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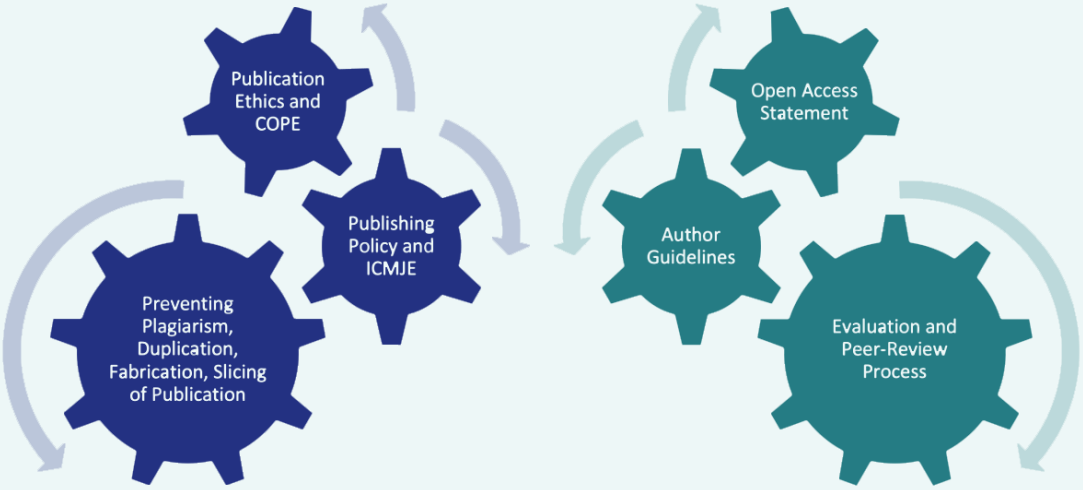

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The burden of non-communicable diseases attributable to physical inactivity in Türkiye

Türkiye'de fiziksel inaktiviteye atfedilen bulaşıcı olmayan hastalık yükü

Büşra TOZDUMAN[1], Buğra Taygun GÜLLE[1]

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Abstract

Physical inactivity is a major risk factor for non-communicable diseases (NCDs) globally. In Türkiye, the prevalence of physical inactivity is notably high, ranking third in Europe, with 44.4% of the population classified as physically inactive. This study aims to estimate the population attributable fractions (PAFs) of coronary heart disease, type 2 diabetes (DM), stroke, dementia, depression, and hypertension cases, deaths and disability-adjusted life-years (DALYs) due to physical inactivity in Türkiye.

Data on physical inactivity prevalence and NCDs' incidences, mortalities and DALYs were sourced from recent national surveys and Global Burden of Disease study. Relative risks (RRs) were obtained from global meta-analyses. PAFs were calculated using Levin's equation.

PAFs of physical inactivity were 16.7% for dementia, 11.6% for depression, 9.5% for stroke, 8.8% for CHD, 7.1% for type 2 diabetes and 3.1% for hypertension. Between 3.7% (for hypertension) and 17,5% (for dementia) of NCD deaths and 3.4% (for hypertension) and 17.1% (for dementia) of the DALYs due to NCDs examined in this study were attributable to insufficient physical activity. The burden was more significant among women and older ages.This study emphasizes the need for promoting physical activity and implement interventions focusing particularly on women and the elderly to reduce the burden of NCDs in Türkiye.

Keywords: Physical inactivity, non-communicable disease, populaton attributable fraction

Özet

Fiziksel inaktivite, tüm dünyada bulaşıcı olmayan hastalıklar (BOH) için en önemli risk faktörlerindendir. Türkiye, %44,4'lük fiziksel inaktivite prevalansı ile Avrupa'da üçüncü sırada yer almaktadır. Bu çalışmanın amacı, Türkiye'de fiziksel inaktiviteye atfedilen koroner kalp hastalığı, tip 2 diyabet (DM), inme, demans, depresyon ve hipertansiyon vaka sayısı, mortalitesi ve engelliliğe göre ayarlanmış yaşam yıllarını belirlemektir.

Fiziksel inaktivite prevalansı ile BOH'ların insidansları, mortaliteleri ve ve engelliliğe göre ayarlanmış yaşam yılları verileri ulusal çalışmalardan ve Küresel Hastalık Yükü çalışmasından elde edilmiştir. Rölatif riskler (RR) yakın zamanda yapılan meta-analizlerden alınmıştır. Topluma atfedilebilir fraksiyonlar Levin'in denklemine dayanarak hesaplanmıştır.

Fiziksel inaktivitenin topluma atfedilebilir fraksiyonları demans için %16,7, depresyon için %11,6, inme için %9,5, KKH için %8,8, tip 2 DM için %7,1 ve hipertansiyon için %3,1'di. BOH nedenli ölümlerin fiziksel aktiviteye atfedilebilirliği %3,7 (hipertansiyon) ile %17,5 (demans); engelliliğe göre ayarlanmış yaşam yıllarınının fiziksel aktiviteye atfedilebilirliği %3,4 (hipertansiyon) ile %17,1 (demans) aralığında değişmekteydi. Kadınlarda ve artan yaşla fiziksel inaktiviteye atfedilen BOH fraksiyonu artmaktaydı. Türkiye'de BOH yükünü azaltmak için fiziksel aktivitenin desteklenmesine ve özellikle kadınlar ve yaşlılara odaklanan müdahalelere ihtiyaç vardır.

Anahtar Kelimeler: Fiziksel inaktivite, bulaşıcı olmayan hastalıklar, topluma atfedilirlik fraksiyonu

Introduction

Physical inactivity is defined by the World Health Organization (WHO) as “an insufficient physical activity level to meet present physical activity recommendations” (1). Physical inactivity is one of the leading risk factors for non-communicable diseases (NCDs) and mortality worldwide, while regular physical activity can reduce the risk of cancers by 8–28%, heart disease and stroke by 19%, diabetes by 17%, and depression and dementia by 28–32% (2). It is estimated that if physical inactivity levels remain unchanged, there will be 499.2 million new cases of preventable NCDs and mental health conditions globally between 2020 and 2030. The total cost of these preventable conditions is projected to reach US$301.8 billion, averaging around US$27.4 billion per year (3). This makes physical inactivity one of the biggest public health problems of the 21st century (4). For this reason, the WHO aims to achieve a 15% reduction in physical inactivity among adults and adolescents between 2016 and 2030. To achieve this goal, four strategic objectives have been identified: creating active societies, environments, people, and systems (5).

According to the WHO, in 2020, 31% of adults worldwide did not meet the recommended levels of physical activity, which equates to 1.8 billion physically inactive adults (6). Türkiye has the third-highest prevalence of physical inactivity in Europe, with 44.4% of the population being physically inactive. Additionally, while the global gender gap in physical inactivity is around 5%, this disparity is much larger in Türkiye, reaching nearly 20% (53.4% in women compared to 35.2% in men) (7). Türkiye also ranks first in Europe for obesity prevalence, a condition closely linked to physical inactivity, further underscoring the importance of addressing this public health issue (8). The Turkish Ministry of Health, within the scope of the “Action Plan for the Prevention of Adult and Childhood Obesity and Physical Activity 2019-2023,” aims to reduce physical inactivity by 15% by 2030. The plan focuses on providing leadership and coordination, increasing physical activity among children and adolescents, making physical activity a part of adults’ daily lives, and encouraging the elderly to be more physically active (8).

Although similar studies have been conducted globally (3,10,11), Türkiye’s high rates of physical inactivity, along with the notable gender disparity, suggest the need for a more detailed and country-specific evaluation. A study with updated and country-specific data would help to better understand the factors driving these patterns in Türkiye and could inform the development of more appropriate public health interventions tailored to the Turkish context.

The aim of this study is to calculate the proportion of chronic diseases such as coronary heart disease (CHD), type 2 diabetes (DM), stroke, dementia, depression, and hypertension in Türkiye that can be attributed to physical inactivity, using the Population Attributable Fraction (PAF) to estimate the percentage of cases that could potentially be prevented if physical inactivity was eliminated. By estimating the population attributable fractions, we aim to provide data that will inform public health strategies targeting increased physical activity.

Material and Method

This study was designed and conducted as an ecological study. Physical inactivity was defined as not meeting current WHO recommendation (doing at least 150 min of moderate-intensity, or 75 min of vigorous-intensity physical activity per week or any equivalent combination of the two) (1). According to WHO

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Guidelines on Physical Activity and Sedentary Behaviour there is high certainty evidence that any level and any intensity of physical activity is associated with lower incidence of CHD and type 2 DM (1). Also, moderate certainty evidence supports an association between physical activity and improvements in mental health and cognitive health (1). Physical Activity Guidelines Advisory Committee Scientific Report indicates that stroke is less common among individuals who are or become more physically active (12).

Data Sources

Physical activity data based on sex- and age-specific prevalence were obtained from 2017 National Household Health Survey, Prevelance of Non-Communicable Disease Risk Factors (13). Sex and age specific incidence, death and disability-adjusted life year (DALY) data for CHD, stroke, type 2 DM, depression (major depression and dysthymia) and dementia were obtained from the recent Global Burden of Disease study in 2021. In this study, the data was organized into 5-year age groups, and the calculations were performed accordingly (14). For hypertension, incidence data was obtained from the Ministry of Health's report of cohort study conducted in Türkiye (15). The relative risks (RRs) associated with physical inactivity defined for the diseases were retrieved from the recent meta-analyses (16–19).

PAF Calculations

To estimate the attributable burden of diseases associated with physical inactivity, PAFs were calculated using the Levin's equation (20):

$$\text{PAF}=\frac{P\ (RR-1)}{1+P\ (RR-1)}$$

where P is the prevalence for physical inactivity, RR is its corresponding relative risk (RR). Prevalences for physical inactivity were obtained by gender and age group, as reported in the National Household Health Survey, and the PAFs were calculated separately. The number of cases, deaths, and DALY data for NCDs were also organized by the same age groups and genders to calculate the proportions attributable to physical inactivity. All data was stored and analysed using Microsoft Excel 2016 (Microsoft Corporation, USA).

Results

Between 3.1% (for hypertension) and 16.7% (for dementia) of NCD cases examined in this study were attributable to physical inactivity. Following dementia, the highest proportion of cases attributable to physical inactivity was found in

Table 1: Proportion and number of cases, deaths and DALYs attributable to physical inactivity, by type of disease and sex

Parameters	Men		Women		Both	
	PAF (%)	Attributable number	PAF (%)	Attributable number	PAF (%)	Attributable number
Incidences						
CHD	7.2	26,694	11.2	28,259	8.8	54,953
Stroke	7.3	3,352	11.6	5,758	9.5	9,111
Type 2 DM	5.7	9,430	8.6	13,879	7.1	23,309
Hypertension	2.3	21,420	3.6	44,568	3.1	66,007
Depression	8.6	142,273	13.3	406,919	11.6	549,192
Dementia	12.6	5,808	19.3	13,978	16.7	19,787
Mortality						
CHD	7.7	4,758	12.6	6,368	9.9	11,127
Stroke	7.8	2,151	12.6	4,051	10.4	6,202
Type 2 DM	7.0	724	11.2	1,402	9.3	2,127
Hypertension	2.7	1,587	4.6	2,943	3.7	4,531
Dementia	13.0	940	20.0	2,572	17.5	3,513
DALYs						
CHD	7.2	99,581	12.0	99,067	9.0	198,649
Stroke	7.4	43,918	11.9	69,587	9.6	113,506
Type 2 DM	6.0	33,321	9.5	61,676	7.9	94,997
Hypertension	2.6	31,990	4.4	33,998	3.4	49,986
Depression	8.6	22,693	13.3	61,269	11.6	83,962
Dementia	12.8	19,022	19.6	49,880	17.1	68,902

depression (11.6%). PAFs for stroke, CHD and type 2 DM were 9.5%, 8.8% and 7.1% respectively. PAFs were significantly higher for all diseases in women. The high number of depression and dysthymia cases caused by physical inactivity is also noteworthy (Table 1).

Physical inactivity was responsible for 3.7%-17.5% of the deaths and 3.4%-17.1 of the DALYs. An estimated 11,127 deaths and 198,649 DALYs related to CHD could have been prevented by achieving sufficient levels of physical activity (Table 1). For all noncommunicable diseases, 6.0% of deaths (8.3% for women and 4.1% for men) and 3.7% of DALYs (4.5% for women and 2.8% for men) were due to physical inactivity.

With increasing age, the proportion of all NCDs attributable to physical inactivity also increased. In all age groups, PAFs were higher in women than in men (Fig. 1 and 2).

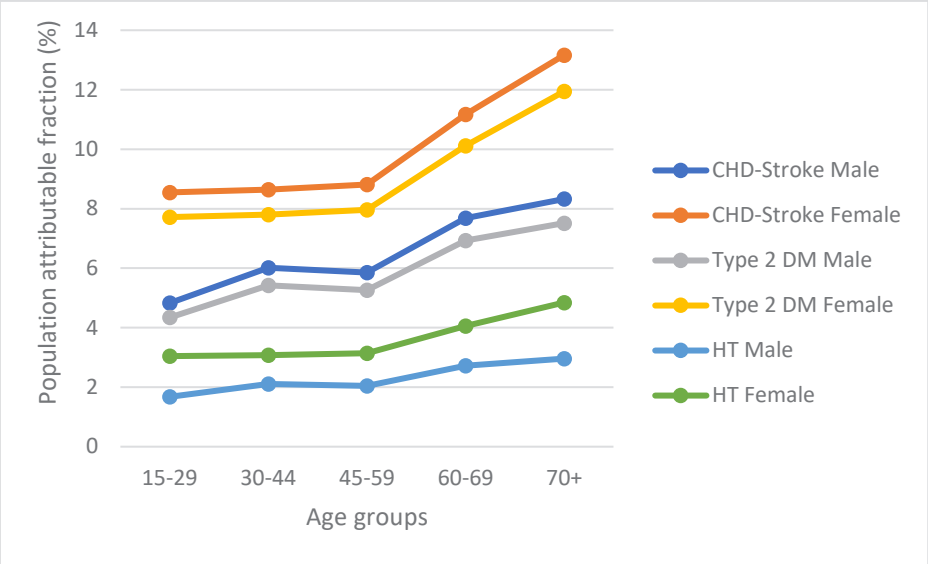

Figure 1: Population attributable fractions of CHD, Stroke, DM and HT by sex and age groups

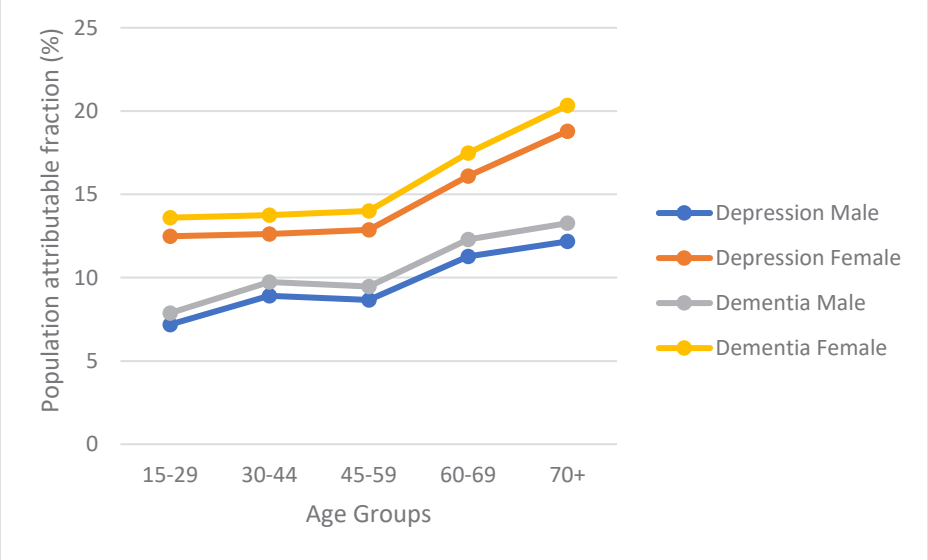

Figure 2: Population attributable fractions of depression and dementia by sex and age groups

Discussion

The results of this study highlight the significant burden of physical inactivity on various chronic diseases in Türkiye. PAFs of physical inactivity are 8.8% for CHD, 9.5% for stroke, 7.1% for type 2 diabetes, 3.1% for hypertension, 11.6% for depression, and 16.7% for dementia. The data also show that physical inactivity plays an important role in both the incidence and mortality of these chronic diseases, with notable contributions to the overall disease burden, as measured by DALYs.

