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Dear Readers,

We are delighted to be with you in the final issue of 2024. In this issue, we are pleased to share eight studies with you, including five original research articles, two case reports, and a letter to the editor. Some of these contributions come from outside our country. With this issue, our journal will have completed its seventh year of publication. Over the past seven years, a total of 602 manuscripts from various countries have been submitted to our journal, demonstrating its growing recognition on an international platform. Additionally, our journal has seen a significant rise in ranking within SCOPUS, one of the most prestigious indexes. While it ranked 39th among journals in its field last year, it has climbed to the 22nd position this year.

Among the studies we are presenting in this issue, two are related to healthcare utilization. Ural and colleagues evaluate the impact of referring dermatology patients to appropriate healthcare centers on healthcare expenditure. In another study, Gökçeoğlu and colleagues examine the extent of unnecessary visits to public hospitals and the factors associated with these visits. Vaccine hesitancy, with its increasing prevalence and adverse effects on health, continues to hold a prominent place on our agenda. Keser and colleagues emphasize in their study that vaccine hesitancy is influenced by internet-based information and environmental interactions. Another study in this issue focuses on elderly health and the long-term use of inhaled corticosteroids.

I would like to extend my gratitude to all authors, reviewers, and editorial team members who contributed to this issue.

Looking forward to meeting you again in spring.

M. Reşat DABAK, M.D., Prof.

Editor-in-Chief

ANATOL J FAMILY MED
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Original Article

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Follow-up Status of Patients Referring to Secondary and Tertiary Hospitals in Family Health Centers

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ABSTRACT

Objectives: This study aimed to evaluate the frequency of patients' preference for other health care services instead of receiving health care services from Family Health Center (FHC) and the factors affecting this preference.

Methods: The cross-sectional study involving 1217 patients was conducted between 12 and 22, December 2023. Among the patients who applied to the outpatient clinic, all patients who agreed to participate in the study were included in the study without skipping a line. Thus, the sample group was randomly selected. Data were collected using a structured information form. Face-to-face interviews were conducted with the patients in the study.

Results: The study included 1217 patients who were admitted to the hospital for outpatient treatment, and 729 (59.9%) of the patients were treated in hospitals despite being eligible for diagnosis and treatment at the FHC. When the factors determining the tendency to seek care in FHC were evaluated, being 18 years of age or older 2.133 times (CI: 1.518–2.997; p<0.001), being literate or more educated 2.410 times (CI: 1.713–3.391; p<0.001), having income equal to or more than expenses 2.418 times (CI: 1.712–3.415; p<0.001), having a large family type 418 times (CI: 1. 712–3.415; p<0.001), having a large family type 1.954 times (CI: 1.309–2.917; p=0.001), being satisfied with the FHC 1.515 times (CI: 1.058–2.170; p=0.023), having a complaint duration of 8–90 days 2.368 times (CI: 1.465–3.828; p<0.001) have an effect.

Conclusion: In this study, 59.9% of hospital admissions were found to be unnecessary admissions, suggesting that primary health care services are not used effectively.

Keywords: Health care system, outpatient health services, primary healthcare, public hospitals, referral

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INTRODUCTION

Healthy societies and nations are built upon healthcare systems that prioritize preventive healthcare services as much as curative ones.[1] Following the Alma Ata Declaration, the significance of primary healthcare services has been widely acknowledged, leading to global efforts to enhance such services.[1,2] In Türkiye, the Health Transformation Policy implemented in 2003 introduced substantial reforms in healthcare service delivery. With this transformation, the goal was to elevate primary healthcare practices and service providers. In the new era of healthcare, the Family Medicine model was developed to ensure more accessible and effective primary care.[1,3] According to this model, healthcare services should initiate at the primary care level and progress, as needed, with patients being referred by their family physicians to secondary and tertiary healthcare facilities. Disruption in this healthcare delivery system results in chaos, where the family medicine system fails, and hospitals become overwhelmed. Delivering healthcare services that should be provided in Family Health Centers (FHC) in secondary and tertiary healthcare facilities is a situation that rapidly depletes the country's financial resources

and negatively affects the continuity of service. The absence of an active referral system in Türkiye undermines the integrity of the healthcare system, leading to the misuse of hospitals and the provision of substandard healthcare services.[4-6]

In fact, in 2022, 39.9% of all physician visits in Türkiye were made to primary care and 60.1% to secondary and tertiary healthcare institutions.[7] While the number of physician visits per person was 3.1 in 2002, it increased to 10 in 2022. In the Southeastern Anatolia region, the average number of physician visits per person was 2.3 in 2002 and reached 9 in 2022; only 3.5 of these were made to primary care institutions. Although the Health Transformation Policy increased access to healthcare services and usage levels, it could not provide the expected improvement in the level of preference for primary care institutions.

This study aimed to evaluate the frequency of patients' preference for secondary and tertiary health care services instead of receiving health care services from FHC and the factors affecting this preference.

METHOD

The cross-sectional study was conducted in three public hospitals (Health Science University Mehmet Akif İnan Training and Research Hospital, Şanlıurfa Training and Research Hospital and Balıklıgöl State Hospital) located in the provincial center of Şanlıurfa between 12 and 22, December 2023. This research was conducted in a Şanlıurfa city where the fertility rate and child population are highest and the socioeconomic level is quite low. Centers with the potential to represent the average health service use of the city were chosen for the study.[8]

The population of the study consisted of patients who were examined in pediatrics, internal medicine, child and adolescent mental health, physical therapy and rehabilitation, neurology, cardiology, chest, infectious diseases, ear nose and throat, gynecology, and obstetrics outpatient clinics. Departments where polyclinic applications are intense, where patients followed up in FHCs apply, and where there have been problems in finding an appointment for examination in the recent period, were selected. Patients referred to subspecialty clinics for preoperative evaluation and consultation were excluded in the study.

No sample selection was made, and every patient who agreed to participate in the study among the patients applying to the outpatient clinics was included in the study without skipping a turn. Thus, the sample was randomly selected. It was aimed to reach the entire universe and 1217 patients were studied.

A polyclinic was selected from each department so as not to disrupt the hospital's operations. All patients who accepted to participate in the study from among the patients who applied to the selected polyclinics were included in the study without skipping a turn. During data collection, help was received from the parent/patient's relative for patients under the age of 18 and for patients who could not be contacted one-to-one. A structured information form consisting of 19 questions was used in the study. Data was collected using the face-to-face interview technique. The information form questioned the patients' socio-demographic characteristics, health service usage preferences, and the physician's opinion on the current application. The form consists of two parts, the sections to be answered by the patients and the physician. The patient-related section of the survey was filled out by the hospital's Information Technology (IT) personnel during face-to-face interviews with the patients; the physician-related section was filled out by the physician at the end of the patient's examination. The average data collection time for each patient was six minutes. Interpreter support was provided for patients who did not speak Turkish. The IT personnel and physicians who worked in data collection were informed about the survey before the research. In the information form, the physician was asked which health institution the patient should apply to with his/her current complaint and preliminary diagnosis. In line with the answer, unnecessary outpatient clinic application status was determined.

The dependent variable of the study is the situation of thinking that FHCs should be preferred with current complaints. Independent variables are age, gender, education level, income level, employment status, family type, presence of chronic diseases, number of days of complaints, and satisfaction level with FHCs.

Analysis was conducted using SPSS 25.0 statistical software. Descriptive statistics (frequency, percentage), Continuity Correction Chi-square (gender, employment status, chronic illness status), and Pearson Chi-square (age groups, educational status, income level, family type, satisfaction with FHCs, complaint duration) tests were used for data analysis. Multiple Logistic Regression analysis was performed for variables found to be significant in univariate analysis. Statistical significance was accepted as $p<0.05$.

RESULTS

The study was conducted with 1217 patients who applied to the hospital for outpatient treatment. The sociodemographic characteristics of the patients are summarized in Table 1.

Table 1. The sociodemographic characteristics of the patients

	n (%)
Age groups	
0–17 years	457 (37.6)
18–24 years	169 (13.9)
25–64 years	554 (45.5)
65 years and above	37 (3.0)
Gender	
Female	730 (60.0)
Male	487 (40.0)
Educational status	
Does not speak Turkish	41 (3.4)
Illiterate	257 (21.1)
Literate	105 (8.6)
Primary school	174 (14.3)
Middle school	212 (17.4)
High school	237 (19.5)
University and above	191 (15.7)
Employment status	
Yes	329 (27.0)
No	888 (73.0)
Occupations of workers	
Civil servant	122 (37.1)
Worker	106 (32.2)
Tradesmen	50 (15.2)
Farmer	51 (15.5)
Income level	
Less than expenses	621 (51.0)
Equal to expenses	524 (43.1)
More than expenses	72 (5.9)
Family type	
Nuclear	862 (70.8)
Extended	355 (29.2)
Chronic illness	
Yes	170 (14.0)
No	1047 (86.0)
Comorbidities*	
Diabetes/HT/Cholesterol	74 (43.5)
Asthma/COPD/Chronic bronchitis	48 (28.2)
Chronic hepatitis	20 (11.8)
Cardiac disease	7 (4.1)
MS/Epilepsy/Migraine	7 (4.1)
OCD/SCH/Bipolar/ADHD	6 (3.5)
Allergy	3 (1.8)
Rheumatic disease	3 (1.8)
Chronic intestinal disease	2 (1.2)

*Among those with chronic illnesses.

ADHD: Attention deficit hyperactivity disorder; COPD: Chronic obstructive pulmonary disease; HT: Hypertension; MS: Multiple sclerosis; OCD: Obsessive-compulsive disorder; SCH: Schizophrenia.

Of the patients, 895 (73.5%) preferred hospital care without first consulting their family physician regarding their current complaints. The complaints and health service utilization characteristics during the hospitalization of the patients are summarized in Table 2.

Although they were suitable for diagnosis and treatment at the FHC, 729 (59.9%) of the patients applied to the hospital. Follow-up status in the FHC for the applications made are summarized in Table 3.

When the patients were evaluated according to the characteristics of health service seeking, significant differences were found in terms of age groups, education status, income level, satisfaction with the services in FHC, and duration of complaint ($p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, respectively). Significant differences in these variables were observed in the 0–17 age group for age groups, in the uneducated group for education status, in the less than expenses group for income level, in the satisfied group for satisfaction with diagnosis and treatment at the FHC, and in the 8–90 days group for duration of complaint. The seeking for health services according to sociodemographic characteristics of the patients are summarized in Table 4.

When the factors determining the tendency to seek care in FHC were evaluated, age groups, educational status, income level, family type, satisfaction with diagnosis and treatment at the FHC, and duration of complaint were found to be significant (Coefficients of the logistic regression model=132.543, $p<0.001$). The factors determining the tendency to seek care in FHC are summarized in Table 5.

DISCUSSION

In this research, the reasons why institutions are preferred for health care and unnecessary applications to polyclinics are examined. It has been determined that patients first prefer public hospitals for their complaints, primary care institutions are often overlooked, and more than half of hospital applications are unnecessary. The health service structure in Türkiye has been shaped through FHC, 2nd and 3rd level hospitals.[2,9] For the health system to function properly, especially primary health services should be used effectively; all applications should be made to FHCs in all cases except for emergencies. However, it has become common for patients to directly visit hospitals without consulting a family physician first.[10,11] The study revealed that a significant number of patients visited hospitals for reasons such as pain, upper respiratory tract infection, gastrointestinal system, pregnancy monitoring, and general check-ups. Interestingly, patients even sought hospi-

Table 2. The complaints and health service utilisation characteristics during hospitalisation of the patients

	n (%)
Complaint duration	
0–7 days	672 (55.9)
8–90 days	288 (25.7)
91–180 days	33 (2.9)
181 days and above	129 (11.5)
Reason for admission	
Pain	268 (22.0)
General examination, follow-up	135 (11.1)
Pregnancy monitoring and conditions accompanying pregnancy	156 (12.9)
Gastrointestinal system complaints (diarrhea, constipation, bloating, nausea, vomiting)	102 (8.3)
Cough, shortness of breath	94 (7.8)
Weakness, fatigue, loss of appetite	51 (4.2)
Upper respiratory tract infection complaints (including sore throat)	51 (4.2)
Fever	39 (3.2)
Skin complaints	43 (3.4)
Urinary system complaints	31 (2.5)
Menstrual irregularity	27 (2.2)
Medication or medical report request	24 (2.0)
Contraceptive need/counseling	23 (1.9)
Neurological complaints (numbness, tremors, forgetfulness, fainting, dizziness, hand tremors)	23 (1.9)
Psychiatric complaints (distress, obsession, continuous monitoring, fear of surveillance, gaming addiction, inability to communicate)	23 (1.9)
Irregular blood sugar levels	22 (1.8)
Growth retardation	20 (1.6)
Cardiac complaints (palpitations, leg edema, chest pain)	18 (1.5)
Genital complaints	16 (1.3)
Anal area complaints (itching, pain, bleeding, hemorrhoids)	10 (0.8)
Uncontrolled hypertension	10 (0.8)
Academic failure, inattention, speech impairment	13 (1.1)
Obesity-related complaints	8 (0.7)
Nosebleeds, hearing loss, ringing in the ears	7 (0.6)
Cancer screening	2 (0.2)
Infertility	1 (0.1)
Reason for not consulting your family physician for the current complaint	
I do not find the healthcare services provided at the FHC sufficient.	219 (24.5)
I wanted to consult a specialist physician.	178 (19.9)
I do not find my family physician's knowledge sufficient.	149 (16.6)
I usually do not visit the FHC.	115 (12.8)
My family physician is very indifferent.	77 (8.6)
I am under follow-up at the hospital.	61 (6.8)
I could not get an appointment.	43 (4.8)
It was said that tests cannot be performed at the FHC.	16 (1.8)
The FHC is far from my home.	25 (2.8)
My family physician does not prescribe the medications I want/request.	12 (1.4)
Satisfaction with the diagnosis and treatment received from the FHC	
Not satisfied	264 (21.7)
Undecided	633 (52.0)
Satisfied	320 (26.3)

