5.5
	Yes, I drink occasionally.	8	1.8
	No, I don't use it.	310	68.7
What is your frequency of alcohol use?	Every day	10	2.2
	3-6 times a week	5	1.1
	1-2 times a week	20	4.4
	2-3 times a month	44	9.8
	Rare	44	9.8
	None	328	72.7
Are your meals regular?	Yes	370	82.0
	No	81	18.0

Among the participants, 51.2% (n=231) were mostly using the active ingredient Pantoprazole. This was followed by Lansoprazole (24.6%, n=111) and Esomeprazole (16.2%, n=73). The least used drug was Omeprazole (0.4%, n=2). The most frequently prescribed specialties were General Internal Medicine (47%, n=212) and Family Medicine (30.8%, n=139), respectively. 23.9% (n=108) of the patients stated that the physician did not inform them about how long they should take the medication. 38.8% of the patients stated that they were using PPI because of polypharmacy, 59.6% because of stomach complaints, and 1.6% because of other reasons. The frequency of PPI use and the duration of PPI use are shown in Table 2.

Table 2. Frequency and duration of PPI use in patients

		None	%
Frequency of use	1 time a day	325	72.1
	2 times a day	32	7.1
	Occasionally, when he has a stomachache	87	19.3
	Rarely	7	1.6
Duration of use	Less than 4 Weeks	105	23.3
	Less than 8 Weeks	54	12.0
	Longer than 8 Weeks	36	8.0
	3 Months	22	4.9
	6 Month	17	3.8
	1 Year	29	6.4
	2 Year	15	3.3
	Over 2 Years	173	38.4

After the initiation of the medication, 47% of the patients never went for a follow-up visit, 81.2% never took a break from the medication, 35.5% used the medication from the pharmacy voluntarily without consulting the physician, and 39.9% used it inappropriately.

Among those who stopped the medication (n=85); 71.77% (n=61) stated that they restarted the medication on their own decision because their complaints recurred, and 28.23% (n=24) stated that they restarted the medication with the doctor's advice.

Of the patients (n=451); 75.4% stated that they were not informed about the side effects of the drug, and 43.2% stated that they did not receive information about side effects from their physicians.

Table 3 shows the questionnaire questions evaluating the patient-physician communication status and the answers given to them. In addition, it was determined that there was a significant correlation between the physician's mention of the side effects of the drug and inappropriate PPI use in patient-physician communication (p=0.009), (Table 4).

Table 3. Questions and responses assessing patient-physician communication about PPI use

		None	%
Has your physician ever warned you about medication?	Yes	125	27.7
	I don't remember	158	35.0
	No	168	37.3
Does your doctor tell you about the side effects of the medicine?	Yes	95	21.1
	I don't remember	161	35.7
	No	195	43.2
Does your doctor ask you how long you have been taking the medicine?	Not prescribed again	7	1.6
	Always asking	83	18.4
	Mostly asking	84	18.6
	Occasionally he asks	81	18.0
	Rarely asked	72	16.0
	Never asks	124	27.5

Table 4. Association between patient-physician communication and inappropriate PPI use

		Inappropriate Use		p-value*
		Yes n(%)	No n(%)	
Did your doctor tell you about the side effects of the medicine?	Yes	25(13.9)	70(25.8)	**0.009**
	I don't remember	71(39.4)	90(33.2)	
	No	84(46.7)	111(41.0)	
Does your doctor ask you how long you have been taking the medicine?	Not prescribed again	1(0.6)	6(2.2)	**0.036**
	Always asking	22(12.2)	61(22.5)	
	Mostly asking	34(18.9)	50(18.5)	
	Occasionally he asks	36(20.0)	45(16.6)	
	Rarely asked	28(15.6)	44(16.2)	
	Never asks	59(32.8)	65(24.0)	
Did your doctor give any warning about the medicine?	Yes	40(22.2)	85(31.4)	**0.034**
	No	140(77.8)	186(68.6)	

p: Chi-square, n: None*

8.2% (n=37) of the patients stated that they experienced side effects while using PPI. In the long term, the most common side effects were nausea (1.8%, n=8) and headache (1.6%, n=7), and in the short term, the most common side effects were nausea (3.1%, n=14) and constipation (2.7%, n=12). In addition, there was a significant relationship between use for more than 2 years and the occurrence of side effects (p=0.001), (Table 5).

Table 5. The relationship between the duration of PPI use and side effects

Side Effect	PPI Time to Use								
	Less than 4 weeks n(%)	**Less than 8 weeks n(%)**	**longer than 8 weeks n(%)**	**3 months n(%)**	**6 months n(%)**	**1 year n(%)**	**2 year n(%)**	**More than 2 years n(%)**	**p***
Yes	14(%13.3)$_a$	8(%14.8)$_a$	3(%8.3)$_a$	4(%18.2)$_a$	2(%11.8)$_a$	3(%10.3)$_a$	1(%6.7)$_{a,b}$	2(%1.2)$_b$	**0.001**
No	91(%86.7)$_a$	46(%85.2)$_a$	33(%91.7)$_a$	18(%81.8)$_a$	15(%88.2)$_a$	26(%89.7)$_a$	14(%93.3)$_{a,b}$	171(%98.8)$_b$	

p: Chi-square (likelihood ratio) , n: None*

In our study, when the relationship between the age of the participants and the physician's information about PPI use was evaluated, it was found that physicians mostly warned older patients about PPI use (p=0.006), (Table 6).

Table 6. Age of the participants and the physician's information on PPI use

	Age(mean±sd)	**p-value***
Physician warning	55.43±17.11	**0.006**
The physician does not remember warning	57.17±17.70	
No physician warning	50.74±18.42	
Physician has a side effect bet	55.28(17.80)	**0.021**
Doesn't remember the side effect bet	56.81(18.50)	
No side effects mentioned	51.73(%17.41)	

p: Kruskal-Wallis, sd: Standard deviation*

Discussion

This study will guide in identifying inappropriate PPI use and showing the magnitude of the problem, and the identification of associated conditions will guide the planning of interventions in terms of rational drug use. In

addition, the lack of any other study determining the frequency of inappropriate PPI use and associated factors in Hatay province reveals the importance of this study.

Considering the criteria for inappropriate use according to the existing literature, 39.9% of the patients in this study used PPI inappropriately, and 83.6% of the patients never discontinued the medication for more than 1 year. T.Boghossian, R.Nardino, A.Ladd, P.Haastrup, L.Pasina et al. found that the rate of inappropriate PPI use ranged between 25% and 75%.[3, 9-13]

In a study conducted in our country, the rate of drug use without consulting a physician was found to be 5.3%.[14] In our study, it was found that 35.5% of the patients took the medication from the pharmacy voluntarily without consulting a physician. In a study conducted by Nazan K. and Murat K. in our country, it was found that 86.3% of the patients were not informed about the side effects of the drug.[15] In our study, this rate was found to be 75.4%. These high rates indicate inappropriate use of PPIs, further emphasizing the importance of our study in terms of the region, and reveal the need for effective interventions in our region regarding inappropriate PPI use.

In our study, 70% of the patients who discontinued PPI started to use PPI again because their complaints started again. In a study conducted in our country, this rate was 56%.[16] These high rates can be explained by the increase in rebound ascites caused by the use of PPIs for more than 2 weeks. In cases where PPIs should be used for a long time, it is recommended to continue treatment at the lowest effective dose to prevent rebound hyperacid secretion and to terminate the treatment by adjusting the dose every other day in a step-down manner.[17] This information should be internalized by primary care physicians and should be included in their daily practice and shared with their patients.

In the studies conducted by Fatma C. et al. and Pasina L. et al. the 3 most frequently used active substances were found to be Lansoprazole, Pantoprazole, and Esomeprazole. [12, 18] In our study, the most frequently used active substance was Pantoprazole, and the least frequently used active substance was Omeprazole. The fact that Pantoprazole was the most frequently used active ingredient may be because the mean age of the patients who participated in our study was high, and due to the multidrug use, physicians prescribed Pantoprazole more frequently with the idea that the drug interaction rate was lower in Pantoprazole compared to other active ingredients.

In addition, considering that patient-physician communication was significantly associated with inappropriate PPI use (Table 4), the importance of primary care physicians, who have the most contact with patients, is understood, and primary care physicians have great duties in this regard.

In recent years, regulatory measures have been introduced in primary care settings in our country to address the growing concern of inappropriate proton pump inhibitor (PPI) use. These measures include limitations on prescribing rates, particularly for indications not supported by current clinical guidelines. Such interventions aim to promote rational drug use and reduce the potential risks associated with unnecessary long-term PPI therapy.

Future research should focus on evaluating the effectiveness of these prescribing restrictions. Specifically, longitudinal studies could investigate whether these policy changes have led to measurable improvements in prescribing behavior, reduced rates of inappropriate PPI use, and better adherence to evidence-based guidelines. This would provide valuable insight into the long-term impact of such regulatory strategies on clinical practice and public health.

In conclusion, in our study, we observed an increase in side effects due to inappropriate PPI use for more than 2 years. Patients reported that they used PPIs without being under the control of a physician, and they also reported that physicians did not inform them about the duration of PPI use and side effects.

To prevent inappropriate use of PPIs, there is a need for physician-patient training as well as interventions by health authorities to prescribe the drug depending on the duration of use and not to give it to the patient without a prescription. Perhaps these interventions could start by stating that the use of the term 'stomach protector' instead of PPI is not appropriate for these drugs. This term creates the perception that patients should use a PPI with any medication when it is started. As seen in this study, there are serious deficiencies in the follow-up of patients who are prescribed PPI for any reason and in the termination of PPI use. In addition, the perception that polypharmacy requires the use of PPI should be abandoned, and PPI should be prescribed if there is a drug that requires the use of PPI among the drugs used by the patient.

As a result, it would be a correct approach to start PPI at the appropriate dose for patients with a necessary indication, to inform the patient at the first prescription, to inform the patient about when PPI will be terminated, to formulate the physician's plan, and to inform the patient.

Ethical Considerations: This study was approved by the Ethics Committee for Non-Interventional Clinical Research of Hatay Mustafa Kemal University on November 29, 2021, under decision number 01.

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

References

1. Luo H, Fan Q, Bian T, et al. Awareness, attitude and behavior regarding proton pump inhibitor among medical staff in the Southwest of China. BMC Health Serv Res. 2019;19(1):880 (doi: 10.1186/s12913-019-4725-6).
2. Uygun A. Long duration proton pump ıf ppı ınhibitors (ppı) will be used, which ppı to prefer? What should be considered? Current Gastroenterology journal. 2013;17(1).46-58
3. Ali Ö. Proton pump inhibitors and safety of use. Current Gastroenterology journal. 2013;17(3)179-201.
4. Savarino V, Dulbecco P, Bortoli N, Ottonello A, Savarino E. The appropriate use of proton pump inhibitors (ppis): need for a reappraisal. Eur j intern med.2017;37:19-24 (doi: 10.1016/j.ejim.2016.10.007).
5. Wahking RA, Steele RE, Hanners RE, Lockwood SM, Davis KW. Outcomes from a pharmacist - led proton pump inhibitor stewardship program at a single ınstitution. Hosp pharm. 2018;53(1):59-67 (doi: 10.1177/0018578717747192).
6. O'Mahony D, O'Sullivan D, Byerne S, O'Connor MN, Ryan C, Gallagher P. Stopp/start criteria for potentially inappropriate prescribing in older people: version 2. Age ageing. 2015;44(2):213-8 (doi: 10.1093/ageing/afu145).
7. Cooper JA, Ryan C, Smith SM, et al. The development of the prompt (prescribingoptimally In Middle-Aged People's Treatments) Criteria. BMC Health Serv Res. 2014;14:484 (doi: 10.1186/s12913-014-0484-6).
8. Bilgener E. Budget effects of consumptıon of proton pump ınhıbıtors ın turkey ın years 2006-2011. Journal of Faculty of Pharmacy of Ankara University. 2018;42(2):23-31.
9. Haastrup PF, Paulsen MS, Christensen RD, Søndergaard J, Hansen JM, Jarbøl DE. Medical and non-medical predictors of ınitiating long-term use of proton pump inhibitors: a nationwide cohort study of first-time users during a 10-year period. Aliment pharmacol ther. 2016;44(1):78-87 (doi: 10.1111/apt.13649).
10. Ladd AM, Panagopoulos G, Cohen J, Mar N, Graham R. Potential costs of inappropriate use of proton pump inhibitors. Am J Med Sci. 2014; 347(6):446-51 (doi: 10.1097/MAJ.0b013e31829f87d5).
11. Nardino RJ, Vender RJ, Herbert PN. Overuse of acid-suppressive therapy in hospitalized patients. Am J Gastroenterol. 2000;95(11):3118-22 (doi: 10.1111/j.1572-0241.2000.03259.x).
12. Pasina L, Nobili A, Tettemanti M, et al. Prevalence and appropriateness of drug prescriptions for peptic ulcer and gastro-esophageal reflux disease ın a cohort of hospitalized elderly. Eur J Intern Med. 2011;22(2):205-10 (doi: 10.1016/j.ejim.2010.11.009).

13. Boghossian TA, Rashid FJ, Thompson W, et al. Deprescribing versus continuation of chronic proton pump inhibitor use in adults. Cochrane database syst rev. 2017; 3(3):011969 (doi: 10.1002/14651858.CD011969.pub2).
14. Karataş Y, Dinler B, Erdoğdu T, Ertuğ P, Seydaoğlu P. Evaluation of drug use attitudes of patient and ıts relatives attending to Çukurova University Medical Faculty Balcalı Hospital. Cukurova Medical Journal, 2012;37(1):1-8.
15. Kapıcı N, Kekilli M. Family medicine practice proton pump inhibitors treatment awareness study. Medical Specialization Thesis, University of Health Sciences, Department of Family Medicine, Türkiye; 2018.
16. Erden MÇ, Pamuk G, Erden B, Koç EM. Awareness level of patients using proton pump ınhibitor applying to a training family health center. Forbes J Med. 2021;2(3):166-170 (doi: 10.4274/forbes.galenos.2021.41736).
17. Inadomi JM, Cemal R, Murata GH et al. Step-down management of gastroesophageal reflux disease. Gastroenterology. 2001;121(5):1095-100 (doi: 10.1053/gast.2001.28649)
18. Cankara F, Aşcı H, Sönmez Y. Profiles of patients hospitalized in the university hospital, physician preferences and polypharmacy presence of the drug. Suleyman demirel university journal of health sciences. 2015;6(1):20-5.

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):311-325 // 10.5505/amj.2025.97254

FACTORS AFFECTING THE HEALTH SERVICE UTILISATION OF DISABLED INDIVIDUALS

Ali İhsan Çabuk[1], Ersin Akpinar[2]

[1]Narlıca Number 2 Family Health Center, Adana, Türkiye

[2]Department of Family Medicine, Çukurova University, Adana, Türkiye

Correspondence:

Ali İhsan Çabuk (e-mail: aliihsn@hotmail.com)

Submitted: 03.04.2025 // Accepted: 02.07.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine

Department of Family Medicine

Abstract

Objectives: Although people with disabilities need health services more, they benefit less from health services. To determine the reasons for this condition, the present study examines the barriers that individuals with disabilities face in accessing health services.

Materials and Methods: In face-to-face meetings, a sociodemographic information form and a questionnaire regarding the obstacles encountered while accessing health services were administered to individuals with disabilities or their parents living in Adana.

Results: 412 disabled individuals between 0.3 and 88 years of age participated in the study. 58.98 % of the participants are men, and 41.01 % are women. While 90.29 % of participants pay for medicine, 91.02 % of participants pay for all kinds of medical supplies, and 92.96 % pay for health services. 64.3 % of participants experience stress while receiving health services. For 70.1 % of the participants, assistant personnel are not assigned in the health institution. 51.2 % of participants do not see sufficient understanding from other patients' relatives, and 52.2% cannot use their right of priority.

Conclusion: Economic conditions and social security rates of disabled individuals are low compared to those of society. The most important obstacle to the access of people with disabilities to health is economic barriers. Other obstacles are that disabled individuals experience stress in the procurement of services, parents with low education level, need their relatives for treatment, not allocating auxiliary personnel in health institutions, not having sufficient understanding from other patient relatives, and not being able to use their rights of priority.

Keywords: Disabled person, health care, access, obstacle, health equity, health disparities.

Introduction

Disability is a concept that has existed throughout human history.[1] It has increased due to occupational accidents and chronic diseases due to the extension of human life after the Industrial Revolution.[2,3] There are more than one billion disabled people worldwide [3] 12.3% of the population in Turkey is disabled.[4] According to the World Disability Report published by the World Health Organization in 2011, "Disability is a human condition. Every person may experience permanent or temporary disability or loss of function at some point in their life. Most extended families have a disabled person, and non-disabled individuals assume the responsibility of their disabled relatives.[5] Disability is the result of a complex relationship between an individual's health status, personal factors, and external factors representing the conditions in which they live.[6]"

The health service needs of disabled individuals may differ depending on their primary health problem. For example, while someone who is visually impaired from birth does not need to see an ophthalmologist constantly, someone with cystic fibrosis or multiple myeloma may need continuous health services for secondary problems and comorbidities that may develop.[5] Disabled individuals have a shorter life expectancy because they experience more secondary and comorbid health problems and have more unmet health needs than the general population.[5,7] Depression is often seen as a secondary problem in disabled individuals, and comorbidities are also higher than in the general population.[5] For example, individuals with mental disorders have an increased risk of infectious and non-communicable diseases.[8] Chronic diseases such as hypertension, cardiovascular diseases, arthritis, and diabetes are significantly more common in disabled individuals than in the non-disabled population.[9] Individuals with mental disabilities have a higher risk of stroke and coronary heart disease before the age of.[7] In addition, it was found that the frequency of colorectal cancer is twice as high in schizophrenia patients.[7] There is also an increase in risky behaviors in disabled individuals. The rate of physical activity in disabled adults is significantly lower than in non-disabled individual.[9] Preventive services, such as screening programs, are provided to individuals with disabilities at a lower rate. Routine breast and cervical cancer screenings are performed significantly less frequently in women with developmental disabilities than in non-disabled individuals.[9] 11.5% of women with developmental disabilities have never been examined by a gynecologist or obstetrician before.[9] 26.8% of women with developmental disabilities aged 40 and over stated that they had never had a mammogram before.[9]

Disabled individuals have a high rate of exposure to violence and abuse. In a meta-analysis, the rate of exposure to domestic violence among individuals with disabilities was 15-22% in women and 4-10% in men. The frequency of exposure to any physical abuse was 20.7% in women and 17.8% in men. Sexual abuse is six times higher than in the general population. It was observed at 9.9% in women and 3.1% in men.[10]

The obstacles to inadequate health care in the World Disability Report; These are listed as not being able to cover examination expenses, not having access to transportation, not being able to cover transportation expenses, healthcare providers not having sufficient equipment, healthcare providers not having sufficient skills, previous ill-treatment, not having enough time, not knowing where to go, and individuals not thinking they are sick enough to seek medical attention.[5] Another systematic review conducted on individuals with mental disabilities over the age of sixteen found that the three most important factors for not benefiting from primary or community health care were: not identifying needs, accessing services, and interacting during consultation with the healthcare institution.[11] 69.8% of disabled individuals in Turkey stated that they "need someone else to follow up on hospital procedures," 53.3% of them stated that they "cannot communicate adequately with healthcare professionals," 47.5% of them stated that "healthcare professionals do not provide information about the disabled individual's health problem," 47.4% of the participants stated that they "have difficulty moving within the healthcare institution," and 45.6% of the participants stated that "there are obstacles in transportation to the healthcare institution."[12]

Our study focused on identifying the obstacles that disabled individuals encounter in accessing healthcare services. We conducted face-to-face interviews with disabled individuals and their parents living in Adana. As a result of this study, the obstacles that disabled individuals face in accessing healthcare services and the situations they encounter in receiving healthcare services will be revealed. The data found will be shared with the public.

Materials and Methods

The present study is a descriptive, cross-sectional study. The research universe consists of disabled individuals living in Adana province. According to the information received from CİMER (Presidency's Communication Centre), the number of disabled individuals in Adana province is 73080 people.[13] The sample size was calculated with the "Epi InfoTM" program. Our calculated sample size was 382 people for a 95% confidence interval. Our study was applied to 431 individuals. 19 people who filled out the questionnaire incompletely due to unknown reasons were not included in our study. The number of participants included in the study was 412 people, and the response rate was 95.6%. Participants were reached in disabled associations and rehabilitation centers. Every individual who wanted to participate in the study and completely filled out the form participated in the study. Individuals who did not agree to participate were not included in the study. The study was initiated on 02.07.2019 and completed on 02.07.2020. Approval was received from the Ethics Committee of Çukurova University Faculty of Medicine on (Date:14.06.2019, No:81) and the Principles of the Helsinki Declaration were followed.

The surveys were filled out face-to-face with the members of disabled associations and individuals who applied to rehabilitation centers under the supervision of various trainers and guidance teachers. Adults and individuals who were able to fill out the survey were asked to fill out the survey themselves, while adults and child participants who could not fill out the survey were asked to fill out the survey with their parents or guardians. An interpreter was provided for hearing-impaired individuals, and the questions were read to visually impaired individuals. The data obtained were transferred to the Microsoft Excel program.

The sociodemographic information form (age, gender, marital status, special education status, who they live with, parents' living situation, if parents are alive, their working status, social security status, average monthly income of the household, disability status and disability rate, when the disability status occurred) and the questionnaire on obstacles encountered while using health services, previously developed by Kördeve, were used.[14] The survey's Cronbach Alpha is 0.824.[14] The questions in the questionnaire were asked.[14] The answers are in the form of a 5-point Likert scale, starting with "never" at the lowest and ending with "always" at the highest. Two of the propositions (propositions 11 and 14) were designed as negative (reverse) coding, while the other propositions were designed as positive coding. The questionnaire consisted of propositions examining the physical conditions of health institutions, the behavior of health personnel, the social security and economic status of the disabled individual, the psychological status of the patient, and the situations that help the disabled individual.

"TURCOSA" statistical software (Turcosa Analytics Ltd Co., Turkey) was used to interpret and analyze the data. Turcosa is a cloud-based statistical software using R.[15] First, the frequency values of the data obtained from our participants were measured. Appropriate non-parametric "Mann-Whitney U" and "Kruskal-Wallis" tests were applied to analyze whether there was a significant relationship between the obtained sociodemographic data and the survey questions. The significance level was accepted as $p<0.05$.

Results

Of the 412 individuals who participated in the present study, 58.98% (n=243) were male and 41.02% (n=169) were female. 93.4% (n= 385) of the participants were single. The average age of the participants was 13.03±13.45 years. (Min=0.3 years, Max=88 years). Individuals who received special education received an average of 6.24±5.66 years of special education. The education level of 50.25% of the mothers and 36.16% of the fathers was primary school or below. 17.72% of the participants did not have health insurance. The disability rates of the participants ranged from 20% to 100%. 45.6% (n=188) of the participants had more than one disability, and 59.22% (n=244) were congenitally disabled." (Table 1). The responses of the participants to the survey questions are shown in Table 2.