Previous global studies have shown that the PAF of physical inactivity in Türkiye was around 5-5.5% for stroke and CHD, 5% for type 2 diabetes, 8% for depression, 9% for dementia, and 2% for hypertension (3,10). In these studies, it has also been observed that the PAFs for physical inactivity in Türkiye are higher compared to countries with a similar economic level or geographical region (3,10). Additionally, a global study found that the average PAF for physical inactivity in CHD worldwide was 6%, while in Türkiye it was 9.3%. For type 2 DM, the global average PAF was 7%, whereas in Türkiye it was found to be 11.5% (11). Furthermore, a meta-analysis including 22 studies from various countries reported an unweighted PAF for dementia related to physical inactivity ranging from 7.1% to 30.5%, with a pooled estimate of 16.7%, which is identical to the PAF we calculated for Türkiye (21). The PAF for physical inactivity in diabetes has been reported to range from 3% to 39% in different studies (22).

PAF calculations can yield different results depending on the chosen RR, the sources used for prevalence estimates, and the data provided for the incidence of selected diseases. In this study, we aimed to obtain the most accurate PAF estimates for Türkiye by utilizing the most widely accepted and frequently used meta-analyses for RR, and by calculating prevalence for physical inactivity and incidences for non-communicable diseases data separately for age groups and genders based on the most up-to-date and comprehensive national studies. Although PAF estimates vary depending on the study location and methods, it is clear that the PAF of physical inactivity for chronic diseases is notably high in Türkiye. The elevated PAFs for incidence are reflected in similarly significant contributions of physical inactivity to mortality and overall disease burden, as measured by DALYs.

The gender gap in physical inactivity in Türkiye is significantly high, with a difference of 18.2%. This disparity is more comparable to countries like Iran, Iraq, Pakistan, and Afghanistan, rather than European nations (7). As a result, in all the diseases examined, the PAF of physical inactivity is consistently higher among women compared to men. The primary reason for this gender difference in physical inactivity is attributed to higher gender inequality (23). Additionally, in middle- and high-income countries, income inequality has also been shown to contribute to the gender gap in physical inactivity (24) . Despite this, the Ministry of Health's Action Plan contains very limited targets specifically aimed at women (9). To address this inequality, it is important to implement gender-sensitive policy approaches that consider how contextual factors and exercise environments can be adapted to encourage voluntary physical activity among women (25). Such approaches could help reduce the gender disparity in physical inactivity and improve overall public health outcomes.

As stated by the WHO, the prevalence of physical inactivity increases, particularly among those aged 60 and over (6), and this trend is similarly observed in Türkiye. In Türkiye, the already significant gender gap in physical inactivity becomes even more pronounced in the population aged 70 and above. Therefore, the WHO's recommendation to "focus on women and older adults" takes on even greater importance for Türkiye (6). The Turkish Ministry of Health's action plan includes a specific goal to increase physical activity among the elderly (9). It is essential that the actions outlined in this goal are implemented quickly and effectively.

It is important to consider the limitations of our study when interpreting the findings. A key limitation is the reliance on physical activity data, which may not fully capture the complexity of individual behaviors. Additionally, the RRs used in our analysis were derived from international studies and may not fully reflect the specific demographic, genetic, or environmental factors relevant to the Turkish population. The uniform application of RRs across all age groups and both sexes may not account for variations in susceptibility to chronic diseases based on age or gender. Moreover, the lag time between

exposure (physical inactivity) and disease onset was not taken into account, as the data primarily represented recent exposure without adjustment for delayed effects. Lastly, interactions between risk factors such as diet, smoking, and physical inactivity were not considered, potentially leading to an overestimation of some PAFs by assuming independence between these factors.

Despite these limitations, our study possesses several strengths that enhance the reliability and relevance of the findings. First, the analysis is based on prevalence data collected within Türkiye, ensuring that the results reflect the specific characteristics of the Turkish population. Furthermore, the use of the most up-to-date data provides an accurate representation of the current prevalence of physical inactivity and its health consequences. A notable strength is that this study was conducted in a population with one of the highest rates of physical inactivity globally, offering critical insights into the public health implications. Additionally, data were stratified by both gender and age, allowing for a detailed understanding of how physical inactivity impacts different segments of the population.

Conclusions

Physical inactivity represents a significant public health challenge for Türkiye, contributing substantially to the burden of chronic diseases. The marked gender disparity, particularly among women and the elderly, highlights the necessity for targeted interventions. It is imperative that immediate action be taken to reduce physical inactivity, with a particular focus on women and older adults, as highlighted by the WHO. While the Ministry of Health's action plan provides a valuable framework, greater emphasis must be placed on the timely and effective implementation of its recommendations, particularly in relation to the identified key populations.

Future research should focus on addressing identified barriers to physical activity within these groups and evaluating the effectiveness of interventions. By prioritising these recommended actions, it is anticipated that Türkiye can significantly reduce the burden of chronic diseases and enhance the overall health and well-being of its population.

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The impacts of sociodemographic characteristics and personality traits on adherence with the preventive measures of the pandemic

Bireylerin sosyodemografik ve kişilik özelliklerinin pandemideki önleyici tedbirlere uyuma etkileri

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Abstract

This study aimed to evaluate the associations between the level of compliance with preventive measures during the COVID-19 pandemic and sociodemographic characteristics and personality traits in Türkiye. The data of this descriptive study was collected in February – March 2022, during the fourth wave of the pandemic in Türkiye. A total of 1228 individuals participated in the study via online questionnaire. The COVID-19 Prevention Guidelines Compliance Scale was used to evaluate adherence to COVID-19 prevention measures, while the Ten-Item Personality Inventory was used to assess personality traits. Of the participants, 57.7% were women, and the median age was 50 years. The majority were university graduates (55.6%), married (61.5%), and resided in an urban center (82.4%). The multivariate linear regression analysis revealed that compliance with COVID-19 preventive measures was higher among females (β=2.535, p<0.001), individuals of older age (β=0.073, p<0.001), and those with at least one comorbidity (β=0.926, p=0.017), while compliance was lower among individuals with a previous history of COVID-19 (β=-0.572, p=0.005). In addition, higher compliance was associated with agreeableness (β=0.280, p<0.001), neuroticism (β=0.369, p<0.001), and conscientiousness (β = 0.268, p = 0.005). Compliance with pandemic protective measures varies among individuals depending on their sociodemographic, medical, and personality characteristics. Understanding personal characteristics that impact health behaviors is essential to provide targeted approaches to individuals during public health crises.

Keywords: Compliance, COVID-19, pandemic, personality, prevention and control

Özet

Bu çalışmanın amacı, Türkiye'de COVID-19 pandemisi sürecinde uygulanan önleyici tedbirlere uyum düzeyi ile sosyodemografik özellikler ve kişilik özellikleri arasındaki ilişkileri değerlendirmekti. Bu tanımlayıcı çalışmanın verileri, Türkiye'de pandeminin dördüncü dalga dönemi içerisinde olan Şubat - Mart 2022'de toplandı. Çalışmaya toplam 1228 kişi çevrimiçi anket yoluyla katıldı. COVID-19 Önleme Yönergeleri Uyum Ölçeği, COVID-19 önleme tedbirlerine uyumu değerlendirmek için kullanılırken, kişilik özelliklerini değerlendirmek için On Maddeli Kişilik Envanteri kullanıldı. Katılımcıların %57,7'si kadındı ve ortanca yaş 50 yıldı. Çoğunluk üniversite mezunuydu (%55,6), evliydi (%61,5) ve bir şehir merkezinde ikamet ediyordu (%82,4). Çok değişkenli doğrusal regresyon analizi, COVID-19 önleyici tedbirlere uyumun kadınlarda (β=2,535, p<0,001), ileri yaştaki bireylerde (β=0,073, p<0,001) ve en az bir komorbiditesi olanlarda (β=0,926, p=0,017) daha yüksek olduğunu ve daha önce COVID-19 öyküsü olan bireylerde daha düşük olduğunu (β=-0,572, p=0,005) ortaya koydu. Ayrıca, daha yüksek uyumun; uyumluluk (β=0,280, p<0,001), nevrotiklik (β=0,369, p<0,001) ve vicdanlılık (β=0,268, p=0,005) ile ilişkili olduğu bulundu. Pandemide koruyucu tedbirlere uyum, bireyler arasında sosyodemografik, tıbbi ve kişilik özelliklerine bağlı olarak değişmektedir. Sağlık davranışlarını etkileyen kişisel özellikleri anlamak, halk sağlığı krizleri sırasında hedef odaklı yaklaşımlar sağlamak açısından önemlidir.

Anahtar Kelimeler: Uyumluluk, COVID-19, pandemi, kişilik, önleme ve kontrol

Introduction

A crucial declaration in March 2020 by the World Health Organization marked the onset of a worldwide battle against the COVID-19 pandemic (1). In response, countries worldwide swiftly implemented various measures and restrictions, including social distancing, hand washing, wearing masks, stay-at-home orders, school closures, and travel restrictions (2). These practices, designed to prevent contact and contamination, have profoundly altered our lives. The fight against the COVID-19 pandemic and adherence to the protocols was not just about self-protection, but also about a sense of responsibility towards society. The pandemic measures have led to a requirement for changes in both individual and social behavior. Behavior change is impacted by a combination of personal, social, and environmental influences. Personal factors encompass individuals' knowledge, awareness, and risk perception about the disease. Social factors are connected to the beliefs of family and friends as well as societal norms. Environmental factors, on the other hand, are connected to how conducive the environment is for changing behaviors (3). These factors indicate that numerous qualities play a key role in adhering to pandemic protocols, on both personal and societal scales.

Unquestionably, the measures implemented during the fight against the pandemic have ushered in a new living order. The adaptation of individuals to this world order, reshaped by the pandemic, has been diverse, with their responses varying. Personality emerge as one of the most pivotal factors influencing individuals' perception and adaptation to the pandemic (4). Personality consists of inherent traits that develop through interactions with the environment. These traits differentiate one person from another and can be used to forecast their future actions (5). The big-five factors were discovered by Tupes and Christal in the 1960s and became prominent among personality-descriptive terms in subsequent decades. The factors were named as follows, Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. Extraversion is characterized by being active, assertive, outgoing, enthusiastic, talkative, and energetic. Agreeableness is defined as appreciative, forgiving, generous, kind, and trusting. Efficient, organized, reliable, and responsible are characteristics that define conscientiousness. Neuroticism is described as being anxious, unstable, worrying, and unstable. Finally, openness is defined as curious, imaginative, original, and wide interests (6).

While the pandemic may have drawn to a close, the importance of individual and societal adherence to public health crisis measures remains. Therefore, revealing factors affecting compliance with COVID-19 measures may provide valuable insights for future health crises. The aim of this study was to investigate the relationships between compliance with COVID-19 measures and personality traits, as well as other individual characteristics, in the Turkish community.

Material and Method

Study design and participants

The study was designed as descriptive research. The data of the study was collected in February – March 2022. During the data collection period, the number of cases in Türkiye ranged between 20,000 and 90,000 (7). The participants were contacted via WhatsApp and Telegram groups of university students and researchers' social media accounts to reach different sociodemographic groups. They were sent the access link to the online surveys created via Google Forms.

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Data collection tool

The data collection tool consisted of three parts and 33 questions. The first section included questions about sociodemographic characteristics (sex, age, education level, marital status, residency, and profession), comorbidities, and daily life during the pandemic of participants.

The second section included the COVID-19 Prevention Guidelines Compliance Scale (C-PGC). Plohl and Musil created the original version of the scale, and Karatana et al. developed the Turkish version (8, 9). The scale consisted of 11 questions and is of 4-point Likert type (Never comply: 1 – Always comply: 4). There was no cutoff value or subdimension in the scale. The increase in the total score indicated high compliance with pandemic measures (8).

The last section consisted of the Ten-Item Personality Inventory (TIPI). Gosling et al. created the original version of the TIPI, and Atak developed the Turkish version (10, 11). The scale consisted of 5 subdimensions, with two items in each component: 'Openness', 'Conscientiousness', 'Extraversion', 'Agreeableness', and 'Neuroticism'. Participants score each item between 1 and 7. Assigning a high score signifies perceiving their personality as closely matching the attributes outlined in the corresponding item (10).

Statistical analysis

Statistical analysis of the data was performed with IBM SPSS version 29 software. Descriptive data were presented as count (n), frequency (%), mean, standard deviation, median and range values. Univariate and multivariate linear regression analysis examined relationships between individual characteristics and C-PGC scores. Age and the personality traits were included as continuous variables in the regression analysis. Variables with $p<0.05$ in the univariate analysis were further evaluated in the multivariate analysis. The statistical significance level was accepted as $p<0.05$ in the analyses.

Ethics

Ethics committee approval for the study was received from the Marmara University School of Medicine Ethics Committee on 11.02.2022 with protocol number 09.2022.295. Permissions for use of the scales applied in the study were provided from the developers of the Turkish versions. All procedures performed in this study were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Declaration of Helsinki and its later amendments.

Results

Table 1 shows the sociodemographic characteristics of the participants (n = 1228). Of these, 57.7% were women, and the median age was 50 years (range = 33 – 60). The majority were university graduates (55.6%), married (61.5%), and resided in an urban center (82.4%). While %63.9 employed, 13.2% were working at home primarily.

Table 1: Sociodemographic and medical characteristics of the participants (n = 1228)

Parameters		n (%)
Sex		
	Male	519 (42.3)
	Female	709 (57.7)
Age in years, median (range)		50 (33 – 60)
Education (n=1227)		
	Primary school	6 (0.5)
	Secondary school	8 (0.7)
	High school	113 (9.2)
	University	683 (55.6)
	Master's degree	350 (28.5)
	Doctorate	67 (5.5)
Marital status (n=1227)		
	Single	473 (38.5)
	Married	754 (61.5)

Residency (n=1227)		
	Urban center	1010 (82.4)
	District	192 (15.6)
	Town/village	25 (2.0)
Working status		
	Unemployed	443 (36.1)
	Employed, primarily at home	162 (13.2)
	Employed, primarily at workplace	623 (50.7)
Comorbidity		385 (31.4)
	Hypertension	176 (14.3)
	Type 2 diabetes mellitus	102 (8.3)
	Cardiovascular disease	63 (5.1)
	Respiratory system disease	50 (4.1)
	Cancer	16 (1.3)
	Other	110 (9.0)
Profession		
	Healthcare worker	363 (29.6)
	Retired	249 (20.3)
	Student	154 (12.5)
	Worker	231 (18.7)
	Homemaker	40 (3.3)
	Educator	60 (4.9)
	Private sector worker	80 (6.5)
	Other	51 (4.2)

Approximately one-third of the participants (31.4%) had at least one comorbidity. The most common diseases were hypertension (14.3%), type 2 diabetes mellitus (8.3%), and cardiovascular diseases (5.1%) (Table 1). Most of the individuals were living with their family (72.4%) during the pandemic period, followed by living with friends/colleagues (18.1%) and living alone (9.5%). Of the participants, 32.6% had previous COVID-19 PCR positivity, 51.0% had been in contact with an individual having COVID-19 PCR positivity, and 85.2% had a relative with COVID-19 (Table 2).

Table 2: Personal characteristics of the participants during the COVID-19 pandemic

Parameters		**n (%)**
People living together in home with (n=1226)		
	Family	888 (72.4)
	Friends/colleagues	222 (18.1)
	Alone	116 (9.5)
Had COVID-19 PCR positive result		
	No	718 (58.5)
	Yes	401 (32.6)
	Unknown	109 (8.9)
Contacted with an individual having COVID-19 PCR positivity (n=1224)		
	No	591 (48.3)
	Yes	624 (51.0)
	Unknown	9 (0.7)
Had a relative with the COVID-19 (n=1225)		1044 (85.2)

PCR: Polymerase Chain Reaction

The mean value of the participants' C-PGC score was 36.8 (SD = 6.4), and the median value was 38.0 (range = 33.0 – 42.0). In the C-PGC items, the highest scores were on "Covering your mouth and nose with your bent elbow or tissue when you cough or sneeze" (mean ± SD; 3.7 ± 0.6) and "Avoiding contact with sick people" (mean ± SD; 3.6 ± 0.8). On the other hand, the lowest scores were on "Maintaining at least 1 meter distance between yourself and others" (mean ± SD; 3.1 ± 0.9) and "Regularly cleaning and disinfecting frequently touched surfaces" (mean ± SD; 3.1 ± 0.9) (Table 3).