Table 2. The complaints and health service utilisation characteristics during hospitalisation of the patients (CONT.)

	n (%)
Health institutions to which another person with the same complaint can apply	
FHC	198 (16.3)
State hospital	758 (62.3)
University hospital	183 (15.0)
Private hospital	78 (6.4)
The first health institution usually consulted for any complaint, except in emergencies	
FHC	192 (15.8)
State hospital	911 (74.9)
University hospital	52 (4.3)
Private hospital	62 (5.0)
Reason why FHC is not the first choice for any complaint	
Limited diagnostic facilities at the FHC	282 (27.5)
I want to receive higher-quality service from specialist physicians at the hospital.	254 (24.8)
I do not consider my family physician knowledgeable enough to understand my health problem.	227 (22.1)
I only prefer my family physician to get prescriptions.	137 (13.4)
My family physician does not issue prescriptions or reports.	48 (4.7)
I had issues with my family physician.	40 (3.9)
I only go for vaccinations and follow-ups.	25 (2.4)
The hospital is closer to my home.	12 (1.2)
Requesting a laboratory test*	453 (39.2)
Requesting an imaging*	303 (26.2)

*The physician declined to participate in the study for 61 patients who presented to the relevant outpatient clinics.
FHC: Family health center.

Table 3. Follow-up status in the FHC for the applications made

Specialties	Applications at the polyclinic level (n=1217)	Eligibility for treatment at FHC for each outpatient clinic* (n=729)
Pediatrics	361 (29.7)	266 (73.6)
Internal Medicine	242 (19.9)	153 (63.1)
Obstetrics and Gynecology	215 (17.7)	138 (63.8)
Ear, Nose and Throat	118 (9.7)	49 (40.7)
Child and Adolescent Mental Health	87 (7.1)	9 (9.2)
Pulmonology	70 (5.8)	53 (74.3)
Cardiology	39 (3.2)	23 (59.0)
Infectious Diseases	37 (3.0)	10 (27.0)
Physical Therapy and Rehabilitation	25 (2.1)	18 (70.6)
Neurology	23 (1.9)	10 (45.5)

*The data in this column shows the percentage of patients eligible for treatment at the FHC for each outpatient clinic.
FHC: Family health center.
Data is presented as n (%).

tal care for contraception needs and cancer screening.[12] Despite the primary responsibility of FHCs for preventive healthcare, they are underutilized, indicating a potential lack of public awareness about the services they offer.[2,11,12] Of the patients, 73.5% visited the hospital without consulting a family physician first, and 74.9% generally preferred

Table 4. The seeking for health services according to sociodemographic characteristics of the patients

	Health Facilities where Health Services are Sought		Chi-square	p
	FHC (n=198)	Other (n=1019)		
Age groups			51.008	<0.001*
0–17 years	116 (58.6)	341 (33.5)		
18–24 years	10 (5.1)	159 (15.6)		
25–64 years	71 (35.9)	483 (47.4)		
65 years and above	1 (0.4)	36 (3.5)		
Gender			0.987	0.320†
Female	112 (56.6)	618 (60.6)		
Male	86 (43.4)	401 (39.4)		
Educational status			60.151	<0.001*
Illiterate	88 (44.4)	210 (20.6)		
Literate	12 (6.1)	93 (9.1)		
Primary school	25 (12.6)	149 (14.6)		
Middle school	17 (8.6)	195 (19.1)		
High school	22 (11.1)	215 (21.1)		
University and above	34 (17.2)	157 (15.5)		
Employment status			0.280	0.597†
Yes	50 (25.3)	279 (27.4)		
No	148 (74.7)	740 (72.6)		
Income level			36.764	<0.001*
Less than expenses	140 (70.7)	481 (47.2)		
Equal to expenses	50 (25.3)	474 (46.5)		
More than expenses	8 (4.0)	64 (6.3)		
Family type			13.191	<0.001†
Nuclear	162 (81.8)	700 (68.7)		
Expended	36 (18.2)	319 (31.3)		
Chronic illness			3.341	0.068†
Yes	19 (9.6)	151 (14.8)		
No	179 (90.4)	868 (85.2)		
Satisfaction with diagnosis and treatment at the FHC			120.292	<0.001*
Not satisfied	95 (48.0)	169 (16.6)		
Undecided	42 (21.2)	591 (58.0)		
Satisfied	61 (30.8)	259 (25.4)		
Complaint duration			21.104	<0.001*
0–7 days	124 (76.1)	548 (57.1)		
8–90 days	23 (14.1)	265 (27.6)		
91–180 days	3 (1.8)	30 (3.1)		
181–365 days	13 (8.0)	116 (12.2)		

FHC: Family health center.

Data is presented as n (%).

*Pearson Chi-square, †Continutiy Correction Chi-square.

Table 5. The factors determining the tendency to seek care in FHC

	B	SE	p	OR	95% CI
Age group	0.758	0.173	<0.001	2.133	1.518–2.997
(Ref: 18 years and older group)					
Educational status	0.880	0.174	<0.001	2.410	1.713–3.391
(Ref: Being literate and having higher education)					
Income level	0.883	0.176	<0.001	2.418	1.712–3.415
(Ref: The situation where income is equal to and greater than expenses)					
Family type	0.670	0.204	0.001	1.954	1.309–2.917
(Ref: Extended family type)					
Satisfaction with diagnosis and treatment at the FHC	0.416	0.183	0.023	1.515	1.058–2.170
(Ref: Being satisfied with diagnosis and treatment at FHC)					
Complaint duration	0.862	0.245	<0.001	2.368	1.465–3.828
(Ref: 8 and 90 days)					

FHC: Family health center.
Multiple Logistic Regression.

public hospitals for any medical concern. This suggests that the primary care level is often overlooked by patients.[12,13] Healthcare services that should be provided at the primary care level are often sought at hospitals instead. Similarly, in many hospitals across Türkiye, patients seek care for complaints that do not necessarily require specialist expertise, bypassing the primary care level. Most of these referrals, made without consulting a family physician, end up in the wrong outpatient clinics.[11,13,14] According to data from the Ministry of Health, in 2022, 39.9% of physician visits were made to primary care facilities, while 60.1% were made to secondary and tertiary care facilities. The per capita physician visits were 3.9 at FHCs, whereas it was 6.0 at secondary and tertiary care hospitals. This situation indicates that benefiting from FHCs lags behind hospitals relatively both in the research region and across Türkiye.[2,13-15]

This study revealed that the majority of patients preferring state hospitals without consulting a family physician are dissatisfied with the healthcare services provided at FHCs, including laboratory testing facilities, and the competence of their family physicians. A significant frequency of patients also believe they should always consult a specialist, even if they do not trust their knowledge and experience, while some patients choose their family physician solely to obtain prescriptions. The aim of the family medicine system is for individuals to receive healthcare services from their local healthcare institution. However, with the introduction of the new family medicine practice, individuals were granted the right to choose their preferred physician, thus eliminating the concept of locality in family medicine.[16] This research highlights the significant number of patients who visit hospitals due to the distance from FHCs. Interestingly, while some patients find the testing facilities at FHCs inadequate, a considerable number of specialists still request laboratory tests and imaging studies for many patients. However, most of these laboratory requests consist of routine tests typically conducted at FHCs. The perception of inadequate testing facilities and family physicians' competence at FHCs across Türkiye has reduced patient satisfaction with primary healthcare institutions.[12-14,16,17] The frequency of satisfaction with FHCs in this study was found to be low. In a university hospital in Istanbul in 2017, the satisfaction level with healthcare services provided at FHCs was found to be 22.0%, while in a study conducted in Denizli in 2020, it was 27.5%.[18,19] Despite the passage of years, there has been no significant improvement in patient satisfaction with FHCs. This indicates that as satisfaction with FHCs decreases, patients are more likely to bypass primary healthcare institutions.

The majority of those seeking hospital cares with an expectation of quality health service are actually cases that could be managed at FHCs. For instance, 49.5% of visits to the internal medicine clinic of an educational and research hospital, and 70.7% of those to the ear, nose, and throat clinic of another hospital, could have been managed at FHCs.[11,20] In this study, the frequency of unnecessary visits to outpatient clinics while patients could have been managed at FHCs is 59.9%. Particularly, there have been more than 60.0% unnecessary visits to pediatrics, physical therapy and rehabilitation, internal medicine, obstetrics, and gynecology clinics. However, in more specialized clinics, such as

child psychiatry and infectious diseases, the frequency of unnecessary visits is relatively lower. The research reveals that visits to state hospitals, which patients prefer, often involve cases that could have been managed at FHCs.

In this study, a significant frequency of patients felt that consulting a family physician instead of a hospital was necessary for their current complaint, influenced by various factors. The likelihood of adults visiting primary healthcare centers was lower compared to pediatric patients. The prevalence of respiratory infections in children, often linked to school environments, tends to steer families towards the nearest healthcare center, typically a FHC.[21] The presence of mothers accompanying child patients and the easy accessibility of primary healthcare centers may also contribute to this preference.[21,22] Furthermore, factors beyond maternal influence play a role in healthcare decisions. Patients from extended families were more inclined to believe that hospital visits were necessary instead of consulting FHCs. The extensive familial influence often shapes healthcare decisions, possibly influenced by frequent hospital visits by elderly family members for chronic conditions.[18] Age, education, and socioeconomic status also affect healthcare preferences. Patients with higher education levels and better income tended to prefer primary healthcare centers less compared to illiterate and economically disadvantaged individuals. Surprisingly, an increase in education level reduced the preference for FHCs, contrary to expectations. Alongside education, rising income levels increased expectations for effective and quality healthcare services. Educated individuals with no financial constraints tended to seek care from hospitals and specialist physicians, while less educated and relatively poorer patients found basic healthcare services provided by FHCs sufficient.[23] The study suggested that it is necessary to visit FHCs for symptoms present for the first few days and those persisting for more than three months. Easily accessible family physicians are preferred during the first seven days of symptom onset, with conditions, such as fever accelerating this preference. Hospital visits were primarily for respiratory tract infections and fever complaints. Patients with complaints for 8–90 days were more inclined to consider hospitals as their preferred choice. Concerns arising from symptoms originating from known acute and chronic conditions often lead to referrals to specialist physicians for detailed examination.[24] Surprisingly, those satisfied with the services provided by FHCs were more likely to visit hospitals. Despite satisfaction with their family physician and the services received those who choose hospitals may be unaware of conditions requiring hospital visits and may prefer consultation with a specialist physician. The lack of an active referral system significantly contributes to this situation.[5,6]

The density of patients in outpatient clinics may have negatively affected the participation frequencies of both physicians and patients in the study. This is the main limitation of the study.

CONCLUSION

74.2% of the patients generally applied to the hospital first to receive health care and did not prefer a family physician. Patient satisfaction with FHC is at a low level of 26.3%. The main reason for skipping FHCs was the inadequacy of the health services provided. This situation caused the unnecessary outpatient clinic admission level in hospitals to be 59.9%. Barriers to the effective use of primary care; rapid general practitioner turnover, a newly graduated physician easily becoming a family physician, insufficient family physician specialists in the field, and some physicians not having sufficient field experience. Studies should be conducted to strengthen primary care for the solution, and a referral system that does not bring physicians and patient's face-to-face should be developed. This study highlights unnecessary congestion in hospitals due to the underutilization of primary healthcare services. The objective is to draw attention to the dysfunctional aspects of the system to mitigate further harm to the economy and healthcare workforce.

Disclosures

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Utilization of Primary Healthcare Services in Türkiye and Its Impact on Health Expenditures: A Study Based on Dermatology Outpatient Clinic Data

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ABSTRACT

Objectives: The aim of this study was to evaluate the effect of examinations on health expenditures in patients who applied to the dermatology outpatient clinic in case of a referral to the appropriate healthcare center.