Table 1. Sociodemographic characters

		Number (n)	Percentage (%)
Gender	Male	243	58.,98
	Female	169	41.02
Age	Child	330	80.1
	Adult	82	19.9
Marital status	Single	385	93.4
	Married	23	5.6
	Widow	4	1.00
Special Education	In special education	362	87.86
	No special education	50	12.14
Accommodation	Family	402	97.58
	Care center	5	1.21
	Other	5	1.21
Parent	Both alive	349	84.71
	Only the mother is alive	33	8.01
	Only the father is alive	12	2.91
	Both deceased	18	4.37
Mother's educational degree	No education	79	19.18
	Primary school	128	31.07
	High school	112	27.18
	College	37	8.98
	University	56	13.59
Father's educational degree	No education	23	5.58
	Primary school	126	30.58
	High school	146	34.44
	College	40	9.71
	University	77	18.69
Employment of parents	Both unemployed	73	17.72
	Only one parent is	275	66.75
	Both employed	64	15.53
Social security	Yes	339	82.28
	No	73	17.72
Household income	0-1/2 Minimum wage (TL)	41	10.0
	1/2- 1 minimum wage	81	19.7
	1-3/2 minimum wage	197	47.8
	3/2-2 minimum wage	37	8.9
	2 minimum wage and more	56	13.6
Having multiple disabilities	Yes	188	45.6
	No	224	54.4
Disabilities*	Hearing	51	12.38
	Visual	46	11.16
	Speaking	111	26.94
	Orthopedic	66	16.02
	Cognitive zihnsel	197	47.81
	Neurological	153	37.13
	Other	33	8.01
Time of disability	Congenital	244	59.22
	Acquired	168	40.78

*Multiple choices were marked

Table 2. Questionnaire data

	Never		Rarely		Sometimes		Frequently		Always	
	n	%	n	%	n	%	n	%	n	%
In healthcare institutions, telephones, elevators, stairs, and hospital entrances are designed for disabled citizens.	49	11.89	90	21.85	126	30.58	85	20.63	62	15.05
All stairs and ramps in the hospital are designed for disabled people.	36	8.74	91	22.09	121	29.37	101	24.51	63	15.29
The toilets and sinks in the health facility have been designed with disabled citizens in mind.	48	11.65	69	16.75	96	23.30	108	26.21	91	22.09
There are adequate directional signs for disabled people in health institutions.	50	12.14	102	24.76	123	29.85	84	20.39	53	12.86
After the treatment, adequate explanations are made by the relevant health professional.	57	13.84	122	29.61	122	29.61	63	15.29	48	11.65
I can easily have an appointment at the health institution.	60	14.56	102	24.76	105	25.48	73	17.72	72	17.48
In the health institution, there are braille, illuminated, and verbal warnings and signs where disabled citizens can use all their tools and equipment.	77	18.69	108	26.21	114	27.67	73	17.72	40	9.71
Thanks to my social security, I can get my medicines free of charge.	141	34.22	92	22.33	89	21.60	53	12.87	37	8.98
Thanks to my social security, I can get the medical supplies I need for any illness I have, free of charge.	146	35.43	99	24.03	91	22.09	47	11.41	29	7.04
Thanks to my social security, I can receive all kinds of health services free of charge.	117	28.40	108	26.21	97	23.54	49	11.89	41	9.96
I experience stress while receiving services from health institutions.	50	12.14	97	23.54	103	25.00	78	18.93	84	20.39
When I first enter the healthcare facility, I receive the necessary attention and assistance from the staff.	68	16.51	102	24.76	143	34.71	57	13.83	42	10.19
I can go to a health institution and receive treatment without my relative being with me.	120	29.13	114	27.67	74	17.96	52	12.62	52	12.62
The fact that I am given priority during the examination disturbs me psychologically.	184	44.66	97	23.54	70	16.99	33	8.01	28	6.80
There is sufficient, easily accessible disabled parking at the health facility.	78	18.93	95	23.06	134	32.53	63	15.29	42	10.19
I can easily explain my problem to the doctor and healthcare personnel who treat me.	39	9.47	93	22.57	122	29.61	78	18.93	80	19.42
When I first enter a healthcare facility, I can obtain equipment appropriate for my disability.	66	16.02	79	19.18	129	31.31	78	18.93	60	14.56
When I go to a health facility, a staff member is assigned to help me.	190	46.11	99	24.03	68	16.51	38	9.22	17	4.13
While being examined, I receive the necessary understanding from other patients and their relatives.	94	22.81	117	28.40	107	25.97	65	15.78	29	7.04
I do not have to wait in line for outpatient clinic services; I can use my priority right.	96	23.30	119	28.88	84	20.39	66	16.02	47	11.41
Seats for sitting while waiting are suitable for disabled citizens	98	23.79	104	25.24	96	23.30	64	15.53	50	12.14

The differences between the responses of the child and adult age groups to the survey statements are shown in Table 3. According to this table, statements 4 (There are sufficient direction signs for the disabled in health

institutions.), 11 (I experience stress when receiving service from health institutions.), and 13 (I can go to the health institution and receive my treatment procedures without my relative.) were experienced significantly more frequently by the child participants, while statement 18 (When I go to the health institution, a staff member is assigned to help me.) was experienced significantly more frequently by the adult participants (respectively; p=.001, p=.007, p=.004, p=.031).

Table 3. The comparison of the statements in the questionnaire according to age

	Child (n=330)	Adult (n=82)	P
	Median (min-max)	Median (min-max)	
Statement 1	3 (1-5)	3 (1-5)	0.343
Statement 2	3 (1-5)	3 (1-5)	0.078
Statement 3	3.5 (1-5)	3 (1-5)	0.179
Statement 4	3 (1-5)	3 (1-5)	0.001*
Statement 5	3 (1-5)	3 (1-5)	0.200
Statement 6	3 (1-5)	3 (1-5)	0.613
Statement 7	3 (1-5)	3 (1-5)	0.050
Statement 8	2 (1-5)	2 (1-5)	0.527
Statement 9	2 (1-5)	2 (1-5)	0.825
Statement 10	2 (1-5)	2 (1-5)	0.777
Statement 11	3 (1-5)	3 (1-5)	0.007*
Statement 12	3 (1-5)	3 (1-5)	0.960
Statement 13	2 (1-5)	2 (1-5)	0.004*
Statement 14	2 (1-5)	2 (1-5)	0.104
Statement 15	3 (1-5)	3 (1-5)	0.792
Statement 16	3 (1-5)	3 (1-5)	0.994
Statement 17	3 (1-5)	3 (1-5)	0.896
Statement 18	2 (1-5)	2 (1-5)	0.031*
Statement 19	2 (1-5)	3 (1-5)	0.083
Statement 20	2 (1-5)	3 (1-5)	0.271
Statement 21	2 (1-5)	3 (1-5)	0.328

Mann-Whitney U, *p<0,05

Table 4 shows the differences between individuals' status of receiving special education and their responses to the survey statements. According to this table, statements 17 (When I first enter the health institution, I can obtain equipment suitable for my disability (wheelchair, stretcher, voice guidance, etc.)), 18 (When I go to the health institution, a staff member is assigned to help me). 19 (I receive the necessary understanding from other patients and relatives during the examination.) and 21 (The seats to sit on while waiting are suitable for disabled citizens.) are experienced significantly more frequently by individuals who do not receive special education than by individuals who receive special education (respectively, p=.001, p=0.46, p=.020, p=.024).

Table 4: The comparison of statements according to the status of special education

	Special Education (n=362)	No special education (n=50)	p
	Median (min-max)	Median (min-max)	
Statement 1	3 (1-5)	3 (1-5)	.554
Statement 2	3 (1-5)	3 (1-5)	.346
Statement 3	3 (1-5)	4 (1-5)	.112
Statement 4	3 (1-5)	3 (1-5)	.611
Statement 5	3 (1-5)	3 (1-5)	.810
Statement 6	3 (1-5)	3 (1-5)	.071
Statement 7	3 (1-5)	3 (1-5)	.151
Statement 8	2 (1-5)	2 (1-5)	.801
Statement 9	2 (1-5)	2 (1-5)	.652
Statement 10	2 (1-5)	2 (1-5)	.918
Statement 11	3 (1-5)	3 (1-5)	.212
Statement 12	3 (1-5)	3 (1-5)	.114
Statement 13	2 (1-5)	2 (1-5)	.056
Statement 14	2 (1-5)	1 (1-5)	.069
Statement 15	3 (1-5)	3 (1-5)	.788
Statement 16	3 (1-5)	3 (1-5)	.430
Statement 17	3 (1-5)	4 (1-5)	.001*
Statement 18	2 (1-5)	2 (1-5)	.046*
Statement 19	2 (1-5)	3 (1-5)	.020*
Statement 20	2 (1-5)	3 (1-5)	.679
Statement 21	2 (1-5)	3 (1-5)	.024*

Mann-Whitney U, *p<0,05

Discussion

The study shows the socio-demographic status of disabled individuals in Adana province and the situations they encounter while receiving health services. In the study conducted by Aktuğ in 2008, 55.1% of the participants were male.[16] In the study conducted by Karadağ, 62.2% of the participants were male.[17] In the study conducted by Karip, 65.7% of the participants were male.[18] In the study conducted by Yüzüak, 57.4% of the participants were male.[19] These data are consistent with the data of 57% male and 43% female individuals with disabilities in the November 2019 Bulletin of the General Directorate of Elderly and Disabled Services affiliated with the Ministry of Family and Social Services of the Republic of Turkey.[20] In this study, similar to the literature and Turkey in general, the proportion of disabled male individuals is higher.

In our country, the number of special education institutions (formal education) for individuals with disabilities was 342 in the 2001-2002 academic year. While there were 2834 teachers in special education schools and 53,306 students in special education schools, special education classes, and inclusive education, these numbers increased to 1417 schools, 15321 teachers, and a total of 425,774 students in special education schools, special education classes, and inclusive education in the 2019-2020 academic year.[20,21] The number of special

education and rehabilitation centers (non-formal education) was 1318 in the 2006-2007 academic year. 8587 teachers and 131,206 students were receiving education in these institutions. This number reaches 2066 institutions, 26608 teachers, and 438570 students in the 2019-2020 academic year.[20,21] 87.56% of our participants (n=330) receive special education. The average period they have received special education is 6.237 years. The reason for this high rate of disabled individuals receiving special education may be the high rate of students in our sample who are in private rehabilitation and special education institutions. The laws, practices, and improvements made by the Republic of Turkey for the education of disabled individuals have increased the participation of disabled individuals in education.

Since the majority of the students of the special education and rehabilitation centers in the present study were individuals with neurological and speech disabilities, the rates of the individuals we obtained according to their disability groups do not coincide with the data of the Ministry of Family, Labor, and Social Services of the Republic of Turkey. [20]

In Durduran's study, 61% of the participants had a congenital disability.[22] This difference may be due to Durduran's sample only consisting of children. This is because disability increases with age due to chronic diseases.[5] In Aktuğ's study, 63% of the participants later became disabled. It might be due to the location. Their study was conducted in Gölcük after the earthquake, and the average age of the participants was higher than in our study.[16] According to the data of the Ministry of Family, Labor, and Social Services of the Republic of Turkey, the rate of chronic diseases among people with disabilities is 44.33%.[20] In the present study, the rate of congenital disability decreases as the average age increases. In Durduran's study conducted in Konya, 10% of the mothers of the participants were illiterate, while 79.6% of the mothers were primary school graduates. Although the study was conducted in Konya, it was conducted in the city center, and approximately 90% of the mothers were reported to have a low level of education.[22] In Aktuğ's study, 16.7% of the mothers of disabled individuals were illiterate, while 70.6% of the mothers were primary school graduates or only literate.[16] In Karadağ's study, it was stated that 65.3% of the mothers of disabled individuals were primary school graduates.[17] Adana province is in a better position than Konya, Gölcük, and Gaziantep in this regard. It is thought that the difference is due to the socio-cultural differences of the cities and the years in which the studies were conducted. According to the Turkey Demographic and Health Survey 2018, 9% of women in Turkey have no education, while 29% are primary school graduates and 20% are secondary school graduates.[23] In general, mothers of disabled individuals are less educated than the general population.

In Durduran's study conducted in Konya province, 3.2% of the individuals participating in the study had fathers who had no education at all, while 71% of their fathers were primary school graduates.[22] In Aktuğ's study, 5.9% of the disabled individuals participating in the study had illiterate fathers, while 63.4% of their fathers were primary school graduates or only literate.[16] In Karadağ's study, 78.9% of the participants had fathers who were

primary school graduates.[17] This difference may be due to the cultural and economic differences between the cities and the year in which the studies were conducted. According to the "Education at a Glance" report published by the Organization for Economic Co-operation and Development (OECD), the rate of individuals between the ages of 25-34 in the Republic of Turkey in 2018 who did not graduate from secondary school was 43%.[24] This rate was determined as 45% for men and 40% for women. In general, the education level of fathers of disabled individuals is also below the general average of the Republic of Turkey. The reason why the education rates of the fathers of the individuals in the presented study are higher than the rate stated in this report is that the report includes individuals in a certain age range and covers all individuals in the Republic of Turkey.

In Durduran's study, 97% of the participants were unemployed mothers.[22] In Aktuğ's study, 95.8% of the participants have unemployed mothers, and in Karadağ's study, 92.6% of the participants have unemployed mothers.[16,17] This situation may be due to differences in the mother's educational status. Therefore, cultural and economic reasons between cities affect this situation. In Durduran's study, 80.6% of the disabled individuals have health insurance, while 83.3% of the control group have health insurance.[22] In Aktuğ's study, 9.2% of the participants did not have social security.[16] It is thought that this situation is due to economic differences between cities. In the July 2020 statistics of the Social Security Institution (SGK), the insured population rate was stated as 86%.[25] According to the Turkey Disability Survey, 47.55% of those with disabilities other than chronic diseases and 63.67% of individuals with disabilities due to chronic diseases have social security.[4] As in Durduran's study, when the data in our study is compared with the SGK data, it is seen that disabled individuals have lower rates of health insurance compared to the general population. The education level of parents of persons with disabilities is lower than that of the general population, and their household income is also lower. In addition to these situations, the lack of health insurance is also an important issue affecting them. This situation coincides with the fact that poverty increases the rate of disability, as stated in the "World Report on Disability". As stated in the same report, there is a mutual interaction between poverty and disability. There can be disability due to poverty as well as poverty due to disability.[5]

In Karip's study, 2.7% of the participants stated that there is a disabled parking lot, 11% stated that the disabled parking lot is used by other vehicles, and 7% stated that there is no disabled parking lot.[18] In Karip's study, 7% of the participants stated that healthcare personnel assigned to help disabled individuals were assigned to the hospital entrance, 24% received help from the reception, and 73.7% did not receive help.[18] While 22% stated that they benefited from the priority right in the polyclinic, 9.7% partially benefited from it, and 68.3% did not use it.[18] The results are similar to the results of the presented study.

When the survey results of the participants are evaluated, they are generally satisfied with the physical conditions of health institutions. These conditions have been determined by various regulations in our country.

However, there are still situations that need to be improved. For example, according to the "Family Medicine Implementation Regulation", disabled toilets are obligatory only in class A ASMs (Family Health Center). [26] There are also supervisory deficiencies. In the study conducted by Pınar et al., 37 ramps were examined in 26 health institutions. As a result of the examinations, no ramps were found to be fully compliant with the standards. In addition, it was found that there were no ramps at the entrance of three health institutions.[27]

The most common complaint of the participants is that they are not assigned any auxiliary personnel when they apply to health institutions. Although it was decided to provide accompanying personnel for individuals with disabilities in the "Office of the Provision of Health Services for Persons with Disabilities No. 2010/79" with the article "In health institutions, accompanying personnel will be provided to facilitate service receipt for disabled and elderly patients and assist them in their transactions.", the negative responses of more than 70% of the participants show the deficiencies in practice[28] Adult individuals are significantly more likely to be assigned accompanying personnel than children. This is thought to be because children are taken to health institutions with their families.

According to the results of a systematic review conducted in Latin America and the Caribbean, people with disabilities spend more money on health expenditures. Although the number of applications of people with disabilities is higher than those without disabilities, the scope and quality of the service received is lower. The number of preventive health services and screenings is lower.[29]

A systematic review conducted in low- and middle-income countries found that the most common reasons for people with disabilities to access health care are the lack of affordability of services, equipment, or medicines. In addition, distance, transportation problems, lack of companions, discrimination, and communication barriers were listed.[30]

As an unexpected result in our study, individuals who did not receive special education significantly more often than those who received special education stated that they received appropriate equipment, assistive personnel, and understanding from other patients. Although there are various reasons for this situation (age, disability rate, etc.), it shows us that individuals without special education know their rights better.

Since the present study is cross-sectional, there is no cause-and-effect relationship. Although the study reached a sufficient sample size, the selected sample is not stratified according to age or disability status. Since the participants were reached through disability associations and private rehabilitation centers, most of the participants were under the age of 18 and received private rehabilitation. The limitations of the study are the low participation from rural areas and the fact that the questionnaire was completed by parents or dependents instead of disabled individuals under the age of eighteen who were unable to complete the questionnaire. The

fact that it covers all age groups and all types of disability, and that there has not been such a study in Adana province before, is also a strength.

In conclusion, the most important obstacle for disabled individuals to access health is economic barriers. Most disabled individuals pay for health services, medicine, and medical supplies. Disabled individuals have low economic status and social security rates compared to society. The low level of education of disabled individuals and their parents causes them to be less informed about their rights and opportunities. This situation poses an obstacle when getting appointments and services from health institutions. Other obstacles include the stress experienced by disabled individuals in receiving services, the need for relatives for treatment procedures, the lack of allocation of auxiliary personnel in health institutions, the lack of sufficient understanding from other patient relatives, and the inability to exercise their priority rights. Although disabled individuals are relatively satisfied with the physical conditions of health institutions and health personnel, these factors also need to be improved.

To facilitate access to health care for people with disabilities, general health expenditures of disabled individuals should be completely free of charge, and financial incentives should be provided for their treatment and follow-up. The level of education of disabled people and their families should be increased. Barrier-free cities should be created and expanded to facilitate access to health. The performance system based on the number of patients should be abandoned for the payments made to healthcare professionals, and the wages paid to healthcare professionals should be increased for individuals with disabilities whose diagnosis and treatment take a long time. Disability training and incorporating mandatory disability awareness training should be added to the pre-graduation training of health personnel. Community screenings for disabilities should be increased. Mobile healthcare units and home-based medical services should be deployed.

Ethical Considerations: Approval was received from the Ethics Committee of Çukurova University Faculty of Medicine on (Date:14.06.2019, No:81) and the Principles of the Helsinki Declaration were followed.

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

Acknowledge

This article is derived from the medical specialty thesis titled “Barriers Encountered by Persons with Disabilities in Accessing Health Services”.

References

1. Mackelprang RW, Salsgiver RO. People with disabilities and social work: historical and contemporary issues. *Social Work*. 1996;41(1):7-14. (doi: 10.1093/sw/41.1.7.)
2. Tellioğlu S. Türkiye'de engellilere yönelik sosyal hizmetlerin ve politikalarıntarhiçesi. *Uluslararası Sosyal Bilimler Dergisi*. 2019;88:818-32. (doi:10.16992/ASOS.14871).
3. World Health Organization. Disability and Health. [Internet]. https://www.who.int/news-room/fact-sheets/detail/disability-and-health (Accessed:28.11.2024).
4. Türkiye İstatistik Kurumu. Turkey Disability Survey 2002. [Internet]. https://kutuphane.tuik.gov.tr/pdf/0014899.pdf. (Accessed:27.02.2025).
5. World Health Organization. World report on disability 2011. [Internet]. https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/world-report-on-disability. (Accessed:1.06.2025).
6. World Health Organization. International classification of functioning, disability and health (ICF). Geneva. 2001. [Internet]. https://iris.who.int/bitstream/handle/10665/42407/9241545429.pdf?sequence=1. (Accessed:1.06.2025).
7. Australian Institute of Health and Welfare. Disability and ageing Australian population patterns and implications. Canberra. 2000. [Internet]. https://www.aihw.gov.au/reports/disability/disability-and-ageing-australian-population/summary. (Accessed:1.06.2025).
8. Prince M, Patel V, Saxena S, et al. No health without mental health. *Lancet*. 2007 8;370(9590):859-77. (doi: 10.1016/S0140-6736(07)61238-0).
9. Havercamp SM, Scandlin D, Roth M. Health disparities among adults with developmental disabilities, adults with other disabilities, and adults not reporting disability in North Carolina. *Public Health Reports*. 2004;119(4):418-26. (doi:10.1016/j.phr.2004.05.006).
10. Desai M, Messer LB, Calache H. A Study of the Dental Treatment Needs of children with disabilities in Melbourne, Australia. *Australian Dental Journal*. 2001;46(1):41-50. (doi: 10.1111/j.1834-7819.2001.tb00273.x).
11. Cantrell A, Croot E, Johnson M, et al. Access to primary and community health-care services for People 16 years and over with intellectual disabilities: A mapping and targeted systematic review. *National Institute for Health Research*. 2020. (doi: 10.3310/hsdr08050).
12. Türkiye İstatistik Kurumu. Özürlülerin sorun ve beklentileri araştırması: Türkiye İstatistik Kurumu; 2010.[Internet]. https://data.tuik.gov.tr/Bulten/Index?p=Ozurlulerin-Sorun-ve-Beklentileri-Arastirmasi-2010-6370 . (Accessed:27.02.2025).
13. Personal Comminication with CİMER (Presidency's Communication Centre)

14. Kördeve MK. Engelli bireylerin sağlık hizmeti alımında karşılaştıkları problemler. *Uluslararası Sağlık Yönetimi ve Stratejileri Araştırma Dergisi*. 2017;3(2):14-24.
15. Turcosa Analytics (2020). TURCOSA [Cloud-based statistical software]. Retrieved from https://release.turcosa.com.tr/.
16. Aktuğ E. *Kocaeli İli Gölcük İlçesinde Süreğen Hastalık Dışı Özürlülük Sıklığı, Nedenleri ve Özürlülerin Sorunları.* Yüksek Lisans Tezi, Kocaeli Universitesi, Saglik Bilimleri Enstitusu, Kocaeli; 2008.
17. Karadağ G. Engelli çocuğa sahip annelerin yaşadıkları güçlükler ile aileden algıladıkları sosyal destek ve umutsuzluk düzeyleri. *TAF Preventive Medicine Bulletin*. 2009;8(4):315-22.
18. Karip S. *Engelli Bireylerin Sağlık Hizmetlerine Ulaşılabilirlik Düzeylerinin Belirlenmesi: Konya Örneği.* Yüksek Lisans Tezi, Selçuk Üniversitesi, Sağlık Bilimleri Enstitüsü, Konya; 2016.
19. Yüzüak K. *Ağrı İlinde Yaşayan Engelli Bireylerde İkincil Sağlık Sorunlarının Sıklığı ve Yaş Gruplarına Göre Karşılaştırılması.* Yüksek Lisans Tezi, T.C. Kafkas Üniversitesi, Kars; 2017.
20. T.C. Aile, Çalışma ve Sosyal Hizmetler Bakanlığı Engelli ve Yaşlı Hizmetleri Genel Müdürlüğü. Engelli ve Yaşlı İstatistik Bülteni Kasım-2019: 2019. [Internet]. https://www.aile.gov.tr/media/31492/istatistik-bulteni-kasim2019.pdf. (Acsessed:27.02.2025).
21. T.C. Milli Eğitim Bakanlığı. Milli Eğitim İstatistikleri, Örgün Eğitim 2019/'20. Ankara.2019/2020. [Internet]. https://sgb.meb.gov.tr/meb_iys_dosyalar/2020_09/04144812_meb_istatistikleri_orgun_egitim_2019_2020.pdf. (Accessed:27.02.2025).
22. Durduran Y. *Engelli Çocukların Engellilikleri Dışındaki Sağlık Sorunları ve Sağlık Hizmetinden Yararlanma Durumları: Kontrollü Saha Çalışması*. Doktora Tezi, Selçuk Üniversitesi Sağık Bilimleri Enstitüsü, Konya; 2009
23. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü. 2018 Türkiye nüfus ve sağlık araştırması. Ankara. 2019. [Internet]. https://fs.hacettepe.edu.tr/hips/dosyalar/Ara%C5%9Ft%C4%B1rmalar%20-%20raporlar/2018%20TNSA/TNSA2018_ana_Rapor_compressed.pdf. (Accessed:27.02.2025).
24. Türk Eğitim Derneği. Bir bakışta eğitim 2019: TEDMEM. 2019. [Internet]. https://tedmem.org/storage/writes/February2023/tAS47e8gvanOc3bATTQE.pdf (Accessed:27.02.2025).
25. T.C. Sosyal Güvenlik Kurumu. Sosyal güvenlik kurumu aylık bülteni sigortalı istatistikleri Temmuz 2020. 2020. [Internet]. https://www.sgk.gov.tr/Istatistik/Aylik/42919466-593f-4600-937d-1f95c9e252e6/. (Accessed:27.02.2025).
26. Aile Hekimliği Uygulama Yönetmeliği. Resmi Gazate, 25.01.2013;28539. [Internet]. https://www.resmigazete.gov.tr/eskiler/2013/01/20130125-26.htm. (Accessed:1.06.2025).
27. Pınar T, Saygun M, Açıkgöz EM, Atçeken İ, Demirtaş H. Kırıkkale il merkezinde bulunan sağlık kuruluşları girişlerindeki engelli rampalarının standartlara uygunluğunun değerlendirmesi. *TAF Preventive Medicine Bulletin*. 2016;15(2):105-11. (doi: 10.5455/pmb.1-1452514819).

28. T.C. Sağlık Bakanlığı Temel Sağlık Hizmetleri Genel Müdürlüğü. 2010/79 sayılı Özürlü Kişilere Yönelik Sağlık Hizmetlerinin Sunumuna İlişkin Sağlık Bakanlığı genelgesi. Ankara. [Internet]. https://www.saglik.gov.tr/TR-11155/201079-sayili-ozurlu-kisilere-yonelik-saglik-hizmetlerinin-sunumuna-iliskin-genelge.html. (Accessed:1.06.2025).
29. Rodríguez Gatta D, Rotenberg S, Allel K, Reichenberger V, Banks LM, Kuper H. Access to general health care among people with disabilities in Latin America and the Caribbean: a systematic review of quantitative research. *Lancet Reg Health Am*. 2024;32:100701. (doi: 10.1016/j.lana.2024.100701).
30. Bright T, Wallace S, Kuper H. A systematic review of access to rehabilitation for people with disabilities in low- and middle-income countries. *Int J Environ Res Public Health*. 2018;15(10):2165. (doi:10.3390/ijerph15102165).