Table 3: C-PGC scale and item scores

Items	Mean ± SD	Median (range)
C-PGC total score	36.8 ± 6.4	38.0 (33.0-42.0)
Regularly and thoroughly cleaning your hands with an alcohol-based hand rub.	3.2 ± 0.9	3.0 (1 – 4)
Avoiding touching your eyes, nose and mouth with unwashed hands.	3.4 ± 0.8	4.0 (1 – 4)
Covering your mouth and nose with your bent elbow or tissue when you cough or sneeze.	3.7 ± 0.6	4.0 (1 – 4)
Frequently washing your hands with soap and water for at least 20 seconds.	3.4 ± 0.8	4.0 (1 – 4)
Avoiding meetings, events and other social gatherings in areas with ongoing community transmission.	3.2 ± 0.9	3.0 (1 – 4)
Practicing social distancing by doing your grocery shopping at off-peak hours and/or less often.	3.3 ± 0.9	4.0 (1 – 4)
Maintaining at least 1 meter (3 feet) distance between yourself and others.	3.1 ± 0.9	3.0 (1 – 4)
Practicing social distancing by avoiding crowds in confined and poorly ventilated spaces.	3.2 ± 0.9	3.0 (1 – 4)
Avoiding contact with sick people.	3.6 ± 0.8	4.0 (1 – 4)
Regularly cleaning and disinfecting frequently touched surfaces.	3.1 ± 0.9	3.0 (1 – 4)
Staying home if you are sick, or, hypothetically staying home if you were sick (except to get medical care).	3.5 ± 0.8	4.0 (1 – 4)

C-PGC: COVID-19 Prevention Guidelines Compliance Scale, Sd: Standard deviation

Table 4 shows the univariate and multivariate linear regression analysis results examining the relationships between participants' characteristics and C-PGC scores. According to the multivariate analysis, compliance with COVID-19 measures was higher among females (β=2.535, p<0.001), individuals of older age (β=0.073, p<0.001), and those with at least one comorbidity (β=0.926, p=0.017), while compliance was lower among individuals with a previous history of COVID-19 (β=-0.572, p=0.005). In addition, higher C-PGC scores were associated with agreeableness (β=0.280, p<0.001), neuroticism (β=0.369, p<0.001), and conscientiousness (β=0.268, p=0.005).

Table 4: Relationships between individual characteristics and the C-PGC scores, univariate and multivariate linear regression analysis

Parameters	Univariate analysis			Multivariate analysis (n = 1224)*		
	B	95.0% CI	p	B	95.0% CI	p
Sex (female)	2.511	1.799 – 3. 222	**<0.001**	2.535	1.858 – 3.212	**<0.001**
Age	0.078	0.056 – 0.101	**<0.001**	0.073	0.050 – 0.096	**<0.001**
Education (at least high school)	0.338	-0.855 – 1.532	0.578	-		
Marital status (married)	1.297	-1.546 – 4.140	0.370	-		
Residency (Urban)	-0.379	-1.105 – 0.348	0.307	-		
Working status (employed, primarily at workplace)	-0.158	-0.875 – 0.558	0.665	-		

Comorbidity	1.870	1.105 – 2.636	**<0.001**	0.926	0.171 – 1.681	**0.016**
Living together in home with family or friends/ colleagues	0.721	- 0.504 – 1.946	0.248	-		
Had COVID-19 PCR positivity	-0.860	-1.259 – -0.461	**<0.001**	-0.572	-0.956 – -0.188	**0.004**
Contacted with an individual having COVID-19 PCR positivity	-0.794	-1.492 - -0.097	**0.026**	-0.370	-1.042 – 0.301	0.279
Had a relative with the COVID-19	-0.338	-1.344 – 0.667	0.509	-		
Extraversion	-0.091	-0.260 – 0.078	0.290	-		
Agreeableness	0.438	0.297 – 0.579	**<0.001**	0.280	0.120 – 0.439	**<0.001**
Conscientiousness	0.654	0.493 – 0.815	**<0.001**	0.268	0.087 – 0.485	**0.005**
Neuroticism	0.548	0.417 – 0.678	**<0.001**	0.369	0.219 – 0.519	**<0.001**
Openness	0.326	0.177 – 0.475	**<0.001**	-0.131	-0.297 – 0.035	0.123

CI: Confidence interval, PCR: Polymerase Chain Reaction, C-PGC: COVID-19 Prevention Guidelines Compliance Scale
**Adjusted R square = 0.156*

Discussion

This study focused on adherence to COVID-19 protective measures among adults and revealed connections between various individual characteristics and compliance. The mean C-PGC scale score of the participants in our study was found to be 36.8 (SD = 6.4). The mean score for all items was above 3.0 points ('sometimes comply' on the scale). The highest scoring item, which was related to covering the mouth when coughing or sneezing, indicated that adherence to the measures is significantly impacted by social responsibility in our community, along with individual protection. Previous studies that applied the same scale found that the mean score in Türkiye was 37.8 (SD = 7.1), while in Slovenia the mean score per item was 3.6 (SD = 0.33) (8, 9). Findings from earlier studies revealed mean scores slightly higher than those reported in our study. Furthermore, studies have revealed that higher scores on the C-PGC scale were associated with increased risk awareness, heightened fear of COVID-19, and greater trust in scientific knowledge (12, 13).

In line with our research, the literature review revealed that the most of previous studies indicated a higher compliance rate among women with measures compared to men (14-19). High compliance was also compatible with the increase in age (14, 15, 17). Studies revealed that male individuals and younger populations tend to underestimate the risks of diseases and engage in more health risk behaviors (20, 21). These attitudes have also caused the level of compliance with pandemic measures to be relatively low. Our study found no significant difference between education and compliance with measures. However, collected data via online platforms resulted in primary and secondary school education levels being represented by only 1.2% of the participants, caused challenges in comparing different groups.

Chronic diseases are typically linked to poor lifestyle behaviors (22). However, from the early days of the pandemic, strong associations between chronic diseases and COVID-19-related outcomes were discovered and widely publicized (23). According to the results of multivariate regression analysis, individuals in our study with at least one comorbidity were more likely to follow recommended protective measures, regardless of age. Likewise, a study in Poland revealed that having comorbidities has a positive impact on attitudes towards protecting oneself from SARS-CoV-2 infection (24).

The results of multivariate regression analysis indicated that individuals with a history of COVID-19 had significantly lower compliance scores with pandemic measures than those without. As

our study is not prospective, it is challenging to determine whether a history of COVID-19 positivity leaded to lower compliance with precautions or if lack of compliance with precautions raised the risk of COVID-19 positivity. However, as our survey specifically targeted the participants' current compliance with the measures, it is believed that considering prior infection as having a protective effect by the participants played a significant role in this connection.

Among personality traits, conscientiousness was discovered to have a positive impact on adherence to COVID-19 protective measures in our study. The conscientious individuals' self-discipline and sense of duty allowed them to adhere to the rules (6). Choi's study revealed that higher conscientiousness was significantly associated with greater compliance with COVID-19 protective measures, such as keeping distance and using hand sanitizers (15). In addition, Telaku stated that conscientious individuals have adapted to the restrictive measures of the pandemic (25). Furthermore, our study found a relationship between neuroticism and high compliance with measures. During the pandemic, news and announcements on media platforms have created an excessive level of concern in some segments of society about the disease. Neuroticism increases individuals' reactions to stressful events and their coping mechanism for perceived stress sometimes may be avoiding (26, 27). Thus, most previous studies have not indicated a favorable connection between neuroticism and following recommended actions. Telaku found neuroticism to be related to perceived stress but did not show a direct relationship to adherence (25). The study by Aschwanden demonstrated that higher neuroticism was tied to a decrease in precautions (28). However, these studies were conducted in the first months of the pandemic period, and the perceived stress levels of the neurotic individuals in our study may have been decreased by the two-year period since the beginning of the epidemic. Agreeableness was another feature that increased adherence with measures in our study. Their characteristics of being trustful and tender-minded enabled their compliance (6). A similar relationship was found in the studies of Choi and Telaku (15, 25).

Extraversion includes sociability, dominance, ambition, positivity, and a penchant for seeking excitement (29). It has been reported that they had difficulties in coping with the restrictions during the pandemic period (30). Although Brouard's study found a negative relationship between extraversion and compliance with measures, there was no association in our study (14). Additionally, our participants generally scored relatively low on items related to compliance with social distance and participation in meetings and social gatherings. Besides the understanding of diseases and perception of risks, the cultural norms within societies also impact adherence to safety measures. These outcomes can be attributed to the belief that complying with some pandemic measures may be perceived as detached attitude in our society.

One of the strengths of our study was that compliance levels with COVID-19 measures were evaluated using a valid scale, unlike most previous studies. This provides to evaluate the measures in a collective manner rather than separately. In addition, conducting the surveys via online rather than under observation prevented social compatibility bias. Finally, to our knowledge, our study is the first in Türkiye to examine the relationship between compliance with pandemic measures and personality traits. However, our study has some limitations. First, since participants were included in the study through access links via social media applications, WhatsApp and Telegram, the data could not be collected from the population that did not use online platforms. Therefore, the representation rate of individuals with low sociocultural levels in the sample decreased. Second, since the study is not longitudinal, the results only show attitudes regarding compliance with the measures during the data collection period. Third, the level of COVID-19 risk perception and fear, which were associated with compliance with protective measures in the literature, could not be evaluated in our study. Additionally, information about the participants' professions and the departments for university students could not be obtained.

Conclusions

As the COVID-19 pandemic subsides, it is crucial to anticipate society's behavior in future epidemics and other public health crises. Our study's findings

shed light on the specific characteristics of Turkish society in its response to a public health crisis like a pandemic and compliance with precautions. These insights are not only informative but also actionable, guiding the creation of appropriate policies for groups with poor behavioral change skills and poor adaptation levels. This proactive approach is essential for effective public health policy in the face of future health crises.

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Türkiye'de sağlık hizmetlerine erişimin teknik etkinlik değerlendirmesi

Assessment of technical effectiveness in access to health services in Türkiye

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Abstract

Efficiency evaluations in health services provide evidence on how resources in the field of health (health professionals, medical equipment, financial resources, hospitals, etc.) are used effectively in transforming them into health services, and prevent problems that may arise in terms of access to health and equity by ensuring the optimal allocation of these resources in line with needs. The subject of this research was to measure the technical efficiency levels of the number of applications to physicians, which indicate access to health services at the provincial level in Türkiye, by correlating them with satisfaction. The research was conducted using Data Envelopment Analysis, the number of applications to physicians and dentists, which indicate capacity utilization, was defined as the input variables, the level of satisfaction with health services was defined as the output variable, and the analyzes were carried out using constant returns (CCR) input and output oriented models. According to the findings obtained from the research, the average efficiency score of the provinces in Türkiye was determined as 0.703, while 2.5% of 81 provinces were evaluated as fully effective, 97.5% were not found to be effective.

Again, according to the findings, if the current level of satisfaction can be maintained or the projected level of satisfaction can be reached, the number of applications to the physician per capita was reduced between 0.12-3.19, and the number of applications to the dentist per capita was reduced between 0.04-0.23. In total, the cost of inefficiency due to the number of applications varies between 360 million-7.7 billion, representing 0,059-1,28% of total health expenditures.

Keywords: Health institutions, technical activity, applying to a physician, data envelopment analysis

Özet

Sağlık hizmetlerinde verimlilik değerlendirmeleri, sağlık alanındaki kaynakların (sağlık profesyonelleri, tıbbi ekipmanlar, finansal kaynaklar, sağlık kurumları vb.) sağlık hizmetine dönüşmesinde etkin bir şekilde nasıl kullanıldığı hususunda kanıtlar sunan ve bu kaynakların ihtiyaçlar doğrultusunda optimal şekilde tahsisini sağlanması ile sağlığa erişim ve hakkaniyet açısından oluşabilecek sorunları önleyen bir yaklaşımdır. Bu araştırmanın konusunu Türkiye'de iller düzeyinde sağlık hizmetlerine erişimi gösteren hekime müracaat sayılarına ait teknik etkinlik düzeylerinin memnuniyet ile ilişkilendirilerek ölçülmesi amacıyla yapılmıştır. Araştırma Veri Zarflama Analizi kullanılarak yapılmış, kapasite kullanımına işaret eden hekime ve diş hekimine müracaat sayıları girdi değişkeni, sağlık hizmetlerinden memnuniyet düzeyi çıktı değişkeni olarak tanımlanmıştır. Analizler sabit getiriler (CCR) girdi ve çıktı yönlü modeller kullanılarak gerçekleştirilmiştir. Araştırmadan elde edilen bulgulara göre Türkiye'de illerin ortalama etkinlik skoru 0,703 tespit edilmiş, 81 ilin %2,5'i tam etkin değerlendirilirken %97,5'i etkin bulunmamıştır. Yine bulgulara göre mevcut memnuniyet düzeyinin korunması ya da projekte edilen memnuniyet düzeyine ulaşılabilmesi durumunda kişi başı hekime müracaat sayılarında 0,12-3,19 br., kişi başı diş hekim müracaat sayılarının 0,04-0,23br. arasında azaltılması gerektiği hesaplanmıştır. Toplamda müracaat sayılarından kaynaklı verimsizliğin maliyeti 360 milyon-7,7 milyar arasında değişmekte ve toplam sağlık harcamalarının da %0,059-1,28'e işaret etmektedir.

Anahtar Kelimeler: Sağlık kurumları, teknik etkinlik, hekime müracaat, veri zarflama analizi

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1. Giriş

Sağlık hizmetlerinin erişim ve hakkaniyet bağlamında etkili ve verimli bir şekilde sunulması sahip olduğu kaynaklarının doğru kullanımından geçmektedir. Sağlık hizmetleri yüksek teknoloji kullanımı ile emek yoğun bir sektör olduğu için kaynak yönetimi sadece bu hizmetlerin verimliliği ve performansı için değil, aynı zamanda toplumun genel sağlık durumu için de hayati öneme sahiptir. Doğumda beklenen yaşam süresinin artması, yaşlanma, göç, hastalık türlerinin çeşitlenmesi ve bu yüklerin artması gibi nedenlerle sağlık sistemleri üzerindeki baskı her geçen gün artmaktadır. Toplumun sağlık durumunun iyileştirilmesi, en yüksek ortalama seviyeye ulaşılması gerektiği anlamına gelir ki bu durum sağlık sistemlerinin adil bir finansmanla desteklenmesi ve toplumun ihtiyaçlarını karşılayacak yeterli sayıda ve nitelikte sağlık kaynaklarının hakkaniyetle dağıtımına işaret eder. Ayrıca son zamanlarda sağlık hizmetlerine erişim ve erişimde hakkaniyet, sağlık hizmetlerinde temel performans göstergeleri arasında değerlendirilmeye başlanmıştır (1, 2). Doğal olarak sağlık hizmetlerinde verimlilik konusu literatürde sıklıkla çalışılan konulardan biri olmuştur. Sağlık hizmetlerinde verimlilik makro-ekonomik ve mikro-ekonomik verimlilik olarak iki yaklaşımla değerlendirilir. Makro-ekonomik verimlilik sağlık hizmetleri harcamalarındaki büyümenin Gayri Safi Milli Hasıla (GSMH)'daki büyümeden daha az olması ve maliyetlerin kabul edilebilir bir GSMH payının üstüne çıkmaması olarak tanımlanırken; hizmetlerin en düşük maliyetle sunularak tüketici memnuniyetinin gerçekleştirilmesi ile sağlık kazanımlarına yönelik hizmet karmasının seçimi mikro-ekonomik verimlilik olarak tanımlanmaktadır (3). Makro ölçekte ülkeler düzeyinde sağlık sistemlerini, mikro ölçekte sağlık kurum ve kuruluşlarının sahip olduğu kaynaklarını verimli şekilde kullanıp kullanmadığının değerlendirilmesi bir topluma sunulacak sağlık hizmetlerinde politikaların belirlenmesinde, sağlık hizmetlerinin planlanmasında ve sağlık kaynaklarının kullanımında etkili ve verimli işleyen bir sağlık sistemi inşa edilmesini sağlamada önemli rol üstlenebilir.

Sağlık hizmetlerinde verimlilik değerlendirmeleri sağlık alanındaki kaynakların (sağlık profesyonelleri, tıbbi ekipmanlar, finansal kaynaklar, hastaneler vb.) sağlık hizmetine dönüşmesinde etkin bir şekilde nasıl kullanıldığı hususunda kanıtlar sunar ve bu kaynakların ihtiyaçlar doğrultusunda optimal şekilde tahsisini sağlayarak sağlığa erişim ve hakkaniyet açısından oluşabilecek sorunları önler. Verimlilik değerlendirmeleri aynı zamanda sağlık hizmetlerinin performansını izlemek ve iyileştirmek için bir araç olarak da kullanılabilir. Bu, hizmet kalitesini artırmak, bekleme sürelerini azaltmak ve hasta memnuniyetini artırmak için önemlidir.