Methods: Of the 29.929 patients who applied to the dermatology outpatient clinic between January and December 2023. The patients were administered a 16-question questionnaire, including complaints, sociodemographic characteristics, and treatment access habits. Expert judgment was used to determine the appropriate healthcare service for each patient, and the economic impact of misreferrals was calculated.

Results: The mean age of the participants was 31.5±13.0 years, and only 20 (5.3%) patients needed tertiary healthcare services. One hundred and sixty (42.2%) of the patients could be treated in primary healthcare service and 199 (52.5%) in secondary healthcare service. A total of 154.632 TL was invoiced for all patients who were examined in the dermatology clinic. Since the patients were not treated in the appropriate health service, an overpayment of 109.502,48 TL was made in health expenses. Among the reasons for not applying to a family physician, 98 (25.8%) frequently stated that they did not trust the knowledge and capacity of the family physician and 123 (32.5%) frequently stated that they expected to receive better service at the university hospital.

Conclusion: To reduce health expenditures and improve the quality of care, appropriate referral patterns of patients to health centers should be developed, which can significantly improve the cost-effectiveness and functionality of the health system.

Keywords: Dermatology, family practice, health expenditures, health, primary healthcare

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INTRODUCTION

Tiered health services are an approach designed to optimize resource utilization by offering patients lower-cost but effective interventions.[1] If the initial intervention is insufficient, more intensive treatments are planned subsequently. Family medicine lies at the core of the healthcare system, providing preventive and curative services for basic health issues within the community. Secondary healthcare service are facilities where specialist physicians handle diagnosis and follow-up care.[2] In contrast, tertiary healthcare service is equipped to provide high-level care for complex medical conditions, conduct clinical trials, develop new medical treatments, and offer training for students and residents. Health problems that cannot be resolved in primary and secondary centers are managed and treated in tertiary centers with advanced medical technology.

According to the Alma Ata Declaration, which Türkiye has signed, 85–90% of health issues should ideally be resolved within primary care.[3] A systematic review has shown that primary care effectively improves public health and reduces healthcare costs.[1] However, the public does not sufficiently utilize primary healthcare services in Türkiye.[4] Patients in our country can apply directly to tertiary healthcare centers under health insurance coverage. Consequently, university hospitals manage numerous outpatient cases daily, which limits the time and attention available for chronic and complex cases, making hospital access more difficult for patients who require tertiary care.[5,6] This situation increases healthcare costs and reduces the quality of service provided in our country.

Few studies have examined the causes of inefficiencies in the utilization of tiered healthcare services and their impact on the national economy. The aim of this study was to evaluate the effect of examinations on health expenditures in patients who applied to the dermatology outpatient clinic in case of a referral to the appropriate healthcare center.

METHOD

This descriptive study was conducted at a university hospital that provides partial healthcare services to approximately 14 provinces and three countries (Georgia, Iran, Azerbaijan), primarily covering the Northeastern Anatolia, Eastern Black Sea, and Western Black Sea regions. The study population consisted of 29.929 patients who visited our outpatient clinic between January and December 2023.

Family medicine is considered as primary healthcare service, state hospitals as secondary healthcare service, and university hospitals as tertiary healthcare service.

Accordingly, the sample size representing the population was calculated using the Epi Info program, based on a prevalence of 50%, a margin of error of 5%, a type 1 error of 5%, and a 95% confidence interval, resulting in a sample size of 379.

A 16-question survey was administered to patients, covering their complaints, sociodemographic characteristics, and healthcare access habits. Patients were evaluated according to the competency targets outlined in the national core education program and dermatology core education programs to determine the appropriate healthcare service they should have accessed. The social security institutions and hospitals obtained information on the patients' billing status, and cost calculations were made. Data were collected by an academician from the dermatology department and a research assistant under the academician's supervision.

Data were analyzed using Statistical Package for the Social Sciences Statistics 20. Descriptive statistics, such as mean ± standard deviation, frequencies, and percentages, were used in the analysis.

RESULTS

A total of 379 patients were included in the study and the mean age was 31.5±13.0 years. The sociodemographic characteristics of patients visiting the dermatology clinic are summarized in Table 1.

After the evaluations made by the dermatologist, it was predicted that 160 (42.2%) of the patients could be treated in primary healthcare service, 199 (52.5%) in secondary healthcare service, and 20 (5.3%) in tertiary healthcare service. The reasons for not visiting primary healthcare services are summarized in Table 2.

In the dermatology clinic, 400,00 Turkish liras (TL) were paid as a consultation fee and 8,00 TL as a co-payment for each patient according to Health Implementation Regulation examination fees for the year 2024. When the invoicing of all patients in the study who were examined in the dermatology clinic was evaluated, a total of 154.632 TL was invoiced, including 151.600 TL consultation fee and 3.032 TL co-payment fee. The costs if patients are treated at the appropriate healthcare service are summarized in Table 3. On the other hand, if the patients had been treated at the appropriate healthcare service, this cost would have been charged to a total of 45.129,52 TL, and it was determined that 109.502,48 TL was excess paid.

DISCUSSION

In this study, patients who visited the tertiary dermatology outpatient clinic were assessed by a specialist to determine the healthcare services at which they should ideally have applied within the tiered healthcare system. Then, the overpayment made due to inappropriate applications was calculated. Our study found that only 5.3% of the applications to the university hospital's dermatology clinic indeed required tertiary healthcare, while 42.2% could have been treated at the primary healthcare service.

The increasing patient load at the tertiary healthcare service, rising costs, and declining service quality create an obstacle for patients who genuinely need to access a specialist.[5,6] Numerous complaints have been registered about the inability to secure appointments through the Central Physician Appointment System, which allocates appointments for institutions under the Ministry of Health. In addition, it was found that 21% of appointments made within a month were not attended. To address this, the

Table 1. Sociodemographic characteristics of patients visiting the dermatology clinic

	n (%)
Age groups	
18 and under	40 (10.6)
19–64	332 (87.6)
65 and over	7 (1.8)
Place of residence	
City center	246 (64.9)
District	81 (21.4)
Village/town	52 (13.7)
Education level	
Middle school or below	85 (22.4)
High school	177 (46.7)
University or above	117 (30.9)
Occupation	
Government	47 (12.4)
Private sector	81 (21.4)
Unemployed	251 (66.2)
Health insurance	
Social security institution	287 (75.7)
None/green card	92 (24.3)
Spouse's education level	
Middle school or below	61 (16.1)
High school	73 (19.3)
University or above	60 (15.8)
Not married	185 (48.8)
Spouse's occupation	
Government	18 (4.7)
Private/shopkeeper	62 (16.4)
No regular job/unemployed	184 (30.1)
Not married	185 (48.8)
Spouse's health insurance*	
Social security institution	161 (42.5)
None/green card	33 (8.7)
Household size	
4 or less	226 (59.6)
More than 5	153 (40.4)
Income level	
Insufficient	58 (15.3)
Just sufficient	191 (50.4)
Comfortable	130 (34.3)
Transportation availability	
Available	137 (36.1)
Not available	242 (63.9)
Type of closest health facility	
Primary healthcare service	225 (59.4)
Secondary healthcare service	111 (29.3)
Tertiary healthcare service	43 (11.3)
Walking distance to closest health facility	
Under half an hour	182 (48.0)
More than half an hour	142 (37.5)
More than an hour	55 (14.5)
First institution visited when one gets sick	
Primary healthcare service	76 (20.1)
Secondary healthcare service	177 (46.7)
Tertiary healthcare service	126 (33.2)
Previous institution visited for this complaint	
None	240 (63.3)
Primary healthcare service	59 (15.6)
Secondary healthcare service	80 (21.1)

*Only married couples are included.

Table 2. Reasons for not visiting primary healthcare service

Reasons	n (%)
Belief that family physician's knowledge/ capacity is insufficient	98 (25.8)
Expectation of better service at the university	123 (32.5)
Family physician is only for prescribing medication	15 (4.0)
Decision to have a dermatology examination while at the hospital for another reason	24 (6.3)
No family physician/at another location	15 (4.0)
Not thinking they can go to a family physician	21 (5.5)
Other	83 (21.9)

Ministry has introduced a policy requiring the cancellation of missed appointments; otherwise, patients are barred from booking another appointment in the same specialty for 15 days.[7] His approach may help utilize resources more effectively given the current appointment habits, but for a more lasting solution, patient habits around seeking specialist access need to be reformed. In our study, 63.3% of participants initially applied to a tertiary healthcare institution for their current complaint. In a previous study, 73.9% of patients preferred to see a family physician for minor skin conditions.[8] In our study, even though for 59.4% of partici-

Tablo 3. The costs if patients are treated at the appropriate healthcare service

	Unit price (TL)	Total fee (TL)	Cost by HealthCare service (TL)
Primary healthcare service (n=160)			
Consultation fee	73,75	11.800,00	11.800,00
Co-payment	0,00	0,00	
Secondary healthcare service (n=199)			
Consultation fee	120,48	23.975,52	25.169,52
Co-payment	6,00	1.194,00	
Tertiary healthcare service (n=20)			
Consultation fee	400,00	8.000,00	8.160,00
Co-payment	8,00	160,00	

TL: Turkish liras.

pants the nearest healthcare facility is a primary healthcare service, only 20.1% of them preferred to visit their family physician first when they needed healthcare services. This frequency was 42% in patients who applied to a family physician at a university hospital.[9]

In 2003, Türkiye implemented the Health Transformation Program, leading to significant changes in the healthcare system.[10] This reform established the family medicine system to provide effective and equitable healthcare services.[11] However, the inadequate number of family physicians has led to physician shortages at this service.[12] The high number of patients per physician shortens the time physicians can spend with each patient, making it challenging to assess patients adequately. In the study by Edirne et al., 48.6% of patients stated they could not get sufficient information from their family physicians.[13] In our study, 25.8% of participants reported not trusting the knowledge and capacity of their family physician, and 32.5% believed they would receive better diagnosis and treatment at a university hospital. Lack of trust may be due to communication problems and increasing the number of physicians and support staff to reduce the patient load per physician may help to solve this problem.

In addition, 13.5% of our patients were those who visited family physicians mainly for prescription refills, could not see another family physician when theirs was out of town, or did not consider visiting a family physician. This also indicates a lack of understanding in society about the role of primary healthcare. In a previous study, the primary reason for visiting family physicians was reported as prescription refills, with a frequency of 58.4%.[14] A 2022 study evaluated knowledge and awareness regarding family medicine services, revealing an average correct response frequency of 51%.[15] All these data indicate the need for public awareness activities about family medicine services, such as advertising, home visits, and various informational campaigns.

Family physicians are at the heart of our healthcare system.[16] Providing preventive health services, coordinating treatment systematically, referring patients when necessary, and coordinating with relevant specialties for chronic disease management requires extensive knowledge and skills. Across all age groups, 5–8% of consultations are due to dermatological conditions, with one-third of the population having at least one skin condition. However, at the end of general medical education, 92% of physicians feel that the dermatology training they received is insufficient.[17] Furthermore, dermatology outpatient clinics at secondary and tertiary hospitals are overwhelmed with patients, many of whom complain about the inability to secure appointments.[18]

Dermatology is a specialty that can be easily integrated into the e-health system, yielding successful results.[16] Teledermatology and artificial intelligence-assisted diagnostic algorithms, which have gained prominence recently, can empower family physicians to manage dermatological issues more effectively. In the Netherlands, family physicians can share a photo of a skin lesion with a specialist through telemedicine applications, arrange treatment based on the specialist's response, and make referrals only if necessary. This approach addresses dermatological problems at the primary healthcare service, preventing unnecessary referrals. This application has allowed the Netherlands to save 40% on healthcare expenditures. A study conducted in London demonstrated that teledermatology saved £12.460 over 3 years.[6] Developing and funding communication networks specifically for requesting and responding physicians in dermatology would be highly beneficial for family physicians.

The major limitation of this study is that it is a single-center study with a limited sample size. Larger-scale studies are needed to understand the precise impact on healthcare expenditures.

CONCLUSION

The preference of tertiary healthcare institutions as the initial point of contact for dermatological complaints is an expected outcome that increases healthcare expenditures. The primary healthcare service is a crucial part of the healthcare system. Increasing the number of family physicians would extend the time they can dedicate to each patient, enhancing communication and fostering trust. The public needs to be educated about primary healthcare service and when to seek care from family physicians.

Disclosures

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Evaluation of Knee Functionality and Frailty in Individuals 65 Years and Older in Primary Care: A Cross-Sectional Study

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ABSTRACT

Objectives: The aim of this study was to investigate the relationship between knee functionality and frailty in individuals aged 65 years and older.

Methods: Participants aged 65 years and older registered at the Family Health Center Unit were included in this cross-sectional study. The patients were administered a sociodemographic data questionnaire, the Lysholm knee scoring scale, and the fatigue, resistance, aerobics, illnesses, and weight loss (FRAIL) frailty scale during face-to-face interviews.