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):326-342 // 10.5505/amj.2025.32698

PREDICTORS OF SELF-PERCEPTIONS OF AGING AND HEALTH AMONG OLDER ADULTS IN TÜRKİYE: THE ROLE OF CRITICAL HEALTH LITERACY, PERCEIVED USEFULNESS OF ICT AND SOCIODEMOGRAPHIC FACTORS

Yaşar Şekerci[1], Gaye Aslı Sancar Demren[1]

[1]Department of Public Relations, Faculty of Communication, Galatasaray University, İstanbul, Türkiye

Correspondence:
Yaşar Şekerci (e-mail: yasarsekercicom@gmail.com)

Submitted: 11.04.2025 // Accepted: 08.09.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

ANKARA MEDICAL JOURNAL

Abstract

Objectives: This cross-sectional study examines factors shaping Turkish older adults' self-perceptions of aging and health (SPAH), emphasizing sociodemographic characteristics, critical health literacy, and perceived usefulness of information and communication technologies (ICTs).

Materials and Methods: Drawing on data from 450 participants aged 65 and over in Istanbul, this cross-sectional research employs a range of quantitative methods, including descriptive and comparative analyses, cross-tabulations, correlations, and path modeling.

Results: Covariance analyses reveal a positive and significant relationship between perceptions of aging and health ($B>0$, $p<0.05$). The study's central contribution lies in uncovering a potential cognitive link between perceptions of aging and health. Path analysis also indicates that the perceived usefulness of ICTs influences critical health literacy, which in turn affects health perceptions. These results suggest that increasing the perceived usefulness of ICTs and critical health literacy can improve perceptions of aging and health. Another key result highlights that socio-demographically disadvantaged older people—particularly women, widows, and those with lower education and income levels—tend to report more negative perceptions of aging and health, along with lower ICT usefulness and critical health literacy.

Conclusion: The findings underline how cumulative social disadvantages shape older adults' aging and health perceptions. By integrating individual-level cognitive factors with broader social determinants, this study addresses a significant gap in the Turkish context. Future research should track these perceptions over time to contribute to developing comprehensive health policies.

Keywords: Aging perception, critical health literacy, health perception, older people, perceived usefulness, sociodemographic factors.

Introduction

The global and Turkish older adult population is rapidly increasing, making population aging one of the most critical demographic challenges of the 21st century. This transformation highlights the need to foster healthy aging experiences and to understand how societies and individuals perceive and respond to aging for the development of effective social policies.

Self-Perceptions of Aging (SPA) refers to older adults' beliefs, expectations, and attitudes about their aging process.[1] In contrast, self-perception of health reflects an individual's subjective evaluation of their health, including feelings, thoughts, and beliefs about whether they perceive themselves as healthy or unwell.[2] Self-perceptions of aging and health (SPAH) directly shape older adults' physical and psychological health and health behaviors.[3] Individuals' perspectives on aging and health provide critical insights into their future health trajectories.[4] Positive SPAs are associated with higher quality of life and preventive health behaviors, while a positive self-perception of health reduces dementia risk by 50%, underscoring its protective role.[3,5]

Globally, older adults in high-income countries report poorer perceptions of physical, mental, social, and psychological health than those in low- and middle-income countries.[6] In contrast, older adults in low-resource countries are more likely to see aging as linked to loss than those in higher-resource countries.[7] In Türkiye and Eastern Europe, older adults perceive their health more negatively than peers in Northern and Western Europe.[8] However, cross-cultural research on SPAH remains limited, and more comparative studies are needed to understand these differences between countries.[7]

Despite the strong interconnection between these aging and health perceptions and their significant influence on health outcomes, they are often examined in isolation within the literature.[9] Given this gap, the interaction between SPA and health perceptions remains under-researched and warrants comprehensive examination. In Türkiye, studies have examined these concepts separately in relation to other variables, but direct research on the relationship between them is scarce.[10–12] The study endeavors to bridge this gap by delving into the relationships between SPA, health, and sociodemographic characteristics, perceived usefulness of Information Communication Technologies (ICT), and critical health literacy levels of older adults in Türkiye. This study may provide valuable evidence for the development of aging policies that enhance the quality of life for older adults in Türkiye and for strategies aimed at reducing the digital health divide.

Socio-economic and demographic characteristics are key social determinants of health. Within this framework, health literacy reflects individuals' capacity to access and understand health information to make informed decisions for disease prevention and health protection.[13] Although there are a limited number of studies examining the relationship between health literacy and health perceptions in older adults,[10] there are no

studies in Türkiye investigating how health literacy interacts with both aging and health perceptions. For this reason, our study also examines socio-demographic factors and critical health literacy to understand the relationship between social determinants of health and aging and health perceptions.

Finally, alongside health literacy, technology adoption, particularly the perceived usefulness of ICT, represents another critical factor shaping how older adults perceive aging and health. Perceived usefulness reflects individuals' beliefs about how valuable ICTs are for their needs. Perceived usefulness is a key determinant of technology adoption, whereas perceived ease of use exerts only an indirect influence through usefulness.[14] Our study contributes to the literature by revealing the pathways between aging and health perceptions in Türkiye.

Hypotheses

H1: Sociodemographic characteristics (gender, education, and income level) are significantly associated with older adults' perceptions of aging and health.

H2: Sociodemographic characteristics (gender, education, and income level) are significantly associated with critical health literacy and perceived usefulness of ICT.

H3: The perceived usefulness of ICT positively influences the critical health literacy levels of older adults.

H4: Critical health literacy levels significantly influence older adults' health perceptions.

H5: There is a significant relationship between older individuals' aging and health perceptions.

Materials and Methods

Population and Sample

This cross-sectional study population consists of older adults residing in Istanbul. According to the Turkish Statistical Institute,[15] Istanbul's older population totals 1.21 million: 64.5% are aged 65-74, 27.7% are aged 75-84, and 7.9% are aged 85 or older. To achieve a representative sample within a 5% margin of error at a 95% confidence level, at least 385 respondents were required; thus, the study collected data from 450 participants. Sample adequacy for factor analysis was assessed using the Kaiser–Meyer–Olkin (KMO) criterion (0.60–0.70 = sufficient; >0.80 = perfect), with all scale-specific KMO values >0.70 and an overall average KMO calculated at 0.805, indicating good sample adequacy.

As shown in Table 1, participants were recruited from Istanbul districts based on the Socio-Economic Development Index (SEGE). Interviews took place in public spaces where older adults gather, such as

coffeehouses, parks, markets, and women-only community events. To encourage female participation, the team included at least one female surveyor. A total of 670 older adults were approached; 450 of them agreed to participate (67% response rate). Stratified random sampling ensured balanced representation across SEGE regions. Data were collected between September 2023 and April 2024. The main reasons for refusal were lack of time, health issues, or concerns about safety and fraud.

Table 1. Sample Selection Criteria

Category	**Details**
Population	**Individuals aged 65 and above residing in Istanbul.**
Population Size in Istanbul	**1,21 million***
Sample Size	**450**
Inclusion Criteria	Age ≥ 65, Residing in Istanbul, able to communicate in Turkish
Exclusion Criteria	Severe physical or cognitive impairments, living in nursing homes or institutional care, residing outside Istanbul
Sampling Criteria	**Socio-Economic Development Index**
District Distribution	
1st Tier Districts	**Şişli, Beşiktaş, Kadıköy, Bakırköy, Fatih, Ataşehir, Başakşehir, Beyoğlu, Ümraniye, Sarıyer, Üsküdar, Tuzla, Maltepe, Beylikdüzü, Pendik, Esenyurt, Bahçelievler, Zeytinburnu, Bağcılar, Kartal, Bayrampaşa, Kağıthane, Küçükçekmece, Güngören, Büyükçekmece, Eyüpsultan, Adalar, Beykoz, Avcılar**
The Number of Participants	**225**
2nd Tier Districts	**Gaziosmanpaşa, Çekmeköy, Esenler, Silivri, Sancaktepe, Sultangazi, Arnavutköy, Çatalca, Şile, Sultanbeyli**
The Number of Participants	**225**

*This study was based on the 2023 TUIK population data.

Data Collection Instruments

Face-to-face interviews were conducted to address digital literacy differences and ensure clarity, with participants giving voluntary consent. The survey included sociodemographic questions and four validated scales. To measure individuals' health perceptions, the Health Perception Scale, adapted to Turkish by Kadıoğlu and Yıldız, was used.[16] In this 15-item Likert-type scale, higher scores indicate more positive health perceptions. The Brief Aging Perceptions Questionnaire (B-APQ), adapted to Turkish by Özkaptan, Kapucu, and Akyar, assessed aging perceptions with a Cronbach alpha reliability of 0.63, indicating that higher scores reflect more positive aging views.[17] The Critical Health Literacy Scale by Türkoğlu and Kılıç evaluated critical health literacy with a Cronbach alpha of 0.85.[18] The Perceived Usefulness Scale, based on Davis's Technology Acceptance Model (1989) and adapted to Turkish by Kadıoğlu and Yıldız, had a reliability coefficient 0.91.[19]

Participants completed the survey independently or with the interviewer's assistance and received further research information afterward.

Data Analysis

This study employed descriptive and reliability analyses, mean comparison and cross-tabulation tests, data visualization, correlation analyses, confirmatory factor analysis (CFA), and path analysis. The Shapiro-Wilk test assessed normality. For non-normal data with three or more groups, Kruskal-Wallis tests were used, with Mann-Whitney U tests applied for two groups. When Kruskal-Wallis results were significant, Bonferroni-adjusted Dunn post-hoc tests were conducted. Since normality was not met, ANOVA and Tukey-HSD tests were not applied. Spearman's correlations examined relationships between scale scores.

The internal consistency of the scales was assessed using Cronbach's alpha and Omega coefficients, with Omega providing additional validation. Since the data were Likert-scale, polychoric correlation matrices were applied, as they are more appropriate for ordinal data.[20] Bidirectional relationships and causal associations within the research model were examined through path analysis. In both CFA and path analysis, the Diagonally Weighted Least Squares (DWLS) estimation method was used due to its robustness against non-normality.[21] CFA results were interpreted based on the threshold values defined in the literature, and the construct validity of the data was assessed using fit indices.[22]

All statistical analyses were conducted at a significance level of $p<0.05$, and R software was used to obtain the findings. The R packages used in the analyses are lavaan for structural equation modeling, Likert for the analysis of Likert-type scale data, psych for psychometric analyses, and the ggcorrplot package for the visualization of correlation matrices.

Results

Participant Characteristics

Table 2 presents the demographic characteristics of the participants included in the study. According to these findings, the mean age of the participants (n=450) was determined as 71.020 ± 5.767. Examining the gender distribution, 42.20% of the participants were female, while 57.80% were male. In terms of marital status, most participants (75.60%) were married, whereas 17.30% were widowed, 4.00% were divorced, and 3.10% were single. Regarding educational background, most participants had completed primary school (44.70%) or secondary school (19.10%), while 7.60% held a university degree or higher level of education. When analyzing

income levels, the majority of participants (58.90%) had an income ranging between 1,000 TRY and 15,000 TRY.

Table 2. Characteristics of Participants Included in the Study (n=450)

Variable	Group	n	%
Age	Mean±SD	71.02±5.77	–
Gender	Female	190	42.20
	Male	260	57.80
Marital Status	Single	14	3.10
	Divorced	18	4.00
	Widowed	78	17.30
	Married	340	75.60
Education Level	Illiterate	13	2.90
	Literate (no formal education)	24	5.30
	Primary School	201	44.70
	Middle School	86	19.10
	High School	89	19.80
	University	34	7.60
	Master's Degree	3	0.70
Income Level (TRY)	No Income	83	18.40
	1,000–15,000	265	58.90
	16,000–30,000	86	19.10
	31,000–50,000	14	3.10
	51,000–100,000	2	0.40

Table 3 presents the mean scores, Cronbach's alpha, and Omega reliability coefficients of the scales used in the study. Accordingly, the mean score for the Aging Perception Scale was calculated as 53.176 ± 5.633, while the Health Perception Scale had a mean score of 41.806 ± 6.283. The Perceived Usefulness of Information and Communication Technologies Scale recorded a mean score of 13.382 ± 9.376, whereas the Critical Health Literacy Scale had a mean score of 12.137 ± 5.895. The Cronbach's alpha and Omega reliability coefficients for all scales exceeded 0.70, indicating strong internal consistency. Based on the total mean scores, older adults generally perceived their aging (3.545) and health (3.380) at a moderate level of positivity. Additionally, participants' critical health literacy levels (3.034) were found to be moderate, whereas their perceived usefulness of information and communication technologies (3.345) was low.

Table 3. Self-perception of aging and health, Perceived Usefulness, Critical Health Literacy Scale Scores (n=450)

Scale/Sub-dimension	M	SD	Alfa	Omega
Aging Perception	53.176	5.633	0.764	0.862
Health Perception	41.806	6.283	0.737	0.856
Perceived Usefulness	13.382	9.376	0.988	0.961
Critical Health Literacy	12.137	5.895	0.953	0.985

Figure 1 presents the visualization findings of the correlation analyses between scale scores. A negative correlation coefficient indicates an inverse relationship, whereas a positive coefficient signifies a direct relationship. As the absolute value of this coefficient approaches 1, the strength of the relationship increases. According to the significance results, all scales exhibit positive and statistically significant relationships ($r>0$, $p<0.05$). A moderate positive correlation is observed between critical health literacy and perceived usefulness of information and communication technologies, whereas the relationships among other factors are positive but relatively weak.

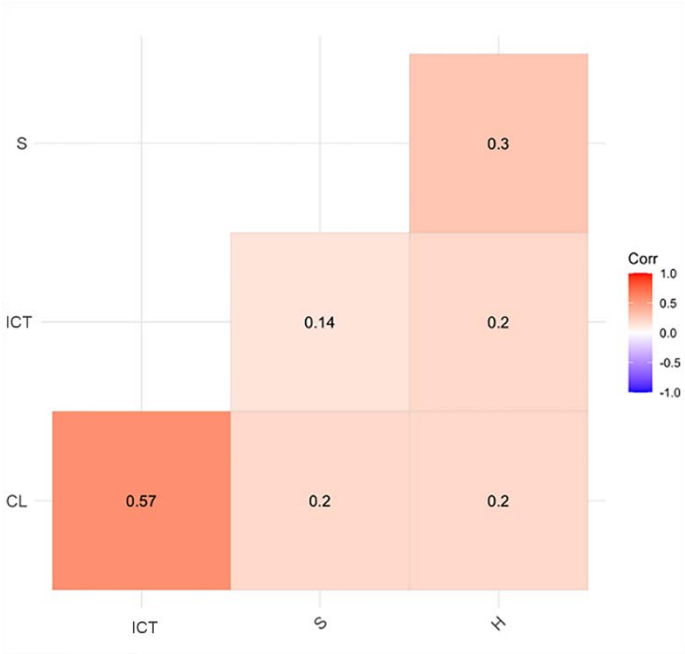


Figure 1. Correlation Graph of Self-Perceptions of Aging, Health, Perceived Usefulness, and Critical Health Literacy

S: Perception of Aging, H: Perception of Health, IT: Perceived Usefulness of Information and Communication Technologies, CL: Critical Health Literacy

Figure 2 presents the graphical representation of the path analysis results for the research model. In the graphical representations, only the path coefficients and causal/bidirectional relationships related to the theoretical model are symbolized. Detailed statistical data on path coefficients are provided in Table 4. In the first stage, the model fit of the path analysis was assessed based on fit indices. According to these indices, the Chi-square/df ratio is below 5, the CFI, GFI, TLI, and IFI values exceed 0.9, the AGFI results are above 0.85, and the RMSEA value is below 0.05.[23] Based on the fit indices obtained from the path analysis, the construct validity of the research model has been confirmed.

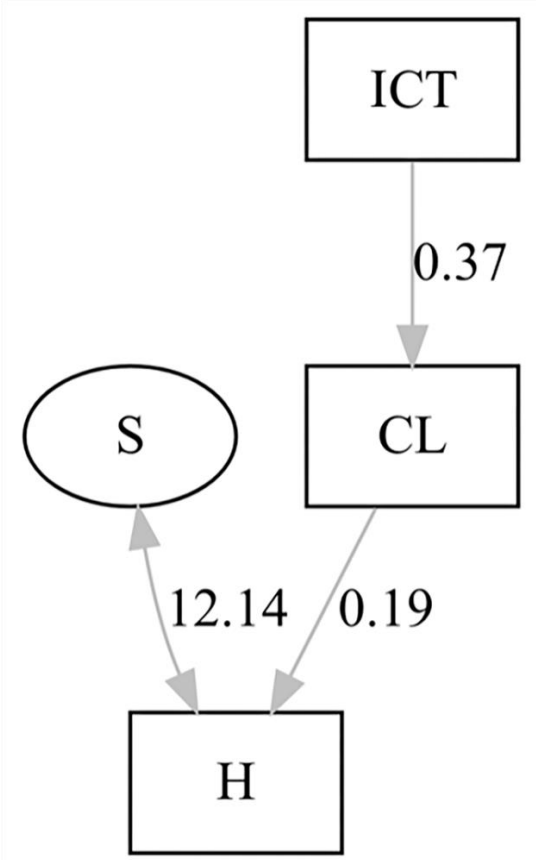


Figure 2. Path Analysis Diagram of the Research Model

S: Self-Perception of Aging, H: Self-Perception of Health, IT: Perceived Usefulness of Information and Communication Technologies, CL: Critical Health Literacy

Statistical evaluations were conducted based on the regression model and covariance results presented in Table 5. According to the covariance findings, there is a positive and statistically significant relationship

between self-perceptions of health and aging (B>0, p<0.05). Regression results indicate that older adults' perceived usefulness of information and communication technologies positively and significantly influences their levels of critical health literacy (B>0, p<0.05). Similarly, the critical health literacy levels among older individuals have a positive and statistically significant impact on their health perception (B>0, p<0.05). Based on the path analysis results, SPA and health perception in older adults will either increase or decrease simultaneously. In conclusion, as the perceived usefulness of information and communication technologies increases, critical health literacy levels are also expected to improve among older adults. Likewise, an increase in critical health literacy is expected to enhance health perception in this population.

Table 5. Regression Coefficients and Covariance Results for Path Analysis

Relationship	Path	B	SE	z	p	Std. β
Regression	ICT → CL	0.368	0.024	15.103	<0.001	0.586
Regression	CL → H	0.194	0.063	3.078	<0.001	0.143
Covariance	H ~~ S	12.143	2.204	5.509	<0.001	0.274

Perception of Aging (S), Health Perception (H), Perceived Usefulness of Information and Communication Technologies (ICT), Critical Health Literacy (CL), Unstandardized Path Coefficient (B), Standard Error (SE), and Standardized Path Coefficient (Std. β).

Tables 6 and 7 present the relationship between participants' sociodemographic characteristics and their self-perceptions of aging and health, perceived usefulness of ICTs, and critical health literacy. The study showed significant differences according to self-reported health status (p<0.05). Older adults who rated their health as very poor, poor, or fair reported more negative perceptions of aging and health, as well as lower levels of ICT usefulness and critical health literacy, compared to those who rated their health as good or very good.

Gender was also significantly associated with health perception (p<0.05); women reported more negative views about their health compared to men. Marital status had a significant relationship with critical health literacy (p<0.05); widowed respondents scored lower than those who were single, divorced, or married.

Furthermore, participants with higher education levels demonstrated more positive perceptions of both aging and health, while only those with higher income levels expressed more positive perceptions of health. Both education and income were positively associated with perceived ICT usefulness and critical health literacy.

Table 6. Relationships Between Sociodemographic Findings and Self-Perceptions of Aging and Health

Scales		Brief Aging Perception					Health Perception				
Variable	**Group**	**Mean**	**SD**	**Med**	**Min**	**Max**	**Mean**	**SD**	**Med**	**Min**	**Max**
Self-Reported Health	Very bad	50.727	3.319	50	47	57	47.182	6.478	47	37	60
	Bad	51.157	4.775	51	40	60	48.543	7.566	48	33	64
	Average	53.030	5.932	54	30	68	49.746	7.651	50	25	68
	Good	54.311	5.559	54	38	66	51.970	7.087	52	32	66
	Very good	54.364	4.891	55	43	62	57.000	11.141	61	39	72
	Test Statistic	20.646					23.812				
	p-value	**0.001**					**0.001**				
Gender	Female	53.126	5.793	54	30	68	49.268	8.071	49	25	71
	Male	53.192	5.509	54	33	66	51.738	7.852	51	32	72
	Test Statistic	24395					-3257				
	p-value	0.823					**0.001t**				
Marital Status	Single	53.286	6.132	54.5	42	64	49.000	10.612	46.5	34	64
	Divorced	55.000	4.472	55.5	45	62	50.389	6.946	48	42	69
	Widowed	51.846	6.073	51.5	30	68	49.192	8.608	48.5	33	72
	Married	53.365	5.519	54	33	66	51.126	7.810	51	25	72
	Test Statistic	7.770					6.381				
	p-value	0.051					0.094				
Education	Illiterate	51.231	5.102	50	44	62	46.923	4.89	46	40	56
	Literate	50.125	4.504	51	40	58	46.583	7.389	47	33	60
	Primary School	53.174	5.810	54	30	68	49.791	8.28	49	25	72
	Middle School	54.163	5.642	55	33	66	51.407	7.686	51	25	72
	High School	52.854	5.310	54	36	64	52.011	8.033	51	34	71
	University	54.441	5.327	55	45	66	54.794	6.304	55	44	68
	Master's Degree	51.333	7.767	49	45	60	54.667	7.572	58	46	60
	Test Statistic	16.565					4.237				
	p-value	**0.011**					**0.001F**				
Income Level	No Income	52.301	5.967	53	30	65	48.060	8.165	49	25	71
	1,000 TRY - 15,000 TRY	53.121	5.739	54	33	68	50.751	7.666	50	29	72
	16,000 TRY - 30,000 TRY	54.058	4.907	54	43	65	53.198	8.106	53	35	72
	31,000 TRY - 50,000 TRY	54.286	5.165	56	45	62	49.929	9.691	47	40	69
	51,000 TRY - 100,000 TRY	48.500	2.121	48.5	47	50	50.500	6.364	50.5	46	55
	Test Statistic	5.923					15.349				
	p-value	0.205					**0.004**				

Mean: Mean (Arithmetic Average), SD: Standard Deviation, Med: Median, Min: Minimum, Max: Maximum, KW: Kruskal-Wallis H Test, U: Mann-Whitney U Test, t: Independent Samples t-Test, F: Independent Samples ANOVA Test, p: Significance Value

Table 7. Relationships Between Sociodemographic Findings and Perceived Usefulness of ICT and Critical Health Literacy

Scales		Perceived Usefulness					Critical Health Literacy				
Variable	**Group**	**Mean**	**SD**	**Med**	**Min**	**Max**	**Mean**	**SD**	**Med**	**Min**	**Max**
Self-Reported Health	Very bad	7.909	8.769	4	4	28	9.545	6.861	4	4	20
	Bad	10.829	8.777	4	4	28	10.529	5.743	11.5	4	20
	Average	13.025	9.125	8	4	28	12.244	6.011	14	4	20
	Good	15.385	9.482	20	4	28	12.896	5.619	15	4	20
	Very good	14.606	10.124	10	4	28	12.667	5.737	16	4	20
	Test Statistic	18.267					10.218				
	p-value	**0.001**					**0.037**				
Gender	Female	13.753	9.070	16	4	28	11.984	5.768	14	4	20
	Male	13.112	9.601	8	4	28	12.25	5.994	15	4	20
	Test Statistic	25.486					23.624				
	p-value	0.546					0.422				
Marital Status	Single	12.214	9.141	9	4	28	15.071	5.03	16	4	20
	Divorced	15.722	7.706	20	4	24	14.889	3.359	16	8	20
	Widowed	11.128	8.758	4	4	28	10.372	6.148	10	4	20
	Married	13.824	9.545	16	4	28	12.276	5.866	14	4	20
	Test Statistic	5.892					12.09				
	p-value	0.117					**0.007**				
Education	Illiterate	4.000	0.000	4	4	4	9.846	6.866	4	4	20
	Literate	6.875	5.788	4	4	20	8.083	5.258	4	4	20
	Primary School	10.726	8.795	4	4	28	10.687	5.966	12	4	20
	Middle School	14.488	9.350	20	4	28	12.744	5.323	15	4	20
	High School	19.348	8.079	22	4	28	15.011	4.976	16	4	20
	University	18.000	8.068	20	4	28	15.353	4.148	16	4	20
	Master's Degree	23.000	5.000	23	18	28	12.667	7.767	15	4	19
	Test Statistic	83.767					57.020				
	p-value	**0.001**					**0.001**				
Income Level	No Income	7.952	7.117	4	4	24	8.614	5.342	4	4	20
	1,000 TRY - 15,000 TRY	12.826	9.495	8	4	28	12.245	5.989	15	4	20
	16,000 TRY - 30,000 TRY	19.337	7.492	20	4	28	14.581	4.651	16	4	20
	31,000 TRY - 50,000 TRY	18.857	6.200	20	4	28	15.714	3.384	16	8	20
	51,000 TRY - 100,000 TRY	18.000	14.142	18	8	28	14.000	8.485	14	8	20
	Test Statistic	64.215					47.198				
	p-value	**0.001**					**0.001**				

Mean: Mean (Arithmetic Average), SD: Standard Deviation, Med: Median, Min: Minimum, Max: Maximum, KW: Kruskal-Wallis H Test, U: Mann-Whitney U Test, t: Independent Samples t-Test, F: Independent Samples ANOVA Test, p: Significance Value

Discussion

This study examined the underlying factors influencing how Turkish older adults perceive aging and health, highlighting the roles of sociodemographic characteristics, critical health literacy, and the perceived usefulness of ICTs. According to the results, older participants' perceptions of aging (53.176±5.633) were found to be moderately high, their health perceptions (41.806±6.283) were moderate, their perceived usefulness of ICT (13.382±9.376) was low, and their critical health literacy (12.137±5.895) was at a moderate level. These findings suggest that older adults perceive their aging more positively than their health, yet all dimensions have room for improvement. The results align with previous studies that indicate Turkish older adults generally have moderate to low levels of aging perception.[24]

While these general patterns provide a useful overview, a closer look at critical health literacy reveals important nuances for older adults. Our results for critical health literacy and health perception are consistent with previous studies reporting moderate levels.[10] These discrepancies may reflect differences in how health literacy is defined or regional diversity. In addition, rural living increases social and health inequalities, which may explain varied findings on health literacy and aging perceptions.[25]

In parallel to limited health literacy, our findings also point to the perceived usefulness of ICT being low among older adults. Early research indicates that older adults' acceptance and intention to use ICT are influenced by multiple factors, including sociodemographic mediators, perceived usefulness, security, attitudes, subjective norms, perceived behavioral control, and emotions.[26] Accordingly, the low perceived usefulness observed in our study may be due to the interaction of these factors.