Bu araştırmanın konusunu Türkiye'de sağlık hizmetlerine erişim ve memnuniyet arasındaki verimliliğin mikro ölçekte değerlendirilmesi oluşturmaktadır. Nitekim Türkiye'de 2002 yılında kişi başı hekime müracaat sayısı 3,1'den 2022 yılında 10,0'a yükselmiş, sağlık hizmetlerinden memnuniyet oranları ise 2003 yılında %39,5'ten 2018 yılında %70,4'e yükselmiş ancak son dört yılda 7,5 puan azalarak %62,90[1] olmuştur (4). Hekime müracaat sayılarının artması bireylerin sağlık hizmetlerine kolay erişebildiğini göstermektedir ancak sağlık hizmetine erişim kolaylaşırken memnuniyetsizliğin artması bu hizmetlerin sunumunda problem yaşandığı diğer bir deyişle

[1] *Yıllara ve Sektörlere Göre Sağlık Kuruluşlarının Hizmetlerinden Memnuniyet Oranı Devlet: %65,8; Üniversite: %64,7; Özel: %58,2 ortalaması alınarak hesaplanan değer*

sağlık kapasitesinin kullanılmasında problem olduğuna işaret etmektedir. Bu araştırma yukarıda açıklanan probleme cevap aramak için Türkiye'de iller düzeyinde sağlık hizmetlerine erişim ve memnuniyet arasındaki ilişkinin teknik etkinliğinin değerlendirmesi amacıyla gerçekleştirilmiştir.

2. Yöntem

Bu bölüm araştırmada kullanılan yöntemin açıklaması, çalışmaya ait sınırlılıklar, istatistik programları ve etik beyan kapsamında 4 (dört) başlıkta derlenmiştir. Araştırmada kesitsel tipte ve verilerin geriye dönük incelenmesi yoluyla Veri Zarflama Analizi (VZA) modeli kullanılarak gerçekleştirilmiştir.

2.1. Sınırlılıklar

Araştırmada kullanılan değişkenler, metodoloji, araştırmanın yılı araştırmanın sınırlılıkları olarak değerlendirilmiştir.

2.2. Etik Beyan

Bu çalışma için analizlerde kullanılan verilerin halka açık veriler olması ve analizlerde ikincil veriler kullanılması nedeniyle etik kurul değerlendirmesi gerekmemektedir.

2.3. İstatistik Analiz

Analizlerde tanımlayıcı analizler Eviews programı, Veri Zarflama Analizleri DEAP 2.1 programı kullanılmıştır.

2.4. Araştırmanın Modeli

VZA karar verme birimlerinin (KVB) etkinlik ölçümünde kullanılan ve doğrusal programlama temeline dayanan parametrik olmayan bir analiz yöntemidir. Bu yöntemde çoklu girdi ve çoklu çıktı değeri, tek bir verimlilik değerine dönüştürülerek etkinliğin değerlendirilmesinde önemli kanıtlar sunmaktadır (5, 6). VZA'da girdi ve çıktı yönelimli olmak üzere iki model kullanılmaktadır. Girdi yönelimli model verimsiz bir KVB'nin kendisi ile aynı çıktı değerine sahip başka bir KVB ile karşılaştırılmasına imkan veren girdi minimizasyonu ilkesine dayanır (6). Çıktı yönelimli modelde girdi düzeyi sabit tutularak çıktı düzeyinin en üst seviyeye çıkarılması yani çıktı maksimizasyonu esasına dayanır (6). Ayrıca bu yöntem ölçeğe göre getiri durumunu sabit getiriler (CCR) ve değişken getiriler (VRS) açısından değerlendirmeye imkân sağlar (6, 7).

VZA literatürde 1950'lerden sonra araştırmalarda yer almaya başlamıştır (8). VZA, sağlık hizmetlerinde teknik etkinliğinin değerlendirmesinde en çok araştırma yapılan ikinci alandır (9). Dünya'da VZA ile sağlık alanında teknik etkinliği değerlendiren literatürde birçok çalışma bulunmaktadır (10-15). Türkiye'de de VZA yöntemi kullanılarak teknik etkinliğini belirlemeye yönelik literatürde çok sayıda araştırma yer almaktadır (16-21). Aşağıda sağlık alanında yapılan ve araştırmada kullanılan değişkenlere benzer yayınlara ait özet bilgilere yer verilmiştir.

Kaçak (2022) araştırmasında 27 OECD ülkesi 2010-2018 dönemleri arasında incelemiştir. Girdi değişkenleri olarak alkol tüketimi, birinci basamak sağlık hizmeti harcamaları, yatak sayısı hekim sayısı, çıktı değişkenleri olarak beklenen yaşam süresi, anne ölüm oranı, yatan hasta sayısı, poliklinik sayısı belirlenmiştir. Sonuçlara göre halk sağlığı sistemi etkin olarak değerlendirilen ülke sayısı 11, hastane hizmet sistemi etkin olarak değerlendirilen ülke sayısı 18 olarak tespit edilmiştir (22).

Durur vd. (2022) araştırmalarında Sağlık Bakanlığına bağlı 30 sağlık hizmet bölgesini değerlendirmiştir. Girdi değişkenleri olarak yatak sayısı, pratisyen hekim sayısı, uzman hekim sayısı, hemşire/ebe sayısı; çıktı değişkenleri olarak başvuru sayısı, yatan hasta sayısı, ağırlıklı ameliyat sayısı, doğum sayısı ele alınmıştır. Sonuçlara göre sağlık hizmet bölgelerinin ortalama etkinlik skoru CCR modeli için %94,9; BCC modelinde %97,7 tespit edilmiştir (23).

Bardakçı ve Filiz (2020) araştırmalarında Artvin ilinde sağlık hizmeti veren 6 kamu hastanesini incelemiştir. Girdi değişkenleri yatak sayısı, hekim sayısı ve hemşire-ebe sayısı; çıktı değişkenleri ağırlıklı ameliyat sayısı, muayene sayısı ve yatan hasta sayısı belirlenmiştir. Analiz sonuçları 2016 yılında 6 kamu hastanesinden 4'ünün, 2017 yılında ise sadece 3'ünün etkin olduğunu göstermiştir (24).

Kaçak ve Bağcı (2020) Sağlık Bakanlığına bağlı 39 Ağız Diş Sağlığı Merkezini (ADSM) incelediği araştırmalarında girdi değişkeni olarak diş hekimi sayısı, ilk madde ve malzeme giderleri; çıktı değişkenleri olarak muayene sayısı, diş çekim sayısı, kanal tedavisi sayısı, dolgu tedavisi sayısı belirlenmiştir. Sonuçlara göre 18 ADSM etkin

bulunmuş, merkezlerin Varlıkların Getirisi (ROA) değerleri ortalama 0.72 etkin olmayan merkezlerin ise 0.61 bulunmuştur (25).

Şahinbaş, Konca ve Yetim (2019) araştırmalarında 35 OECD ülkesini incelemiştir. Girdi değişkenleri olarak Sağlık harcaması, Hekim sayısı, hemşire sayısı, Yatak sayısı; çıktı değişkeni olarak doğumda beklenen yaşam süresi, bebek ölüm hızı (tersi), algılanan Sağlık statüsü, sağlık hizmetlerinden memnuniyet düzeyi (%) belirlenmiştir. Sonuçlara göre ülkelerin BCC modeline göre %65,7'si, CCR modeline göre %28,5'i etkin çıkmıştır. Ayrıca Türkiye ve Meksika etkinlik skorları diğer ülkelerden daha yüksek çıkmıştır (14).

Yüksel ve Yiğit (2019) Türkiye'de ADSM'leri inceledikleri araştırmalarında girdi değişkenleri diş hizmeti veren birim sayısı, diş hekimi sayısı ve diş üniti sayısı; çıktı değişkenleri olarak hasta sayısı, poliklinik sayısı, diş çekimi sayısı, konservatif tedavi sayısı, endodontik tedavi sayısı belirlenmiştir. Sonuçlara göre 81 ilin ADSM değerlendirilmiş; CCR modeline göre illerin %17.3'ünün (14), BCC modeline göre %35.9'unun (29) etkin olduğu tespit edilmiştir (26).

Şahin ve Ilgün (2018) Türkiye'de ADSM'leri inceledikleri araştırmalarında girdi değişkenleri diş hekimi sayısı, diş üniti sayısı; çıktı değişkenleri olarak poliklinik, diş çekimi, kanal tedavisi, dolgu tedavisi, cerrahi müdahale ve protez sayıları belirlenmiştir. Sonuçlara göre Türkiye'de iller bazında ADSM etkinlik incelemesinde CCR yöntemi 81 ilden 18'inin etkin olduğu ve 63 ilin etkin olmadığı, BCC yöntemi 32 ilin etkin olduğu ve 49 ilin ise etkin olmadığı sonucuna ulaşılmıştır (27).

Şenol ve Gençtürk (2017) araştırmalarında 80 Kamu Hastanesi incelemiştir. Girdi değişkenleri olarak yatak, hekim, ebe ve hemşire sayısı; çıktı değişkenleri olarak acil muayene, A Grubu, B Grubu ve C Grubu ameliyat, poliklinik muayene ve yatan hasta sayısı belirlenmiştir. Sonuçlara göre 80 kamu hastanesinden %25'i CCR modeline göre, %38'i BCC tekniğine göre etkin bulunmuştur (28).

Özata ve Sevinç (2010) Konya İlinde yer alan Sağlık Ocaklarını inceledikleri araştırmalarında hekim, hemşire ve ebe sayıları girdi değişkeleri; muayene, aşı-enjeksiyon ve ebe ev ziyaretleri çıktı değişkenleri olarak tanımlanmıştır. Sonuçlara göre sağlık ocaklarının etkinliği %83,77 bulunmuştur (29).

Literatürde araştırmalar, sağlık sistemlerinin etkinliklerini analiz etmek için çeşitli ülkeler, bölgeler ve sağlık hizmeti sunan kuruluşlar üzerinde farklı girdi ve çıktı değişkenlerini kullanarak gerçekleştirilmiştir. Genellikle, girdi olarak sağlık personeli sayısı, yatak kapasitesi, hekim sayısı ve harcamalar gibi sağlık hizmeti sunumundaki kaynak kullanımını ifade eden unsurlar dikkate alınırken, çıktı olarak yaşam süresi, hasta sayısı, ameliyat ve muayene sayısı gibi sağlık hizmetlerinin sonuçlarını temsil eden değişkenler değerlendirilmiştir.

Bu çalışma, iller düzeyinde sağlık hizmetlerine erişimi hekime müracaat sayıları aracılığıyla değerlendirerek, teknik etkinlik düzeylerinin memnuniyet ile ilişkisini incelemeyi amaçlamaktadır. Bu araştırmanın literatürdeki benzer araştırmalardan belirgin bir farkı, sağlık hizmetlerine erişim ile bireylerin bu hizmetlerden duyduğu memnuniyeti bir arada ele almasıdır. Sağlık sistemlerinin teknik etkinliği genellikle araştırmalarda odak noktası olarak yer alırken, memnuniyet unsuru sıklıkla göz ardı edilmektedir. Dolayısıyla bu araştırma sağlık hizmetlerine erişim ve memnuniyet arasındaki ilişkiyi irdeleyerek daha geniş ve kapsamlı bir bakış açısı sunmayı hedeflemektedir. Araştırmada ayrıca, müracaat sayıları üzerinden sağlık hizmetlerinin teknik etkinsizliğini dikkate alarak verimsizlik maliyetlerinin hesaplanması da gerçekleştirilecektir. Bu yaklaşım, sağlık harcamaları içerisindeki verimsizlik maliyetlerinin büyüklüğünü ortaya koyacak ve sağlık sisteminde kaynakların daha etkin kullanımına yönelik somut veriler sağlayacaktır. Literatürde sağlık alanında teknik etkinlik değerlendirmeleri yapılmış olsa da, verimsizlik maliyetlerini gösteren çalışmalara pek rastlanmamaktadır. Halbuki, VZA'nın bir diğer kullanım alanı, sağlık harcamalarındaki potansiyel ekonomik tasarrufları tahmin etmektir (30). Bu nedenle, araştırma, verimsizlik maliyetlerini hesaplamasıyla alana önemli bir katkı sağlamayı amaçlamaktadır.

Memnuniyet, sağlık hizmetlerinin kalitesine dair öznel bir değerlendirme olduğundan, bu araştırma hasta deneyimlerine dayalı daha derinlemesine sonuçlar ortaya koyacaktır. Böylece, sağlık

hizmetlerinin yalnızca verimliliği değil, aynı zamanda kullanıcı deneyimleri de dikkate alınarak kapsamlı bir değerlendirme yapılmasına imkân tanınacaktır. Hekime müracaat sayıları üzerinden iller bazında sağlık hizmetlerine erişim düzeyinin değerlendirilmesi, bireylerin ne sıklıkla hekime başvurduğunu ve bu hizmetlere erişim kolaylığını ölçme fırsatı sunacaktır.

Bu bağlamda, araştırmamız Türkiye'de iller düzeyinde sağlık hizmetlerine erişim farklılıklarını inceleyerek, iller arasındaki eşitsizlikleri ve bu eşitsizliklerin memnuniyet ile ilişkisini mikro düzeyde analiz etme olanağı sağlayacaktır. Sonuç olarak, araştırmamız hem teknik hem de algısal (memnuniyet) değerlendirmeleri bir araya getirerek sağlık hizmetlerinin etkinliği hakkında daha kapsamlı bir anlayış sunmayı hedeflemektedir.

Araştırma kapsamında üç ana değişken belirlenmiştir. Hekime müracaat, sağlık hizmetlerinin fiziksel olarak sunulmasını (yeterlik) ve ulaşılabilirliğini (erişebilirlik) temsil eden bir kapasite göstergesi olarak ele alınmıştır. OECD, müracaat sayısını, telefonla başvuru hariç, herhangi bir sebeple hekime başvuruda bulunulması olarak tanımlamış ve bunu bireylerin sağlık hizmetlerine erişiminin en önemli göstergesi olarak vurgulamıştır. Memnuniyet ise, sağlık hizmeti sunumunun sonucunda elde edilen değeri yansıtan bir çıktı olarak değerlendirilmiştir. Bu bağlamda, araştırmada kapasite kullanımını ifade eden hekime ve diş hekimine müracaat sayıları girdi değişkenleri olarak tanımlanmış, sağlık hizmetlerinden memnuniyet düzeyi ise çıktı değişkeni olarak ele alınmıştır. Bu değişkenlere ait detaylar, Tablo 1'de sunulmaktadır.

VZA'da model geliştirilirken önce KVB seçilmesi gerekir. Daha sonra modelde yer alacak girdi/çıktı değişkenleri belirlenerek aralarındaki korelasyon ilişkisine bakılır. Araştırmaya konu değişkenler arasında 0,80 ve üzerinde korelasyon ilişkisi tespit edildiğinde yüksek korelasyona neden olan değişkenlerin model dışında bırakılması önerilmektedir (31). Bu minvalde araştırmamızda yer alan çıktı değişkeni sabit tutulduğundan girdi değişkenleri arasındaki ilişki değerlendirilmiş ve korelasyon değerinin 0,53 değeri ile düşük düzeyde olduğu tespit edildiğinden bu iki girdi değişkeni elenmeden analize dahil edilmiştir. Bu aşamadan sonra KVB sayısının belirlenmesi aşamasına geçilir. Literatürde KVB için geliştirilmiş formüller bulunmaktadır. KVB sayısı "n", girdi sayısı "m" ve çıktı sayısı "s" olmak üzere; Rv=n/(m+s) formülünde hesaplanan oran küçük olursa VZA etkin ve etkinsiz birimlerin sayısı bakımından ayırım gücünü kaybedeceği belirtilmektedir (32). Literatürde Rv değerinin 3'ten büyük olması ve KVB sayısının da $n \geq 3(m+s)$ eşitsizliğine uygun olacak şekilde belirlenmesi gerektiğini vurgulanmaktadır (33). Bu minvalde araştırmamızda ele alınan KVB sayısı 81'dir. Banker vd. (1989) formülasyonuna göre; $n \geq 3(m+s) \Rightarrow 81 \geq 3(1+2) \Rightarrow 81 \geq 9$ olmakta ve modelimiz uygun KVB sayısına yönelik önerilen tüm hesaplamalara uygun değerlendirilmektedir.

Bu aşamadan sonra analizlerde etkinliğin ölçümü için kullanılacak model/lerin belirlenmesi gerekmektedir. Girdi yönelimli modeller girdi minimizasyonuna, çıktı yönlü modeller çıktı maksimizasyonuna odaklanır. Sağlık hizmetleri doğası gereği çıktılardan ziyade girdiler üzerinde kontrol gücüne sahip bir alandır bu nedenle literatürde sağlık alanında yapılan araştırmalar genellikle girdi yönelimli modeller üzerinde durmaktadırlar (34-36).