Results: The study was conducted with 122 participants whom 74 (60.7%) were male. The frequency of frailty was 32 (26.2%) and the frequency of frailty pre-frail was 43 (35.2%). There was a relationship between FRAIL score with age and body mass index (BMI) (r=0.326 and p=0.001 for age, r=0.202 and p=0.020 for BMI). While 23 (71.9%) of the women were frail and 20 (46.5%) were pre-frail, 9 (28.1%) of the men were frail and 23 (53.5%) were pre-frail (p=0.001). There was a relationship between Lysholm scores and FRAIL total scores (r=−0.819 and p=0.001).

Conclusion: Loss of knee functionality may increase frailty. Therefore, evaluating knee joint functionality may be useful in frailty assessment in elderly patients.

Keywords: Aged, frailty, knee

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INTRODUCTION

The world's population is aging rapidly.[1] In 2004, there were 461 million people over the age of 65; this number reached 2 billion in 2020. Because it is undeniable that the world is aging rapidly, it is increasingly important for public health to focus on problems that occur or may occur with aging. Frailty is defined as a syndrome of physiological decline associated with aging and characterized by a marked vulnerability to adverse health outcomes. The frail elderly are more susceptible to stressors, such as acute illness, surgery, multiple medications, and others than younger or more vigorous elderly people. While there are many instruments that can be used to determine frailty, studies have shown that it increases mortality and morbidity, leads to falls and concomitant hip fractures, and increases and prolongs hospitalization.[2] The modern healthcare system focuses on treating single-organ dysfunction and disease. However, many older people have multiple organ problems. Frailty is a practical, unifying concept in the care of older patients that leads to a more holistic view of patients and their situations. Awareness and recognition of frailty and related risks by healthcare providers will definitely improve care for this highly vulnerable patient group. According to numerous population-based studies, the prevalence of frailty varies over a wide range. The results vary according to the assessment method used, the

population of the study, and income levels. According to a systematic review of 15 studies and 44.894 patients in 2012, the prevalence was 9.9%.[3] In the Survey of Health, Aging, and Retirement (SHARE) study, conducted in Europe using eight measures, the prevalence ranged from 6% to 44%.[4] Frailty is observed more frequently in studies conducted in Turkey. Elbi and Özyurt, İlhan and Bakkaloğlu, observed the prevalence of frailty to be 64.5% and 63.2%, respectively, in their studies on the elderly living in a community.[5,6] According to data in the 2019 Global Burden of Disease study, osteoarthritis is the most important cause of physical disability in the elderly, and the most common form is knee gonarthrosis, with a frequency of 71%.[7] The knee joint is an important factor in maintaining mobility. Age is the factor that most significantly increases the risk of osteoarthritis, not only in the knee joint but in all joints.[8] There are many scales and methods for evaluating knee functionality. The Lysholm knee scale, first published in 1982, was developed to determine the functional status of patients with anterior cruciate ligament injuries in the knee.[9] It was later shown to be useful in many other knee complaints, injuries, and diseases. Therefore, it is not disease-specific and can be used to evaluate various knee disorders. The fatigue, resistance, aerobics, illnesses, and weight loss (FRAIL) frailty scale can be applied in a short time, especially in family medicine, which is often the first place patients consult, and does not require additional measuring, by health professionals. The scale has five components: Fatigue, resistance, ambulation, illness, and weight loss.[6] For fatigue, the patient is subjectively questioned about the frequency of feeling tired in the past month; for resistance, the patient is questioned about difficulty in climbing stairs; for ambulation, the patient is questioned about walking a few hundred meters without difficulty; and for illness, the patient is questioned about chronic diseases and weight loss of more than 5% in a year. Frailty and pre-frailty symptoms can be detected more frequently, especially in the geriatric population where knee functions are reduced and symptoms such as fatigue, decreased resistance, and difficulty in the movement are at the forefront.

This study aimed to investigate the relationship between knee functionality and frailty in individuals aged 65 years and older.

METHOD

The study was conducted at Artova Family Health Center between August 01, 2022, and September 01, 2022. Patients aged 65 and over who applied to the family medicine outpatient clinic were included in the study. Participants who were bedridden, with body mass index (BMI) ≥40, and those who had undergone knee and/or hip surgery were excluded from the study.

From a total population of 579 patients aged 65 years and over registered in a Family Medicine Unit, the minimum sample size was calculated as 111 with a frailty prevalence of 9.9%, 95% confidence interval, and 5% margin of error.[3] The study was completed with 122 patients.

Demographic characteristics, the FRAIL scale, and the Lysholm scores of the participants were evaluated. Data were collected from patients who gave verbal consent using face-to-face interviews to answer questionnaires. Frailty status was taken as the dependent variable and demographic data and Lysholm scores as independent variables.

Patients between the ages of 65 and 74 years as youngest-old, those between ages 75 and 84 years as middle-old, and those aged over 85 years as oldest-old were considered. The five-item FRAIL scale was used for screening for frailty.[6] There are five components: Fatigue, resistance, ambulation, illness, and loss of weight. Scale scores range from 0 to 5 (1 point for each component) and represent vigorous (0), pre-frail (1–2), and frail (3–5) health status. The Lysholm scale was used for determination knee functionality.[9] Possible score range: 0–100, where 100 means no symptoms or disability. Scores are categorized as excellent (95–100), good (84–94), fair (65–83) and poor (≤64).

The IBM SPSS Statistics v.22 package program was used for statistical analyses. The conformity of the parameters to normal distribution was evaluated by Kolmogorov-Smirnov and Shapiro-Wilks tests. Data were evaluated using descriptive statistics such as frequency, percentage, mean, standard deviation, median, and interquartile range. In comparing quantitative data, the One Way Anova test was used to compare normally distributed parameters between groups and the Tukey Honestly Significant Difference test was used to determine the group causing the difference. On the other hand, the Kruskal–Wallis test and Mann–Whitney U test were used to determine abnormally distributed parameters between groups. Fisher's exact test and the Chi-square test were applied for scale scores. Spearman's correlation test was used for the correlation between Lysholm and FRAIL, and Pearson's correlation test was used to determine their correlation with age and BMI. Statistical significance was accepted as $p<0.05$.

RESULTS

The study was conducted with 122 patients and the demographic characteristics of the participants are summarized in Table 1.

Table 1. The demographic characteristics of the participants

	Mean±SD
Age (years)	73.0±6.8
BMI (kg/m^2)	27.0±3.8
	n (%)
Age groups	
Youngest-old	75 (61.5)
Middle-old	35 (28.7)
Oldest-old	12 (9.8)
Gender	
Male	74 (60.7)
Female	48 (39.3)
Smoking	
Yes	13 (10.7)
No	80 (65.6)
Former smoker	29 (23.4)
Alcohol	
Yes	14 (11.5)
No	93 (76.2)
Former user	15 (12.3)

BMI: Body mass index.

Of the participants, 32 (26.2%) were frail, 43 (35.2%) were pre-frail, and 47 (38.5%) were vigorous. The demographic characteristics according to frailty status are summarized in Table 2.

When the subgroups of the fragility scale were evaluated, 26 (21.3%) of the participants stated that they were all of time fatigue, 62 (50.8%) had resistance, 40 (32.8%) had ambulation, 24 (19.7%) had no disease, and 23 (19.7%) had more than 5% weight loss. Subheadings of FRAIL according to gender are summarized in Table 3.

There was a relationship between FRAIL score with age and BMI (r=0.326 and p=0.001 for age, r=0.202 and p=0.020 for BMI).

There was an inverse and strong relationship between Lysholm scores and FRAIL total scores (r=−0.819 and p=0.001). Especially, there was a relationship between the Lysholm score and the score of the first three questions of the FRAIL scale (r=−0.834 and p=0.001).

While a relationship was found between Lysholm score and age, no relationship was found between Lysholm score and BMI (r=−0.324 and p=0.001 for age, r=−0.173 and p=0.056). The demographic characteristics according to the Lysholm Score are summarized in Table 4.

Table 2. The demographic characteristics according to frailty status

	Frailty			p
	Vigorous (n=47)	**Prefrail (n=43)**	**Frail (n=32)**	
Age (years)	70.1±5.1	74.3±7.3	75.6±6.9	0.001*
BMI (kg/m^2)	26.6±3.2	26.5±4.6	28.3±3.3	0.077*
Age groups				
Youngest-old	39 (83.0)	21 (48.9)	15 (46.9)	0.001†
Middle-old	7 (14.9)	17 (39.5)	11 (34.4)	
Oldest-old	1 (2.1)	5 (11.6)	6 (18.7)	
Gender				
Male	42 (89.4)	23 (53.5)	9 (28.1)	0.001‡
Female	5 (10.6)	20 (46.5)	23 (71.9)	
Smoking				
Yes	9 (19.1)	2 (4.7)	2 (6.3)	0.001†
No	18 (38.3)	34 (70.1)	28 (87.4)	
Former smoker	20 (42.6)	7 (16.2)	2 (6.3)	
Alcohol				
Yes	11 (23.4)	1 (2.3)	2 (6.3)	0.001†
No	26 (55.3)	38 (88.4)	29 (90.6)	
Former user	10 (21.3)	4 (9.3)	1 (3.1)	

BMI: Body mass index.
Data is presentes as mean±standard deviation and n (%).
*Oneway ANOVA test; †Fisher's Exact test; ‡Chi-square test.

Table 3. Subheadings of FRAIL according to gender

	Male (n=74)	Female (n=48)	p
Fatigue			
All of the time	11 (14.9)	15 (31.3)	0.005*
Most of the time	7 (9.5)	10 (20.8)	
Sometimes	28 (37.8)	18 (37.5)	
Rarely	10 (13.5)	3 (6.2)	
Never	18 (24.3)	2 (4.2)	
Resistance			
Yes	24 (32.4)	38 (79.2)	0.001†
No	50 (67.6)	10 (20.8)	
Ambulation			
Yes	15 (20.3)	25 (52.1)	0.001†
No	59 (79.7)	23 (47.9)	
Illness			
None	16 (21.6)	8 (16.7)	0.395‡
One	21 (28.4)	11 (22.9)	
Two	19 (25.6)	10 (20.8)	
Three	13 (17.6)	11 (22.9)	
Four	4 (5.4)	3 (6.3)	
Five	1 (1.4)	4 (8.3)	
Six	0 (0.0)	1 (2.1)	
Loss of weight			
5% or more	9 (12.2)	15 (31.2)	0.018†
<5%	65 (87.8)	33 (68.8)	

*Chi-square test; †Continuity (yates) correction test; ‡Fisher's Exact test.

Table 4. The demographic characteristics according to the Lysholm score

	Lysholm score	p
Age groups		
Youngest-old	91.0 (34.0)	0.004*
Middle-old	70.0 (53.0)	
Oldest-old	67.5 (72.0)	
Gender		
Male	94.0 (22.0)	0.001†
Female	59.5 (47.0)	
Smoking		
Yes	95.0 (26.0)	0.001*
No	76.0 (51.0)	
Former smoker	95.0 (22.0)	
Alcohol		
Yes	97.5 (15.0)	0.007*
No	79.0 (49.0)	
Former user	94.0 (22.0)	

Data are presented as median (interquartile range).
*Kruskal Wallis test; †Mann Whitney U test.

DISCUSSION

In this study, the frequency of frailty was found to be 26.2%. The frequency of frailty varies according to the society, the population studied, and the scale used. Kapucu et al. found the frequency of frailty to be 44.2% in a study of women with osteoporosis, and Sütlü found the frequency of moderate and severe frailty to be 29.5% in a study of 464 elderly people living in the community.[10,11] The relatively low frequency in this study may be due to the fact that bedridden patients were not included due to the investigation of knee functionality. The most important factors affecting frailty were found to be advanced age, female gender, non-smoking and/or alcohol use, and loss of knee function. The frequency of frailty increases with aging. Shortening of telomeres, increased free radical production, mitochondrial dysfunction, and some biochemical changes that occur with age in the human body have been investigated in relation to frailty. An increase in interleukin-6 and a decrease in high-density lipoprotein are strongly associated with frailty. When these changes affect homeostasis in a disruptive way due to acute and chronic inflammation or for genetic reasons, the frailty threshold is crossed and symptoms such as fatigue, loss of resistance, weight loss, falls, morbidity, dependency, and mortality will negatively affect the health of elderly patients.[12] As in this study, it has been shown in the literature that frailty increases with age.[13] Frailty was found to be four times more common in the female gender. In an article by Gordon et al. investigating the effect of gender on frailty, it was shown that although men had life-threatening diseases more frequently than women, women were likelier to experience non-life-threatening diseases.[14] Cerebrovascular diseases such as heart disease and ischemic stroke are common in men, while arthritis, osteoarthritis, rheumatic diseases, and urinary incontinence are more common in women. The knee joint is the most commonly affected by osteoarthritis. Again, rheumatic diseases are likely to cause fatigue and negatively affect activities such as walking and climbing stairs, especially in the elderly. In this study, the increase in fragility as knee functionality was lost and the lower Lysholm scores of the female gender may be related to this situation. In light of the information obtained from the FRAIL scale, the women interviewed had more fatigue, lower resistance, more difficulty getting around, and were likelier to have lost more than 5% of their weight in the past year. Ahrenfeldt et al. investigated the difference in frailty between gen-

ders in Europe and observed that women were anorexic, tired, weak, had difficulty walking, and had more comorbid diseases than men.[15] In this study, no significant difference was found between genders in terms of comorbid diseases. Smokers and alcohol users had higher Lysholm scale scores and were found to be less frail. In a meta-analysis, the risk of gonarthrosis was significantly reduced in smokers compared to non-smokers. Dose response analysis showed that the risk of gonarthrosis decreased linearly with increasing cigarette consumption.[16] There is an inverse and strong relationship between the Lysholm score and the FRAIL total score.