Beyond health literacy and perceived usefulness, both correlation and path analysis results showed a positive association between older adults' self-perceptions of aging and health ($r > 0$, $p < .05$; $B > 0$, $p < .05$). Nevertheless, improving aging and health perceptions may enhance older adults' quality of life and health outcomes. Unlike previous studies, which have generally studied aging and health perceptions separately, our study makes a novel contribution by examining the interrelations among these perceptions. [4,9]

Our path analysis further clarifies how the perceived usefulness of ICTs may enhance broader health-related decision-making capacities, including critical health literacy. In this regard, path analysis first showed that the perceived usefulness of ICTs had a positive effect on critical health literacy ($B > 0$, $p < 0.05$). This finding supports previous studies suggesting that individuals with lower health literacy levels are less likely to use and perceive health information technologies as useful.[27] These findings are important to understanding the interaction between technology benefit perception and critical health literacy in later life.

According to the other path analysis findings, older adults' critical health literacy levels have a positive effect on their health perceptions (B >0, p<0.05). This finding is consistent with previous studies conducted among older adults in Turkey[10] and broader adult populations.[12] This finding suggests that critical health literacy has a crucial impact on accessing and evaluating health information and shaping individuals' perceptions of health. All these findings from the path analysis revealed that there is a bidirectional relationship between aging and the health perceptions among older people.

Even though perceived usefulness and critical health literacy are personal determinants of shaping perceptions, these are deeply intertwined with structural conditions, particularly sociodemographic characteristics, including income, education, and gender inequality. Our findings revealed that as the older adults' education and income levels increased, their perceptions of health and aging became more positive (p<0.05). This pattern aligns with previous research, which shows that higher education is associated with more positive perceptions of aging.[24] These findings reinforce the key role of income and educational resources in constructing positive aging and health perception among older adults.

In addition to income and education, gender differences are also determinants of health perceptions in older adults. In this matter, older women reported more negative health perceptions than men (p<0.05). This finding supports earlier studies showing that being female is associated with more negative subjective health perceptions.[28] Therefore, there may be a need for women-specific interventions to improve older women's perceptions of health.

Along with health and aging perception, we also explored whether sociodemographic factors contribute to the perceived usefulness of ICTs and critical health literacy among older adults. Our study found that as education and income levels rise, older adults tend to perceive ICTs as more useful. This finding is consistent with Chen and Chan, who found that older individuals with better economic conditions are more likely to use age-related technologies.[29] In contrast, the gender and marital status of the participants did not create a statistically significant difference in the perceived usefulness of ICT.

Likewise, income and educational status emerge as dominant predictors of critical health literacy among older adults. Higher income and education levels are significantly associated with increased critical health literacy (p<0.05). Beauchamp et. al. also found that lower levels of education are associated with lower levels of health literacy.[30] All these results indicate that income and educational status are key sociodemographic determinants for older people.

Limitations and Further Research

This study has some limitations. First, its cross-sectional design restricts causal inference, and the temporal order of variables should be tested in future longitudinal research. Second, as the sample was limited to older adults in Istanbul, the findings may not reflect rural populations, limiting generalizability. Third, the reliance on self-reports may have introduced bias. Future studies should include longitudinal designs, qualitative follow-ups, and intervention trials to improve digital literacy among older adults.

In conclusion, our findings show that disadvantages in older age are relational and cumulative, shaped by perceptual, technological, informational, and socioeconomic factors. SPAH are strong indicators of quality of life and well-being and should be used to evaluate social policies and inequalities. In practice, this calls for integrating technology education into community-based programs to boost digital participation and reduce inequalities. Health professionals can also use these perceptions in their interventions. Such efforts require coordination between the Ministry of Health and the Ministry of Family and Social Services.

Ethical Considerations: This study received ethical approval from the Galatasaray University Scientific Research and Publication Ethics Committee during its meeting on 06.07.2023, under decision number 01 of protocol code 2023/017. All participants were provided with detailed information about the study and consented through a voluntary consent form.

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

References

1. Velaithan V, Tan MM, Yu TF, Liem A, Teh PL, Su TT. The Association of Self-Perception of Aging and Quality of Life in Older Adults: A Systematic Review. *Gerontologist*. 2024;64(4). doi:10.1093/GERONT/GNAD041
2. Henchoz K, Cavalli S, Girardin M. Health perception and health status in advanced old age: A paradox of association. *J Aging Stud*. 2008;22(3):282-290. doi:10.1016/J.JAGING.2007.03.002
3. Silva-Smith AL, Benton MJ. Self-Perception of Aging Among Older Adults and Participation in Prevention. *West J Nurs Res*. 2021;43(11):1010-1016. doi:10.1177/0193945921989017
4. Westerhof GJ, Nehrkorn-Bailey AM, Tseng HY, et al. Longitudinal effects of subjective aging on health and longevity: An updated meta-analysis. *Psychol Aging*. 2023;38(3):147-166. doi:10.1037/PAG0000737
5. Levy BR, Slade MD, Pietrzak RH, Ferrucci L. Positive age beliefs protect against dementia even among elders with high-risk gene. *PLoS One*. 2018;13(2). doi:10.1371/JOURNAL.PONE.0191004
6. Desmouceaux C, Dewhurst M, Maurel D, Pautasso L. *In Sickness and in Health: How Health Is Perceived around the World*.; 2022.
7. Diehl M, Wahl HW. Self-perceptions of aging: A conceptual and empirical overview. *Curr Opin Psychol*. 2024;55:101741. doi:10.1016/J.COPSYC.2023.101741
8. Eurostat. *Health Perception*.; 2021. doi:https://doi.org/10.2908/HLTH_SILC_01
9. Benyamini Y, Burns E. Views on aging: older adults' self-perceptions of age and of health. *Eur J Ageing*. 2019;17(4):477. doi:10.1007/S10433-019-00528-8
10. Say Şahin D, Özer Ö, Sonğur C. Effect of Health Literacy on Health Perception: An Application in Individuals at Age 65 and Older. *Soc Work Public Health*. 2018;33(2):85-95. doi:10.1080/19371918.2017.1409680
11. Kalınkara V, Sarı İ. Yaşlı Bireylerin Sosyal Medya Kullanımı ve Yaşlılık Algısı. *Türkiye Sosyal Araştırmalar Dergisi*. 2023.
12. Yiğitalp G, Bayram Değer V, Çifçi S. Health literacy, health perception and related factors among different ethnic groups: a cross-sectional study in southeastern Turkey. *BMC Public Health*. 2021;21(1):1-10. doi:10.1186/S12889-021-11119-7/TABLES/4
13. Nutbeam D, Kickbusch I. Health Promotion Glossary. *Health Promot Int*. 1998;13(4):349-364. doi:10.1093/HEAPRO/13.4.349
14. Davis FD. Technology acceptance model: TAM. *AS: Information Seeking Behavior and Technology Adoption*. 1989:205-2019.
15. TÜİK. İstatistiklerle Yaşlılar, 2022. Türkiye İstatistik Kurumu. https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Yaslilar-2022-

49667#:~:text=Ya%C5%9Fl%C4%B1%20n%C3%BCfus%20olarak%20kabul%20edilen,9%2C9'a%20y%C3%BCkseldi. Published 2023. Accessed March 4, 2023.

16. Kadioğlu H, Yildiz A. Sağlık Algısı Ölçeği'nin Türkçe Çevriminin Geçerlilik ve Güvenilirliği. *Turkiye Klinikleri Journal of Medical Sciences*. 2012;32(1):47-53. doi:10.5336/MEDSCI.2010-21761
17. Bal Özkaptan B, Kapucu S, Akyar İ. Yaşlılığı Algılama Anketi Kısa Formu (Brief Aging Perceptions Questionnaire: B-APQ) Türkçe Versiyonu: Geçerlilik ve Güvenirlik Çalışması. *Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi*. 2019;6(3):149-157. doi:10.31125/HUNHEMSIRE.630862
18. Türkoğlu N, Kiliç D, Tarihi A. Sağlık Okuryazarlığı Ölçeği'nin Türkçeye Uyarlanması: Geçerlilik ve Güvenirlik Çalışması. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*. 2021;24(1):25-33. doi:10.17049/ATAUNIHEM.662054
19. Guner H, Acarturk C. The use and acceptance of ICT by senior citizens: a comparison of technology acceptance model (TAM) for elderly and young adults. *Univers Access Inf Soc*. 2020;19(2):311-330. doi:10.1007/S10209-018-0642-4
20. Kiwanuka F, Kopra J, Sak-Dankosky N, Nanyonga RC, Kvist T. Polychoric Correlation With Ordinal Data in Nursing Research. *Nurs Res*. 2022;71(6):469-476. doi:10.1097/NNR.0000000000000614
21. Lionetti F, Keijsers L, Dellagiulia A, Pastore M. Evidence of factorial validity of parental knowledge, control and solicitation, and adolescent disclosure scales: When the ordered nature of Likert scales matters. *Front Psychol*. 2016;7(JUN):206130. doi:10.3389/FPSYG.2016.00941/BIBTEX
22. Hu LT, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Equ Modeling*. 1999;6(1):1-55. doi:10.1080/10705519909540118
23. Kline RB. *Principles and Practice of Structural Equation Modeling*. The Guilford Press. Newyork: Guilford Press; 2016. https://books.google.com/books/about/Principles_and_Practice_of_Structural_Eq.html?hl=tr&id=mGf3Ex59AX0C. Accessed March 4, 2025.
24. Gönderen Çakmak HS, Kaşlı K. Bir İlçede Yaşayan Yaşlıların Yaşlılık Algılarının Değerlendirilmesi. *Bolu Abant Izzet Baysal Universitesi Tip Fakultesi Abant Tip Dergisi*. March 2022. doi:10.47493/ABANTMEDJ.954826
25. İ, Karakaş M. Sosyal ilişkilerin taraflarından biri: kırsaldaki yaşlı dul kadın. *Senectus*. 2023;1(1):19-50. doi:https://doi.org/10.26650/senectus.2023.1.1.0001
26. Ma Q, Chen K, Chan AHS, Teh PL. Acceptance of ICTs by older adults: A review of recent studies. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. 2015;9193:239-249. doi:10.1007/978-3-319-20892-3_24
27. Mackert M, Mabry-Flynn A, Champlin S, Donovan EE, Pounders K. Health literacy and health information technology adoption: The potential for a new digital divide. *J Med Internet Res*. 2016;18(10):e6349. doi:10.2196/jmir.6349

28. Lin JN. Gender Differences in Self-Perceptions About Aging and Sleep Among Elderly Chinese Residents in Taiwan. *J Nurs Res*. 2016;24(4):347-356. doi:10.1097/JNR.0000000000000167
29. Chen K, Chan AHS. Gerontechnology acceptance by elderly Hong Kong Chinese: a senior technology acceptance model (STAM). *Ergonomics*. 2014;57(5):635-652. doi:10.1080/00140139.2014.895855
30. Beauchamp A, Buchbinder R, Dodson S, et al. Distribution of health literacy strengths and weaknesses across socio-demographic groups: A cross-sectional survey using the Health Literacy Questionnaire (HLQ). *BMC Public Health*. 2015;15(1):1-13. doi:10.1186/S12889-015-2056-Z/TABLES/3

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):343-356 // 10.5505/amj.2025.36528

CLINICAL CHARACTERISTICS AND PREDICTORS OF ADVERSE OUTCOMES IN ELECTRICAL INJURIES: A FIVE-YEAR RETROSPECTIVE STUDY IN THE EMERGENCY DEPARTMENT

Melih Çamcı[1], Faruk Büyük[2], Erhan Şimşek[3]

[1]Department of Emergency Medicine, Ankara Bilkent City Hospital, Ankara Yıldırım Beyazıt University, Ankara, Türkiye

[2]Department of Emergency Medicine, Erciş Şehit Rıdvan Çevik State Hospital, Van, Türkiye

[3]Department of Family Medicine, Ankara Yıldırım Beyazıt University, Ankara, Türkiye

Correspondence:

Melih Çamcı (e-mail: drmelih112@gmail.com)

Submitted: 29.07.2025//Accepted: 10.09.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine

Department of Family Medicine

ANKARA MEDICAL JOURNAL

Abstract

Objectives: Electrical injuries are critical emergencies with outcomes ranging from local damage to systemic complications. Severity depends on the current type, voltage, contact duration, resistance, and current path. Predictive data from initial emergency department (ED) presentations remain limited. This study aims to identify clinical and biochemical markers at ED admission that predict adverse outcomes (intensive care unit [ICU] admission, prolonged hospitalization, complications).

Materials and Methods: This retrospective study analyzed electrical injury cases (ICD-10: T75.4, W86, W87) in a secondary-level ED between January 2020 and January 2025. Demographics, injury details, clinical findings (mental status, burns, electrocardiography [ECG], chest X-ray), and outcomes were collected. Ethical approval was obtained. Statistical methods included chi-square, t-test, Mann–Whitney U, Kruskal–Wallis, Spearman correlation, regression, and receiver operating characteristic (ROC) analysis ($p<0.05$).

Results: Among 142 patients, 65.5% were male, with peak incidence in ≥21 (35.9%) and ≤5 (28.9%) years. Most injuries were domestic (85.9%) from appliances (54.9%) involving alternating current (AC; 95.8%). All non-normal sinus rhythm (non-NSR) ECG patients were admitted to the ICU. Other predictors included outdoor injuries, direct current (DC) exposure, foot/head contact, falls, unconsciousness, and severe burns. Creatine kinase (CK), CK-MB, and lactate levels showed high predictive value. Lactate and hemoglobin were associated with longer hospitalization. Positive chest X-ray findings and elevated lactate were independent predictors, while appliance-related injuries were protective.

Conclusion: Early ECG and laboratory assessments (lactate, hemoglobin, CK, CK-MB), along with event and burn characteristics, help predict outcomes in electrical injuries. Prompt ED risk stratification is essential.

Keywords: Electric injuries, emergency department, risk factors, prognosis, retrospective study.

Introduction

Electrical injuries represent a significant medical emergency that encompasses a broad clinical spectrum ranging from localized tissue damage to severe systemic complications following exposure to electrical current.[1] These injuries are associated with considerable morbidity and mortality worldwide and are often attributable to preventable causes.[2] The severity of injury and extent of damage are primarily determined by factors such as the type of current (alternating current [AC] or direct current [DC]), voltage level, duration of contact, tissue resistance, and the path the current takes through the body.[3]

Globally, electrical injuries result from various etiologies, including occupational and domestic accidents, affecting individuals across all age groups.[4] In the United States, approximately 1,000 deaths and 30,000 emergency department visits annually are attributed to electrical shock injuries.[5,6] Notably, the incidence of electrical injuries in Turkey is reported to be higher compared to other countries, with domestic accidents being more prevalent among children, and occupational accidents being more common among adult patient groups.[7]

Among patients presenting to emergency departments with electrical injuries, the most frequently observed clinical manifestations include burns, cardiac arrhythmias, loss of consciousness, and musculoskeletal injuries.[8,9] Additionally, secondary traumas due to falls from height constitute another major contributor to morbidity and mortality in these cases.[5] Literature indicates that exposure to alternating current (AC) poses a higher risk for fatal arrhythmias such as ventricular fibrillation.[10] Shih et al., in their study evaluating the effects of cardiac dysrhythmias secondary to electrical injury, reported that the majority of cases involved male patients, with the highest incidence in the 20–40-year-old age group.[11] Furthermore, Brandao et al., in their 10-year retrospective analysis of electrical burns, found that while low-voltage domestic incidents were more common, high-voltage industrial accidents were associated with significantly higher mortality rates.[12]

Initial clinical assessment—including electrocardiography (ECG), laboratory parameters (creatine kinase [CK], CK-MB, troponin, lactate), and radiological imaging—plays a critical role in patient evaluation.[13,14] There is strong evidence in the literature supporting the utility of CK and lactate levels in predicting poor clinical outcomes.[15] Early assessment of these parameters can contribute significantly to anticipating hospitalization needs and intensive care unit (ICU) requirements.[16] Current literature emphasizes that factors such as the site of electrical contact, current path through the body, level of consciousness, and percentage of total body surface area (TBSA) burned are important determinants of clinical outcomes.[17,18]

Accurate prognosis and effective patient management in cases of electrical injury necessitate a multidisciplinary approach in the emergency department. Although numerous clinical factors associated with

outcomes in electrical injuries have been documented, evidence remains limited regarding the predictive value of variables available at the time of initial ED presentation. We hypothesize that specific clinical findings and laboratory parameters obtained upon admission are significantly associated with adverse clinical outcomes (e.g., ICU admission, prolonged hospitalization, or development of complications). Accordingly, this study aims to identify clinical and biochemical markers that may predict poor prognosis in patients presenting with electrical injuries and to highlight their potential utility in guiding early management decisions.

Materials and Methods

Study Design and Setting

This retrospective observational study was conducted in the Emergency Department of Erciş Şehit Rıdvan Çevik State Hospital, a secondary healthcare facility with approximately 450,000 annual patient visits and serving as one of the main healthcare providers in the region. The study covers five years between January 1, 2020, and January 1, 2025. All patients of any age group who presented to the emergency department due to electrical injury and were recorded with ICD-10 diagnostic codes T75.4, W86, and W87 were included in the study. Data were collected retrospectively through the hospital information management system (HIMS).

Participants and Data Collection

All data were independently retrieved by two trained researchers from the hospital information system and electronic medical records. Diagnoses were cross-validated by comparing clinical compatibility. The level of consciousness was assessed using the Glasgow Coma Scale (GCS), while burn percentage and degree were determined using the Rule of Nines. Inclusion criteria required complete documentation on demographic characteristics (age, sex, education level), incident-related variables (location and time of injury, source, and type of electrical current, contact area), clinical findings (presence of fall from height, consciousness status, burn percentage and degree, ECG and chest X-ray findings), and clinical outcomes (discharge status, hospital admission, ICU requirement, length of hospital stay). Additionally, laboratory parameters such as creatine kinase (CK), CK-MB, troponin, and lactate levels were extracted from patient records. Cases with missing data or those not meeting the inclusion criteria were excluded from the study. In addition, a post-hoc power analysis was performed using G*Power (version 3.1.9.4) based on the primary clinical endpoint of hospital stay. For a two-tailed independent samples t-test with an effect size of $d = 2.0445$, $\alpha = 0.05$, and group sample sizes of $n1 = 15$ and $n2 = 10$ ($df = 23$), the achieved power ($1–\beta$) was 0.9977, indicating that the available sample size was sufficient for the analyses.

Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Clinical Research Ethics Committee of the University of Health Sciences Van Training and Research Hospital (Approval No: 60VAEK/2025.04.11, Date of Approval: May 9, 2025). Due to the retrospective nature of the study, the requirement for informed consent was waived by the ethics committee. All patient data were anonymized and handled in accordance with principles of confidentiality and privacy.

Statistical Analysis

Statistical analysis was performed using SPSS version 25.0. Categorical variables were expressed as frequencies and percentages; continuous variables were presented as mean, median, minimum, and maximum values. The normality of distribution was assessed using the Kolmogorov–Smirnov test. Relationships between categorical variables were analyzed using the Chi-square test. For continuous variables, the independent samples t-test was used for normally distributed data, while the Mann–Whitney U test was applied for non-normally distributed data. In analyses involving three or more groups, the Kruskal–Wallis test was used, followed by Dunn's post-hoc test for multiple analyses when significant differences were observed. Correlations between continuous variables were assessed using the Spearman correlation coefficient. Factors affecting the length of hospital stay were analyzed using linear regression, while predictors of poor clinical outcomes were evaluated using logistic regression analysis. Additionally, the predictive power of laboratory parameters for adverse clinical outcomes was assessed using Receiver Operating Characteristic (ROC) curve analysis, and optimal cut-off values were calculated. A p-value of <0.05 was considered statistically significant in all analyses.

Results

The distribution of demographic characteristics, incident details, and clinical presentation features of the included cases is presented in Table 1. Of the 142 patients presenting to the emergency department due to electrical injury, 93 were male (65.5%) and 49 were female (34.5%). Age group analysis showed the highest incidence in individuals aged ≥21 years (n=51, 35.9%), followed by children aged ≤5 years (n=41, 28.9%). The majority of injuries (n=122, 85.9%) occurred in domestic settings, with the most common time of presentation being between 08:00 and 16:00. The most frequent source of electrical injury was household electrical appliances (n=78, 54.9%). In terms of current type, most exposures involved alternating current (AC) (n=136, 95.8%). There were no statistically significant differences in case distribution by year or month ($p>0.05$).

Table 1. Demographics, Incident Characteristics, and Clinical Findings of Electrical Injury Cases

Variables	Category	n (%)
Gender	Male	93 (65.5)
	Female	49 (34.5)
Age (years)	Min–Max (Median)	1–68 (16)
	Mean ± SD	18.85 ± 16.24
Hospital Stay (days)	Min–Max (Median)	1–17 (5)
	Mean ± SD	6.36 ± 4.87
Age Groups	≤5	41 (28.9)
	6–10	19 (13.4)
	11–15	10 (7.0)
	16–20	21 (14.8)
	≥21	51 (35.9)
Educational Level	Preschool	42 (29.6)
	Primary	61 (43.0)
	Secondary	30 (21.1)
	Higher	9 (6.3)
Incident Location	Indoor	122 (85.9)
	Outdoor	12 (8.5)
	Workplace	8 (5.6)
Time of Incident	08:00–16:00	70 (49.3)
	16:00–00:00	65 (45.8)
	00:00–08:00	7 (4.9)
Source of Electricity	Appliance	78 (54.9)
	Home Wiring	46 (32.4)
	Power Line	13 (9.2)
	Industrial	5 (3.5)
Type of Current	AC	136 (95.8)
	DC	6 (4.2)
Fall from Height	Yes	7 (4.9)
	No	135 (95.1)
Consciousness	Alert	115 (81.0)
	Unconscious	12 (8.5)
	Brief Loss	15 (10.6)
Burn Percentage	<1%	128 (90.1)
	≥1%	14 (9.9)
Burn Degree	1st	129 (90.8)
	2nd	7 (4.9)
	3rd	6 (4.2)
ECG Findings	NSR	129 (90.8)
	Non-NSR	13 (9.2)
Clinical Outcome	Discharged	116 (81.7)
	Ward	10 (7.0)
	ICU	16 (11.3)
Total		142 (100)

Contact site analysis revealed that 123 patients (86.6%) had hand involvement, with the most common entry point being the right hand (n=43, 30.3%). At admission, 115 patients (81.0%) were conscious. Burns involving less than 1% of total body surface area (TBSA) were observed in 128 cases (90.1%), with 129 (90.8%) presenting with first-degree burns.

Electrocardiogram (ECG) findings revealed normal sinus rhythm (NSR) in 129 patients (90.8%) and arrhythmias in 13 patients (9.2%). Among those with arrhythmias, the types identified were sinus tachycardia (n=9), atrial fibrillation (n=2), ventricular extrasystole (n=1), and ventricular tachycardia (n=1).

In terms of clinical outcomes, 116 patients (81.7%) were discharged, 16 (11.3%) were admitted to the intensive care unit (ICU), and 10 (7.0%) were admitted to general wards. Laboratory parameters at the time of ED presentation are summarized in Table 2. Most patients had leukocyte count, hemoglobin, hematocrit, creatinine, AST, ALT, sodium, and potassium levels within reference ranges. However, statistically significant variations were detected. Biomarkers reflecting muscle and cardiac damage showed wide and elevated distributions: the mean creatine kinase (CK) level was 354.43 ± 1235.89 U/L, CK-MB was 30.00 ± 37.16 U/L, and troponin was 9.51 ± 42.73 pg/mL. The mean lactate was 1.87 ± 1.45 mmol/L, which was significantly elevated.