Bu araştırmada illerin kişi başı muayene sayılarının teknik etkinlik değerini ortaya koymak için CCR girdi-çıktı yönelimli modeller kullanılmıştır. Teknik etkinlik değerlendirilirken illerin teknik etkinlik değerinin 1'e eşit olduğu durumda o ilin kapasite kullanımında tam etkin olduğu, teknik etkinlik değerinin 1'den küçük tespit edilmesi halinde illerin göreli olarak etkinsiz olduğu kabul edilmiştir.

Tablo 1: Değişkenlerin tanımlanması

Değişkenler	Birim	Kaynak*	Kısaltmalar	Türü
Hasta Memnuniyeti	%	SİY, 2022	HM	Çıktı-Ç1
Hekim Müracaat Sayısı	Kişi başı	SİY, 2022	HMS	Girdi- G1
Diş Hekimi Müracaat Sayısı	Kişi başı	SİY, 2022	DMS	Girdi- G2

**SİY: Sağlık İstatistikleri Yıllığı*

Ayrıca analiz sonuçlarında her il için belirlenen teknik etkinlik değerinin yanında kendisine referans gösterilen il bilgilerine de yer verilmiştir.

3. Bulgular

Araştırmada konu değişkenlere ait tanımlayıcı bilgilere göre; hasta memnuniyet ortalaması 62,90 +1,28; kişi başına düşen hekim muayene sayısının ortalaması 10,03 +1,28 (min: 6,8, max: 12,7); diş hekimi muayene ortalaması 0,67 + 0,16 (min: 0,36, max: 1,16)'dır. VZA analizi kapsamında CCR girdi-çıktı yönlü modeller kullanılarak analizler gerçekleştirilmiştir.

CCR girdi-çıktı yönlü modellere göre illerin ortalama teknik etkinlik değeri 0,703'tür. Girdi yönelimli model değişkenleri (hekim muayene sayıları) azaltırken, veri çıktı düzeyini (memnuniyet) sabit tutmaktadır. Modelde çıktı değişkeni olarak belirlenen memnuniyet düzeyinin sabit olması, mevcut memnuniyet düzeyinin daha az muayene sayıları ile (daha etkin) elde edilebilmesi için seçilen girdi değişkenlerinde yapılacak azalışları göstermesi anlamına gelmektedir. CCR Girdi yönlü modele göre etkin bulunan iller Hakkâri ve Şırnak olup; diğer 79 il teknik etkin bulunmamıştır. Etkin bulunan Hakkâri etkin bulunmayan 72 il için referans gösterilirken, Şırnak 53 il için referans gösterilmiştir. Bu sonuca göre etkin olmayan illerin kendilerine referans gösterilen illeri referans alarak değerlerini iyileştirebilir. Şöyle ki; İstanbul'un etkinlik skoru 0,745 değeri ile etkin olmadığı anlaşılmaktadır. Etkin hale gelmesi için Hakkâri ilini %41,7; Şırnak ilini %58,3 oranında örnek alarak verilerini güncelleyebilir. Yapılan analizlerde, İstanbul ilinde her KVB için söz konusu iyileştirmeler gerçekleştirildiğinde, mevcut memnuniyet düzeyini karşılayan kişi başına hekim muayene sayısı 6,86, diş hekimi muayene sayısı 0,41 olacaktır.

Çıktı yönelimli modelde veri girdi değişkenlerini (hekim muayene sayıları) kullanarak çıktının

Tablo 2: İller için CCR girdi yönlü model sonuçları

IL	HM	HMS	DMS	TE	Projeksiyon HMS	Projeksiyon DMS	Referans İller
Adana	62,9	11,8	0,48	0,750	6,90	0,36	Şırnak (1,000)
Adıyaman	62,9	9,3	0,72	0,731	6,80	0,48	Hakkâri (1,000)
Afyonkarahisar	62,9	10,3	0,62	0,666	6,86	0,41	Hakkâri (0,439); Şırnak (0,561)
Ağrı	62,9	7,1	0,49	0,959	6,81	0,47	Hakkâri (0,916); Şırnak (0,084)
Amasya	62,9	11,2	0,75	0,609	6,82	0,46	Hakkâri (0,805); Şırnak (0,195)
Ankara	62,9	10,5	0,64	0,653	6,85	0,42	Hakkâri (0,480); Şırnak (0,520)
Antalya	62,9	9,8	0,62	0,698	6,84	0,43	Hakkâri (0,606); Şırnak (0,394)
Artvin	62,9	8,9	0,52	0,771	6,87	0,40	Hakkâri (0,343); Şırnak (0,657)
Aydın	62,9	11,1	0,73	0,615	6,83	0,45	Hakkâri (0,741); Şırnak (0,259)
Balıkesir	62,9	10,9	0,60	0,632	6,88	0,38	Hakkâri (0,158); Şırnak (0,842)
Bilecik	62,9	9,0	0,71	0,756	6,80	0,48	Hakkâri (1,000)
Bingöl	62,9	7,6	0,64	0,895	6,80	0,48	Hakkâri (1,000)
Bitlis	62,9	7,6	0,48	0,900	6,80	0,43	Hakkâri (0,600); Şırnak (0,400)
Bolu	62,9	12,0	1,15	0,567	6,80	0,48	Hakkâri (1,000)
Burdur	62,9	10,2	0,51	0,706	6,90	0,36	Şırnak (1,000)
Bursa	62,9	9,7	0,64	0,704	6,83	0,45	Hakkâri (0,752); Şırnak (0,248)
Çanakkale	62,9	11,1	0,53	0,679	6,90	0,36	Şırnak (1,000)
Çankırı	62,9	8,9	0,81	0,764	6,80	0,48	Hakkâri (1,000)
Çorum	62,9	10,6	0,60	0,649	6,88	0,39	Hakkâri (0,243); Şırnak (0,757)
Denizli	62,9	11,5	0,70	0,596	6,85	0,42	Hakkâri (0,476); Şırnak (0,524)
Diyarbakır	62,9	8,8	0,49	0,782	6,88	0,38	Hakkâri (0,193); Şırnak ()0,807
Edirne	62,9	11,7	0,77	0,583	6,83	0,45	Hakkâri (0,743); Şırnak (0,257)
Elazığ	62,9	10,9	0,72	0,626	6,82	0,45	Hakkâri (0,757); Şırnak (0,243)

Erzincan	62,9	10,3	0,98	0,660	6,80	0,48	Hakkâri (1,000)
Erzurum	62,9	10,0	0,94	0,680	6,80	0,48	Hakkâri (1,000)
Eskişehir	62,9	11,1	0,87	0,613	6,80	0,48	Hakkâri (1,000)
Gaziantep	62,9	10,0	0,56	0,688	6,88	0,39	Hakkâri (0,210); Şırnak (0,790)
Giresun	62,9	11,3	0,56	0,643	6,90	0,36	Şırnak (1,000)
Gümüşhane	62,9	8,3	0,59	0,819	6,80	0,48	Hakkâri (1,000)
Hakkâri	62,9	6,8	0,48	1,000	6,80	0,48	Hakkâri (1,000)
Hatay	62,9	10,0	0,54	0,689	6,89	0,37	Hakkâri (0,100); Şırnak (0,900)
Isparta	62,9	12,7	0,98	0,535	6,80	0,48	Hakkâri (1,000)
Mersin	62,9	10,4	0,40	0,9	6,90	0,36	Şırnak (1,000)
İstanbul	62,9	9,2	0,55	0,745	6,86	0,41	Hakkâri (0,417); Şırnak (0,583)
İzmir	62,9	10,5	0,68	0,651	6,83	0,44	Hakkâri (0,687); Şırnak (0,313)
Kars	62,9	7,9	0,52	0,864	6,83	0,45	Hakkâri (0,744); Şırnak (0,256)
Kastamonu	62,9	10,3	0,62	0,666	6,86	0,41	Hakkâri (0,439); Şırnak (0,561)
Kayseri	62,9	11,4	0,80	0,597	6,80	0,48	Hakkâri (0,978); Şırnak (0,022)
Kırklareli	62,9	10,7	0,72	0,637	6,82	0,46	Hakkâri (0,823); Şırnak (0,177)
Kırşehir	62,9	10,8	0,65	0,635	6,86	0,41	Hakkâri (0,439); Şırnak (0,561)
Kocaeli	62,9	9,8	0,66	0,696	6,82	0,46	Hakkâri (0,826); Şırnak (0,174)
Konya	62,9	10,1	0,73	0,673	6,80	0,48	Hakkâri (1,000)
Kütahya	62,9	10,6	0,84	0,642	6,80	0,48	Hakkâri (1,000)
Malatya	62,9	11,0	0,75	0,619	6,81	0,47	Hakkâri (0,871); Şırnak (0,129)
Manisa	62,9	10,8	0,70	0,633	6,83	0,44	Hakkâri (0,690); Şırnak (0,310)
Kahramanmaraş	62,9	9,7	0,57	0,708	6,86	0,40	Hakkâri (0,361); Şırnak (0,639)
Mardin	62,9	8,4	0,50	0,817	6,86	0,41	Hakkâri (0,403); Şırnak (0,597)
Muğla	62,9	9,4	0,53	0,732	6,88	0,39	Hakkâri (0,231); Şırnak (0,769)
Muş	62,9	7,8	0,49	0,877	6,84	0,43	Hakkâri (0,582); Şırnak (0,418)
Nevşehir	62,9	10,1	0,66	0,676	6,83	0,45	Hakkâri (0,718); Şırnak (0,282)
Niğde	62,9	10,4	0,68	0,657	6,83	0,45	Hakkâri (0,720); Şırnak (0,280)
Ordu	62,9	10,5	0,71	0,649	6,82	0,46	Hakkâri (0,841); Şırnak (0,159)
Rize	62,9	11,5	1,16	0,591	6,80	0,48	Hakkâri (1,000)
Sakarya	62,9	10,1	0,55	0,682	6,89	0,38	Hakkâri (0,125); Şırnak (0,875)
Samsun	62,9	12,0	0,90	0,567	6,80	0,48	Hakkâri (1,000)
Siirt	62,9	8,2	0,52	0,834	6,84	0,43	Hakkâri (0,614); Şırnak (0,386)
Sinop	62,9	9,6	0,71	0,708	6,80	0,48	Hakkâri (1,000)
Sivas	62,9	10,8	0,94	0,63	6,80	0,48	Hakkâri (1,000)
Tekirdağ	62,9	10,5	0,71	0,649	6,82	0,46	Hakkâri (0,841); Şırnak (0,159)
Tokat	62,9	10,6	0,83	0,642	6,80	0,48	Hakkâri (1,000)
Trabzon	62,9	11,8	0,65	0,583	6,88	0,38	Hakkâri (0,160); Şırnak (0,840)
Tunceli	62,9	8,7	0,72	0,782	6,80	0,48	Hakkâri (1,000)
Şanlıurfa	62,9	8,9	0,39	0,923	6,90	0,36	Şırnak (1,000)
Uşak	62,9	11,2	0,71	0,611	6,84	0,43	Hakkâri (0,613); Şırnak (0,387)
Van	62,9	8,0	0,50	0,855	6,84	0,43	Hakkâri (0,564); Şırnak (0,436)
Yozgat	62,9	8,9	0,67	0,764	6,80	0,48	Hakkâri (1,000)
Zonguldak	62,9	11,0	0,82	0,618	6,80	0,48	Hakkâri (1,000)
Aksaray	62,9	10,7	0,51	0,706	6,90	0,36	Şırnak (1,000)
Bayburt	62,9	9,0	0,83	0,756	6,80	0,48	Hakkâri (1,000)

Karaman	62,9	9,9	0,68	0,688	6,81	0,47	Hakkâri (0,898); Şırnak (0,102)
Kırıkkale	62,9	10,9	0,87	0,624	6,80	0,48	Hakkâri (1,000)
Batman	62,9	9,3	0,57	0,737	6,85	0,42	Hakkâri (0,499); Şırnak (0,501)
Şırnak	62,9	6,9	0,36	1,000	6,90	0,36	Şırnak (1,000)
Bartın	62,9	11,3	0,66	0,608	6,87	0,40	Hakkâri (0,342); Şırnak (0,658)
Ardahan	62,9	8,8	0,69	0,773	6,80	0,48	Hakkâri (1,000)
Iğdır	62,9	8,3	0,67	0,819	6,80	0,48	Hakkâri (1,000)
Yalova	62,9	11,5	0,72	0,595	6,84	0,43	Hakkâri (0,570); Şırnak (0,430)
Karabük	62,9	10,7	0,95	0,636	6,80	0,48	Hakkâri (1,000)
Kilis	62,9	10,8	0,80	0,630	6,80	0,48	Hakkâri (1,000)
Osmaniye	62,9	10,9	0,57	0,633	6,89	0,36	Hakkâri (0,007); Şırnak (0,993)
Düzce	62,9	10,5	0,60	0,655	6,87	0,39	Hakkâri (0,273); Şırnak (0,727)

Kaynak: Yazar tarafından hazırlanmıştır. HM: Hasta Memnuniyeti; HMS:Hekim Müracaat Sayısı; DMS: Diş Hekimi Müracaaat Sayısı; TE: Teknik Etkinlik

(memnuniyetin) artırılmasını hedefleyen değerleri ortaya koyarak illerin etkinliğinin artırılması söz konusu olabilecektir. CCR Çıktı yönlü modele göre etkin bulunan iller Hakkâri ve Şırnak olup; diğer 79 il teknik etkin bulunmamıştır. Etkin bulunan Hakkâri etkin bulunmayan 72 il için referans gösterilirken, Şırnak 53 il için referans gösterilmiştir. Buna göre tam etkin olmayan illerin kendilerine referans gösterilen illeri kendilerine referans alarak değerlerini iyileştirebilir. Şöyle ki; Ankara'nın etkinlik skoru 0,653 değeri ile etkin olmadığı anlaşılmaktadır. Etkin hale gelmesi için Hakkâri ilini %73,6; Şırnak ilini %79,6 oranında örnek alarak verilerini güncelleyebilir. Yapılan analizlerde, her KVB için söz konusu iyileştirmeler gerçekleştirildiğinde, mevcut kişi başına hekim muayene sayısı ve diş hekimi muayene sayısı değişmeden elde edilecek çıktı değeri (memnuniyet) 96,38'e yükselecektir. Diğer bir örnek olarak Adana ili 0,75 teknik etkinlik değeri ile etkin bulunmamıştır. Adana ili Şırnak iline ait değerleri 1,33 kat olacak şekilde güncellemesi durumunda 9,2 kişi başı hekim muayenesi, 0,48 kişi başı diş hekim muayene sayısı ile memnuniyet düzeyini 62,9'dan 83,87'ye çıkaracağı öngörülmektedir.