It is possible that patients with low knee functionality frequently give negative answers to the first 3 questions of the FRAIL scale. If the knees are not functional enough, fatigue and inability to climb 10 steps or walk several hundred meters without support are expected. When it is evaluated whether this situation causes frailty, it is considered to cause frailty according to the FRAIL scale. Similarly, a strong correlation was found between the Lysholm score and negative answers to the first three questions of the FRAIL scale. As the loss of knee functionality worsens, functional reserves such as fatigue, resistance, and ambulation worsen in elderly patients. Whatever the cause of frailty, the negative consequences associated with frailty are a problem for these patients, even in the absence of chronic disease or weight loss. Wanaratna et al. investigated frailty and associated factors in 780 community-dwelling elderly people with knee osteoarthritis and found that those with moderate or severe symptoms were statistically significantly more frail.[17] Many studies have proven that osteoarthritis is associated with frailty, even when different scales are used for frailty.[18-22] Some studies have associated the higher frequency of frailty in women with the higher frequency of osteoarthritis in women, as in this study.[23,24] In a prospective study by Bindawas et al., knee pain and frailty status of people with or without a diagnosis of osteoarthritis were investigated with their own statements, and it was concluded that those with knee pain, soreness, and stiffness were more frail.[21] Mobility impairment at advanced ages is associated with a higher risk of disability, lower quality of life, hospitalizations, admission to inpatient care, and death, as well as higher health costs.[25]

The limitations of this study are that the participants were not questioned about their sports habits in their youth, they generally lived in rural areas, and only the FRAIL scale was used to assess frailty. There is a need for more comprehensive studies in which the causes of movement limitations, fatigue, and diminished resistance are investigated, and knee functionality is evaluated with multiple fragility scales.

CONCLUSION

Identifying frailty in the elderly is the first step in preventing future negative outcomes. Frailty should not be seen as an inevitable process associated with aging, but rather as a preventable condition. Early detection and treatment of knee problems can reduce frailty and associated morbidity and mortality. This study provides results supporting the conclusion that loss of knee functionality increases frailty. Increasing mobility in the elderly at a younger age, encouraging regular sports habits, and providing early detection, diagnosis, and treatment of knee-related functional losses to prevent morbidity and mortality may be beneficial.

Disclosures

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The Evaluation of the Vaccine Hesitancy among Parents of Children Aged 0-14

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ABSTRACT

Objectives: This study aims to assess vaccine hesitancy among parents of children aged 0–14 and its related factors.

Methods: This study is a cross-sectional study conducted among parents of children aged 0–14 who consulted the Eskişehir Osmangazi University Family Medicine Polyclinic between April 1 and September 30, 2022. The questionnaire form comprises sociodemographic characteristics and questions regarding vaccines. The World Health Organization Vaccine Hesitancy Scale was used to determine the frequency of vaccine hesitancy among the parents.

Results: A total of 375 parents were assessed. In the study, 11 (2.9%) of the parents had at least one child who had not been vaccinated. Parents with unvaccinated children had a vaccine hesitancy score of 41.0 (17.0) and parents with unvaccinated children had a vaccine hesitancy score of 42.0 (8.0) (p=0.201). Parents who used the Internet as a source of information about vaccines had lower vaccine hesitancy scale scores than those who did not (40.0 [8.0] vs. 43.0 [8.0], p<0.001). In addition, the vaccine hesitancy score of parents who received vaccine-related information from health professionals was significantly higher (43.0 [8.0] vs. 40.0 [11.5], p=0.001).

Conclusion: Obtaining vaccine-related information from health-care professionals rather than the Internet or other sources could lead to significant progress in combating vaccine hesitancy among parents.

Keywords: Family practice, vaccination hesitancy, vaccination refusal

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INTRODUCTION

The World Health Organization (WHO) states that between 3.5 and 5 million deaths are prevented every year through immunity.[1] However, the global rate of immunization fell from 86% in 2019 to 81% in 2021, whereas the number of children who had not been vaccinated at all rose by 5 million between 2019 and 2021.[2] One of the important reasons for the fall in vaccinations, which has become more widespread in the last 20 years, are the notions of "vaccine hesitancy" and "vaccine refusal." According to WHO definitions, while "vaccine refusal" is the situation where a person refuses to accept any vaccinations of his/her own free will, "vaccine hesitancy" is the situation where there is a delay in having certain vaccinations carried out or not permitting certain vaccinations, despite having access to them. The WHO, which has conducted studies on this subject due to the increase in vaccine hesitancy in recent years, stated in 2019 that one of the 10 factors that could threaten global health was "vaccine hesitancy."[3] The number of measles cases rose by 3 times in Europe between the years 2016 and 2017. It has been determined that 87% of the cases of measles are those who had refused to be vaccinated.[4] The WHO established the "The Strategic Advisory Group of Experts on Immunization Vaccine Hesitancy Working Group" in 2012 due to the increase in vaccine hesitancy in recent years, and one of the most important activities of this group has been to develop the Vaccine Hesitancy Scale as a common measurement tool.

The opposition to vaccines is increasing rapidly in Türkiye following the winning of a lawsuit concerning the requirement to obtain consent from the parent before vaccinations in 2015 and in particular, as a result of the frequent citing of anti-vaccination statements in the media in the last 10 years.[5] The number of families who did not want their children to be vaccinated rose from just 183 in 2011 to around 23.000 in 2018. For this reason, there is an increase in the number of diseases that can be prevented by vaccination and the related deaths and disabilities. An example is the increase in measles cases in recent years. While measles cases did not exceed 10 between 2007 and 2010, the number of cases increased significantly after 2011. After 2012, cases continued to increase with immigration to Türkiye, and 1005 cases were seen in 2013.[6] The measles vaccine was added to the national vaccination calendar for 9-month-old babies. Unfortunately, vaccinations were interrupted after the February 6 earthquake in Türkiye, and measles cases reached 7.885 in the first 6 months of 2023.[7] This situation has once again shown us the importance of primary health care and vaccination.

One of the important reasons for decreasing vaccinations in recent years is vaccine refusal and hesitancy.[3] It is important to determine the prevalence of vaccine refusal and vaccine hesitancy, which have started to threaten the health of the community with their increase both in the world and in Türkiye, as well as determine the reasons for hesitancy and understand the factors behind the rise in this hesitancy. The aim of this study is to evaluate vaccine hesitancy among parents with children between the ages of 0–14, who consulted the Eskişehir Osmangazi University Family Medicine Polyclinic.

METHOD

This cross-sectional study was conducted among parents of children aged 0–14 who consulted the Eskişehir Osmangazi University Family Medicine Polyclinic between April 1 and September 30, 2022. Parents with children aged 0–14 years and over 18 years were included in the study. Cognitive dysfunction and illiterate parents were excluded from the study.

The data were collected by giving the parents a questionnaire and asking them to complete it. The researcher created a sociodemographic data form with the aim of learning the demographic information of the participants. The matters asked and recorded in the study were the age, gender, education status, number of children, and income status of the participants, whether they owned the home they lived in, the place they had lived for the lengthiest period during their life (small town, village, and city), their vaccination status, the sources which affected their decisions on vaccines (Internet, television, health professional, friends and relatives, religious leaders, newspapers and magazines, and other), whether they knew anybody who did not have their children vaccinated, whether they had failed to have at least one of their children vaccinated with a complete set of vaccines despite these vaccines being on their vaccination schedule and any side effects experienced (none, mild, and severe) by their children after any vaccinations. The age of the parents and the number of children were recorded numerically.

The Vaccine Hesitancy Working Group developed the WHO Vaccine Hesitancy Scale.[8] It also stated that the scale would need to be tested to ensure it was valid in all countries. In line with this warning, the validity and reliability studies of the Vaccine Hesitancy Scale in Turkish were conducted in four separate stages in Türkiye.[9-12] This study uses the WHO Vaccine Hesitancy Scale in Turkish, which was adapted to Turkish culture and has been shown that it could be used by Turkish parents, by Aslan et al. The responses to this scale, which is comprised 10 questions, were of a Likert type with 5 grades between "I definitely agree" and "I definitely disagree."[10] While questions number 5, 9, and 10 on the scale contained negative statements, all of the other questions contained positive ones. The level of vaccine hesitancy fell as the grades given in response to the positive statements increased, whereas the level of hesitancy rose as the grades given in response to the negative statements increased. Therefore, responses number 5, 9, and 10 are reverse coded. Thus, as the total number of marks obtained from the scale increases, the level of vaccine hesitancy falls. There is no cutoff point separating those who are hesitant from those who are not within the scale.

The data were analyzed using the Statistical Package for the Social Sciences Version 22 package program. Frequency, percentage, mean, standard deviation, median, and interquartile range were used for descriptive statistical methods. A Chi-square test was used for the comparison of the qualitative values. The relationship between the variables was tested using the Spearman correlation analysis. The Mann–Whitney U test was used in the analyses between two groups, and the Kruskal–Wallis test was used in the comparisons between more than two groups, as the data in the comparisons did not display a normal distribution. A $p<0.05$ was considered statistically significant.

RESULTS

In this study, 375 parents were included. The sociodemographic characteristics of the parents are summarized in Table 1.

Table 1. The sociodemographic characteristics of the parents

	Median (IQR)
Age (years)	39.0 (11.0)
Number of children	2.0 (0.0)
Gender, n (%)	
Female	259 (69.1)
Male	116 (30.9)
Education status, n (%)	
Literate	1 (0.3)
Primary school	52 (13.9)
Secondary school	41 (10.9)
High school	75 (20.0)
University	206 (54.9)
Income status, n (%)	
Income lower than expenses	113 (30.1)
Income and expenses equal	198 (52.8)
Income higher than expenses	64 (17.1)
The house they live in owns to them, n (%)	
Yes	120 (32.0)
No	255 (68.0)
The place where they live, n (%)	
Small town	40 (10.7)
Village	61 (16.3)
City	274 (73.0)

Table 2. The knowledge and opinions about vaccines of the parents

	n (%)
The sources influencing the decisions of the parents concerning vaccines*	
Internet	107 (28.5)
Television	59 (15.7)
Health professional	309 (82.4)
Friends and relatives	50 (13.3)
Religious leaders	12 (3.2)
Newspapers and magazines	19 (5.1)
Other	43 (11.5)
Recognize someone who has not vaccinated their children	
Yes	83 (22.1)
No	145 (38.7)
Unknown	147 (39.2)
Vaccine-related side effect	
None	269 (71.8)
Mild	104 (27.7)
Severe	2 (0.5)

*Each item was evaluated individually.

When the parents' own vaccination status was evaluated, 18 (4.8%) stated that they were vaccinated, 273 (72.8%) stated that they were not vaccinated, and 84 (22.4%) stated that they could not remember. The knowledge and opinions about vaccines of the parents are summarized in Table 2.

The median of the WHO Vaccine Hesitancy Scale score was 42.0 (8.0). No relationship was found between the WHO Vaccine Hesitancy Scale with age and number of children (p=0.706, p=0.763, respectively). The sociodemographic and vaccine-related characteristics of the WHO Vaccine Hesitancy Scale score are summarized in Table 3.

When the vaccination status of children was evaluated, it was found that 11 (2.9%) had at least one vaccine that had not been given to at least one child, 349 (93.1%) had vaccines and 15 (4.0%) had unknown. The sociodemographic and vaccine-related characteristics of parents allowed to vaccinate their children are summarized in Table 4.

DISCUSSION

The aim of this study is to evaluate vaccine hesitancy among parents with children between the ages of 0–14.

In this study, no significant relationship was found between the education status of the parents and their scores on the WHO Vaccine Hesitancy Scale in Turkish. Similarly, no significant relationship was found between the presence of a minimum of one vaccination of parents who had not allowed at least one of their children to be given despite these vaccines being in the vaccination schedule and the education status of the parents. However, in the study conducted by Aslan et al., it was determined that most of the parents who were hesitant to allow their children to be vaccinated were mothers with an education status of primary school or less.[10] In the study conducted by Luman et al., it was shown that there were more delays to childhood vaccinations as the education status of the participants decreased.[13] While a significant relationship was not found in this study, a relationship has been shown between the education levels of parents and the health and vaccination frequency of their children in numerous studies.