Table 2. Distribution of Laboratory Parameters in Patients Exposed to Electrical Injury

Parameter (Reference	Min–Max (Median)	Mean ± SD	P-value
Leukocyte [4–10 x10^3/µL]	4000–10000 (8000)	7812.68 ±	<0.001
Hemoglobin [11–16 g/dL]	11–16 (14)	13.98 ± 1.30	<0.001
Hematocrit [37–54 %]	37–54 (42)	42.82 ± 3.93	<0.001
Platelet [100–400	113000–400000	294000 ±	=0.035
Urea [17–43 mg/dL]	17–43 (28.50)	28.92 ± 6.64	=0.026
Creatinine [0.6–1.1	0.6–1.1 (0.80)	0.80 ± 0.17	<0.001
AST [0–50 U/L]	11–50 (27)	28.80 ± 9.22	<0.001
ALT [0–50 U/L]	1–50 (18)	20.87 ± 10.69	<0.001
CK [0–145 U/L]	25–13830 (112)	354.43 ± 1235.89	<0.001
CK-MB [0–25 U/L]	2–352 (19)	30.00 ± 37.16	<0.001
Troponin [0–19.8 pg/mL]	0–473 (2.30)	9.51 ± 42.73	<0.001
Potassium [3.5–5.1	3.5–5.1 (4)	4.07 ± 0.33	<0.001
Sodium [136–146	136–146 (138)	138.69 ± 2.05	<0.001
Lactate [0.5–1.6 mmol/L]	0.5–12.0 (1.55)	1.87 ± 1.45	<0.001

*Statistical significance based on Kolmogorov–Smirnov normality test ($p<\alpha=0.05$).

Relationships between clinical outcomes and various clinical, incident-based, and laboratory variables are summarized in Table 3. A significant association was observed between ECG findings and clinical outcome: 89.9% of patients with NSR were discharged, whereas all patients with arrhythmias were admitted to the ICU.

The incident location significantly affected clinical outcomes. Discharge occurred in 89.3% of domestic cases, whereas 66.7% of open-area incidents required ICU care. Similar associations were found with electricity source and current type: all patients exposed to direct current (DC) required ICU admission.

The anatomical contact site also influenced outcomes. Patients with hand contact had higher discharge rates, while those with contact through the feet or head had increased ICU admission rates. Of patients with a history of falling from height, 71.4% required ICU admission compared to 8.1% in those without such a history.

Consciousness level was strongly associated with outcome: 89.6% of alert patients were discharged, whereas 91.7% of unconscious patients required ICU admission. Burn extent and degree also significantly influenced outcomes—higher TBSA and burn severity were associated with ICU admission. A significant difference in length of hospital stay was observed across age groups, with patients aged ≥21 years having longer stays than other groups.

The diagnostic performance of AST, ALT, CK, CK-MB, troponin, and lactate levels in predicting adverse clinical outcomes is illustrated in Figure 1. CK and CK-MB demonstrated the strongest discriminative power. A CK threshold of >174.00 U/L yielded 92.3% sensitivity and 77.6% specificity; a CK-MB threshold of >27.50 U/L provided 92.3% sensitivity and 80.2% specificity. Lactate also showed high discriminative power, with a threshold of >1.75 mmol/L yielding 76.9% sensitivity and 72.4% specificity. Troponin demonstrated acceptable diagnostic performance (threshold >2.95 pg/mL; sensitivity 69.2%, specificity 68.1%). In contrast, AST and ALT had poor predictive value for adverse outcomes.

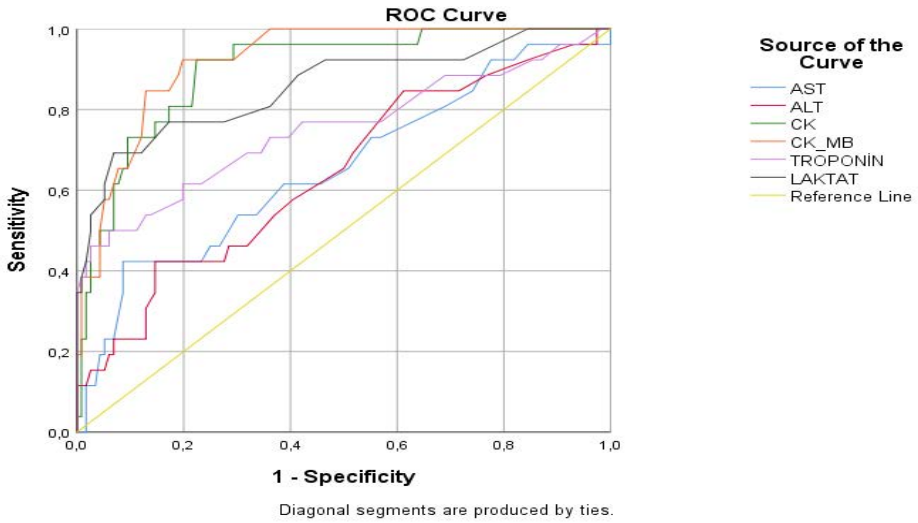


Figure 1: ROC Curves for AST, ALT, CK, CK-MB, Troponin, and Lactate in Predicting Adverse Clinical Outcomes

Correlation analysis revealed a strong positive relationship between age and serum creatinine level. Moderate positive correlations were observed between hemoglobin, hematocrit, urea, and length of hospital stay. Moderate negative correlations were found with platelet count and AST, and a weak negative correlation was noted for CK-MB.

Table 3. Relationship Between Emergency Department Outcomes and Clinical, Incident, and Laboratory Variables

		Clinical Outcome				
		Ward Admission	**ICU Admission**	**Discharged**	**Total**	**Statistical Analysis**
ECG Findings		**n (%)**	**n (%)**	**n (%)**		
	Non-NSR	0 (0.0)	13 (100)	0 (0.0)	13 (100)	χ^2=112.692 p<0.001*
	NSR	10 (7.8)	3 (2.3)	116 (89.9)	129 (100)	
Incident						
	Outdoor	2 (16.7)	8 (66.7)	2 (16.7)	12 (100)	χ^2=52.765 p<0.001*
	Indoor	8 (6.6)	5 (4.1)	109 (89.3)	122 (100)	
	Workplace	0 (0.0)	3 (37.5)	5 (62.5)	8 (100)	
Source of Electricity						
	Home Wiring	6 (60.0)	4 (25.0)	36 (31.0)	46 (32.4)	χ^2=38.759 p<0.001*
	Power Line	2 (20.0)	4 (25.0)	7 (6.0)	13 (9.2)	
	Appliance	2 (20.0)	3 (18.8)	73 (62.9)	78 (54.9)	
	Industrial	0 (0.0)	5 (31.3)	0 (0.0)	5 (3.5)	
Type of Current						
	AC	10 (100)	10 (62.5)	116 (100)	136 (95.8)	χ^2=28.542 p<0.001*
	DC	0 (0.0)	6 (37.5)	0 (0.0)	6 (4.2)	
Contact Site						
	Foot	0 (0.0)	7 (43.8)	5 (4.3)	12(8.5)	χ^2=35.832 p<0.001*
	Head	0 (0.0)	1 (6.3)	1 (0.9)	2 (1.4)	
	Hand	9 (90.0)	5 (31.3)	109 (94.0)	123 (86.6)	
	Arm	1 (10.0)	3 (18.8)	1 (0.9)	5 (3.5)	
Entry Point						
	Right Foot	0 (0.0)	5 (31.3)	2 (1.4)	7 (4.9)	χ^2=37.953 p<0.001*
	Right Hand	6 (60.0)	6 (37.5)	31 (26.7)	43 (30.3)	
	Heat	0 (0.0)	1 (6.3)	1 (0.9)	2 (1.4)	
	Left Foot	0 (0.0)	2 (12.5)	4 (3.4)	6 (4.2)	
	Left Hand	3 (30.0)	0 (0.0)	20 (17.2)	23 (16.2)	
	Absent	1 (10.0)	2 (12.5)	58 (50.0)	61 (43.0)	
Exit Point						
	Right Foot	1 (10.0)	4 (25.0)	0 (0.0)	5 (3.5)	χ^2=37.167 p<0.001*
	Left Foot	0 (0.0)	2 (12.5)	0 (0.0)	2 (1.4)	
	Absent	8 (80.0)	9 (56.3)	115 (99.1)	132 (93.0)	
	Right Hand	0 (0.0)	0 (0.0)	1 (0.9)	1 (0.7)	
	Left Hand	1 (10.0)	1 (6.3)	0 (0.0)	2 (1.4)	
Fall from Height						
	No	8 (5.9)	11 (8.1)	116 (85.9)	135 (100)	χ^2=34.512 p<0.001*
	Yes	2 (28.6)	5 (71.4)	0 (0.0)	7 (100)	
Consciousness						
	Unconscious	0 (0.0)	11 (91.7)	1 (8.3)	12 (100)	χ^2=51.913 p<0.001*
	Alert	8 (7.0)	4 (3.5)	103 (89.6)	115 (100)	
	Brief Loss	2 (13.3)	1 (6.7)	12 (80.0)	15 (100)	
Burn Percentage						
	<1%	9 (7.0)	5 (3.9)	114 (89.1)	128 (100)	χ^2=44.858 p<0.001*
	≥1%	1 (7.1)	11 (78.6)	2 (14.3)	14 (100)	
Burn Degree						
	1	10 (7.8)	4 (3.1)	115 (89.1)	129 (100)	χ^2=58.751 p<0.001*
	2	0 (0.0)	6 (85.7)	1 (14.3)	7 (100)	
	3	0 (0.0)	6 (100)	0 (0.0)	6 (100)	

*Chi-square test p<α=0.05 indicates statistical significance.

Table 4 presents the results of linear regression analysis to identify factors affecting hospital stay. The model explained 50.3% of the variance in hospital stay (R^2=0.503) and was statistically significant (F=11.116, p<0.001). Hemoglobin and lactate levels were found to significantly affect hospital stay. Each 1 g/dL increase in hemoglobin extended hospital stay by 1.753 days, while each 1 mmol/L increase in lactate prolonged stay by 1.057 days. As a result of the analysis, the presence of findings on chest radiography, serum lactate level, and the electrical current source being an electrical appliance was found to have a statistically significant impact on poor clinical outcomes. Patients with positive chest X-ray findings had a 15.013-fold higher likelihood of experiencing a poor clinical outcome (hospital ward or ICU admission) compared to those with negative findings (p < 0.001). Each 1 mmol/L increase in lactate level was associated with a 5.698-fold rise in the risk of a poor outcome (p < 0.001). In contrast, when the source of electrical injury was an electrical appliance, it was found to have a protective effect, reducing the risk of poor clinical outcome by 79% (Odds Ratio: 0.210, p = 0.043).

Table 4. Linear Regression Model Predicting Hospital Stay Duration in Patients Exposed to Electrical Injury

Variables	B Coefficient	Se	T Test	P-value	Confidence Interval
Constant	-21.351	6.720	-3.177	**0.004***	(-35.286)-
Lactate	1.057	0.395	2.676	**0.014***	0,238-1.876
Hemoglobin	1.753	0.483	3.626	**0.001***	0.750-2.755

Model Significance F=11.116, p<0.001, R^2=50.3. The regression equation is: Hospital stay = -21.351 + 1.057 × Lactate + 1.753 × Hemoglobin. Results of the multivariable logistic regression analysis predicting adverse clinical outcomes are presented in Table 5. The model was statistically significant (χ^2=79.591, p<0.001) with Nagelkerke R^2 = 0.699. Model fit was verified by the Hosmer–Lemeshow test (χ^2=10.270, p=0.247).

Table 5. Logistic Regression Model Predicting Adverse Clinical Outcomes

Variables	B Coefficient	SE	Odds Ratio	P-value	Confidence
Chest X-ray	2.709	0.777	15.013	<0.001*	3.277–68.778
Lactate	1.740	0.542	5.698	<0.001*	1.971–16.473
Consciousness Status				0.668	
Alert	-0.708	5.443	0.493	0.897	0.0–21181.74
Unconscious / Brief	0.400	5.530	1.492	0.942	0.0–75925.63
Source of Electricity				0.248	
Power Line	-0.879	2.870	0.415	0.759	0.0–115.05
Appliance	-1.560	0.772	0.210	0.043*	0.046–0.954
Industrial	19.446	15235.11	278868614.2	0.999	-
Incident Location				0.698	
Indoor	-0.245	2.851	0.783	0.932	0.003–209.01
Workplace	-1.661	3.026	0.190	0.583	0.001–71.53
Constant	-4.456	6.043	0.012	0.461	

Model significance: χ^2 = 79.591, p < 0.001, Nagelkerke R^2 = 69.9, Hosmer–Lemeshow Goodness of Fit: χ^2 = 10.270, p = 0.247

Discussion

In this study, we retrospectively evaluated the demographic, clinical, and laboratory characteristics of 142 patients who presented to the emergency department (ED) due to electrical injury, and analyzed factors predicting poor clinical outcomes. Our findings demonstrate that electrical injuries are particularly common among children and young adults, with household electrical appliances being the primary etiological source. These demographic and etiological patterns are largely consistent with previous studies by Aghakhani et al. and Başaran et al.[17,19] Furthermore, the presence of non-sinus rhythm on electrocardiogram (ECG), elevated lactate and hemoglobin levels as predictors of prolonged hospital stay, and a lower risk of adverse outcomes in cases involving exposure to current from 'electrical appliances' emerged as critical findings.

In our study, 65.5% of the patients were male, and 85.9% of incidents occurred in domestic settings. These findings align with literature suggesting that male individuals are more prone to electrical injuries and that domestic accidents, despite being typically low voltage, may have potentially serious consequences.[18] Galet et al. emphasized that over 90% of high-voltage injuries occur in men,[5] while Stockly and colleagues also reported male predominance in electrical shock cases.[6] Additionally, 95.8% of our cases involved alternating current (AC) exposure, a known contributor to fatal arrhythmias such as ventricular fibrillation, as noted by Jensen et al.[10]

One of the most striking findings in terms of clinical outcomes was the strong association between ECG findings and disease progression. All patients with non-sinus rhythm (100%) were admitted to the ICU, highlighting the prognostic value of ECG during the initial ED evaluation. Similarly, impaired consciousness at the time of presentation was significantly associated with poor outcomes. However, our findings differ from those of Pilecky et al., who, in a cohort of 480 patients, reported no significant association between ECG changes and mortality.[20] This discrepancy may stem from differences in study populations, the proportion of high-voltage injuries, or variations in patient management protocols. Notably, Pilecky et al. also reported that impaired consciousness was not a significant predictor of arrhythmia development, [20] whereas, in our study, impaired consciousness was found to be a strong indicator of poor clinical outcomes. This suggests that the consciousness level may reflect overall systemic impact and prognosis, independent of arrhythmia occurrence.

The presence of concomitant traumatic factors, such as falls from height, significantly worsened the clinical course, with 71.4% of these patients requiring ICU admission. Similarly, burn involvement of more than 1% TBSA and the presence of second- or third-degree burns were among the primary determinants of hospitalization. These results are supported by Gökdemir et al., who reported that high-voltage injuries are more likely to be accompanied by traumatic sequelae such as falls from height.[21]

In our study, the prognostic value of laboratory markers was evaluated via ROC analyses. Serum creatine kinase (CK), CK-MB, and lactate levels demonstrated high diagnostic performance. A CK threshold of >174.00 U/L provided a sensitivity of 92.3% and specificity of 77.6%; for CK-MB >27.50 U/L, sensitivity and specificity were 92.3% and 80.2%, respectively. Lactate was also a strong discriminator, with a >1.75 mmol/L cut-off yielding 76.9% sensitivity and 72.4% specificity. These results support previous findings regarding the importance of lactic acidosis as an early marker of cellular hypoperfusion.[1] Ahmed et al. reported that CK elevation was more common in high-voltage injuries compared to low-voltage injuries,[13] and Kopp et al. found significant associations between elevated CK/lactate levels and limb amputation or mortality.[22]

Linear regression analysis revealed that both lactate and hemoglobin levels had a significant effect on hospital stay duration. This underscores the critical importance of these two parameters for both prognostic assessment and ongoing clinical monitoring in electrical injury cases. While the association between elevated lactate and hospital admission is supported by Durdu et al. [23] there is limited literature addressing the impact of hemoglobin levels on the length of hospitalization. This indicates a need for further research into the prognostic significance of hemoglobin in electrical injuries.

Multivariable logistic regression analysis showed that abnormal chest X-ray findings and elevated lactate levels were independent predictors of poor clinical outcomes.[24] Patients with positive chest X-ray findings had a 15.013-fold higher likelihood of poor outcome ($p<0.001$), and each 1 mmol/L increase in lactate was associated with a 5.698-fold increased risk ($p<0.001$). Conversely, exposure to household electrical appliances appeared to have a protective effect, reducing the risk of poor outcomes by 79% (Odds Ratio = 0.210, $p=0.043$). This is likely due to the lower voltage of most household devices, resulting in less severe injuries.

In summary, this study highlights several critical indicators for predicting adverse clinical outcomes in patients presenting to the emergency department following electrical injury. Easily obtainable biomarkers such as ECG rhythm abnormalities, elevated serum lactate, CK, and CK-MB levels are invaluable tools for early risk stratification. Clinical factors, including falls from height, altered consciousness, contact sites, and burn severity, also carry significant prognostic value. These findings equip emergency physicians with the ability to rapidly identify life-threatening cases and initiate timely, aggressive interventions. Our results strongly emphasize the necessity of a multidisciplinary, patient-specific risk assessment approach in managing electrical injury cases. Future prospective multicenter studies are warranted to further elucidate the long-term prognostic implications of these markers.

The retrospective nature of this study and its single-center design pose several important limitations. Retrospective data collection may lead to potential data omissions and recording bias. Moreover, being conducted at a single institution restricts the generalizability of the findings to broader populations and

different healthcare settings. The relatively small sample size also limited the statistical power and may have hindered the full evaluation of some variables in the analysis. In light of these limitations, there is a pressing need for prospective, multicenter studies to validate these findings in larger and more diverse patient populations.

This study identified significant clinical and laboratory predictors of adverse outcomes in patients presenting to the emergency department following electrical injury. Abnormal electrocardiographic (ECG) findings at presentation, along with elevated serum lactate, creatine kinase (CK), and CK-MB levels, were noteworthy prognostic indicators. Additionally, clinical factors such as the nature of the incident, anatomical site of contact, burn percentage, and burn severity were found to be essential in guiding the treatment process. A multidisciplinary assessment and early risk stratification in the emergency department play a crucial role in reducing morbidity and mortality in such cases. In addition, strengthening preventive efforts and public awareness through primary care settings may help reduce the occurrence and severity of such injuries.

Ethical Considerations: This study was approved by the Clinical Research Ethics Committee of the University of Health Sciences Van Training and Research Hospital (Approval Date: May 9, 2025; Decision No: 60VAEK/2025.04.11).

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

References

1. Lee RC. Injury by electrical forces: pathophysiology, manifestations, and therapy. Curr Probl Surg. 1997;34(9):677–764.
2. Alqassim M, Ewiss R, Al Ali H. The role of forensic engineering in the diagnosis of electrocution fatalities: two case reports. Saf Health Work. 2023;14(1):124–30.
3. Farzan R, Ziabari SMZ, Jafaryparvar Z, Homaierad E, Shoja EI, Tolouei M. A review of electrocardiography changes in electrical burn injury: is it time to revise protocol? Ann Burns Fire Disasters. 2023;36(2):132.
4. Zemaitis MR, Cindass R, Lopez RA, et al. Electrical injuries. [Updated 2025 Jan 20]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. Available from: https://www.ncbi.nlm.nih.gov/books/NBK448087/
5. Galet C, Khor D, AlQasas T, Barrash J, Granchi T, Bertellotti R, et al. Electrical injuries and outcomes: a retrospective review. Burns. 2023;49(7):1739–44.
6. Stockly OR, Wolfe AE, Espinoza LF, Simko LC, Kowalske K, Carrougher GJ, et al. The impact of electrical injuries on long-term outcomes: a Burn Model System National Database study. Burns. 2020;46(2):352–9.
7. Kılınç O, Karagöz Y, İlhan M, Bakan HU. Evaluation of cases in which forensic reports were prepared due to injuries due to electric shock by Akdeniz University, Department of Forensic Medicine between 2010–2022. Mediterr Med J. 2024;10(3):450–6.
8. May T, Mumma BE, Bartos JA, Rodriguez AJ, Kurz MC. 2023 American Heart Association focused update on adult advanced cardiovascular life support guidelines. Circulation. 2024;149:e254–73.
9. Petroni T, Moubarak G, Varenne O, Weber S, Duboc D. Do we need to systematically hospitalize electrocuted patients in ICU? Int J Cardiol. 2011;152(3):410–1.
10. Jensen PJ, Thomsen PE, Bagger JP, Nørgaard A, Baandrup U. Electrical injury causing ventricular arrhythmias. Heart. 1987;57(3):279–83.
11. Shih JG, Shahrokhi S, Jeschke MG. Review of adult electrical burn injury outcomes worldwide: an analysis of low-voltage vs high-voltage electrical injury. J Burn Care Res. 2017;38(1):e293–8.
12. Brandão C, Vaz M, Brito IM, Ferreira B, Meireles R, Ramos S, et al. Electrical burns: a retrospective analysis over a 10-year period. Ann Burns Fire Disasters. 2017;30(4):268.
13. Ahmed J, Stenkula C, Omar S, Ghanima J, Bremtun FF, Bergan J, et al. Patient outcomes after electrical injury–a retrospective study. Scand J Trauma Resusc Emerg Med. 2021;29:1–6.
14. Pawlik AM, Lampart A, Stephan FP, Bingisser R, Ummenhofer W, Nickel CH. Outcomes of electrical injuries in the emergency department: a 10-year retrospective study. Eur J Emerg Med. 2016;23(6):448–54.

15. Ahn JY, Kim J, Lee J, et al. Lactate as predictor of outcome in electrical injuries. J Emerg Med. 2018;55(3):369–75.
16. Kassai Y, Nakamura R, Saito T, et al. Use of cardiac biomarkers in triage of electrical injuries. Am J Emerg Med. 2020;38(3):517–21.
17. Aghakhani K, Heidari M, Tabatabaee SM, Abdolkarimi L. Effect of current pathway on mortality and morbidity in electrical burn patients. Burns. 2015;41(1):172–6.
18. Seyfrydova M, Rokyta R, Rajdl D, Huml M. Arrhythmias and laboratory abnormalities after an electrical accident: a single-center retrospective study of 333 cases. Clin Res Cardiol. 2023;112(12):1835–47.
19. Başaran A, Gürbüz K, Özlü Ö, Demir M, Eroğlu O, Daş K. Electrical burns and complications: data of a tertiary burn center intensive care unit. Ulus Travma Acil Cerrahi Derg. 2020;26(2):222–6.
20. Pilecky D, Vamos M, Bogyi P, Muk B, Stauder D, Racz H, et al. Risk of cardiac arrhythmias after electrical accident: a single-center study of 480 patients. Clin Res Cardiol. 2019;108(8):901–8.
21. Gökdemir MT, Söğüt Ö, Sayhan MB, Kaya H. Factors affecting mortality in high voltage electrical injuries in adults. Duzce Med J. 2013;15(1):22–6.
22. Kopp J, Loos B, Spilker G, Horch RE. Correlation between serum creatine kinase levels and extent of muscle damage in electrical burns. Burns. 2004;30(7):680–3.
23. Durdu T, Ozensoy HS, Erturk N, Yılmaz YB. Impact of voltage level on hospitalization and mortality in electrical injury cases: a retrospective analysis from a Turkish emergency department. Med Sci Monit. 2025;31:e947675.
24. Arnoldo BD, Purdue GF, Kowalske K, Helm PA, Burris A, Hunt JL. Electrical injuries: a 20-year review. J Burn Care Rehabil. 2004;25(6):479–84.

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):357-367 // 10.5505/amj.2025.78026

TWO DECADES OF PLANETARY HEALTH AND ENVIRONMENTAL RESEARCH: A GLOBAL BIBLIOMETRIC ANALYSIS (2004–2024)

Tuğba Güler Sönmez[1], Mehmet Enes Gökler[2], İzzet Fidancı[3]
Hamit Harun Bağcı[1]

[1]Republic of Turkey Ministry of Health, General Directorate of Public Health, Ankara, Türkiye
[2]Department of Public Health, Ankara Yıldırım Beyazıt University, Faculty of Medicine, Ankara, Türkiye
[3]Department of Family Medicine, Hacettepe University, Faculty of Medicine, Ankara, Türkiye

Correspondence:
Tuğba Güler Sönmez (e-mail: gulertugba@hotmail.com)

Submitted: 28.07.2025 // Accepted: 15.09.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

ANKARA MEDICAL JOURNAL

Abstract

Objectives: Planetary health, ecohealth, and environmental health have emerged as key research domains that adopt an interdisciplinary approach to global health challenges by addressing the direct and indirect impacts of environmental change on human health. The study aims to evaluate how these concepts have evolved in the academic literature between 2004 and 2024, the main thematic focuses, and the geographical distribution of scientific output.

Materials and Methods: Data were obtained from the Web of Science Core Collection database, and Bibliometrix (R package) and Biblioshiny interface were used in the analysis. The 9347 publications were evaluated. Conceptual clusters and thematic transitions over time were also included in the analysis.