VZA analizlerinde elde edilen sonuçların tutarlılığı değerlendirilirken rastgele seçilen çıktı yönlü BCC etkinlik modelinin teknik etkinlik değeri ile çıktı

Tablo 3: İller için CCR çıktı yönlü model sonuçları

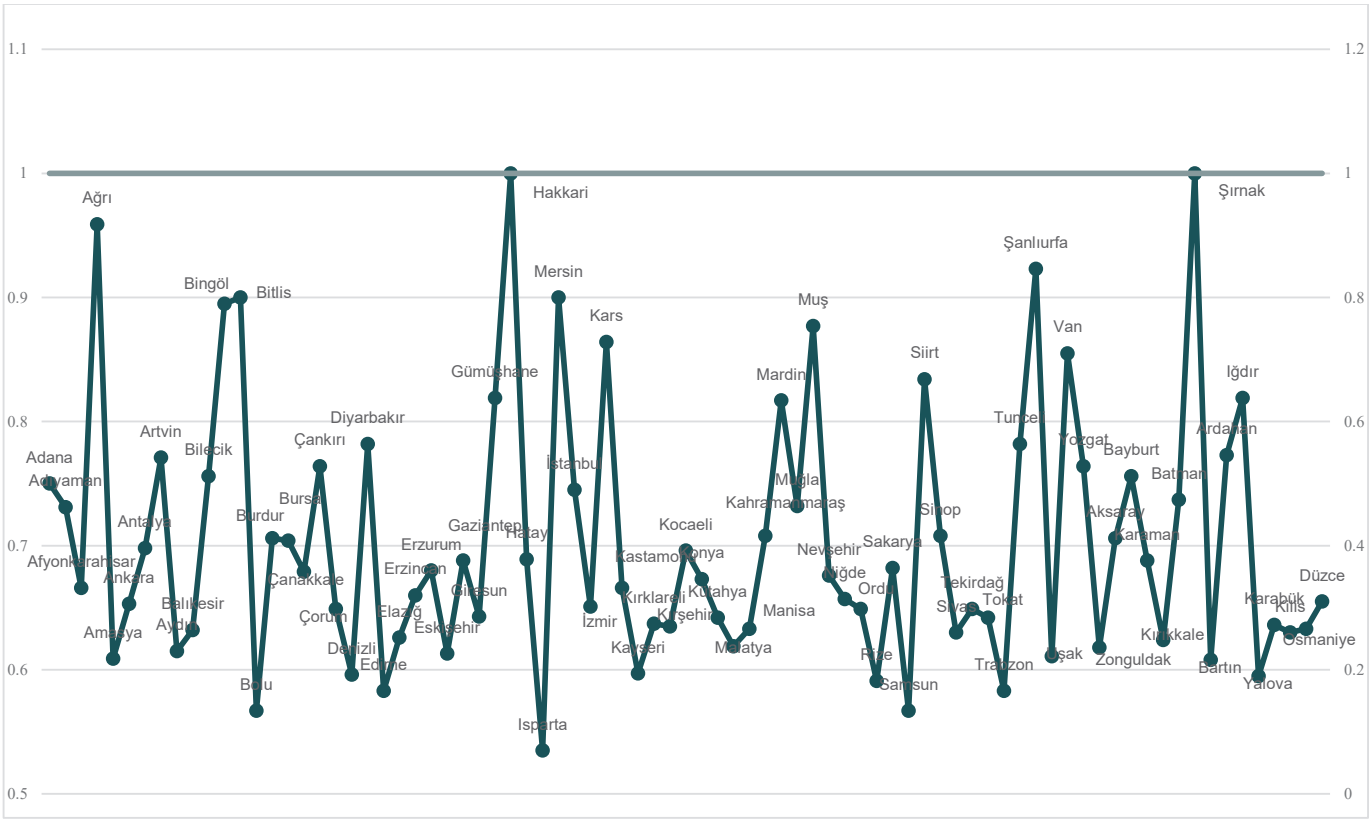
IL	HMS	DMS	TE	Projeksiyon HM	Projeksiyon HMS	Projeksiyon DMS	Referans İller
Adana	11,8	0,48	0,750	83,87	9,2	0,48	Şırnak (1,333)
Adıyaman	9,3	0,72	0,731	86,03	9,3	0,66	Hakkâri (1,368)
Afyonkarahisar	10,3	0,62	0,666	94,49	10,3	0,62	Hakkâri (0,660); Şırnak (0,843)
Ağrı	7,1	0,49	0,959	65,59	7,1	0,49	Hakkâri (0,955); Şırnak (0,088)
Amasya	11,2	0,75	0,609	103,31	11,2	0,75	Hakkâri (1,323); Şırnak (0,319)
Ankara	10,5	0,64	0,653	96,38	10,5	0,64	Hakkâri (0,736); Şırnak (0,796)
Antalya	9,8	0,62	0,698	90,13	9,8	0,62	Hakkâri (0,868); Şırnak (0,565)
Artvin	8,9	0,52	0,771	81,54	8,9	0,52	Hakkâri (0,444); Şırnak (0,852)
Aydın	11,1	0,73	0,615	102,29	11,1	0,73	Hakkâri (0,421); Şırnak (1,205)
Balıkesir	10,9	0,60	0,632	99,59	10,9	0,60	Hakkâri (0,250); Şırnak (1,333)
Bilecik	9,0	0,71	0,756	83,25	9,0	0,64	Hakkâri (1,324)
Bingöl	7,6	0,64	0,895	70,3	7,6	0,54	Hakkâri (1,118)
Bitlis	7,6	0,48	0,900	69,89	7,6	0,48	Hakkâri (0,667); Şırnak (0,444)
Bolu	12,0	1,15	0,567	111,00	12,0	0,85	Hakkâri (1,175)
Burdur	10,2	0,51	0,706	89,11	9,8	0,51	Şırnak (1,417)
Bursa	9,7	0,64	0,704	89,40	9,7	0,64	Hakkâri (1,069); Şırnak (0,352)
Çanakkale	11,1	0,53	0,679	92,60	10,2	0,53	Şırnak (1,472)

Çankırı	8,9	0,81	0,764	82,33	8,9	0,63	Hakkâri (1,309)
Çorum	10,6	0,60	0,649	96,97	10,6	0,60	Hakkâri (0,375); Şırnak (1,167)
Denizli	11,5	0,70	0,596	105,56	11,5	0,70	Hakkâri (0,799); Şırnak (0,880)
Diyarbakır	8,8	0,49	0,782	80,45	8,8	0,49	Hakkâri (0,247); Şırnak (1,032)
Edirne	11,7	0,77	0,583	107,82	11,7	0,77	Hakkâri (1,274); Şırnak (0,440)
Elazığ	10,9	0,72	0,626	100,45	10,9	0,72	Hakkâri (1,208); Şırnak (0,389)
Erzincan	10,3	0,98	0,660	95,28	10,3	0,73	Hakkâri (1,515)
Erzurum	10,0	0,94	0,680	92,5	10,0	0,71	Hakkâri (1,471)
Eskişehir	11,1	0,87	0,613	102,68	11,1	0,78	Hakkâri (1,632)
Gaziantep	10,0	0,56	0,688	91,44	10,0	0,56	Hakkâri (0,306); Şırnak (1,148)
Giresun	11,3	0,56	0,643	97,84	10,8	0,56	Şırnak (1,556)
Gümüşhane	8,3	0,59	0,819	76,78	8,3	0,59	Hakkâri (1,221)
Hakkâri	6,8	0,48	1,000	62,9	6,8	0,48	Hakkâri (1,000)
Hatay	10,0	0,54	0,689	91,29	10,0	0,54	Hakkâri (0,146); Şırnak (1,306)
Isparta	12,7	0,98	0,535	117,48	12,7	0,89	Hakkâri (1,868)
Mersin	10,4	0,40	0,900	69,89	7,7	0,40	Şırnak (1,111)
İstanbul	9,2	0,55	0,745	84,38	9,2	0,55	Hakkâri (559); Şırnak (0,782)
İzmir	10,5	0,68	0,651	96,68	10,5	0,68	Hakkâri (1,056); Şırnak (0,481)
Kars	7,9	0,52	0,864	72,80	7,9	0,52	Hakkâri (0,861); Şırnak (0,296)
Kastamonu	10,3	0,62	0,666	94,49	10,3	0,62	Hakkâri (0,660); Şırnak (0,843)
Kayseri	11,4	0,80	0,597	105,42	11,4	0,80	Hakkâri (1,639); Şırnak (0,037)
Kırklareli	10,7	0,72	0,637	98,72	10,7	0,72	Hakkâri (0,278); Şırnak (1,292)
Kırşehir	10,8	0,65	0,635	99,08	10,8	0,65	Hakkâri (0,691); Şırnak (0,884)
Kocaeli	9,8	0,66	0,696	90,42	9,8	0,66	Hakkâri (1,188); Şırnak (0,250)
Konya	10,1	0,73	0,673	93,43	10,1	0,71	Hakkâri (1,485)
Kütahya	10,6	0,84	0,642	98,05	10,6	0,75	Hakkâri (1,559)
Malatya	11,0	0,75	0,619	101,56	11,0	0,75	Hakkâri (1,406); Şırnak (0,208)
Manisa	10,8	0,70	0,633	99,45	10,8	0,70	Hakkâri (1,090); Şırnak (0,491)
Kahramanmaraş	9,7	0,57	0,708	88,89	9,7	0,57	Hakkâri (0,510); Şırnak (0,903)
Mardin	8,4	0,50	0,817	77,02	8,4	0,50	Hakkâri (0,493); Şırnak (0,731)
Muğla	9,4	0,53	0,732	85,98	9,4	0,53	Hakkâri (0,316); Şırnak (1,051)
Muş	7,8	0,49	0,877	71,71	7,8	0,49	Hakkâri (0,663); Şırnak (0,477)
Nevşehir	10,1	0,66	0,676	93,04	10,1	0,66	Hakkâri (1,063); Şırnak (0,417)
Niğde	10,4	0,68	0,657	95,81	10,4	0,68	Hakkâri (1,097); Şırnak (0,426)
Ordu	10,5	0,71	0,649	96,89	10,5	0,71	Hakkâri (1,295); Şırnak (0,245)
Rize	11,5	1,16	0,591	106,38	11,5	0,81	Hakkâri (1,691)
Sakarya	10,1	0,55	0,682	92,24	10,1	0,55	Hakkâri (0,184); Şırnak (1,282)
Samsun	12,0	0,90	0,567	111,00	12,0	0,85	Hakkâri (1,765)
Siirt	8,2	0,52	0,834	75,42	8,2	0,52	Hakkâri (0,736); Şırnak (0,463)
Sinop	9,6	0,71	0,708	88,80	9,6	0,68	Hakkâri (1,412)
Sivas	10,8	0,94	0,63	99,90	10,8	0,76	Hakkâri (1,588)
Tekirdağ	10,5	0,71	0,649	96,89	10,5	0,71	Hakkâri (1,295); Şırnak (0,245)
Tokat	10,6	0,83	0,642	98,05	10,6	0,75	Hakkâri (1,559)
Trabzon	11,8	0,65	0,583	107,82	11,8	0,65	Hakkâri (0,274); Şırnak (1,440)
Tunceli	8,7	0,72	0,782	80,48	8,7	0,61	Hakkâri (1,279)
Şanlıurfa	8,9	0,39	0,923	68,14	7,5	0,39	Şırnak (1,083)
Uşak	11,2	0,71	0,611	103,01	11,2	0,71	Hakkâri (1,003); Şırnak (0,634)
Van	8,0	0,50	0,855	73,53	8,0	0,50	Hakkâri (0,660); Şırnak (0,509)

Yozgat	8,9	0,67	0,764	82,33	8,9	0,63	Hakkâri (1,309)
Zonguldak	11	0,82	0,618	101,75	11,0	0,78	Hakkâri (1,618)
Aksaray	10,7	0,51	0,706	89,11	9,8	0,51	Şırnak (1,417)
Bayburt	9,0	0,83	0,756	83,25	9	0,64	Hakkâri (1,324)
Karaman	9,9	0,68	0,688	91,44	9,9	0,68	Hakkâri (1,306); Şırnak (0,148)
Kırıkkale	10,9	0,87	0,624	100,83	10,9	0,77	Hakkâri (1,603)
Batman	9,3	0,57	0,737	85,39	9,3	0,57	Hakkâri (0,677); Şırnak (0,681)
Şırnak	6,9	0,36	1,000	62,90	6,9	0,36	Şırnak (1,000)
Bartın	11,3	0,66	0,608	103,52	11,3	0,66	Hakkâri (0,562); Şırnak (1,083)
Ardahan	8,8	0,69	0,773	81,40	8,8	0,62	Hakkâri (1,294)
Iğdır	8,3	0,67	0,819	76,78	8,3	0,59	Hakkâri (1,221)
Yalova	11,5	0,72	0,595	105,71	11,5	0,72	Hakkâri (0,958); Şırnak (0,722)
Karabük	10,7	0,95	0,636	98,98	10,7	0,76	Hakkâri (1,574)
Kilis	10,8	0,80	0,630	99,90	10,8	0,76	Hakkâri (1,588)
Osmaniye	10,9	0,57	0,633	99,37	10,9	0,57	Hakkâri (0,010); Şırnak (1,569)
Düzce	10,5	0,60	0,655	96,09	10,5	0,6	Hakkâri (0,417); Şırnak (1,111)

Kaynak: Yazar tarafından hazırlanmıştır. HM: Hasta Memnuniyeti; HMS:Hekim Müracaat Sayısı; DMS: Diş Hekimi Müracaaat Sayısı; TE: Teknik Etkinlik

yönlü CCR modelinin teknik etkinlik değeri olmak üzere BCC>CCR kısıtı tüm durumlar için geçerli olmalıdır. Bu durum BCC Modelindeki konveks üretim imkanları kümesinin CCR modelindeki üretim imkanları kümesinin bir alt kümesi olmasından kaynaklandığı belirtilmektedir (37). Diğer bir deyişle CCR çıktı yönlü bir modelde etkin değerlendirilen bir KVB mutlaka BCC çıktı yönlü modelde de etkin bulunacaktır. Araştırmada BCC modeli çalışılmış ve CCR çıktı yönlü modele göre etkinlik değeri 0,75 ile etkin olmayan Adana İli BCC çıktı yönlü modelde 1 değeri ile etkin olarak tespit edilmiş ve bu durum yukarıda bahsettiğimiz durumu karşılayan bir örnek olarak değerlendirilmiştir. Araştırmadan elde



Şekil 1: İllere Göre Teknik Etkinlik Değerleri, Türkiye, 2022

edilen illere ait teknik etkinlik değerleri Şekil 1'de sunulmuştur.

4. Tartışma, Sonuç

Bu araştırma, iller düzeyinde teknik etkinlik ile hasta memnuniyeti arasındaki ilişkiyi inceleyerek literatürdeki mevcut çalışmalardan ayrılmaktadır. Önceki araştırmalar genellikle sağlık hizmetlerinin teknik etkinliğine odaklanmış, ancak memnuniyet gibi sosyo-psikolojik faktörlerle bu etkinliği ilişkilendirmemiştir. Oysa bu çalışma, sağlık kaynaklarının verimli kullanımı ile sağlık hizmetlerinden duyulan memnuniyet arasındaki bağı ele alarak, hem hizmetlerin verimliliğini hem de bireyler üzerindeki kalite algısını değerlendirmeyi hedeflemiştir. Bu yönüyle, sağlık sistemlerinin teknik etkinliğinin yanı sıra, hasta deneyimlerine ve hizmetlerin algılanan kalitesine dair daha kapsamlı bir analiz sunmaktadır. Ayrıca teknik etkinsizlik nedeniyle elde edilen sonuçlardan sağlık harcamalarındaki verimsizliğin büyüklüğü de hesaplanmaya çalışılmıştır.

Araştırma bulguları, iller düzeyinde sağlık hizmetlerinin etkin kullanımında önemli farklılıklar olduğunu ortaya koymaktadır. Türkiye genelinde illerin ortalama teknik etkinlik skoru 0,703 olarak tespit edilmiş ve illerin yalnızca %2,5'inin tam etkin olduğu belirlenmiştir. Bu durum, sağlık hizmetlerinin büyük bir bölümünün potansiyel verimlilik düzeyine ulaşamadığını göstermektedir. Tam etkin olarak tespit edilen iller Hakkâri ve Şırnak olup, bu illerin teknik etkinlik değerleri 0,94 ile 1,00 arasında değişmektedir. Bu bulgular, bölgesel farklılıkların sağlık hizmetlerinin etkin kullanımında belirgin bir etkiye sahip olduğunu ve diğer araştırmaların sonuçlarıyla uyumlu olduğunu ortaya koymaktadır (23). Yine Türkiye'deki sağlık hizmetleri kapasitesine ilişkin daha önce VZA yöntemi ile yapılan çalışmalarda da benzer bulgular elde edilmiştir. Genel olarak bu araştırmalar, sağlık sisteminin büyük oranda verimsiz olduğunu ve kaynakların etkili bir şekilde kullanılamadığını vurgulamaktadır (19, 38-41). Verimsizlik, özellikle yatak sayısı, hekim sayısı ve sağlık harcamaları gibi girdilerin etkin kullanımındaki yetersizliklerden kaynaklanmaktadır. Aynı zamanda, sağlık hizmetlerinin üretim süreçlerinin potansiyel çıktı düzeyine ulaşamaması da bu verimsizliğin bir diğer göstergesi olarak öne çıkmaktadır (39, 40).

Araştırmamızdan elde edilen sonuçlara göre Çıktı yönelimli modele göre mevcut 10,02 ile kişi başına düşen hekim müracaat sayısının 0,12 br.; 0,67 ile kişi başına düşen diş hekimi müracaat sayısının 0,04 br. azaltılması durumunda memnuniyet puanı 28,27 puan artmaktadır. Yine girdi yönelimli sonuçlara göre mevcut memnuniyet düzeyini (%62,90) sağlayan kişi başı hekim müracaat sayısı ortalama 6,83 br., kişi başına düşen diş hekimi müracaat sayısı ortalama 0,43 br olduğu tespit edilmiştir. Bu sonuçlar kişi başı hekim müracaat sayılarında 3,19 br; kişi başı diş hekimine müracaat sayılarının 0,2352 br. azaltılma gerektiğini göstermektedir.