Table 3. Sociodemographic and vaccine-related characteristics of the World Health Organization vaccine hesitancy scale score

	Median (IQR)	p
Gender		
Female	42.0 (9.0)	0.978†
Male	42.0 (8.0)	
Education status		
Primary school	40.0 (10.0)	0.247‡
Secondary school	40.8±4.8	
High school	42.0 (8.0)	
University	43.0 (8.0)	
Income status		
Income lower than expenses	42.0 (7.0)	0.904‡
Income and expenses equal	42.0 (9.0)	
Income higher than expenses	42.0 (8.8)	
The house they live in owns to them		
Yes	42.0 (9.0)	0.067†
No	43.0 (9.0)	
The place where they live*		
Small town	39.5 (6.8)	0.043‡
Village	42.0 (8.0)	
City	42.5 (8.0)	
The sources influencing the decisions of the parents concerning vaccines		
Internet		
No	43.0 (8.0)	<0.001†
Yes	40.0 (8.0)	
Television		
No	42.0 (8.0)	0.313†
Yes	41.0 (7.0)	
Health professional		
No	40.0 (11.5)	0.001†
Yes	43.0 (8.0)	
Friends and relatives		
No	42.0 (8.0)	0.648†
Yes	43.0 (7.3)	
Religious leaders		
No	42.0 (8.0)	0.988†
Yes	41.0 (6.3)	
Newspapers and magazines		
No	42.0 (8.0)	0.159†
Yes	42.0 (8.0)	
Other		
No	42.0 (8.0)	0.223†
Yes	42.0 (9.0)	
Vaccine-related side effect		
No	42.0 (8.0)	0.190†
Yes	42.0 (8.8)	
Recognize someone who has not vaccinated their children		
Yes	44.0 (8.0)	0.001‡
No	40.0 (9.0)	
Unknown	41.0 (8.0)	
Unvaccinated child		
No	42.0 (8.0)	0.201†
Yes	41.0 (17.0)	

*Small town vs. city p=0.012.

†Mann Whitney U test, ‡Kruskal Wallis test.

In this study, the frequency of parents who did not allow at least one of their children to be given a complete set of vaccines despite the fact that it was included in the vaccination schedule was found to be 2.9%, whereas the frequency of those who had allowed all of their children to have all of the vaccinations was found to be 93.1%. The frequency of parents whose children had received all vaccinations was found to be 94% in the study conducted by Üzüm et al., and this is similar to the results from this study.[14]

A significant relationship was found between the parents who did not allow at least one of their children to be given a complete set of vaccines despite the fact that these were included in the vaccination schedule and the side effects which had occurred in the vaccinations to their children. In the study conducted by Özkan and Çatıker in 2006, it was found that 71.6% of parents whose children had either not been vaccinated at all or whose vaccines were incomplete, were worried about the side effects of vaccines.[15] Similarly, it was also found that half of the parents who did not allow their children to be vaccinated were worried about side effects, in the study by Aslan et al.[10] In a study conducted in Sweden in 2016, it was revealed that 74.7% of the parents who refused vaccines were worried about their side effects.[16] In a manner which supports these other studies, it was also shown in this study that the probability of parents not allowing their children to be vaccinated increased if those parents had experienced side effects.

A significant relationship was found between those influenced by the Internet in their decisions on vaccines and their scores on the WHO Vaccine Hesitancy Scale in Turkish, and the vaccine hesitancy of those influenced by the Internet was found to be significantly higher. In a similar manner to this study, it was also shown that parents obtained information concerning vaccines from the Internet and that the negative information on the Internet had been effective in their refusal of vaccines, in a study conducted in the Czech Republic in 2015.[17] A significant relationship was found between those influenced by health professionals and their scores on the WHO Vaccine Hesitancy Scale in Turkish, and vaccine hesitancy among those influenced by health professionals was found to be significantly lower. In a study conducted by Chung et al., in 2017, it was determined the participants who were the least influenced by health professionals in the decisions on vaccines were also the ones who had refused vaccinations. Moreover, the frequency at which parents who had refused vaccines had been influenced by the Internet and books were found to be significantly higher than other parents.[18] This study also supports the results of this study.

Table 4. The sociodemographic and vaccine-related characteristics by parental allow to vaccinate their children

	Unvaccinated child			p
	No (n=349)	Yes (n=11)	Unknown (n=15)	
Age (year)	39.0 (10.0)	31.0 (10.0)	38.0 (13.0)	0.029*
Number of children	2.0 (0.0)	1.0 (2.0)	2.0 (1.0)	0.694*
Education status				
Literate	1 (0.3)	0 (0.0)	0 (0.0)	0.657†
Primary School	49 (14.0)	0 (0.0)	3 (20.0)	
Secondary School	37 (10.6)	1 (9.1)	3 (20.0)	
High School	70 (20.1)	2 (18.2)	3 (20.0)	
University	192 (55.0)	8 (72.7)	6 (40.0)	
Income status				
Income lower than expenses	107 (30.7)	2 (18.2)	4 (26.7)	0.826†
Income and expenses equal	183 (52.4)	6 (54.5)	9 (60.0)	
Income higher than expenses	59 (16.9)	3 (27.3)	2 (13.3)	
The house they live in owns to them				
No	108 (30.9)	5 (45.5)	7 (46.7)	0.313†
Yes	241 (69.1)	6 (54.5)	8 (53.3)	
The place where they live				
Small town	37 (10.6)	2 (18.2)	1 (6.7)	0.885†
Village	57 (16.3)	1 (9.1)	3 (20.0)	
City	255 (73.1)	8 (72.7)	11 (73.3)	
Own vaccination status				
Incomplete	15 (4.3)	2 (18.2)	1 (6.7)	0.146†
Complete	257 (73.6)	5 (45.4)	11 (73.3)	
Does not know	77 (22.1)	4 (36.4)	3 (20.0)	
Recognize someone who has not vaccinated their children				
No	142 (40.7)	2 (18.2)	1 (6.7)	0.001†
Yes	72 (20.6)	7 (63.6)	4 (26.6)	
Unknown	135 (38.7)	2 (18.2)	10 (66.7)	
Vaccine-related side effect				
None	255 (73.1)	3 (27.3)	11 (73.3)	0.005†
Mild	93 (26.6)	7 (63.6)	4 (26.7)	
Severe	1 (0.3)	1 (9.1)	0 (0.0)	

The data are presented as median (interquartile range) and n (%).
*Mann Whitney U test, †Chi squared test.

Where all of the individuals known to the parents in this study had their children vaccinated, the vaccine hesitancy of these parents' scores in the WHO Vaccine Hesitancy Scale in Turkish was found to be significantly higher. This means that these parents have low vaccine hesitancy frequency. Moreover, the probability that a parent who did not allow at least one of their children to be given a full set of vaccines although these were included in the vaccination schedule knowing someone who did not have their children vaccinated is significantly higher. This is the only parameter that has a significant result in both of the assessments conducted in this study. Similarly, vaccine hesitancy was also found to be significantly higher among the parents who knew individuals who had not had their children vaccinated, in the study conducted by Aslan et al.[10] When this study is assessed together with other similar studies, the high level of influence had by the thoughts of acquaintances and the experiences of the people around them on parents is clear.[19]

One of the limitations of this study is the fact that the data obtained from the parents through a questionnaire is dependent on the statements of the parents. There were also a considerable amount of responses such as, "I do not remember", and this may have prevented us from detecting significant relationships. While 54.9% of the parents in this study were university graduates, this is higher than the data shown in the Population and Health Study of Türkiye for 2018 and thus may have had an effect on the results of this study. The other limitations of this study are that it was not possible to obtain a normal distribution in many of the variables, the very low number of parents whose children had experienced severe side effects, and that the study was conducted only with parents who had consulted the Eskişehir Osmangazi University Family Medicine Polyclinic.

CONCLUSION

Vaccine hesitancy is increasing all over the world and assessing the risk factors associated with it may help to counteract vaccine hesitancy. There is a need for health professionals to provide the correct information in a timely manner, as the frequency of refusal of vaccinations was found to be high for parents who have experienced side effects in their children. Otherwise, when parents go to the Internet to do their own research, their vaccine hesitancy prevalence increases. The responsibility falling to health professionals on this matter is big because when health professionals do provide information to parents, the vaccine hesitancy prevalence of these parents becomes lower. In addition to this, by ensuring that these opportunities are also available in the small towns and villages of the rural areas, the increase in vaccine hesitancy in the small towns should be prevented.

Disclosures

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Ethics Committee Approval: Approval for this study was obtained from the Eskişehir Osmangazi University Non-Invasive Clinical Research Ethics Committee (Approval date: January 18, 2022, and approval number: 21). Parents were informed about the research at the polyclinic after the examination.

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Side Effects of Long-Term Inhaled Corticosteroid Use in Chronic Obstructive Pulmonary Disease

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ABSTRACT

Objectives: The literature lacks sufficient data on the long-term side effects of inhaled corticosteroids (ICS) in patients with chronic obstructive pulmonary disease (COPD) when used for over a year. In this study, the frequency of potential side effects was investigated in patients with COPD who had been using ICS.

Methods: This single-center and observational study included stable COPD patients diagnosed with spirometry who had been using ICS for at least 1 year. Patient demographic and clinical characteristics and ICS-related side effects were recorded in detail according to the hospital records.

Results: The study enrolled 92 patients, 74 (80.4%) of whom were male, with an mean age of 66.5± 8.4 years. The frequency of potential side effects of ICS, including voice changes, oral candidiasis, bruises, and cataracts, was higher after treatment than before treatment (3 [3.3%] vs. 34 [36.9%], p<0.001; 3 [3.3%] vs. 15 [16.0%], p=0.008; 2 [2.2%] vs. 14 [15.2%], p=0.004; and 9 [9.8%] vs. 25 [27.2%], p=0.009, respectively). However, there was no difference in the frequency of adverse events such as pneumonia, mycobacterial infection, osteoporosis, and diabetes mellitus before and after treatment (20 [21.7%] vs. 19 [20.7%], p=0.860; 8 [8.7%] vs. 2 [2.2%], p=0.109; 4 [4.3%] vs. 8 [8.7%], p=0.388; and 10 [10.9%] vs. 13 [14.1%], p=0.678, respectively).

Conclusion: Recognizing and assessing the side effects of ICS in patients with COPD and evaluating decisions regarding the use of ICS in routine clinical practice based on the benefit-risk ratio may be necessary.

Keywords: Adverse effects, cataract, chronic obstructive pulmonary disease, oral candidiasis, pneumonia

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) causes approximately 3 million deaths worldwide each year.[1] Reducing mortality is one of the most important goals of treatment, which has not yet been achieved to the desired extent. In the 2023, Global Initiative for Chronic Obstructive Lung Disease (GOLD) strategy report, including pharmacological and non-pharmacological treatment approaches that reduce mortality in COPD, was exciting.[2] The report pointed out two large studies showing that triple therapies, including inhaled corticosteroids (ICS), can reduce mortality in patients with frequently exacerbated COPD.[3,4] ICS are widely used in the maintenance treatment of COPD despite controversy. For the first time in the 2019 GOLD report, treatment recommendations for regimens with ICS are presented more clearly.[5] However, there are still insufficient data and recommendations on how long to continue ICS in patients with treatment response and when to consider withdrawal if the patient is stable. Since the side effects of ICS are generally not followed up for more than 1 year in clinical trials, the most important concern related to long-term use is the side effects of ICS. Despite the in-

haler use, systemic side effects such as increased incidence of pneumonia, cataract, and osteoporosis have also been reported in studies to date.[6,7] In this study, the frequency of long-term local and systemic potential side effects were investigated in patients with COPD who had been using ICS for at least 1 year.

METHOD

This single-center and observational study included 92 stable COPD patients admitted to the chest diseases outpatient clinic between May 2022 and 2023. Patients who had been diagnosed with COPD for at least 1 year, had a confirmed post-bronchodilator forced expiratory volume in 1 s (FEV1)/forced vital capacity (FVC) <0.7, had a smoking history of at least 10 pack-years, and had been on ICS therapy for at least 1 year were included in the study.[5] Patients who had an exacerbation in the past 4 weeks, lacked a spirometric diagnosis, did not use inhaler medication consistently, had various cognitive impairments, and refused participation were excluded from the study.