Results: The analysis showed that there has been a significant increase in publications in the literature, especially after 2015. Five main conceptual areas were identified in the thematic analysis: (1) climate change and heat stress, (2) ecosystem health and biodiversity, (3) sustainability and resilience, (4) health systems and risk assessment, (5) zoonotic diseases and public health policies.

Conclusion: The planetary health literature is gaining momentum as a critical field in terms of global health. Our findings suggest significant implications for global health policy design, particularly for strengthening planetary health governance in underrepresented regions.

Keywords: Environmental health, global health, bibliometrics, sustainability, one health.

Introduction

Planetary health offers a public health-driven and interdisciplinary framework to understand and address environmental changes—such as climate change, biodiversity loss, and ecosystem degradation—affecting human health. Closely linked with the One Health and EcoHealth approaches, planetary health highlights the interconnectedness of human, animal, and environmental systems, emphasizing the need for integrated and sustainable public health policies. Since the adoption of the Paris Climate Agreement and the publication of the 2015 Lancet report on planetary health, interest in this field has grown significantly. The COVID-19 pandemic has further accelerated global recognition of the urgent need to incorporate planetary health principles into health systems and policy-making. Despite this momentum, few studies have systematically mapped the evolution of this interdisciplinary field. This bibliometric analysis aims to fill this gap by examining thematic trends, conceptual transitions, and structural dynamics in planetary health, eco-health, and environmental health research over the past two decades. [1–5]

Materials and Methods

This bibliometric study aimed to analyze the structure and evolution of scientific literature related to planetary health, ecohealth, and environmental health. Data were retrieved from the Web of Science Core Collection (WoS-CC) database, covering the years 2004–2024. The search was conducted on May 2, 2025, using the following keywords: *"planetary health," "eco-health," "ecohealth," "ecosystem health," "environmental health,"* and *"health and environment,"* limited to title and abstract fields. Only articles and reviews published in English were included. Conference papers, editorials, letters, book chapters, and non-health-related technical publications were excluded, resulting in a final dataset of 9347 records.

Bibliometric analyses were performed using the Bibliometrix R package and its web-based interface Biblioshiny, which provides robust tools for evaluating scientific output and mapping thematic trends. Key indicators included: annual publication trends, top productive countries and institutions, most cited articles, keyword co-occurrence networks, author collaboration patterns, and thematic evolution. [6,7]

Journal co-citation analysis and author co-citation networks were used to explore disciplinary structures and academic interactions. Conceptual clusters and thematic transitions were visualized through keyword co-occurrence and bibliographic coupling. [6]

This structured approach enabled us to capture both the quantitative growth and the evolving conceptual landscape of planetary health research across disciplines and geographic regions. [6,7]

Results

Annual Increase in Publications and Growth Trends

Between 2004 and 2024, the number of publications related to planetary health, ecohealth, and environmental health increased significantly. Academic interest accelerated particularly after 2015, following the Paris Climate Agreement and the Lancet Commission report. The COVID-19 pandemic period further reinforced the global relevance of the field, with an observable surge in publications post-2020 (Figure 1).

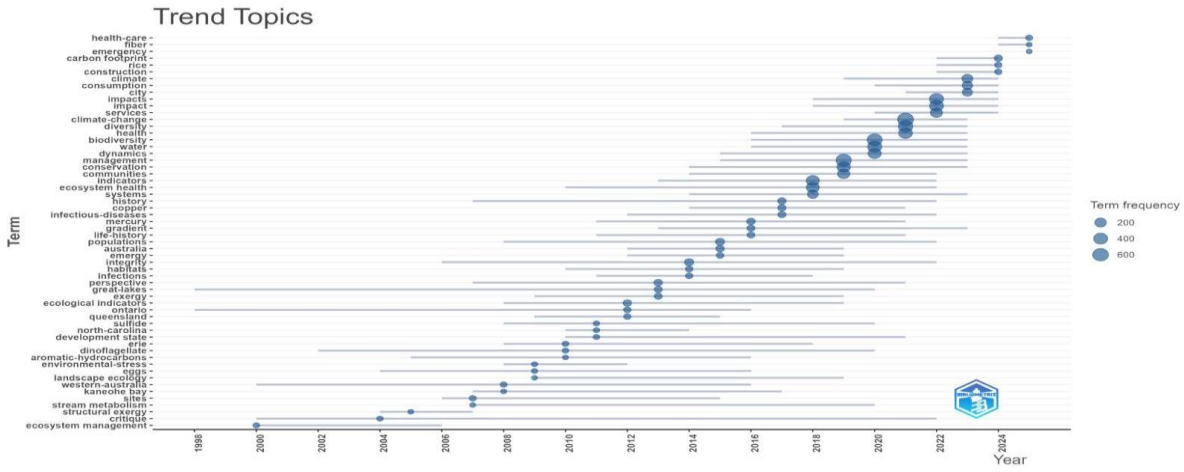


Figure 1. Temporal Evolution of Trending Terms in Planetary and Environmental Health Literature (2000-2024). Horizontal bars represent interquartile ranges, and dot sizes reflect term frequency.

Keyword Co-occurrence Map and Thematic Clusters

Keyword co-occurrence analysis revealed five major thematic clusters in the literature:

1. Climate change and health impacts
2. Ecosystem health and biodiversity
3. Health systems, sustainability, and resilience
4. Zoonotic diseases and One Health-related Public Health policies
5. Environmental justice and governance

This clustering highlights the interdisciplinary structure of planetary health, integrating public health, ecological science, and social dimensions. In the co-occurrence map, climate change and health impacts, together with ecosystem health and biodiversity, appeared as the most central and interconnected clusters, while environmental justice and governance emerged as a relatively smaller yet growing theme. This distribution illustrates both the maturity of certain research areas and the evolving nature of others within planetary health scholarship. (Figure 2).

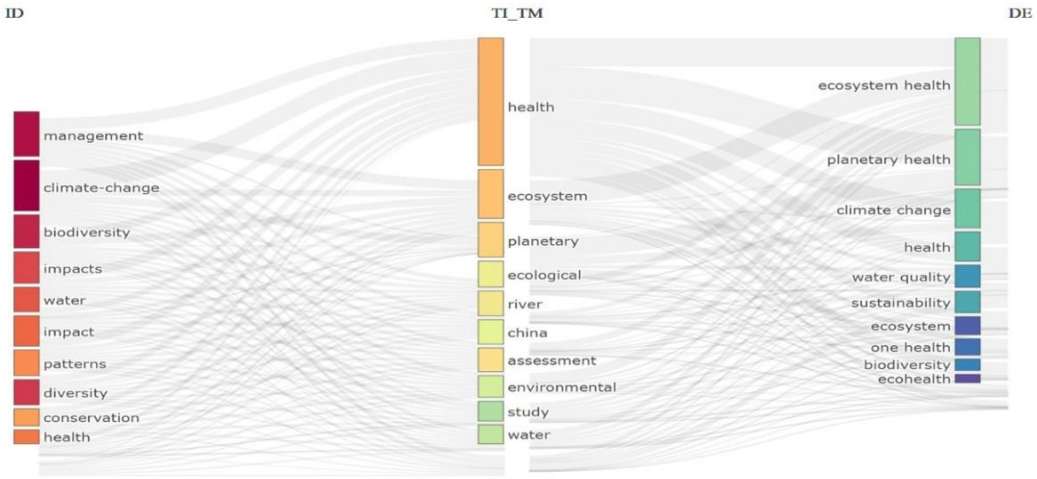


Figure 2. Keyword Co-occurrence Map of Planetary and Environmental Health Literature

Country and Institutional Publishing Performance

The top five contributing countries in terms of publication volume were: the USA, UK, China, Canada, and Germany. Institutions such as Harvard University, the University of Washington, and the London School of Hygiene & Tropical Medicine emerged as leading contributors. While China showed rapid output growth, its international collaboration networks were relatively limited compared to those of the USA and UK.

Influential Authors and Publications

The most highly cited contributors included Costanza et al. (1997) for their foundational work on ecosystem services, Rapport et al. (1998) on ecosystem health, and Whitmee et al. (2015) for the landmark Lancet Commission report on planetary health. These works collectively shaped the conceptual and policy framework of the field. [5,8,9] The Sankey diagram further illustrates the temporal flow of concepts in the literature, showing how earlier streams of ecohealth and ecosystem health progressively converged into planetary health after 2015. It also highlights the increasing integration of climate change and health-related themes into this broader framework, reflecting the field's conceptual consolidation over time (Figure 3).

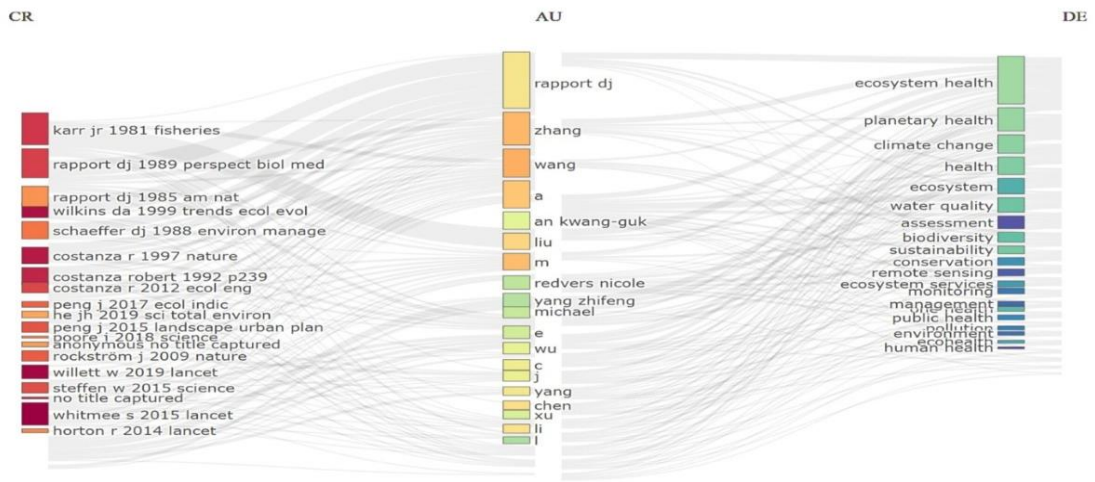


Figure 3. Sankey Diagram of Influential Authors, Cited Publications, and Keywords

Conceptual Transitions and Thematic Evolution

The literature has shown a clear conceptual evolution from earlier frameworks of ecohealth and ecosystem health towards a more comprehensive planetary health paradigm. This transition reflects a growing emphasis on integrated governance models that span sectors such as public health, environment, and socio-political structures. The strategic thematic map provides further insight into this transition, positioning climate change and health system resilience as motor themes at the core of the field, while environmental justice emerges as an evolving but less central area. This distribution illustrates both the maturity of long-established themes and the ongoing development of newer, interdisciplinary domains within planetary health (Figure 4).

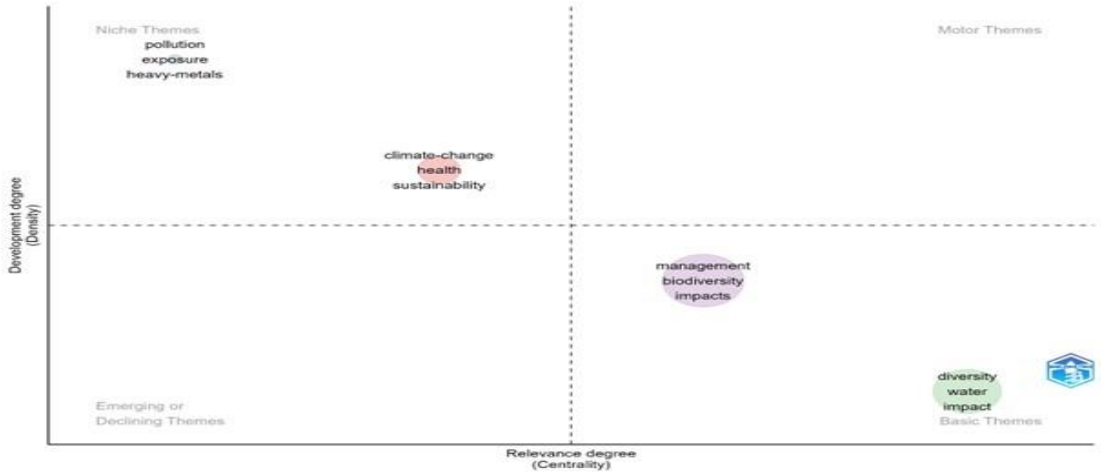


Figure 4. Strategic Thematic Map of Planetary and Environmental Health Research

Data Quality and Limitations

The suitability of Web of Science data for bibliometric analysis is generally adequate; however, there are significant deficiencies in some areas. For example, the 'Science Category' (WC) field was left blank in 100% of the publications. This shows that the current systems are insufficient for the classification of interdisciplinary studies. Furthermore, the 20% missing keywords may have led to the exclusion of some themes in the co-occurrence analysis. This limitation should be carefully considered, particularly regarding the comprehensiveness of content analysis.

Discussion

This study provides a systematic bibliometric overview of the thematic and geographic evolution of planetary health, ecohealth, and environmental health literature over the past two decades. Our analysis demonstrates a significant growth in academic production, particularly following the Paris Climate Agreement and the 2015 Lancet Commission report. The surge in publications post-2020, during the COVID-19 pandemic, reflects a heightened global awareness of the need to integrate planetary health principles into health systems and policies. [1–4,10]

Keyword co-occurrence analysis revealed five key thematic clusters: climate change and health impacts, ecosystem health and biodiversity, health system resilience and sustainability, zoonotic diseases and One Health-based public health policies, and environmental justice and governance. These clusters underscore the interdisciplinary and multi-sectoral nature of planetary health, bridging public health, environmental sciences, and socio-political dimensions.

Our findings also highlight a clear conceptual transition from earlier ecohealth and ecosystem health frameworks towards a more comprehensive planetary health paradigm. This evolution reflects the growing need for integrated governance approaches that address not only biomedical issues but also environmental, social, and structural determinants of health. [2,6,11]

Although our dataset did not allow a systematic quantitative classification of theoretical versus empirical articles, prior bibliometric and scoping reviews have reported similar findings. Several reviews in the field have noted that the majority of planetary health publications tend to be conceptual in nature, with relatively few empirical studies providing original data. This convergence across independent analyses supports our observation that empirical evidence in planetary health research remains limited and underscores the need for more data-driven studies to inform policy and practice. The absence of standardized indicators linking environmental risks with health outcomes presents a barrier to evidence-based policy-making and the operationalization of planetary health concepts at the system level. [11,13]

Geographic disparities in knowledge production also remain evident. While countries such as the USA, UK, Canada, Germany, and Australia lead in both volume and influence, low- and middle-income countries (LMICs) are significantly underrepresented. Although emerging economies such as China and India have increased their output, their international collaboration networks remain limited. This imbalance affects the inclusivity and global relevance of planetary health policies, particularly when the most severe health impacts of climate change and environmental degradation disproportionately affect the Global South. [13–15]

Reducing these disparities requires structural efforts, including:

1. Supporting regional research capacity in LMICs through dedicated funding and training

2. Promoting open-access and subsidized publication opportunities for underrepresented regions

3. Encouraging greater international collaboration and authorship networks

4. Integrating planetary health principles into health professional education curricula

5. Developing cross-sectoral policies to jointly address climate change, biodiversity loss, and zoonotic disease risks

Influential works by Costanza, Rapport, and Whitmee continue to shape the theoretical foundations of planetary health. The Lancet Commission report (2015), in particular, was pivotal in framing planetary health

as a field that transcends environmental health, encompassing broader issues of equity, governance, and sustainability. [1,5]

In summary, planetary health is evolving as both an interdisciplinary academic field and a transformative policy framework. For this potential to be realized, future efforts must prioritize generating robust empirical data, promoting geographic equity in knowledge production, and fostering multi-sectoral, collaborative governance models to support sustainable global health policies.

Strengths And Limitations

In this study, certain limitations related to the quality of bibliographic data from the Web of Science database were identified. The absence of "Science Categories" in 100% of the records reflects the challenges in classifying interdisciplinary fields such as planetary health. Additionally, the use of non-standard or missing keywords in some articles may have impacted the depth of the co-occurrence analyses.

The study was limited to publications from 2004 to 2024, and the search strategy, which focused on title and abstract fields, may have excluded conceptually relevant works expressed in different terminology. Moreover, using only the Web of Science Core Collection (WoS-CC) as a data source may have resulted in the exclusion of literature indexed to other databases such as Scopus or PubMed. This exclusive reliance on WoS-CC also carries the risk of underrepresenting publications from low- and middle-income countries (LMICs), where a significant portion of research is often published in regional or non-indexed journals. [16,17]

Future research should therefore consider broader database inclusion, multilingual sources, and complementary indexing systems (e.g., Scopus, PubMed, regional databases) to achieve a more comprehensive and geographically equitable understanding of the field.

Additionally, missing or non-standardized keywords may have influenced the robustness of the thematic analysis. In particular, inconsistencies in terminology could have led to incomplete clustering or artificial fragmentation of conceptually related themes. As a result, certain areas of research might appear underrepresented, while others may be overemphasized. This limitation emphasizes the importance of adopting standardized vocabularies (e.g., MeSH terms) and incorporating manual validation steps in future bibliometric studies to enhance the accuracy, reproducibility, and comparability of thematic analyses. [6,16,17]

Policy Implications for Advancing Planetary Health

In line with the findings of this study, several policy actions should be prioritized to strengthen planetary health research and practice globally: enhancing regional research capacity in LMICs; promoting open-access and

inclusive publishing opportunities; fostering international collaboration and interdisciplinary networks; integrating planetary health into health professional education; and supporting cross-sectoral governance to jointly address climate change, biodiversity loss, and zoonotic disease risks.

In conclusion, this bibliometric analysis reveals that the themes of planetary health, eco-health, and environmental health have gained prominence in scientific literature with a quantitatively significant acceleration in the last two decades. The results of the analysis revealed that academic production in this field accelerated, especially after the signing of the Paris Climate Agreement in 2015 and the planetary health report published by The Lancet. With the COVID-19 pandemic, it is evident that the weight of these concepts on the scientific and political agenda has further strengthened.

The thematic clusters revealed in the keyword co-occurrence analysis show that the field of planetary health is developing along multidimensional axes such as climate change, ecosystem health and biodiversity, resilience of health systems, community-based interventions, and zoonotic diseases. However, the results of the analysis revealed that publication production is largely concentrated in high-income countries, while low- and middle-income countries remain underrepresented in this literature. Moreover, it is noteworthy that most publications are theoretical or interpretative in nature, while empirical research remains relatively low.

This study makes visible the quantitative growth, conceptual diversity, and interdisciplinary nature of the planetary health literature, while also revealing structural gaps in methodology and global inequalities in representation. While the field of planetary health is maturing conceptually, it is important to increase methodological diversity, to feed it with original empirical data from different geographies, and to build interdisciplinary collaborations in a more systematic way to move forward.

Moreover, the planetary health approach should be considered not only as an academic framework but also as an effective governance model in terms of shaping health policies, restructuring education programs, and ensuring that it is effectively included in community-based practices. Increasing research capacity, especially in low- and middle-income countries, ensuring geographical equity in knowledge production, and promoting inclusive participation in multifactorial global policy-making processes will support the sustainability and equitable development of the field.

Ethical Considerations: This study presented no ethical issues or violations since it utilized publicly accessible data and previously published literature.

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

References

1. Lancet Countdown. 2024 Report [Internet]. 2024; https://lancetcountdown.org/2024-report/. (Accessed: 03.06.2025).
2. Mackenzie JS, Jeggo M. The One Health approach—why is it so important? Trop Med Infect Dis. 2019;4(2):88.
3. Pongsiri MJ, Gatzweiler FW, Bassi AM, Haines A, Demassieux F. The need for a systems approach to planetary health. Lancet Planet Health. 2017;1(7):e257-9.
4. Redvers N. The determinants of planetary health. Lancet Planet Health. 2021;5(3):e111-2.
5. Whitmee S, Haines A, Beyrer C, et al. Safeguarding human health in the Anthropocene epoch: report of the Rockefeller Foundation–Lancet Commission on planetary health. Lancet. 2015;386(10007):1973-2028.
6. Aria M, Cuccurullo C. bibliometrix: an R-tool for comprehensive science mapping analysis. J Informetr. 2017;11(4):959-75.
7. Pranckutė R. Web of Science (WoS) and Scopus: the titans of bibliographic information in today's academic world. Publications. 2021;9(1):12.
8. Costanza R, d'Arge R, de Groot R, et al. The value of the world's ecosystem services and natural capital. Nature. 1997;387(6630):253-60.
9. Rapport DJ, Costanza R, McMichael AJ. Assessing ecosystem health. Trends Ecol Evol. 1998;13(10):397-402.
10. Heat and health [Internet]. 2024; https://www.who.int/news-room/fact-sheets/detail/climate-change-heat-and-health. (Accessed: 03 June 2025).
11. Talukder B, Ganguli N, Choi E, Tofighi M, Vanloon GW, Orbinski J. Exploring the nexus: comparing and aligning Planetary Health, One Health, and EcoHealth. Glob Transit. 2024;6:66-75.
12. Rossa-Roccor V, Acheson ES, Andrade-Rivas F, et al. Scoping review and bibliometric analysis of the term "Planetary Health" in the peer-reviewed literature. Front Public Health. 2020;8:343.
13. Zyoud S, Zyoud AH. Mapping and visualizing global knowledge on planetary health in the climate change context: a comprehensive exploration of insights, trends, and research priorities. Discov Sustain. 2024;5:275.
14. Campostrini S, Guerra R. Can the scientific world positively influence decision makers on planetary health? Lancet. 2018;391:425-6.
15. Chen W. A multi-scale assessment of ecosystem health based on the Pressure-State-Response framework: a case in the Middle Reaches of the Yangtze River Urban Agglomerations, China. Environ Sci Pollut Res Int. 2022;29:29202-19.

16. Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: an overview and guidelines. J Bus Res. 2021;133:285-96.
17. Peña-Rocha M, Gómez-Crisóstomo R, Guerrero-Bote VP, Moya-Anegón F de. Bibliometrics effects of a new paper level classification. Front Res Metr Anal. 2025;10:1531758.

ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(3):368-379 // 10.5505/amj.2025.78476

EXOCRINE PANCREATIC FUNCTION IN ERECTILE DYSFUNCTION: A PROSPECTIVE STUDY BASED ON FECAL ELASTASE MEASUREMENT

Atilla Satır[1], Hakan Demirci[2]

[1]Department of Urology, University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Bursa, Türkiye

[2]Department of Family Medicine, University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Bursa, Türkiye

Correspondence:

Sorumlu Yazar (e-mail: atillasatir@gmail.com)

Submitted: 25.08.2025 // Accepted: 17.09.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine

Department of Family Medicine

Abstract

Objectives: Exocrine pancreatic function, assessed via fecal pancreatic elastase (FPE), could contribute to the pathophysiology of erectile dysfunction (ED); however, supporting evidence is limited. The present study aimed to prospectively evaluate FPE levels in men and investigate the association between exocrine pancreatic insufficiency (EPI) and erectile function.

Methods: This prospective observational study was carried out between June and August 2025 at the urology outpatient clinic of the hospital. Male patients aged between 40 and 65 years presenting with any complaint were enrolled. Erectile function was assessed using the International Index of Erectile Function-5 (IIEF-5). Stool samples were analyzed for FPE by ELISA. Demographic, clinical, and laboratory data were collected. Group comparisons were performed using non-parametric tests, and predictors of erectile function were assessed with multivariate regression.

Results: A total of 153 patients were included. Median FPE levels demonstrated nominal variation across erectile function groups ($p=0.048$, Kruskal–Wallis), yet no statistically significant post-hoc differences after Bonferroni correction. Multivariate regression analysis revealed that diabetes mellitus ($\beta=-0.234$, $p=0.016$) and hypertension ($\beta=-0.167$, $p=0.040$) were independent negative predictors of erectile function, whereas FPE ($\beta=0.184$, $p=0.017$) was a positive predictor. Other variables, including age, BMI, testosterone, and prolactin, did not significantly contribute.

Conclusions: To our knowledge, this is one of the first studies to explore the link between exocrine pancreatic function and ED. Findings suggest that preserved pancreatic exocrine function may be beneficial for erectile health, while diabetes and hypertension remain major negative determinants. Exocrine pancreatic function deserves further investigation as a potential diagnostic and therapeutic target in the multifactorial management of ED.

Keywords: Erectile dysfunction, pancreatic elastase, exocrine pancreatic insufficiency, diabetes mellitus, hypertension

Introduction

Erectile dysfunction (ED) is one of the most prevalent male sexual health disorders, with its frequency increasing significantly with advancing age.[1] Community-based studies conducted in Turkey have reported that nearly half of men over 40 years of age experience some degree of ED, with prevalence rising steadily in older age groups.[2] Beyond its impact on sexual health, ED substantially affects psychological well-being, interpersonal relationships, and overall quality of life. The etiology of ED is multifactorial, with contributions from vascular, hormonal, neurogenic, and psychogenic factors. Systemic diseases such as diabetes mellitus (DM), hypertension, obesity, and cardiovascular disease are consistently associated with higher ED risk.[3,4]

While the traditional pathophysiological framework of ED has centered on vascular and endocrine mechanisms, recent studies have broadened this perspective to include the gastrointestinal system. Emerging evidence highlights the role of the gut–pancreas axis and the gut microbiome in modulating metabolic, hormonal, and endothelial pathways that may affect erectile function.[5,6] In this context, the exocrine pancreas has gained attention due to its critical role in digestion, nutrient absorption, and metabolic regulation.