Sağlık İstatistikleri Yıllığı'na göre 2022 yılında tüm sektörler düzeyinde Toplam Hekime Müracaat Sayısı[2] 907.589.522'dir. Bu müracaatların 854.328.324'ü hekime; 53.261.198'i diş hekimine yapılmıştır. Araştırmamızda mevcut memnuniyet düzeyinin korunması ya da projekte edilen memnuniyet düzeyine ulaşılabilmesi için kişi başı hekime müracaat sayılarında 0,12-3,19 br., kişi başı diş hekim müracaat sayılarının 0,04-0,23 br. arasında azaltılması gerektiği hesaplanmıştır. Bu doğrultuda hekime yapılan toplam müracaatların 10 milyon ile 270 milyon civarında etkin olmadığı belirlenmiş ve SUT muayene fiyatı ile çarpımı sonucu da 270 milyon - 7,2 milyar arasında sağlık harcamasına neden olduğu hesaplanmıştır. Ayrıca diş hekimine yapılan toplam müracaatların 3,4 milyon ile 19,6 milyon civarında etkin olmadığı ve SUT[3] muayene fiyatı ile çarpımı sonucu da 90 milyon - 520 milyon arasında sağlık harcamasına neden olduğu hesaplanmıştır (Ek 1). Toplamda müracaat sayılarından kaynaklı verimsizliğin maliyeti 360 milyon ile 7,7 milyar arasında değiştiği ve toplam sağlık harcamalarının %0,059-1,28'ini; muayenelere yönelik yapılan toplam harcamaların ise %2-32'sini kapsadığı hesaplanmıştır.

Literatürde araştırmamızla uyumlu değerlendirdiğimiz sağlık hizmetlerinin etkin kullanımını etkileyen farklı faktörleri inceleyen ve

[2] Kaynak: SİY, 2022

[3] 2022 SUT geri ödeme listesinde belirlenen muayene işlem puanı 520030 SUT Kodu ile belirlenen Normal poliklinik muayenesi işlem puanı 44,63 puan olup; SUT çarpanı olan 0,593 ile Tutarı hesapladığımızda bir poliklinik muayene ücreti 26,46 lira hesaplanmıştır.

çeşitli verimsizlik biçimlerinin sistem üzerindeki etkilerini vurgulayan çalışmalarda bulunmaktadır. Bu çalışmalar, sağlık sistemlerinin %20 ila %40 arasında kaynak kaybı yaşadığını ve birçok ülkenin sağlık sistemlerini verimsiz kullandığını ortaya koymaktadır (42). Eze vd. (2024) araştırması, incelenen ülkelerin %78,5'inin evrensel sağlık kapsamına ulaşma yolunda verimsiz olduğunu göstermektedir (43). Chandra ve Staiger (2019), hastaneler arasında tahsis yetersizliği ve yanlış bilgi nedeniyle tedavi süreçlerinin aşırı kullanıldığını belirtmektedir (44).Tahsis yetersizliğinin giderilmesi ve sağlık hizmetlerinin daha etkili kullanımı, elde edilecek faydaların artırılacağına dair vurgular içermektedir (44). Samut ve Cafri (2016), 29 OECD ülkesinde hastane verimliliğini inceleyerek, gelir, eğitim ve özel hastane sayısının verimliliği artırdığını; kamu ve özel sağlık harcamalarının ile kamu hastanesi sayısının ise verimliliği olumsuz etkilediğini tespit etmiştir (45). Medeiros ve Schwierz (2015) çalışması, Avrupa Birliği ülkelerindeki sağlık sistemlerinin verimliliğini çeşitli girdi ve çıktı değişkenlerini kullanarak incelemiş ve mevcut verimlilikten en yüksek seviyeye geçildiğinde doğumda yaşam beklentisinin %2,3 veya 1,8 yıl artabileceği sonucuna varılmıştır (46).

4.1. Öneriler

Bu araştırma ve elde edilen bulgular doğrultusunda sağlık sistemlerinin etkinliğini artırmak ve hasta memnuniyetini yükseltmek amacıyla aşağıdaki önerilerde bulunulabilir:

Kaynakların Etkin Kullanımı: Sağlık hizmetlerinin verimliliğini artırmak için mevcut kaynakların etkin bir şekilde kullanılmasını sağlamak gerekmektedir. Özellikle yatak sayısı, hekim sayısı ve sağlık harcamalarının etkin kullanımı üzerine odaklanılmalı; bu unsurların optimizasyonu için düzenlemeler yapılmalıdır.

Eğitim ve Bilinçlendirme: Sağlık profesyonellerinin ve hastaların sağlık hizmetleri konusundaki bilgilerini artırmak, verimliliği yükseltebilir. Eğitim programları düzenleyerek, sağlık sistemindeki kaynakların nasıl daha verimli kullanılacağına dair bilgi akışını artırmak önemlidir.

Veri Analizi ve İzleme: Sağlık hizmetleri kullanımına ilişkin verilerin düzenli olarak toplanması ve analiz edilmesi, verimlilik sorunlarını tespit etmek ve çözüm önerileri geliştirmek için hayati öneme sahiptir. Bu tür bir veri analizi, hangi bölgelerde ve hangi hizmetlerin etkin kullanımda sorun yaşandığını belirlemeye yardımcı olabilir.

Tahsis Yetersizliğinin Giderilmesi: Sağlık Kurumları arasında tahsis yetersizliklerinin giderilmesi için kaynakların daha dengeli bir şekilde dağıtılması gerekmektedir. Bu, hizmet kalitesini artırırken, aynı zamanda hasta memnuniyetini de yükseltecektir.

İzleme ve Değerlendirme Mekanizmaları: Sağlık hizmetleri için izleme ve değerlendirme sistemleri kurulmalı ve bu sistemler aracılığıyla hizmetlerin etkinliği ve hasta memnuniyeti düzenli olarak gözden geçirilmelidir. Elde edilen bulgular, sağlık politikalarının geliştirilmesine yön vermelidir.

Hasta Geri Bildirimi: Hasta memnuniyetini artırmak için hasta geri bildirim mekanizmaları oluşturulmalı ve bu geri bildirimler, sağlık hizmetlerinin iyileştirilmesinde önemli bir kaynak olarak değerlendirilmelidir.

Çok Disiplinli Yaklaşım: Sağlık sistemlerinde verimliliği artırmak için sağlık profesyonellerinin, yöneticilerin ve politika yapıcıların birlikte çalışacağı çok disiplinli bir yaklaşım benimsenmelidir. Bu tür bir işbirliği, sistemin genel verimliliğini artıracak stratejilerin geliştirilmesine katkıda bulunabilir.

Hedefli Yatırımlar: Sağlık altyapısının güçlendirilmesi ve özellikle etkin olmayan alanlara yönelik hedefli yatırımlar yapılmalıdır. Bu, sağlık hizmetlerinin kalitesini ve erişilebilirliğini artırabilir.

Bu öneriler, sağlık sisteminin verimliliğini artırma ve hasta memnuniyetini sağlamada önemli adımlar atılmasına ışık tutmaktadır. Ancak bu stratejilerin uygulanması sürecinde, sağlık sistemindeki dinamik değişimlerin sürekli olarak izlenmesi ve gerektiğinde stratejilerin güncellenmesi büyük önem taşımaktadır. Bu araştırmada ele alınan değişkenler, kullanılan yöntem (VZA) ve araştırmanın kapsadığı zaman dilimi (2022 yılı verileri), çalışmanın sınırlılıkları olarak değerlendirilmiştir. VZA analizlerinde dikkat edilmesi gereken bir diğer nokta da, elde edilen sonuçların analizde kullanılan değişkenlere bağlı olarak değişebileceğidir. Bu nedenle, araştırmanın sonuçlarının yorumlanmasında bu sınırlılıkların göz önünde bulundurulması önemlidir. Sağlık alanında sonuçların ve talebin belirsizliği göz önüne alındığında, sağlık kaynaklarını azaltmak, etkinlik sağlamaktan ziyade olumsuz sonuçlara yol açabilir. Özellikle sağlık hizmetlerinde girdi odaklı

bir yaklaşımın, mümkün olan en az kaynakla en fazla çıktıyı elde etme çabası, bazı durumlarda kaliteyi ve hizmet sunumunu olumsuz etkileyebilir.

Bu çalışmanın sonuçları, belirli bir yıl ve değişkenlere dayandığı için, gelecekte farklı zaman dilimlerini ve değişkenleri içeren analizlerle karşılaştırılmalıdır. Farklı yıllara ait veriler veya yeni değişkenlerle yapılacak analizler, sağlık hizmetlerinin verimliliği konusunda daha geniş bir perspektif sunabilir ve bu çalışmanın bulgularını daha derinlemesine değerlendirme olanağı sağlayabilir. Ayrıca, gelecekte yapılacak araştırmalar hem teknik verimlilik hem de hasta memnuniyeti üzerinde daha fazla değişkeni ve potansiyel etkileri dikkate alarak daha kapsamlı sonuçlar üretebilir.

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Ek 1:

	Mevcut Durum	CCR GYM	CCR ÇYM	CCR GYM MS	CCR ÇYM MS	CCR GYM* SUT	CCR ÇYM*SUT
HMS	854.328.324	3,19	0,12	272.041.774,07	10.233.546,36	7.198.225.341,89	270.779.636,69
DHMS	53.261.198	0,23	0,04	19.614.297,19	3.411.182,12	518.994.303,65	90.259.878,90
HM	62,9	62,9	91,16				

İnönü Üniversitesi Tıp Fakültesi öğrencilerinde küresel iklim değişikliği farkındalık düzeyinin incelenmesi

Investigation of global climate change awareness level in İnönü University Medical Faculty students

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Abstract

Climate change is a significant threat to global health in the 21st century. Therefore, measuring the state of awareness of climate change can help develop effective interventions. This study intends to investigate global climate change awareness and the influencing factors among medical students at Inonu University.

This cross-sectional study was conducted between February-March 2024. All necessary permissions and ethical approval were obtained for the study. The sample size was determined to be 280, and in the present study, 283 students were surveyed under observation using stratified sampling according to class year. The form included questions about sociodemographics, questions related to global climate change awareness, and the Global Climate Change Awareness Scale. Statistical analyses were performed using the Mann-Whitney U Test and Kruskal-Wallis Variance Analysis. Of the students, 50.2% were female, 36.0% were aged 23 and above. It was found that 61.8% of the students had a moderate level of awareness about global climate change. According to the scores obtained from the Global Climate Change Awareness Scale, awareness levels were significantly higher among females compared to males (p=0.021). In addition, awareness levels were better among students worried about climate change and those knowledgeable about climate change. Consequently, in the education curriculum, topics on climate change should be featured to increase awareness among students who are already knowledgeable about it. Since physicians are considered role models in society, informed and proactive steps regarding climate change on the part of medical students can protect the health of future generations.

Keywords: Climate change, medical students, awareness

Özet

İklim değişikliği 21. Yüzyılda küresel sağlığı etkileyen önemli bir tehdit olarak görülmektedir. Bu nedenle iklim değişikliği konusunda farkındalık düzeyinin saptanması yapılacak müdahaleler açısından etkili olacaktır. Bu çalışmada İnönü Üniversitesi tıp fakültesi öğrencilerinin küresel iklim değişikliği farkındalık düzeyleri ve etkileyen değişkenler incelenmiştir. Şubat-Mart 2024 tarihleri arasında yapılan bu araştırma kesitsel tiptedir. Çalışmanın yapılabilmesi için gerekli izin ve etik kurul onayı alınmıştır. Örneklem büyüklüğü 280 kişi olarak hesaplanmış, sınıfa göre tabakalandırma yapılarak 283 öğrenciye gözlem altında anket uygulanmıştır. Anket formunda sosyodemografik özellikleri içeren sorular, küresel iklim değişikliği farkındalığı ile ilişkili sorular ve Küresel İklim Değişikliği Farkındalık Ölçeği yer almaktadır. İstatistiksel analizlerde Mann Whitney U Testi ve Kruskal Wallis Varyans Analizi kullanılmıştır. Öğrencilerin %50,2'si kadın, %36,0'ı 23 yaş ve üzerindedir. %20,1'i birinci sınıf öğrencisidir. Öğrencilerin %61,8'inin Küresel İklim Değişikliği konusundaki farkındalıkları orta düzeyde tespit edilmiştir. Küresel İklim Değişikliği Farkındalık Ölçeğinden alınan puanlara göre kadınların iklim değişikliği konusundaki farkındalığı erkeklerden anlamlı olarak yüksek saptanmıştır (p=0,021). İklim değişikliği konusunda endişesi olanların ve bilgi sahibi olan öğrencilerin farkındalığının daha yüksek olduğu görülmüştür (p<0,05). Öğrencilerden bilgi sahibi olanların farkındalığının daha yüksek çıkması nedeniyle bu konuda bilinçli olmaları için eğitim müfredatlarına bu konular eklenmelidir. Hekimlerin, toplumda örnek alınan bir grup olması nedeniyle tıp fakültesi öğrencilerinin iklim değişikliği ile ilgili bilinçli ve bilgilendirici adımlar atmaları, gelecek nesillerin sağlığını korumak adına kritik öneme sahiptir.

Anahtar Kelimeler: İklim değişikliği, tıp öğrencileri, farkındalık

Giriş

İklim değişikliği insan sağlığı için önemli bir tehdit oluşturmakla birlikte fiziksel çevre, sosyal ve ekonomik koşullar ile sağlık sisteminin işleyişi de dahil olmak üzere hem doğal hem de beşeri sistemleri etkilemektedir (1). Bu ekilenimin temelinde yer alan atmosferde biriken sera gazlarının yoğunluğunun artması, yeryüzünün ortalama yüzey sıcaklığının gün geçtikçe yükselmesine neden olmaktadır (2). Küresel olarak aşırı sıcaklık nedeniyle 65 yaş üzeri bireylerde meydana gelen ölümler 2000-2004 yıllarına oranla 2017-2021 yılları arasında %85 oranında artış göstermiştir (3). Uluslararası Acil Durumlar ve Afet Veri Tabanına göre (The Emergency Events Database /EM-DAT) 2000 ve 2020 yılları arasında iklimle ilişkili afet olarak kabul edilen 4623 olay kaydedilmiştir. Bu olayların 3,39 milyardan fazla insanı etkilediği ve 472 binden fazla ölüme neden olduğu bildirilmiştir (4). Bu etkilenim ve ölümler doğrudan veya dolaylı etkilenim şeklinde gerçekleşmektedir (5).

İklim değişikliğinden korunmak için kullanılan gıda, ulaşım ve enerji kaynaklarının oluşturduğu hava kirliliği ve sera gazı yoğunluğunun azaltılması gerekir. Toplumda iklim değişikliğinden korunma kapsamında oluşturulacak davranış değişikliğinin temelinde farkındalık düzeylerinin saptanması ve arttırılması yer almaktadır (1, 6). İklim değişikliğinin insan sağlığı üzerine etkilerinin yaygın olarak görüldüğü günümüzde sağlık profesyonellerinin de toplumun diğer bireyleri gibi bu durumun farkında olması gerekir. Sağlık profesyonellerinin iklim değişikliği konusunda farkındalıklarının arttırılması iklim değişikliğinin insan sağlığına verebileceği zararları tanımlayabilmeleri ve hastaları sağlık risklerine karşı korumak için danışmanlık yapabilmeleri için önemli olacaktır (7). Hekimlerin insanların sağlığını korumak ve sağlıkla ilgili konularda farkındalık oluşturmak için özel bir sorumluluğu vardır. Ayrıca, sosyal rol modeller olarak kabul edilmeleri nedeniyle iklim değişikliği ve sağlık etkileri konusunda topluma liderlik ederek yön verebilirler (8, 9).

Ülkemizde 2022 yılında tıp fakültesi son sınıf öğrencilerinde yapılan bir çalışmada iklim değişikliğinin nedenleri, oluşum mekanizması, sağlık etkileri ve uluslararası sözleşmeler konusunda bilgi eksiklikleri olduğu saptanmıştır (10). Ülkemizde tıp fakültesi öğrencilerinde yapılan başka bir çalışmada da öğrencilerin küresel ısınma konusunda genel bilgi düzeylerinin iyi olduğu ancak küresel ısınmanın neden olduğu bazı hastalıkları yeterli düzeyde bilmediği ve öğrencilerin yarısından fazlasının uluslararası çevre sözleşmelerini duymadığı saptanmıştır (11). Yurtdışında yapılan bir araştırmada tıp fakültesi öğrencilerinin diğer fakültelerdeki öğrencilere göre farkındalıklarının daha düşük olduğu görülmüştür (12). Farklı çalışmalarda gösterildiği gibi tıp eğitim müfredatına iklim değişikliği konusunun ders olarak eklenmesinin yanı sıra öğrencilere iklim değişikliği konusunda seminer, panel gibi etkinlikler yapılmasının farkındalıklarını arttırdığı gösterilmiştir (9, 13).