The case report form was completed for each patient. This form included information on age, gender, smoking status, smoking pack-years, duration of COPD diagnosis, and grade of COPD (in spirometry the FEV1 value determines the grade as follows: Grade 1 (FEV1 ≥80%), Grade 2 (FEV1 ≥50–<80%), Grade 3 (FEV1 ≥30–<50%), and Grade 4 (FEV1 <30%).[8] The form recorded the number of exacerbations experienced in the previous year, details of inhaler treatments, the duration of ICS use, and any potential side effects of the inhaler medications. It also noted whether these side effects occurred before or during the use of ICS. Modified Medical Research Council (mMRC) and COPD Assessment Test (CAT) scores were recorded for each patient's degree of breathlessness and disease control status.[9] The mMRC scale evaluates a person's perception of dyspnea during daily activities. This scale allows individuals to define their sensation of breathlessness. Dyspnea severity is rated on a scale from 0 to 4, where "0 point" indicates no perception of dyspnea, and "4 points" indicates severe dyspnea perception. The CAT scale is a questionnaire specifically designed for individuals with COPD. Its purpose is to evaluate how COPD affects a person's daily life and to track changes over time. The CAT scores range from 0 to 40, with higher scores indicating a more severe impact of COPD on the patient's life. The mMRC and CAT scores were calculated to assess the potential relationship between the severity of COPD and the likelihood of side effects. The eosinophil counts and percentages of the patients were obtained from the hemogram results performed in the past 6 months during the stable period. Voice changes, oral candidiasis, bruising, pneumonia, cataract, osteoporosis, diabetes mellitus, and tuberculosis were evaluated as possible side effects related with ICS according to patients' self-reports and hospital records.

The data were transferred to the IBM SPSS Statistics 22 program. While evaluating the study data, mean±standard deviation value is used for normal distribution and median (interquartile range) for abnormal distribution of numerical variables and frequency distributions (frequency and percentage) for categorical variables. McNemar test was used to compare the frequency of side effect development before and after ICS treatment. Statistical significance was accepted as $p<0.05$.

RESULTS

A total of 92 patients were included in this study. Regarding medication use, 67 (72.8%) patients were treated with ICS+long-acting beta-2 agonist+long-acting muscarinic agonist, while 25 (27.2%) patients were treated with ICS+long-acting beta-2 agonist. Demographic and clinical characteristics of the patients are summarized in Table 1.

The frequency of potential side effects of ICS, including voice changes, oral candidiasis, bruises, and cataracts, was higher after treatment than before treatment ($p<0.001$, $p=0.008$, $p=0.004$, and $p=0.009$, respectively). The frequency of side effects possibly related to ICS use in before and after ICS treatment is summarized in Table 2.

DISCUSSION

In this study, the local and systemic side effects of ICS, which occupy an important position in the treatment of COPD, were investigated. During the use of ICS, the most common side effect observed was a change in voice, affecting 36.9% of patients. This was followed by cataracts in 27.2% patients and pneumonia in 20.7% patients, respectively. Oral candidiasis was observed in 16.3% patients, bruising in 15.2%, diabetes in 14.1%, and osteoporosis in 8.6%. Voice alterations, oral candidiasis, bruises, and cataracts each of which may be associated with the use of ICS were found to be significantly more common during ICS usage compared to the non-use period. In contrast, adverse events such as pneumonia, osteoporosis, and diabetes were reported at similar frequency both before and after the treatment.

The most common local side effects of ICS are encountered in patients with COPD.[7] In the study by Lyseng-Williamson et al., the rate of voice change side effects in COPD patients using inhaled steroids was found to be 3–5%.[10] In a study conducted by Klaus et al., a lower incidence of dysphonia and oral candidiasis was observed in the group receiving long-acting β2 agonists and anticholinergics compared

Table 1. Demographic and clinical characteristics of the patients

	Mean±SD
Age (years)	66.5±8.4
	n (%)
Gender	
Male	74 (80.4)
Female	18 (19.6)
Smoking status	
Active smoker	40 (43.5)
Ex-smoker (smoked and quit)	52 (56.5)
Grade of COPD	
Grade 1	9 (9.8)
Grade 2	7 (51.1)
Grade 3	30 (32.6)
Grade 4	6 (6.5)
Least one exacerbation in the previous year	41 (44.6)
Treated with systemic steroids for 5 days during the exacerbation	30 (32.6)
	Median (IQR)
COPD diagnosis time (years)	10.0 (13.0)
mMRC scale score	2.0 (2.0)
CAT scale score	17.0 (12.0)
Frequency of exacerbations in the previous year	0.0 (1.0)
Duration of ICS use (years)	6.0 (6.0)
EOS (cells/mL)	200.0 (210.0)
EOS (%)	2.1 (2.5)

CAT scale: COPD assessment test scale; COPD: Chronic obstructive pulmonary disease; EOS: Eosinophil count; ICS: Inhaled corticosteroids; IQR: Interquartile range; mMRC scale: Modified medical research council scale; SD: Standard deviation.

to the treatment group receiving inhaled glucocorticoids.[4] Similarly, it was observed that intraoral local side effects occurred in approximately one out of three patients in our study. Encouraging each patient to gargle with water after use may help reduce this local side effect.[11,12]

Oral candidiasis is one of the important local side effects that may develop due to ICS and may affect the patient's quality of life and compliance with treatment.[13] The analysis of 16 randomized controlled trials (RCTs) has shown that the use of ICS tripled the risk of oral candidiasis.[14] In this study, it was observed that while the prevalence of oral candidiasis was 3.3% before the use of ICS, this prevalence increased to 16.3% after the initiation of ICS.

Bruising, one of the systemic side effects of ICS, is observed more frequently, especially in elderly patients and when high doses of ICS are used. This causes anxiety in patients and sometimes leads to unnecessary further investigations. The Lung Health Study 2 reported that easy bruising was significantly increased in patients with COPD using ICS compared to those using placebo (11.2% vs. 3.5%).[15] Similarly, in this study, there was an increase in reports of bruising in COPD patients following ICS use. A low level of awareness of this side effect among both physicians and patients can lead to it being frequently overlooked.

Another undesirable effect associated with ICS use is an increased incidence of cataract.[16] In the study by Nath et al., cataract was detected in 16.2% of COPD patients using ICS and the frequency of cataracts increased with age and the incidence was as high as 27.3% in patients aged 80 years and older. In addition, no cataract development was observed even with low-dose ICS use for more than

Table 2. The frequency of side effects possibly related to ICS use in before and after treatment

	Before ICS Treatment	After ICS Treatment	p
Side effects			
Change in voice	3 (3.3)	34 (36.9)	<0.001
Oral candidiasis	3 (3.3)	15 (16.0)	0.008
Bruising	2 (2.2)	14 (15.2)	0.004
Cataract	9 (9.8)	25 (27.2)	0.009
Pneumonia	20 (21.7)	19 (20.7)	0.860
Mycobacteria infection	8 (8.7)	2 (2.2)	0.109
Osteoporosis or bone fracture	4 (4.3)	8 (8.7)	0.388
Diabetes mellitus	10 (10.9)	13 (14.1)	0.678

ICS: Inhaled corticosteroids.
Data are presented as n (%).
McNemar test.

1 year, whereas the prevalence of cataract was 32.2% and 39.7% in medium- and high-dose ICS use, respectively. It was observed that 36.9% of the patients had cataracts, with only 9.8% patients having a cataract diagnosis before ICS treatment, and 27.2% patients receiving a cataract diagnosis after ICS use in this study. It may be important in terms of preventive medicine to be careful about cataracts and to remind regular eye controls especially in patients with COPD who use high dose ICS.

Increased risk of pneumonia is the most concerning side effect of ICS. The frequency of pneumonia before ICS use was comparable to the frequency during ICS treatment observed in this study. A review indicated a higher risk of pneumonia in COPD patients and smokers, regardless of ICS use.[17] The "Extrafine Inhaled Triple Therapy Versus Dual Bronchodilator Therapy In Chronic Obstructive Pulmonary Disease" study, which compared triple therapy (beclomethasone dipropionae+formoterol fumarate+glycopyrronium) with dual bronchodilator therapy (formoterol fumarate+glycopyrronium) and followed patients for 52 weeks, the ICS arm was not associated with a higher incidence of pneumonia.[18] Similarly, the "Study to Understand Mortality and Morbidity in COPD (SUMMIT)" study, ICS use did not lead to an increased risk of pneumonia, whereas low FEV1, history of exacerbation and body mass index <25 kg/m^2 were associated with an increased risk of pneumonia.[19] In multicenter RCTs including large patient groups, such as the Informing the Pathway of COPD Treatment and Towards a Revolution in COPD Health, it was pointed out that there was an increased risk of pneumonia in the ICS arm, but this risk was acceptable considering the exacerbations it prevented.[3,20] While most of the studies evaluating the side effect of pneumonia included fluticasone-containing treatments, an increased risk of pneumonia was found in a few studies with non-fluticasone ICS.[21,22] Therefore, patients who are started on ICS should also be evaluated in terms of other pneumonia risk factors and high-risk patients should be closely monitored in terms of benefit- risk ratio.

There are conflicting results in the literature that ICS may increase the risk of osteoporosis. Observational studies have shown that high-dose ICS, especially when used for more than three years, decrease bone mineral density (BMD).[23] The low-dose ICS was not associated with BMD loss, while high-dose ICS was found to be associated.[24] It was detected that the addition of low-dose inhaled budesonide to treatment did not affect BMD at 4-year follow-up in patients with COPD.[25] It was not observed an increase in the frequency of osteoporosis in COPD patients during ICS treatment compared to the non-use period in this study. However, in light of the literature, the risk of osteoporosis should be taken into consideration when prescribing ICS-containing regimens and dose preference in patients with COPD.

The results of observational studies indicate that ICS may be associated with an increased risk of mycobacterial infection and tuberculosis in patients with COPD.[26,27] A meta-analysis of RCTs also found an increased risk of tuberculosis in patients with COPD using ICS. On the other hand, in a population-based nested case–control study, ICS use in patients with COPD was associated with non-tuberculous mycobacterial infections but not with pulmonary tuberculosis.[28] Similarly, it was not observed an increase in the frequency of pulmonary tuberculosis during ICS treatment compared to the previous period. The fact that mycobacterial infection is included in the etiology of COPD may explain the higher frequency of mycobacterial infection before ICS than after treatment in our study.

The ICS may increase the risk of diabetes and impair glucose control in patients with diabetes.[29] However, there are studies in the literature showing that high-dose ICS increases the risk of diabetes and impairs glucose regulation, as well as studies that have not found a correlation between ICS use and diabetes.[29-31] No significant difference was found between the percentage of patients with diabetes before treatment and those diagnosed after ICS treatment in this study. Although the results in the literature are contradictory on this subject, evaluating diabetes symptoms, especially in COPD patients using high-dose ICS, and monitoring glucose levels in diabetic patients at each visit may increase experience in this regard.

This study also has some limitations. The first of all is an observational study. Since side effects potentially related to ICS were questioned retrospectively and based on patient self-reports, there is a risk of recall bias. To minimize this impact, we conducted a retrospective review of hospital and pharmacy records to document reported adverse events. Second, our study did not include a control group that was not using ICS. Adverse events possibly related to ICS use were categorized into two groups: those occurring before treatment and those arising after treatment. The frequency of these events was then compared. Side effects may be dose-dependent on ICS; however, due to the small number of patients in our study, grouping based on the ICS doses used could not be performed. Finally, due to the small number of patients and the presence of many confounding factors such as age and comorbidities, a definitive cause-and-effect relationship between side effects and inhaled ICS use cannot be established based on these results.

CONCLUSION

Although this study is observational, it indicates that long-term ICS use in patients with COPD may be associated with numerous local and systemic side effects. Increased awareness of these side effects among physicians and patients will lead to earlier recognition and treatment. In primary health care centers and pulmonology outpatient clinics, interrogation of patients with COPD about both the benefits and side effects of ICS regimens is of great importance in the decision to continue treatment.

Disclosures

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Case Report

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Clinical Insights and Multidisciplinary Tertiary Prevention in Duchenne Muscular Dystrophy: A Case Report

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ABSTRACT

Duchenne Muscular Dystrophy (DMD) is a severe X-linked recessive disorder characterized by progressive muscle atrophy, loss of mobility, and systemic complications, predominantly affecting males. This case report presents a 10-year-old boy with progressive walking difficulties, frequent falls, and hallmark features such as a positive Gower's sign, waddling gait, lumbar lordosis, calf hypertrophy, and proximal muscle weakness. Symptoms began at age 4, with a notable family history of similar symptoms in an older sibling. Elevated creatine kinase levels and clinical findings strongly suggest DMD, with genetic testing underway for confirmation. Management focused on tertiary prevention strategies, including corticosteroid therapy, physiotherapy, orthotic support, respiratory care, and nutritional counselling. A multidisciplinary approach emphasized the importance of early interventions, assistive devices, and adjunct therapies such as yoga to improve functional outcomes and quality of life. This case highlights the critical role of comprehensive, personalized care and multidisciplinary collaboration in addressing the complex challenges of DMD, ultimately aiming to enhance the well-being and independence of affected individuals.