Fecal pancreatic elastase (FPE) is a widely used non-invasive biomarker for assessing exocrine pancreatic function. Reduced FPE levels indicate exocrine pancreatic insufficiency (EPI), which is associated with malabsorption, malnutrition, and metabolic alterations.[7] Given that nutritional status and metabolic disturbances are key determinants of erectile function, investigating FPE in men with ED may provide new insights into its complex pathophysiology.

Several studies in Turkey have underscored the interplay between metabolic health and ED. Yaman et al. (2006) reported that men with metabolic syndrome had significantly higher rates of ED compared to healthy controls.[8] Similarly, Demir et al. (2008) showed that Turkish men with type 2 diabetes exhibited higher prevalence and severity of ED, reflecting the strong association between glycemic dysregulation and sexual dysfunction.[9] Notably, to date, no study has examined whether exocrine pancreatic function, as measured by fecal elastase, contributes to ED risk or severity in this population. Although only a limited number of studies have directly addressed this issue, prior reports on exocrine insufficiency, nutritional status, and gut microbiota strongly support the plausibility of this link.[10,11]

This study prospectively evaluates FPE levels in men with sexual dysfunction to investigate the potential link between EPI and ED. Understanding this relationship may enhance the multifactorial framework of ED and inform novel diagnostic and therapeutic strategies.

Materials and Methods

Study Design and Setting

This prospective observational study was carried out between June and August 2025at the Urology Outpatient Clinic of the Hospital. The study protocol was reviewed and approved by the institutional ethics committee (protocol number: 2024-TBEK 2025/06-16, date: June 4, 2025), and written informed consent was obtained from all participants before enrollment. The study was carried out in accordance with the principles of the Declaration of Helsinki.

Participants

Men aged between 40 and 65 years presenting with any complaint were considered for inclusion. Inclusion criteria: Patients with self-reported sexual function and willingness to participate. Exclusion criteria: Prior diagnosis of chronic pancreatitis, pancreatic surgery, malignancy, inflammatory bowel disease, severe hepatic or renal impairment, or current use of pancreatic enzyme replacement therapy.

Assessment of Erectile Dysfunction

Erectile function was evaluated using the International Index of Erectile Function-5 (IIEF-5) questionnaire, which has been validated in Turkish populations.[12] Participants completed the IIEF-5 either via a face-to-face interview or by self-administration under supervision.

Measurement of Fecal Pancreatic Elastase

Fresh stool samples were collected from all participants in sterile containers during admission and labeled with unique study codes. Specimens were immediately stored in a freezer at −20 °C until analysis. After thawing, a 15 mg portion was taken from each stool using a standardized stool preparation system. The pancreatic elastase levels were measured using an enzyme-linked immunosorbent assay (ELISA) with the IDK Pancreatic Elastase ELISA Kit (Immundiagnostik AG, Bensheim, Germany). Results were expressed in μg/g stool and calculated from optical density values against a standard curve. According to established thresholds, fecal elastase <200 μg/g was considered indicative of exocrine pancreatic insufficiency (EPI), with values <100 μg/g indicating severe EPI.[13] Diarrheal or urine-diluted stool specimens were excluded because they may yield falsely low results. Participants were instructed to maintain their usual diet and to avoid initiating any new medications, probiotics, or supplements during the week prior to stool collection. Although no specific dietary restrictions were applied, participants were advised to refrain from alcohol intake for 48 hours before sampling. All samples were collected under these standardized conditions to minimize variability.

Additional Data Collection

A structured questionnaire was used to obtain demographic and clinical data, including age, body mass index (BMI), smoking status, comorbidities (diabetes, hypertension, cardiovascular disease), medication history, and relevant laboratory findings (fasting glucose, hormone levels where available).

Statistical Analyses

Data obtained in the study were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA) and the Python programming language. The following Python libraries were used: pandas (data organization and cleaning), numpy (numerical computations), matplotlib and seaborn (graphical visualizations), scipy (basic statistical tests), and statsmodels (regression models and advanced statistical analyses).

For continuous variables, the assumption of normality was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. When normality was not met or the sample size was <30, continuous data were presented as median (interquartile range: Q1–Q3), and group comparisons were performed using the Kruskal–Wallis H test. For variables with significant differences, pairwise comparisons with Bonferroni correction were applied.

Categorical variables were expressed as counts and percentages (%). Group differences were evaluated using the Pearson Chi-square test or Fisher's exact Chi-square test when expected cell frequencies were low. Distribution of FPE values across erectile function groups was assessed with the Kruskal–Wallis test, followed by Bonferroni-adjusted pair-wise comparisons.

The group variable was treated as ordinal, and the linear relationship with FPE was examined using simple linear regression analysis and trend plots. To evaluate the impact of multiple independent variables on EF prediction, multiple linear regression analysis was carried out. The model included age, BMI, hypertension, DM, Benign Prostate Hypertrophy (BPH), Prostate Specific Antigen (PSA), smoking status, total testosterone, prolactin, fasting blood glucose (FBG), and FPE. Hypertension, DM, and BPH were coded as binary variables (0 = absent, 1 = present). Model significance was assessed using the F-test, while the significance of coefficients was examined with t-tests. The possibility of multicollinearity was evaluated using tolerance and VIF values. A p-value <0.05 was considered the threshold for statistical significance in all tests.

Results

In the comparison of demographic and clinical characteristics across erectile function groups, diabetes mellitus showed a strong association with ED severity, being most prevalent in men with severe dysfunction (62.5%) and least common in those with normal function (6.9%, $p < 0.001$) (Table 1).

Table1. Comparison of demographic and clinical characteristics by erectile function

Variable	Group 1	Group 2	Group 3	Group 4	Group 5	p-value
Age, median (Q1–Q3)	59.0 (51.5–61.5)	56.5 (52.0–60.0)	55.5 (50.5–60.0)	53.0 (51.0–57.0)	52.0 (50.0–58.0)	0.287¶
Hypertension, n (%)	11 (34.4)	8 (26.7)	6 (18.8)	3 (10.3)	3 (10.3)	0.083†
Diabetes Mellitus, n (%)	20 (62.5)	8 (26.7)	9 (28.1)	8 (27.6)	2(6.9)	<0.001†
Alcohol, n (%)	1 (3.1)	2 (6.7)	1 (3.1)	0 (0.0)	0 (0.0)	0.670‡
BMI, median (Q1–Q3)	29.0 (26.2–30.6)	28.5 (26.9–31.4)	29.2 (27.5–31.4)	27.6 (25.3–30.3)	28.4 (26.7–30.1)	0.472¶
BPH, n(%)	23 (71.9)	19 (63.3)	20 (62.5)	19 (65.5)	18 (62.1)	0.924†
Surgical History, n (%)	9 (28.1)	8(26.7)	4(12.5)	6 (20.7)	6(20.7)	0.585†
Smoking, n (%)	9 (28.1)	9(30.0)	6(18.8)	7 (24.1)	8(27.6)	0.863†
PSA, median (Q1-Q3)	1.23(0.54-2.47)	0.89(0.70-1.55)	0.99(0.49-3.68)	0.88(0.69-2.32)	1.03(0.70-1.61)	0.908¶
Total Testosterone, median (Q1-Q3)	432.50(318.50-524.50)	382.50 (285.00-495.00)	406.00 (312.00-506.50)	425.00(328.00-495.00)	417.00(379.00-450.00)	0.715¶
Prolactin, median (Q1-Q3)	9.93(7.64-12.20)	11.00(8.17-14.00)	11.30(9.00-14.12)	12.00(10.40-15.30)	11.00(9.84-12.20)	0.123¶
Fasting Blood Glucose, median (Q1-Q3)	125.00 (96.00-182.00)	100.50 (96.00-127.00)	102.00 (96.00-119.00)	100.00 (93.00-115.00)	98.00 (92.00-109.00)	0.044¶[a]

Values are presented as median (interquartile range: Q1–Q3) or number (percentage), as appropriate. † Pearson Chi-square test; ‡ Fisher's exact test; ¶ Kruskal–Wallis H test.[a] Pair-wise comparisons were performed after the Kruskal–Wallis H test using Bonferroni-adjusted significance values (1 > 2, 3, 4, 5).

Fasting blood glucose levels were also significantly higher in men with severe ED compared to those with better function (p = 0.044). Although hypertension tended to be more frequent in lower erectile function groups, this difference did not reach statistical significance (p = 0.083). Other variables, including age, BMI, smoking, alcohol

use, benign prostatic hypertrophy, surgical history, prostate-specific antigen, testosterone, and prolactin, did not differ significantly between groups.

The median FPE values were 194.5 (139.5–463.0) in Group 1, 216.0 (116.0–401.0) in Group 2, 317.5 (147.0–503.0) in Group 3, 424.0 (233.0–624.0) in Group 4, and 385.0 (287.0–466.0) in Group 5 (Figure 1). According to the Kruskal–Wallis H test, FPE values differed significantly across the five groups ($p = 0.048$). Unadjusted pairwise tests indicated nominal differences between Group 2 and Group 5 ($Z = -2.02$, $p = 0.044$), Group 2 and Group 4 ($Z = -2.49$, $p = 0.013$), and Group 1 and Group 4 ($Z = -2.31$, $p = 0.021$). Notably, none of these differences reached statistical significance following Bonferroni correction (all adjusted $p > 0.05$). Descriptive results suggested that mean ranks tended to increase from Group 1 (66.03) to Group 4 (92.09), with Group 5 (86.69) also showing relatively higher scores; nevertheless, these trends did not translate into statistically significant differences.

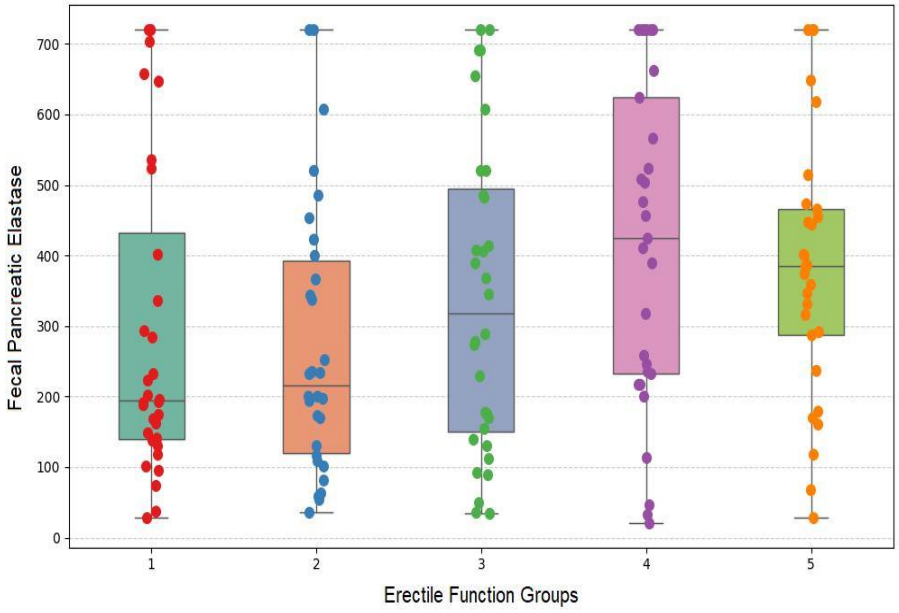
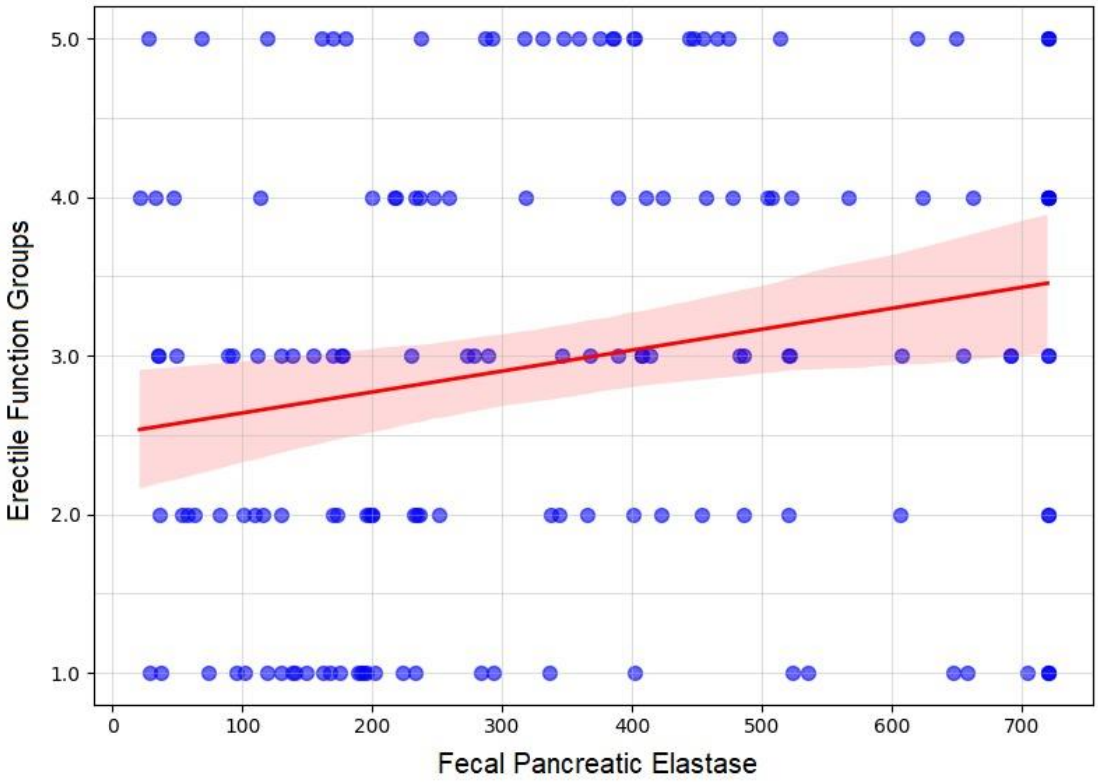


Figure 1. Comparison of fecal pancreatic elastase values between erectile function groups

Simple linear regression analysis demonstrated a modest but statistically significant positive association between fecal pancreatic elastase levels and erectile function groups ($y = 2.51 + 0.0013x$, $p = 0.0127$, $R^2 = 0.040$), indicating that higher elastase values were associated with better erectile function (Figure 2).



($y = 2.51 + 0.0013x$, $p = 0.0127$, $R^2 = 0.040$)

Figure 2. Regression analysis showing the effect of fecal pancreatic elastase values on erectile function groups 1–5

The results of the multiple linear regression analysis demonstrated that the model significantly predicted EF ($R^2 = 0.21$, $F = 3.43$, $p < 0.001$). Among the predictors, hypertension (B = –0.586, SE = 0.282, β = –.167, t = –2.08, p = .040, 95% CI [–1.144, –0.028]) and DM (B = –0.714, SE = 0.294, β = –.234, t = –2.43, p = .016, 95% CI [–1.295, –0.134]) were identified as significant negative predictors of EF. In contrast, FPE was a significant positive predictor of EF (B = 0.001, SE = 0.001, β = 0.184, t = 2.41, p = 0.017, 95% CI [0.000, 0.002]) (Table 2).

Table2. Predictors of erectile function

Variable	B	SE	Beta	t	p	95% CI
Age	-0.024	0.022	-0.110	-1.116	0.266	-0.067 to 0.019
BMI	0.014	0.032	0.035	0.428	0.669	-0.049 to 0.077
Hypertension	-0.586	0.282	-0.167	-2.077	0.040	-1.144 to -0.028
Diabetes Mellitus	-0.714	0.294	-0.234	-2.434	0.016	-1.295 to -0.134
Benign Prostate	0.369	0.297	0.125	1.242	0.216	-0.218 to 0.956
PSA	-0.189	0.251	-0.059	-0.752	0.453	-0.686 to 0.308
Smoking	-0.017	0.014	-0.096	-1.223	0.223	-0.043 to 0.010
Total Testosterone	0.000	0.001	-0.023	-0.295	0.768	-0.002 to 0.001
Prolactin	0.002	0.001	0.020	0.984	0.984	-0.004 to 0.004
Fasting Blood Glucose	-0.005	0.003	-0.136	-1.459	0.147	-0.011 to 0.002
Fecal Pancreatic	0.001	0.001	0.184	2.409	0.017	0.000 to 0.002

Multiple Linear Regression Analysis: $R^2 = 0.21$, $F = 3.43$, $p < 0.001$. CI = Confidence Interval. Hypertension, Diabetes Mellitus, and BPH were coded as binary variables (0 = absent, 1 = present).VIF values (1.04–1.70) indicated no evidence of multicollinearity in the model.

Discussion

This prospective study is, to our knowledge, one of the first to evaluate exocrine pancreatic function via FPE in men with ED. Our findings showed that although fecal elastase levels varied across erectile function groups, post-hoc comparisons revealed no statistically significant differences. Notably, regression analyses identified DM and hypertension as independent negative predictors of erectile function, whereas fecal elastase emerged as a positive predictor. These results highlight the complex interplay between metabolic comorbidities, pancreatic exocrine function, and male sexual health. In addition to diabetes and hypertension, other potential confounding factors such as hyperlipidemia, neurological and psychiatric conditions, medication use (e.g., antidepressants, antihypertensives), exercise habits, and nutritional status are also known to affect erectile function. These factors were not comprehensively assessed in the present study and may partly account for the observed variability in erectile function outcomes.

Although the role of the pancreas in sexual function has traditionally been overlooked, growing evidence suggests that digestive enzymes and gut–pancreas interactions may influence metabolic and vascular pathways relevant to ED.[14-16] Fecal elastase is a sensitive biomarker of EPI, with low levels reflecting impaired digestion

and nutrient absorption.7 Malnutrition and metabolic disturbances, in turn, can exacerbate vascular and hormonal mechanisms underlying ED. Our results support the hypothesis that preserved exocrine pancreatic function could contribute to better erectile function, even after adjusting for major comorbidities.

Consistent with prior studies, DM and hypertension were found to be strong independent risk factors for ED in this cohort. A meta-analysis by Corona et al. reported that diabetic men had nearly a threefold higher risk of ED compared to healthy controls.[17] Similarly, Turkish studies have shown increased ED prevalence among men with metabolic syndrome and type 2 DM.[18,19] Vascular endothelial dysfunction, neuropathy, oxidative stress, and chronic low-grade inflammation are the proposed mechanisms linking these metabolic disorders to ED. Our findings reaffirm these associations while also suggesting that pancreatic insufficiency may represent an additional metabolic contributor.

To date, very few studies have examined the direct relationship between fecal elastase and sexual dysfunction. Our findings, albeit with modest effect sizes, indicate a potential role of pancreatic exocrine function in the multifactorial etiology of ED. This aligns with emerging evidence that the gut microbiota and digestive enzymes may affect hormonal balance and endothelial health.[20-22] Incorporating fecal elastase assessment in selected ED patients, particularly those with diabetes or unexplained symptoms, may provide a non-invasive adjunct tool for risk stratification. Furthermore, studies focusing on pancreatic exocrine insufficiency and nutritional status in chronic disease10 and diabetes-related sexual dysfunction11 also support this hypothesis.

The clinical implications of this study are twofold. First, routine evaluation of pancreatic exocrine function could be considered in men with ED who also present with metabolic disorders, malnutrition, or gastrointestinal symptoms. Second, identifying subclinical EPI in such patients may open avenues for targeted interventions, including dietary modifications, enzyme replacement therapy, and microbiota-oriented strategies. Further multicenter studies with larger sample sizes are warranted to validate these findings and to explore whether treating EPI can improve sexual function outcomes. Notably, the lack of access to FPE testing in primary healthcare settings limits its integration into routine clinical practice. Broader access at the family medicine level could facilitate early diagnosis and management, thereby enhancing the translation of such research into clinical applications.

This study has several limitations. The single-center design and limited sample size reduce generalizability. The cross-sectional nature precludes causal inference. Fecal elastase, while a reliable marker, may be influenced by stool consistency and collection variability. Moreover, detailed dietary assessments, gastrointestinal symptom profiles, and advanced imaging markers of pancreatic function were not addressed. Future prospective longitudinal studies should include these factors and consider interventional designs.

Although the Turkish-validated International Index of Erectile Function-5 (IIEF-5) was used to assess ED, recommending FPE as a diagnostic test for clinical application based on a baseline questionnaire exceeds the scope of the present study. Therefore, it would be reasonable for future research to evaluate the predictive value of FPE in ED using objective measures such as Penile Color Doppler Ultrasonography and Night Penile Tumescence and Rigidity Assessment, in addition to validated ED scales. Furthermore, the mode of questionnaire administration (face-to-face interview vs. self-administration) may have influenced participants' responses and scale scores, introducing an additional source of variability.

Overall, this prospective study demonstrated that DM and hypertension were independent negative predictors of erectile function, while FPE emerged as a positive predictor, suggesting that exocrine pancreatic function could contribute to the multifactorial etiology of erectile dysfunction and deserves further investigation as a potential diagnostic and therapeutic target.

Conflict of Interest: The authors declare that they have no commercial or financial relationships that could be construed as conflicts of interest. No funding was received for the preparation of this study, and there are no competing interests among the authors.

Ethics Approval: This study was reviewed and approved by the Ethics Committee of SBU Bursa Yüksek İhtisas University (protocol number: 2024-TBEK 2025/06-16, date: June 4, 2025). All procedures were conducted in accordance with the ethical standards of the Declaration of Helsinki.

References

1. Feldman HA, Goldstein I, Hatzichristou DG, Krane RJ, McKinlay JB. Impotence and its medical and psychosocial correlates: results of the Massachusetts Male Aging Study. J Urol. 1994;151(1):54-61.
2. Akkus E, Kadioglu A, Esen A, Doran S, Ergen A, Anafarta K, et al. Prevalence and correlates of erectile dysfunction in Turkey: a population-based study. Eur Urol. 2002;41(3):298-304.
3. Bacon CG, Hu FB, Giovannucci E, Glasser DB, Mittleman MA, Rimm EB. Association of type and duration of diabetes with erectile dysfunction in a large cohort of men. Diabetes Care. 2002;25(8):1458-63.
4. Doumas M, Tsakiris A, Douma S, Gravas S, Papadopoulos A, Hatzichristou D. Factors affecting the increased prevalence of erectile dysfunction in Greek hypertensive compared with normotensive subjects. J Androl. 2006;27(3):469-77.
5. Khoo J, Piantadosi C, Duncan R, Worthley S, Jenkins A, Noakes M, et al. Comparing effects of a low-energy diet and a high-protein low-fat diet on sexual and endothelial function, urinary tract symptoms, and inflammation in obese diabetic men. J Sex Med. 2011;8(10):2868-75.
6. Moya A, Ferrer M, Zabala JL, Blas-García A, Esplugues JV. The role of gut microbiota in the development and progression of erectile dysfunction. Int J Mol Sci. 2020;21(19):7069.
7. Loser C, Mollgaard A, Folsch UR. Faecalelastase 1: a novel, highly sensitive, and specific tubeless pancreatic function test. Gut. 1996;39(4):580-6.
8. Yaman O, Soygur T, Zumrutbas AE, Ciftci H, Anafarta K. Erectile dysfunction in men with metabolic syndrome. Int J Impot Res. 2006;18(4):368-74.
9. Demir O, Akgul K, Akar Z, Ciftci H, Yazici C, Kanbay A, et al. Association between severity of erectile dysfunction and left ventricular diastolic dysfunction in men with type 2 diabetes. Urology. 2008;72(1):97-101.
10. Madeddu C, Gramignano G, Floris C, Massa E, Astara G, Cherchi MC, et al. Pancreatic exocrine insufficiency and nutritional status in advanced cancer patients. Support Care Cancer. 2011;19(9):1521–1525.
11. Maiorino MI, Bellastella G, Esposito K. Diabetes and sexual dysfunction: current perspectives. Diabetes MetabSyndrObes. 2014;7:95–105.
12. Rosen RC, Cappelleri JC, Smith MD, Lipsky J, Peña BM. Development and evaluation of an abridged, 5-item version of the International Index of Erectile Function (IIEF-5) as a diagnostic tool for erectile dysfunction. Int J Impot Res. 1999;11(6):319-26.
13. Lankisch PG, Schmidt I, König H, Lehnick D, Knollmann R, Löhr M, et al. Faecalelastase 1: not helpful in diagnosing chronic pancreatitis associated with mild to moderate exocrine pancreatic insufficiency. Gut. 1998;42(4):551-4.