Keywords: Duchenne muscular dystrophy, genetic neuromuscular disorder, multidisciplinary care, tertiary prevention, quality of life

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INTRODUCTION

Duchenne muscular dystrophy (DMD) is the most common genetic neuromuscular disorder, predominantly affecting males due to its X-linked recessive inheritance.[1] It impacts approximately one in 3600 male infants and is characterized by progressive muscle atrophy, leading to severe disability and early death. Initial symptoms, such as difficulty ascending stairs, a waddling gait, and frequent falls, appear between ages 2 and 3. By ages 10–12, most patients require wheelchairs, and ventilation support is needed around age 21.[2] Due to proximal muscle weakness, most affected persons cannot run and jump adequately, which also causes them to adopt the traditional Gowers manoeuvre while getting up from the floor. Affected individuals can also have somewhat delayed motor milestones. When a patient's physical ability sharply deviates from that of their peers at age five on average, they are diagnosed. Boys who go untreated lose muscle strength and need a wheelchair before they turn ten. Muscle function has already decreased by the time a parent becomes concerned about DMD, which typically takes 1.6 years to diagnose.[3] If nothing is done, heart, lungs, and joint difficulties occur,

and the average age at death is about 19 years. There may also be non-progressive cognitive impairment.[4] Early diagnosis and intervention can significantly improve outcomes, allowing patients to live into their fourth decade.

CASE REPORT

A 10-year-old boy presented with progressive difficulty walking and frequent falls over several years. Symptoms began at age 4 with difficulties in walking and rising from the floor. His 12-year-old brother exhibits similar symptoms. The patient struggles to keep up with peers, often complains of leg pain and fatigue, and has delayed developmental milestones. No family history of neuromuscular or genetic disorders was reported.

Initially met developmental milestones until age 4. At present, the patient requires assistance with daily activities such as dressing and using the restroom and experiences increased fatigue after physical activities. Notable difficulties include getting up from the floor, climbing stairs, frequent falls, and walking long distances without support. The patient had positive Gower's sign, waddling gait, lumbar lordosis, decreased muscle strength in proximal lower extremities, calf hypertrophy, hamstring rigidity, and poor oral hygiene. Weakness of the proximal muscles leads to foot drop and tight heel cord (contracture) leads to walking on tiptoe are shown Figure 1 and 2.

The patient had high creatine kinase levels, which are an indicator of muscle damage. Genetic testing is pending, with DMD suspected based on clinical presentation. Further assessments might include electromyography and nerve conduction studies, though muscle biopsy is typically avoided but could reveal DMD-specific histopathological changes.

DISCUSSION

DMD is characterized by muscle atrophy and degeneration.[5] Treatment guidelines focus on diet, exercise, and cardiovascular health to slow disease progression. Corticosteroids such as prednisolone and deflazacort are commonly used to improve muscle strength and function.[6] Tertiary prevention involves managing symptoms and enhancing life quality, including monitoring for scoliosis and using physiotherapy and orthotic support to prevent contractures and maintain posture.[7] Respiratory issues are man-

Figure 1. Foot drop due to proximal weak muscles.

Figure 2. Tight heel cord (contracture) leading to toe walking.

aged through ventilation support and therapies to maximize respiratory capacity.

Rehabilitation plays a crucial role in DMD management, aiming to optimize respiratory function, bone density, muscle strength, and coordination.[8] Standard therapies include physical therapy, stretching, orthopaedic surgery, ventilatory support, scoliosis management, and nutritional supplements. A multidisciplinary team approach is essential, involving various health-care specialists to address the multifaceted challenges of DMD.

Yoga has shown benefits in improving autonomic regulation and parasympathetic control in DMD patients, supporting its use as an adjunct therapy.[9] A multidisciplinary rehabilitation team, including physicians, therapists, and equipment providers, supports patients in various settings to enhance their functional mobility and quality of life.[10] Motorized stand-and-drive wheelchairs can aid in maintaining independence and reducing fall risks.

During the ambulatory stage, key strategies include preventing deformities and falls, promoting specific activities or exercises, and providing necessary equipment and orthoses.[11] In addition, supporting funding for social services, transportation access, and community involvement is vital for the well-being of individuals with DMD.

CONCLUSION

Tertiary prevention is critical in managing DMD, addressing various complications through a team-based approach. This includes cardiomyopathy treatment, respiratory support, mobility aids, and psychosocial support. Staying updated with new therapies and clinical research is essential. End-of-life care focuses on providing palliative care to maintain comfort, dignity, and quality of life. Overall, a comprehensive, personalized strategy aims to maximize the well-being of DMD patients and their families in the face of this challenging illness.

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Case Report

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Multidrug-Resistant Microorganism as a Cause of Urinary Tract Infection in Primary Care

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ABSTRACT

This case report presented a 71-year-old female patient with a clinical picture compatible with a urinary tract infection (UTI) who did not respond to conventional treatment. The urine culture showed the growth of a bacterium called *Providencia rettgeri*, which is multidrug-resistant, among other antibiotics, to the one most commonly used in our population, such as fosfomycin trometamol, for uncomplicated UTIs.

Keywords: Antibiotic resistance, primary care, urinary tract infection

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INTRODUCTION

Bacteria belonging to the *Providencia* genus are part of the Enterobacteriaceae family and are opportunistic Gram-negative microorganisms.[1] Among the various species, *Providencia stuartii* and *Providencia* rettgeri are the most common, particularly noted in urinary tract infections (UTIs), where they can colonize permanent catheters and even trigger in-hospital outbreaks.[2] In addition, they are commonly found in sewage or soil habitats. While historically infrequent, they are increasingly recognized as opportunistic pathogens, causing UTIs, gastrointestinal infections, and even septicemia.[3] These infections are often associated with immunocompromised patients, individuals with urinary catheters, or those with diabetes.[4]

CASE REPORT

In this article, a 71-year-old female with dysuria and pollakiuria was presented. The patient had a history of arterial hypertension and dyslipidemia and was receiving ramipril 5 mg and atorvastatin 10 mg treatment. Notably, the patient denied any fever or back pain during the anamnesis assessment.

On examination, bilateral renal fist percussion was negative, and the abdomen appeared soft and depressible, non-tender to palpation, with no masses, megaliths, signs of defense, or peritoneal irritation. In addition, no audible murmurs were detected.

Given the clinical presentation, the case was initially classified as an uncomplicated UTI. Since this was her first episode this year, empirical treatment with fosfomycin trometamol 3 g in a single dose was prescribed.

Despite initial treatment, the patient reported persistent symptoms without fever or back pain during a follow-up consultation 1 week later. With the repeated unremarkable abdominal examination, the decision was made to repeat the fosfomycin trometamol 3 g regimen, along with another dose administered 72 h after the first, while awaiting urine culture results.

The urine culture revealed the isolation of *P. rettgeri*, with antibiogram results indicating resistance to ampicillin, amoxicillin–clavulanic acid, oral cefuroxime, nitrofurantoin, and fosfomycin, yet susceptibility to cefotaxime, cefepime, gentamicin, and clotrimoxazole.

Given the bacterium's resistance profile, and considering outpatient management, cefixime was chosen as an oral alternative to cefotaxime, leading to the resolution of the clinical symptoms.

DISCUSSION

The widespread use of certain antibiotics over time has contributed to the emergence of multidrug-resistant microorganisms, including *P. rettgeri* in this case.[5] Fosfomycin has been preferred empirically for uncomplicated UTIs caused by *Enterococcus faecalis* or *Escherichia coli* due to its broad spectrum and favorable safety profile.[6,7]

Selecting appropriate treatment is complex due to the reported multi-drug resistance among commonly used antibiotics for *P. rettgeri* infections.[7] Notably, variable responses to fluoroquinolones, aminoglycosides, clotrimoxazole, and fosfomycin have been documented. Furthermore, certain resistance mechanisms have been identified, including chromosomal mutations hindering fosfomycin transport and the presence of the FosA11 enzyme.[7,8]

The bacterium typically responds well to aztreonam, imipenem, meropenem, and third-generation cephalosporins, as observed in this case.[9]

CONCLUSION

The successful response of *P. rettgeri* to cefixime in this case is noteworthy. This underscores the importance of reconsidering the empirical use of antibiotics, as it contributes to the development of resistance among various infectious pathogens, limiting the effectiveness of conventional antibiotics. Confirmation of UTI by urine culture is required before starting empirical antibiotic therapy, especially in uncomplicated cases with minimal symptoms.

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Scientific Letter

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Management of Type 1 Diabetes with Advanced Technology

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ABSTRACT

The understanding and treatment of type 1 diabetes (T1D) is advancing with technological advances. The discovery of insulin in 1921 revolutionized diabetes treatment and paved the way for the development of insulin pumps (IP) continuous glucose monitors (CGMs) and artificial pancreas (AP) systems, which have significantly improved diabetes management. IP provides continuous insulin delivery, offering benefits, such as adaptability, precise dosing, and improved glycemic control. The CGMs enable real-time glucose monitoring, leading to enhanced glycemic management and reduced hypoglycemia risk. The AP systems combine CGM and IP technologies to automate insulin delivery, resulting in improved outcomes and potential dual hormone systems using insulin and glucagon. Despite the potential of these technologies, challenges exist in utilizing them in India, including cost, insurance coverage, availability, awareness, healthcare infrastructure, trained professionals, cultural barriers, and data management issues. However, ongoing research and advanced research utilizing cutting-edge technologies offer hope for new therapies and ultimately a cure for T1D.

Keywords: Artificial pancreas, blood glucose self-monitoring, hypoglycemia, insulin infusion system, type 1 diabetes mellitus

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INTRODUCTION

The technological evolution strongly influenced – and indeed reshaped – the landscape of Type 1 Diabetes (T1D) comprehension.[1] The turning point finally came in 1921 and with the great invention of insulin an era whose influence on all aspects of diabetes treatment proved to be revolutionizing. This achievement led the way for further developments that went on to spawn new technologies, proving significant in improving the existence of those struggling with T1D.

At the leading edge of this technological wave are insulin pumps (IP), which administer precise doses of insulin without needing to be injected and give patients a greater degree of control over their blood sugar.[2] This is supported by the advent of continuous glucose monitors (CGM) that have completely changed how we are able to follow blood sugars in real-time with instantaneous feedback for both patients and providers so they can act on information quickly. The epitome of this advancement comes in the embodiment of an artificial pancreas (AP): a miracle concoction combining IP and CGM to automatically manage insulin administration relative to present glucose levels, allowing for optimal blood glucose control. It is almost a prestige to show the old lifestyle to kids all around TID being live now, making this age witness cutting-edge diabetes management thanks in part from the tech power equals healthier

being won with our gradually knowing people who are T1D better than ever period into which their evolution has synergistically intertwined. This takes us on an enlightening journey that describes the scientific breakthroughs and technological changes that have revolutionized the lives of people living with T1D.

IP

IP are pager-sized computerized devices that convey basal and bolus insulin throughout the day, as per pancreatic discharge.[3] Their pump technology also connects to a cannula that is inserted under the skin and delivers insulin directly into adipose tissue. IP therapy has been demonstrated to improve quality of life as compared with multiple daily insulin injections, providing increased dosing flexibility in response to day-to-day variations and offering better glycemic control. Better blood glucose control is made possible by easily adjusting their insulin dosage with the use of IP. In addition, they give small doses of insulin to help individuals who experience sensitivity or highs and lows in blood glucose. Continuous insulin infusion improves glycemic control and reduces hypoglycemia.

CGM

The CGM comprises a technique for measuring glucose levels in real-time, conducted through an implantable sensor placed under the skin that reads concentrations of glucose present within interstitial fluid from patients with T1D.[4] This is sent to a glucose values display/alert device. These advantages include superior glycemic control compared to customary monitoring, reduced risk of hypoglycemia, and heightened glucose fluctuation awareness.[5] Studies have shown a considerable decrease in glycated hemoglobin levels and time of hypoglycemia among patients operating CGM systems over conventional routines.[6]

AP

The AP or closed-loop system is a new technology using CGM devices integrated with IP that stabilizes glucose into target-range values for subjects.[7] While basal-bolus therapy requires significant patient input, an automated system might ultimately reduce the work that patients need to do while improving outcomes. Automatic modulation of both basal and bolus insulin delivery within fully closed-loop systems has demonstrated efficacy in early research. Dual hormone systems: Dual hormone systems are another important advancement that employs insulin and glucagon to maintain blood glucose levels in a more controlled way by simulating the pancreas's natural operation. However, the research indicates that these advances could be instrumental in enhancing diabetes control to potentially improve the quality of life for individuals with diabetic issues.

CONCLUSION

Managing T1D in India faces challenges such as high costs, limited insurance, restricted availability, lack of awareness, inadequate infrastructure, professional shortages, cultural barriers, and data issues. Despite a weak regulatory framework, technological advancements offer hope for new treatments and understanding, with ongoing research promising future therapies and a potential cure.

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