14. Keller J, Layer P. Human pancreatic exocrine response to nutrients in health and disease. Gut. 2005;54Suppl 6:vi1-28.
15. Domínguez-Muñoz JE. Pancreatic enzyme therapy for pancreatic exocrine insufficiency. CurrGastroenterol Rep. 2007;9(2):116-22.
16. Witt H, Apte MV, Keim V, Wilson JS. Chronic pancreatitis: challenges and advances in pathogenesis, genetics, diagnosis, and therapy. Gastroenterology. 2007;132(4):1557-73.
17. Corona G, Mannucci E, Schulman C, Petrone L, Mansani R, Cilotti A, et al. Psychobiological correlates of hypoactive sexual desire in patients with erectile dysfunction. Int J Impot Res. 2004;16(4):275-81.
18. Esposito K, Giugliano D. Obesity, the metabolic syndrome, and sexual dysfunction. Int J Impot Res. 2005;17(5):391-8.
19. Bal K, Özkara A, Sönmez Y, Can E, Yılmaz H, Bozkurt A, et al. Prevalence of metabolic syndrome and its association with erectile dysfunction among urology patients. Int J Impot Res. 2007;19(3):358-63.
20. Khoo J, Tian HH, Tan B, Chew K, Ng CS, Leong D, et al. Erectile dysfunction and hypogonadism in patients with obstructive sleep apnea: efficacy of continuous positive airway pressure. Int J Impot Res. 2010;22(1):38-43.
21. Turnbaugh PJ, Ley RE, Mahowald MA, Magrini V, Mardis ER, Gordon JI. An obesity-associated gut microbiome with increased capacity for energy harvest. Nature. 2006;444(7122):1027-31.
22. Dinan TG, Cryan JF. The impact of gut microbiota on brain and behavior: implications for psychiatry. CurrOpinClinNutrMetab Care. 2015;18(6):552-8.

ANKARA MEDICAL JOURNAL

Case Report

Ankara Med J, 2025;(3):380-385 // 10.5505/amj.2025.34976

RAPID WEIGHT GAIN FOLLOWING CEFTRIAXONE TREATMENT IN A SEVERELY MALNOURISHED INFANT WITH INFECTION

Angelica Diana Vita[1], Rizki Saputra[1], Mario Bernardinus Realino Nara[1]

[1]RS Umum St Gabriel Kewapante, Sikka, East Nusa Tenggara, Indonesia

Correspondence:

Angelica Diana Vita (e-mail: angelicadiana777@gmail.com)

Submitted: 24.06.2025 // Accepted: 11.08.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine

Department of Family Medicine

ANKARA MEDICAL JOURNAL

Abstract

Severe acute malnutrition (SAM) is a leading cause of child mortality, particularly in low- and middle-income regions such as Nusa Tenggara Timur (NTT), Indonesia, where prevalence and poverty rates remain high. SAM weakens the immune system and increases vulnerability to infections such as pneumonia and sepsis, forming a vicious cycle between malnutrition and disease. Effective management requires early identification and integrated treatment strategies addressing both nutritional and infectious components. This case report presents a severely malnourished infant from a rural area of NTT who developed bronchopneumonia and sepsis but exhibited unexpected early weight gain following a five-day course of ceftriaxone. The rapid clinical improvement suggests a possible role of short-term antibiotic therapy not only in controlling infection but also in enhancing early nutritional recovery. Few cases in the literature have documented such substantial early weight gain in a severely malnourished infant following antibiotic treatment alone. This observation offers a novel clinical insight into the potential metabolic benefits of infection control during the acute phase of SAM and highlights the need for further research into the broader impact of antimicrobial therapy on nutritional outcomes.

Keywords: Malnutrition, ceftriaxone, child, rural health, case report.

Introduction

Severely wasted children face a 12-fold higher risk of death compared to their well-nourished peers. Early detection and appropriate management are essential to improve outcomes.[1] Given the high burden of infections among children with severe acute malnutrition (SAM), prompt treatment of bacterial infections with appropriate antibiotics not only enhances the nutritional response to feeding but also prevents septic complications and reduces mortality. The World Health Organisation (WHO) recommends a range of antibiotic options for complicated SAM, including ampicillin/amoxicillin, gentamicin, and third-generation cephalosporins.[2] This case report highlights the use of a five-day course of ceftriaxone, selected for its broad-spectrum coverage, consideration of local resistance patterns, and the severity of the infection. The observed rapid weight gain suggests a potential role of antibiotics in short-term nutritional recovery, beyond their function in infection control.

Case Report

A 14-month-old male child from Sukun Island, Sikka Regency, Indonesia, weighing 6 kg, presented with a one-week history of intermittent fever, cough, and rhinorrhea. Parents reported poor appetite, but denied dyspnoea, vomiting, or diarrhoea. His weight had plateaued since October 2024. He had a previous episode of cough and cold at 6 months of age, which resolved without complications, based on parental reports. No known household contacts were undergoing tuberculosis (TB) treatment, although the paternal grandmother had a chronic cough. Immunization history was complete up to 9 months only. He was born at term, with a birth weight of 2720 g, length of 51 cm, and head circumference of 34 cm. Nutritional intake currently consists of family foods, though in the past few days, the child has only been consuming porridge. On presentation, his length was 67 cm and weight 6.0 kg, placing him below the 1st percentile for both parameters. The weight-for-age Z-score was <-3 SD, consistent with severe underweight, while the weight-for-length Z-score was approximately -3.5 SD, classifying him as having severe acute malnutrition (SAM). The mid-upper arm circumference was 105 mm, also meeting WHO criteria for SAM.

On admission, he was afebrile, with a temperature of 37.9°C, heart rate of 76 bpm, respiratory rate of 26 breaths per minute, and an oxygen saturation of 95% on room air. Peripheral perfusion was adequate, with a capillary refill time of 2 seconds. The abdomen appeared distended (Figure 1). Pulmonary examination revealed bilateral coarse rhonchi. The data supported the diagnosis of SAM, also known as severe wasting.

Figure 1. Patient's clinical manifestation

Laboratory results showed severe anaemia (haemoglobin 2.7g/dL) and leucocytosis (white cell count 46,800/µL). Blood glucose was within normal limits. Peripheral blood smear confirmed microcytic hypochromic anaemia with leucocytosis. Chest x-ray was suggestive of bronchopneumonia. Serum albumin was not assessed due to limited laboratory availability.

The patient underwent three days of stabilization therapy, including F-75 followed by F-100, intravenous fluids, and third-generation cephalosporin antibiotics (ceftriaxone) from Day 1 to Day 5. A transfusion protocol was initiated (3×60ml packed red blood cell transfusion). During hospitalization, the patient's weight progressively increased from 6kg to 7kg by the sixth day and further to 7.5kg by Day 9, demonstrating a rapid improvement in nutritional status following therapy (Table 1 and Figure 2).

Table 1. Anthropometry pre-treatment and post-treatment

Parameter	Pre-therapy (day 0)	Post-therapy (day 9)	WHO classification
Weight (kg)	6.0	7.5	Weight-for-age Z-score <-3SD (Severely underweight)
Length (cm)	67	67	Within normal limits
Weight-for-length Z-score	<-3SD	Between -1 and 0 SD	<-3SD classified as severe acute malnutrition (SAM)
Abdominal circumference (cm)	39	39	(-)
Upper arm circumference (mm)	105	110	<155 mm classified as SAM

ANKARA MEDICAL JOURNAL

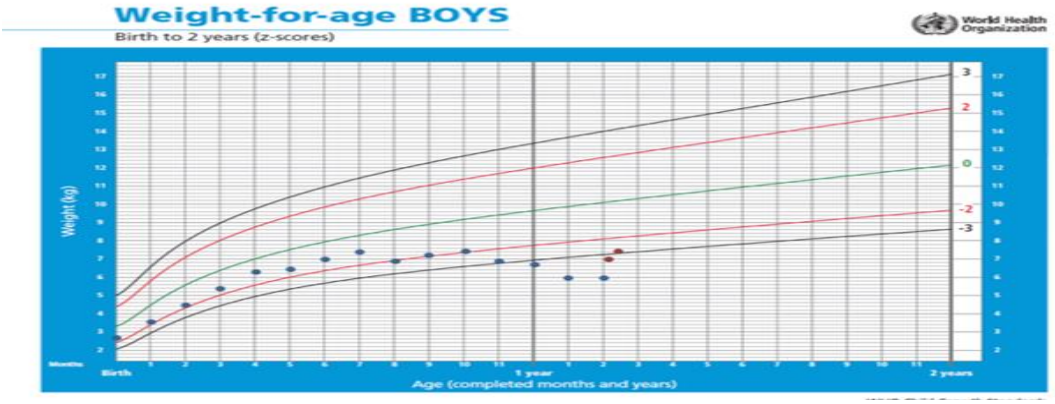


Figure 2. Nutritional status (weight/age)

Table 2. Laboratory findings pre-treatment and post-treatment

Parameter	Pre-therapy (day 0)	Post-therapy (day 9)	Normal Value
Haemoglobin	2.7 g/dL	15.3 g/dL	14-16 g/dL
Haematocrit (Hct)	8.5%	44.1%	45-47%
Leucocyte count	46,800/µL	10,000/µL	4,700-11,000/µL
Erythrocyte count	1.57 million/µL	5.69 million/µL	4.33-5.95 million/µL
Thrombocyte count	243,000/µL	631,000/µL	150,000-400,000/µL

Discussion

This patient came from Sukun Island, which lacks healthcare facilities. Wasting, or acute malnutrition, is a major predictor of child mortality, particularly in severe cases (weight-for-height Z-score <-3 SD or MUAC <115 mm). It reflects a critical loss of body reserves and immune function, increasing susceptibility to infections and reducing the body's ability to recover. These infections—such as bronchopneumonia—further suppressed appetite, increased metabolic demands, and led to nutrient loss, perpetuating a cycle of worsening malnutrition. This vicious cycle highlights the complex interplay between infection and malnutrition.[3]

A five-day course of ceftriaxone was selected for this patient due to the severity of infection and local resistance patterns. Ceftriaxone was chosen for its broad-spectrum activity, effectiveness in short treatment courses, and wide therapeutic index, which enhances both its safety and efficacy. Following ceftriaxone administration, the patient showed significant clinical improvement, including resolution of bronchopneumonia, reduced leucocytosis, and an increase in weight from 6.0 kg (<-3 SD) to 7.5 kg (between -2 and -3 SD) within nine days of treatment. This aligns with research highlighting the importance of antibiotic treatment, particularly amoxicillin, as a predictor of recovery in SAM. Yadeta SK, *et al* found that amoxicillin administration significantly improved recovery rates in eastern Ethiopia, while similar findings were reported by Mamo WN,

et al Fikrie A, *et al* reported a mean weight gain rate of 12.7 ± 8.9g/kg/day, with an overall recovery incidence density rate of 3.8 per 100 person-days and a median recovery time of 17 (IQR: 10–24) days.[4–6]

While WHO protocols for complicated SAM typically recommend a combination of ampicillin or amoxicillin with gentamicin, recent evidence suggests that third-generation cephalosporins may offer comparable outcomes. A meta-analysis summarized by Williams and Berkley (2016), which included 2,767 children with varying degrees of malnutrition from sub-Saharan Africa and Turkey, reported that ceftriaxone, gentamicin, and amoxicillin–gentamicin regimens had the highest bacterial susceptibility rates (>80%) based on blood, urine, and CSF cultures. In contrast, susceptibility was lower for amoxicillin–clavulanate (30.7%) and chloramphenicol (73.7%). An observational study in Niger examined 311 children with complicated SAM and stated that ceftriaxone has shown promising susceptibility data (median 84%, IQR 80–94%) and should be considered in future clinical trials for complicated SAM. [2,7,8]

Additionally, a 2012 randomized controlled trial by Zaidi AKM, *et al* in Pakistan evaluated ceftriaxone versus penicillin–gentamicin in young infants with signs of severe bacterial infection. The study found no significant difference in treatment failure rates between the two regimens, indicating that ceftriaxone may be a feasible alternative in community-based settings. In Indonesia, a 2018 study compared the effectiveness of ampicillin–gentamicin versus third-generation cephalosporins in 77 paediatric patients with community-acquired pneumonia and found no significant difference in rehospitalization rates across mild, moderate, and severe cases.[9,10] Williams PCM *et al*, referencing prior research including data from Sudan, conducted a comparative study on amoxicillin versus ceftriaxone in uncomplicated SAM and found similar outcomes; the ceftriaxone group showed slightly higher weight gain (55.7% vs. 53.5%, difference 2.2%) and recovery rate (74.6% vs. 70.0%, difference 4.6%) than the amoxicillin group, although these differences were not statistically significant.[2]

As this report involves a single patient, the findings are not generalizable. Treatment response may vary depending on local resistance patterns, infection severity, and nutritional status. Nevertheless, this case is noteworthy due to the rapid and substantial weight gain observed in a severely malnourished infant following a short course of ceftriaxone—a finding not commonly reported in similar contexts. This unexpected response raises questions about the broader metabolic or microbiome-related benefits of ceftriaxone in malnourished populations, particularly in remote areas with limited resources. Further research is needed to explore how different antibiotic regimens influence gut microbiota, nutrient absorption, and overall clinical outcomes in malnourished children.

Ethical Considerations: Informed consent has been obtained from the parents of the patient.

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

References

1. Mutunga M, Frison S, Rava M, Bahwere P. The forgotten agenda of wasting in Southeast Asia: Burden, determinants and overlap with stunting: A review of nationally representative cross-sectional demographic and health surveys in six countries. Nutrients. 2020;12(2).
2. Williams PCM, Berkley JA. Guidelines for the treatment of severe acute malnutrition: a systematic review of the evidence for antimicrobial therapy. Paediatr Int Child Health. 2018;38:S32–49.
3. 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.
4. Yadeta SK, Tadesse T, Negese T, Haile B, Kebede A, Motuma A, et al. Predictors of time to recovery from uncomplicated severe acute malnutrition among children in eastern Ethiopia. Frontiers in nutrition. 2024;11.
5. Mamo WN, Derso T, Gelaye KA, Akalu TY. Time to recovery and determinants of severe acute malnutrition among 6-59 months children treated at outpatient therapeutic programme in North Gondar zone, Northwest Ethiopia: A prospective follow up study. Italian Journal of Pediatrics. 2019 Nov 4;45(1):1–8.
6. Fikrie A, Alemayehu A, Gebremedhin S. Treatment outcomes and factors affecting time-to-recovery from severe acute malnutrition in 6-59 months old children admitted to a stabilization center in Southern Ethiopia: A retrospective cohort study. Italian journal of pediatrics. 2019 Apr 11;45(1).
7. Francis F, Robertson RC, Bwakura-Dangarembizi M, Prendergast AJ, Manges AR. Antibiotic use and resistance in children with severe acute malnutrition and human immunodeficiency virus infection. Int J Antimicrob Agents. 2023 Jan 1;61(1):106690.
8. Williams PC, Berkley JA. SEVERE ACUTE MALNUTRITION UPDATE: CURRENT WHO GUIDELINES AND THE WHO ESSENTIAL MEDICINE LIST FOR CHILDREN. 2016.
9. Zaidi AKM, Tikmani SS, Warraich HJ, Darmstadt GL, Bhutta ZA, Sultana S, et al. Community-based treatment of serious bacterial infections in newborns and young infants: A randomized controlled trial assessing three antibiotic regimens. Pediatric Infectious Disease Journal. 2012 Jul;31(7):667–72.
10. Farida Y, Sari NN, Niruri R. Comparative effectiveness of empiric antibiotics in pediatric community acquired pneumonia patient. International Conference on Pharmaceutical Research and Practice. 2018;186–91.

ANKARA MEDICAL JOURNAL

Case Report

Ankara Med J, 2025;(3):386-390 // 10.5505/amj.2025.56056

NON-HODGKIN'S LYMPHOMA DIAGNOSED IN THE PUERPERIUM: A CASE REPORT

Deniz Taşkıran[1], Belemir Ceylan[1], Hasan Mucahit Ozbas[2]

[1]Department of Obstetrics and Gynaecology, Giresun University Faculty of Medicine, Giresun, Türkiye

[2]Department of Hematology, Giresun University Faculty of Medicine, Giresun, Türkiye

Correspondence:
Deniz Taşkıran (e-mail: deniztaskiran93@gmail.com)

Submitted: 09.05.2025// Accepted: 24.06.2025

Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

Abstract

A 28-year-old primigravida presented in the third trimester with a sore throat and cervical swelling. She was initially treated for an upper respiratory tract infection. At 41 weeks, she delivered vaginally due to oligohydramnios. Her symptoms progressed during the puerperium, and imaging revealed cervical lymphadenopathy. Biopsy confirmed diffuse large B-cell lymphoma (non-germinal center phenotype). Chemotherapy was initiated, and clinical follow-up is ongoing. Immunologic changes during pregnancy may increase susceptibility to lymphoproliferative disorders, particularly Hodgkin lymphoma. However, the diagnosis of non-Hodgkin lymphoma (NHL) during pregnancy or the postpartum period is exceedingly rare and often delayed. Case reports remain valuable in increasing clinical vigilance and improving early detection. A comprehensive systemic evaluation is warranted in pregnant or postpartum patients presenting with persistent lymphadenopathy. Lymphoma should be considered in the differential diagnosis of cervical and submandibular masses during this period. Early recognition and treatment of NHL in pregnancy can significantly reduce maternal morbidity and mortality.

Keywords: Puerperium, non-Hodgkin lymphoma, pregnancy.

ANKARA MEDICAL JOURNAL

Introduction

Lymphoma comprises a group of malignant neoplasms originating from lymphocytes and is broadly classified as Hodgkin lymphoma (HL) or non-Hodgkin lymphoma (NHL). HL is the most frequently encountered type during pregnancy, although its etiology remains poorly understood. [1]

NHL is a rare entity in pregnancy and is the third most common neoplasm in the head and neck region. Several classification systems exist, with the World Health Organization (WHO) system being the most widely used.[2] NHL may present in nodal or extranodal locations, with extranodal involvement seen in approximately 25% of cases.[3] B-cell lymphomas account for 85% of NHLs, with diffuse large B-cell lymphoma (DLBCL) representing the most prevalent and aggressive subtype. [4]

Risk factors for NHL include Epstein-Barr virus infection, HIV/AIDS, organ transplantation, autoimmune diseases, and chronic inflammation.[5] Pregnancy-associated immunemodulation may also contribute to the pathogenesis or progression of lymphoma. Notably, 90% of NHLs diagnosed in pregnancy are already advanced-stage at presentation. Treatment typically involves chemotherapy and/or radiotherapy, though cytotoxic agents pose teratogenic risks, particularly during the first trimester. [6]

Multidisciplinary management involving hematology, oncology, obstetrics, and neonatology is essential for optimizing maternal and fetal outcomes.

Case Report

A 28-year-old primigravida at 37 weeks and 5 days of gestation presented to the otorhinolaryngology department with complaints of a sore throat, dysphagia, and right-sided cervical swelling. Clinical evaluation revealed right cervical lymphadenopathy and tonsillitis, with normal bilateral otoscopic findings. She was prescribed ampicillin for a presumed upper respiratory tract infection. Despite treatment, symptoms persisted, and further antibiotics were prescribed over the following three weeks.

At 41 weeks of gestation, she underwent labor induction for oligohydramnios and delivered a healthy female neonate weighing 3320 grams, with Apgar scores of 9 and 10 at one and five minutes, respectively. Postpartum vitals were stable, and she was discharged 24 hours later without any ongoing complaints.

The patient re-presented post-discharge with persistent neck swelling. Neck ultrasonography showed a 35×18 mm lymphadenopathy in the right cervical and jugular chains near the submandibular gland, featuring a fatty hilum, thickened cortex, lobulated borders, and minimal vascularity. Contrast-enhanced diffusion-weighted

MRI demonstrated a 25×27×45 mm mass with necrotic features, diffusion restriction, and heterogeneous contrast enhancement extending from the right Rosenmüller fossa to the piriform sinus. An additional 26×18×32 mm lymph node at level 2A exhibited similar features. Lymphoproliferative malignancies, particularly lymphoma, were considered.

A Tru-Cut biopsy was performed on the suspicious lymph node three days later. Histopathology confirmed diffuse large B-cell lymphoma, non-germinal center subtype, with immunohistochemical staining positive for CD79a, MUM1, PAX8, and c-Myc (5%). Negative markers included CD3, CD20, CD23, BCL2, BCL6, CD10, CD138, and ALK. The Ki-67 proliferation index was markedly elevated at 95%.

Chemotherapy with R-CHOP (rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisolone) was initiated under the care of the medical oncology team, with plans for six cycles. Follow-up and treatment are ongoing. No problems were detected in newborn follow-ups. The patient who started chemotherapy was advised not to breastfeed the baby.

Written and verbal consent was obtained from the patient for the presented case.

Discussion

The literature on pregnancy-associated NHL is limited to case reports and small series, complicating efforts to characterize the disease's course.[7] NHL during pregnancy is associated with poor obstetric outcomes, likely due to diagnostic delays caused by physiological immunosuppression and symptom overlap with benign conditions.

In this case, the initial presentation mimicked an upper respiratory tract infection. Antibiotic therapy delayed further investigation, and a definitive diagnosis was made on postpartum day 20. A review of five pregnancy-associated NHL cases between 2010 and 2022 found a diagnostic delay ranging from 15 to 188 days, with a mean of 30 days. [8]

Diagnosis during pregnancy is challenging, particularly in the absence of systemic symptoms. Imaging with ultrasonography and MRI is preferred due to safety profiles. PET-CT, while highly sensitive, is contraindicated in pregnancy due to fetal radiation exposure and is generally reserved for the postpartum period. Biopsy remains the gold standard and is considered safe during pregnancy. The R-CHOP regimen can be administered during the second and third trimesters but should be avoided in the first trimester due to teratogenicity. Radiotherapy is typically deferred until postpartum unless surgically required for life-threatening complications, in which case fetal shielding is critical.

Among 80 patients with B-cell NHL diagnosed between 1986 and 2019, 57 (71%) had DLBCL, with chemotherapy initiated in 68% of cases.[9] Rituximab plays a key role in treatment but carries risks of neonatal B-cell depletion, rendering its use in pregnancy controversial.

Prognosis has improved with timely diagnosis and appropriate management, with a five-year progression-free survival rate of approximately 75%. A meta-analysis revealed a 6-month maternal survival rate of 53%, with treatment administered antepartum or postpartum in 45% of cases each.[10]

Effective management requires multidisciplinary coordination to ensure both maternal and fetal safety and optimize therapeutic outcomes.

Pregnancy can obscure and delay the diagnosis and treatment of NHL. Systemic evaluation should be conducted in pregnant and postpartum women presenting with persistent cervical swelling or constitutional symptoms. Persistent lymphadenopathy warrants consideration of lymphoma in the differential diagnosis. Early diagnosis and a multidisciplinary management approach are vital to improving maternal and fetal outcomes and reducing morbidity and mortality.

Ethical Considerations: Consent was obtained from the patient for the case report.

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

References

1. Macfarlane GJ, Evstifeeva T, Boyle P. International pat-terns in the ocuurence of Hodgkin's disease in children and young adult males. Int J Cancer. 1995;61:165-9.
2. Singh R, Shaik S, Negi BS, Rajguru JP, Patil PB, Parihar AS, Sharma U. Non-Hodgkin's lymphoma: a review. Journal of family medicine and primarycare. 2020; 9(4):1834-40.
3. Bowzyk Al-Naeeb A, Ajithkumar T, Behan S, Hodson DJ. Non-Hodgkin lymphoma. BMJ. 2018;362:k3204.
4. Mezger NC, Feuchtner J, Griesel M, Hämmerl L, Seraphin TP, Zietsman A, Kantelhardt EJ. Clinical presentation and diagnosis of adult patients with non-Hodgkin lymphoma in sub-Saharan Africa. British journal of haematology. 2020; 190(2): 209- 21.
5. Meena JP, Gupta AK, Parihar M, Seth R. Clinical profile andoutcomes of non-Hodgkin's lymphoma in children: A reportfrom a tertiary care hospital from India. Indian J Med PaediatrOncol. 2019; 40:41–7.
6. Zayac AS, Egini O, Palmisiano ND, Evens AM. Lymphoma and leukemia occurring during pregnancy. In Seminars in Perinatology. 2025; 49(2): 152041.
7. Horowitz NA, Benyamini N, Wohlfart K, Brenner B, Avivi I. Reproductive organ involvement in non-Hodgkin lymphoma during pregnancy: a systematic review. The Lancet Oncology. 2013;14(7), e275-82.
8. Liu H, Dai YM. Clinicalanalysis of 7 cases of pregnancy with non-Hodgkin lymphoma. Zhonghua fu chan ke zazhi. 2023; 58(3), 207-12.
9. Maggen C, Dierickx D, Cardonick E, MhallemGziri M., Cabrera-Garcia A., Shmakov RG. International Network on Cancer Infertility Pregnancy (INCIP). Maternaland neonatal outcomes in 80 patients diagnosed with non-Hodgkin lymphoma during pregnancy: results from the International Network of Cancer, Infertility and Pregnancy. British journal of haematology. 2021; 193(1), 52-62.
10. Horowitz NA., Benyamini N, Wohlfart K, Brenner B, Avivi I. Reproductive organ involvement in non-Hodgkin lymphoma during pregnancy: a systematic review. *The Lancet Oncology*. 2013;14(7), e275-82.