Geleceğin hekimleri olan tıp fakültesi öğrencileri, iklim değişikliğinin sonuçları olan bulaşıcı hastalık yükü, iklim göçleri ve aşırı hava olaylarının neden olduğu afetlerle mücadele etmek ve bu krizleri yönetmek zorunda kalacaklardır. Bu açıdan tıp fakültesi öğrencilerinin, iklim değişikliğinin sağlık üzerindeki etkilerini anlaması ve bu süreçlere karşı eğitimleri sırasında yetkinlik kazanması, gelecekte sağlık sisteminin bu krizlerle başa çıkabilme kapasitesini belirleyecektir (8, 14). Sağlık profesyonellerinin iklim değişikliği konusunda farkındalıklarının arttırılması iklim değişikliğinin insan sağlığına verebileceği zararları

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tanımlayabilmeleri ve hastalara sağlık risklerine karşı danışmanlık yapabilmeleri için gereklidir (7).
Bu çalışmada İnönü Üniversitesi Tıp Fakültesi öğrencilerinin küresel iklim değişikliği (KİD) farkındalık düzeyleri ve etkileyen değişkenlerin incelenmesi amaçlanmıştır.

Gereç ve Yöntem

Kesitsel tipte bir çalışma olup, Şubat-Mart 2024 tarihleri arasında yapılmıştır. Çalışmanın yapılabilmesi için İnönü Üniversitesi Tıp Fakültesi Dekanlığı'ndan ve İnönü Üniversitesi Sağlık Bilimleri Girişimsel Olmayan Etik Kurulundan etik kurul onayı alınmıştır (Karar No:2024/5541). Çalışmanın evrenini İnönü Üniversitesi Tıp Fakültesi'nde okuyan 1692 öğrenci oluşturmaktadır. Örneklem büyüklüğü OpenEpi programı ile referans çalışmadaki prevelans %32,3 baz alınarak %95 güven düzeyi, %5 hata ve 1 desen etkisiyle 280 öğrenci olarak hesaplanmıştır (15). Örnekleme metodu olarak sınıfa göre tabakalandırma yapılarak 283 öğrenciye gözlem altında anket uygulanmıştır. Verileri toplamada kullanılan anket formunun birinci bölümünde öğrencilerin sosyodemografik özellikleri içeren sorular, ikinci bölümünde KİD konusunda bazı sorular, üçüncü bölümde ise KİD Farkındalık Ölçeği bulunmaktadır.
KİD Farkındalık Ölçeği'nin geçerlilik güvenilirlik çalışması, Deniz ve ark. tarafından 2021 yılında yapılmıştır. 21 maddeden oluşan ölçeğin dört alt boyutu vardır; doğal ve beşeri ortama etkiler(Madde 1-9), küresel organizasyonlar ve anlaşmalara ilişkin farkındalık(Madde 10-15), ortaya çıkaran sebepler(Madde 16-18) ve enerji tüketimi ilişkisidir (Madde 19-21). KİD ölçeği; 1=Hiç Farkında Değilim, 5=Tamamen Farkındayım şeklinde 5'li Likert ölçeğidir. Ölçekteki her bir soru 1-5 puan üzerinden değerlendirilir. Ölçek puanının hesaplanması her bir maddeden alınan puanların toplamından elde edilir. Ölçekten en yüksek 105; en düşük 21 puan alınabilmektedir. Ölçekte ters kodlanacak madde yoktur. Ölçeğin değerlendirilmesinde; toplam puanın yükselmesi yüksek düzey farkındalık şeklinde yorumlanırken toplam puanın düşmesi düşük düzey farkındalık olarak yorumlanır. Ölçekten alınan puanlar farkındalık düzeyine göre gruplandırıldığında toplam puanlar soru sayısına bölünmesi sonrası; 1,00-2,33 arası düşük farkındalık, 2,34-3,66 arası orta farkındalık, 3,67-5,00 arası yüksek farkındalık şeklinde ifade edilmektedir. Ölçeğin Cronbach alfa değeri 0,826 olarak hesaplanmıştır (16).
Anket formunda şuan yaşadığınız yer sorusuna verilen cevaplar değerlendirildiğinde aile ile birlikte evde yaşayanlar, akraba yanında evde yaşayanlar, tek başına evde yaşayanlar, arkadaşla evde yaşayanlar tek cevapta birleştirilip tabloda şuan yaşadığı yer ev şeklinde belirtilmiştir.
Çalışmanın bağımlı değişkenleri KİD Farkındalık Ölçeği'nden ve alt boyutlarından alınan puanlar iken bağımsız değişkenler; yaş grupları, cinsiyet, öğrencinin okuduğu sınıf, şuan yaşadığı yer, anne eğitim düzeyi, baba eğitim düzeyi, yaşam boyu en uzun yaşadığı yer, KİD konusundaki endişe duyma durumu ve KİD konusundaki bilgi durumu gibi değişkenlerdir. İnönü Üniversitesi Tıp Fakültesinde eğitim gören ve çalışmaya katılmayı sözlü olarak kabul eden kişiler çalışmaya dahil edilirken çalışmaya katılmayı kabul etmeyen öğrenciler çalışmaya dahil edilmemiştir.
Verilerin analizi IBM SPSS 22.0 paket programı ile gerçekleştirilmiştir. Yapılan Shapiro Wilk testine göre KİD Farkındalık Ölçeği'nden ve alt boyutlarından alınan toplam puanların normal dağılıma uymadığı görülmüştür ($p<0,05$). İstatistiksel analizlerde; Mann Whitney U Testi ve Kruskal Wallis Analizi kullanılmıştır. Tüm değerlendirmelerde $p<0,05$ değeri anlamlı olarak kabul edilmiştir.

Bulgular

Çalışmaya katılan öğrencilerin sosyodemografik özelliklerinin dağılımı Tablo 1'de gösterilmiştir. Öğrencilerin %36,0'ı 23 yaş ve üzerinde, %50,2'si kadın, %20,1'i birinci sınıf öğrencisidir. Öğrencilerin %56,5'i şu anda evde kaldığını ifade etmiştir. Öğrencilerin %23,7'si annelerinin öğrenim düzeyini ilkokul mezunu, %49,8'i ise babalarının öğrenim düzeyini üniversite mezunu ve üzeri olarak ifade etmiştir.

Tablo 1: Çalışmaya katılan öğrencilerin sosyodemografik değişkenlerinin dağılımı

Sosyodemografik Değişkenler	n	%
Yaş Grupları		
20 Yaş ve Altı	90	31,8
21 ve 22 Yaş	91	32,2
23 Yaş ve Üzeri	102	36,0
Cinsiyet		
Erkek	141	49,8
Kadın	142	50,2
Sınıf		
1	57	20,1
2	47	16,6
3	51	18,0
4	45	15,9
5	36	12,7
6	47	16,7
Şuan Yaşadığı Yer		
Devlet Yurdu /Özel Yurt	123	43,5
Ev	160	56,5
Anne Öğrenim Düzeyi		
Okuryazar değil/Okuryazar	27	9,5
İlkokul Mezunu	67	23,7
Ortaokul Mezunu	44	15,5
Lise Mezunu	61	21,6
Üniversite Mezunu ve Üzeri	84	29,7
Baba Öğrenim Düzeyi		
İlkokul Mezunu ve Altı	43	15,2
Ortaokul Mezunu	30	10,6
Lise Mezunu	69	24,4
Üniversite Mezunu ve Üzeri	141	49,8
Öğrenciye Göre Ekonomik Durumu		
Kötü	27	9,5
Orta	164	58,0
İyi	87	30,7
Çok İyi	5	1,8
Yaşam Boyu En Uzun Yaşanılan Yer		
Kent	251	88,7
Kır	32	11,3
Toplam	283	100,0

Tablo 2 incelendiğinde, öğrencilerin %82,0'ı KİD konusunda endişe duyduğunu, %79,5'i tıp eğitimi süresince KİD konusunda eğitim almadığını, % 80,6'sı KİD konusunda bilgisi olduğunu ifade etmiştir. KİD konusundaki bilgi kaynağına bakıldığında; öğrencilerin %68,9'unun sosyal medyadan, %61,1'inin internet sitelerinden, %37,8'inin arkadaş ve sosyal çevreden, %33,6'sının bilimsel makale ve dergilerden bilgi edindiklerini ifade etmişlerdir.

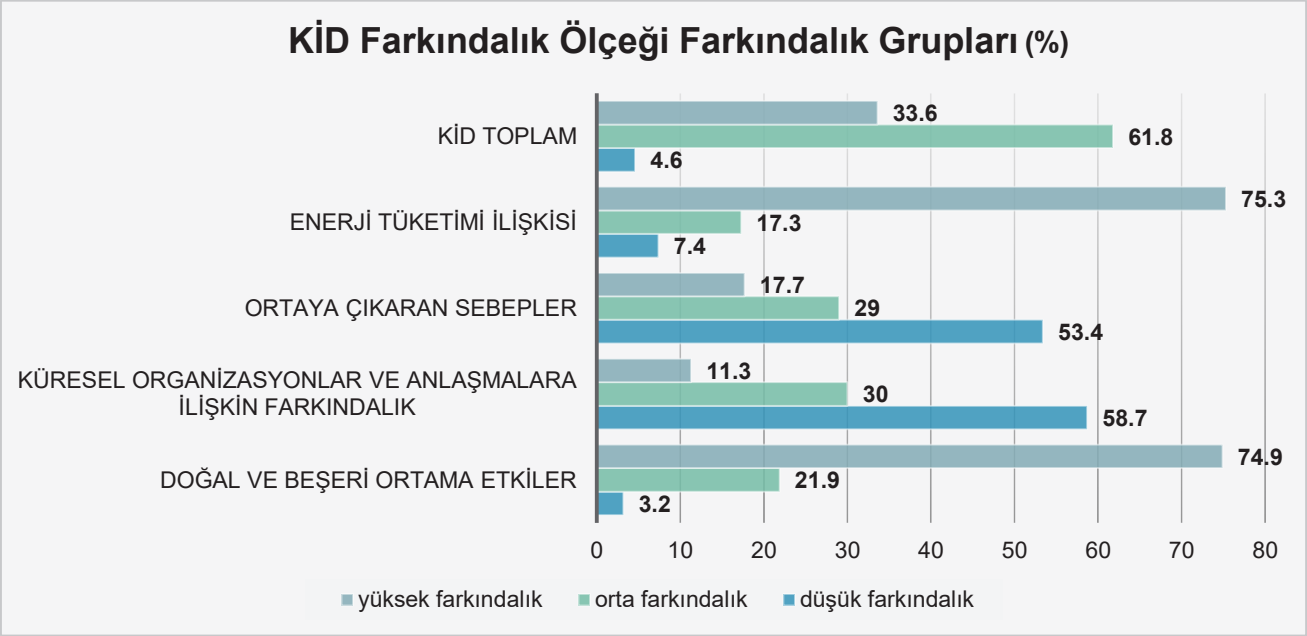
Tablo 2: Çalışmaya katılan öğrencilerin küresel iklim değişikliği konusunda çeşitli değişkenlere göre dağılımı

Endişe Durumu	n	%
Evet	232	82,0
Hayır	51	18,0
Tıp Eğitimi Süresince Eğitim Alma Durumu		
Evet	58	20,5
Hayır	225	79,5
Bilgi Durumu		
Evet	228	80,6
Hayır	55	19,4
Bilginin Kaynağı*		
Sosyal Medya	195	68,9
İnternet siteleri	173	61,1
Arkadaş, Sosyal Çevre	107	37,8

Çevre Örgütleri(GP, WWF, TEMA vb.)	89	31,4
Bilimsel makale/dergi	55	33,6
Üniversitedeki dersler	55	19,4
Ulusal veya Uluslararası Organizasyonlar	33	11,7

**Birden fazla seçenek işaretlenmiştir.*

KİD Farkındalık Ölçeği ve alt boyutlarından alınan puanlara göre öğrencilerin farkındalık düzeyleri Şekil 1'de gösterilmiştir. Öğrencilerin %4,6'sının farkındalığı düşük düzeyde, %61,8'inin farkındalığı orta düzeyde, %33,6'sının farkındalığı yüksek düzeyde saptanmıştır. Alt boyutlar değerlendirildiğinde; en yüksek farkındalığın enerji tüketimi ilişkisi alt boyutunda, en düşük farkındalığın ise küresel organizasyonlar ve anlaşmalara ilişkin farkındalık alt boyutunda olduğu görülmüştür.



KİD: Küresel İklim Değişikliği

Şekil 1: Çalışma grubundaki öğrencilerin küresel iklim değişikliği farkındalık ölçeği alt boyutları toplam puanına göre farkındalık grupları

Tablo 3 incelendiğinde; kadınların KİD Farkındalık Ölçeği ortancası 3,28 (1,33-5,00), erkeklerin KİD Farkındalık Ölçeği toplam puan ortancası 3,52 (1,00-5,00) olup kadınların puanı erkeklerden anlamlı olarak yüksektir (p=0,021). Yaş gruplarına göre KİD toplam puanları incelendiğinde 21-22 yaş grubunun puanı 3,52(2,24-5,00), 23 yaş grubundan 3,28 (1,33-4,90) anlamlı olarak yüksektir (p=0.021). Öğrencilerin eğitim gördükleri sınıfa göre KİD Farkındalık Ölçeği toplam puanı, doğal ve beşeri ortama etkiler ve ortaya çıkaran sebepler alt boyutları puanları arasında anlamlı farklılık saptanmamıştır (p>0,05). Yaş gruplarına göre küresel organizasyonlar ve anlaşmalara yönelik farkındalık (p=0,020) ile enerji tüketimi ilişkisi (p=0,008) alt boyutlarında anlamlı farklılık saptanmıştır.

KİD konusunda endişe duyanların KİD Farkındalık Ölçeği ortancası 3,50 (1,00-5,00), endişe duymayanların 3,04 (2,14-4,90) olup endişe duyanların puanı anlamlı olarak yüksektir (p=0,001). KİD konusunda bilgisi olanların KİD Farkındalık Ölçeği ortancası 3,47 (1,00-5,00), bilgisi olmayanların ortancası 3,09 (1,52-5,00) olup bilgisi olanların puanı anlamlı olarak yüksektir (p=0,001). KİD Farkındalık Ölçeği toplam puanı ve tüm alt boyutlarda öğrenciye göre ekonomik durumu ve KİD konusunda eğitim alma durumuna göre anlamlı farklılık saptanmamıştır (p>0,05).

Tablo 3: Öğrencilerin sosyodemografik özellikleri ve çeşitli değişkenlere göre KİD Farkındalık Ölçeği ve alt boyutları toplam puanlarının karşılaştırılması

Değişkenler	KİD Ölçek Toplam Puan	Doğal ve Beşeri Ortama Etkiler	Küresel Organizasyonlar ve Anlaşmalara İlişkin Farkındalık	Ortaya Çıkaran Sebepler	Enerji Tüketim İlişkisi
	Min.-Ortanca-Maks.	Min.-Ortanca-Maks.	Min.- Ortanca-Maks.	Min.- Ortanca-Maks.	Min.- Ortanca-Maks.
Cinsiyet	**p=0,021***	**p=0,010***	p=0,657*	p=0,180*	p=0,058*
Erkek	1,33- 3,28-5,00	1,00-4,11-5,00	1,00-2,16-5,00	1,00-2,33-5,00	1,00-4,33-5,00
Kadın	1,00-3,52-5,00	1,00-4,38-5,00	1,00-2,00-5,00	1,00-2,33-5,00	1,00-4,66-5,00
Yaş Grupları	**p=0,021****	p=0,498**	**p=0,050****	p=0,087**	p=0,128**
20 Yaş ve Altı	1,00-3,47-5,00	1,00-2,33-5,00	1,00-2,33-5,00	1,00-2,50-5,00	1,00-4,66-5,00
21 ve 22 Yaş	2,24-3,52-5,00[a]	2,11-4,33-5,00	1,00-2,33-5,00	1,00-2,66-5,00	2,00-4,66-5,00
23 Yaş ve Üzeri	1,33-3,28-4,90[b]	1,33-4,22-5,00	1,00-2,00-5,00	1,00-2,33-5,00	1,00-4,33-5,00
Sınıf	p=0,309**	p=0,632**	**p=0,020****	p=0,539**	**p=0,008****
1	1,00-3,57-5,00	1,00-4,33-5,00	1,00-2,66-5,00[c]	1,00-2,66-5,00	1,00-4,66-5,00
2	2,00-3,23-4,90	1,00-4,00-5,00	1,00-2,33-5,00	1,00-2,33-5,00	1,00-4,00-5,00[e]
3	1,33-3,52-5,00	1,33-4,00-5,00	1,00-2,16-5,00	1,00-2,33-5,00	1,67-4,33-5,00
4	2,00-3,47-5,00	2,11-4,33-5,00	1,00-1,66-5,00[d]	1,00-2,66-5,00	1,00-5,00-5,00[g]
5	1,52-3,35-4,90	1,78-4,33-5,00	1,00-2,08-5,00	1,00-2,33-5,00	1,67-4,66-5,00
6	1,71-3,28-4,24	2,33-4,33-5,00	1,00-2,00-3,83	1,00-2,33-4,00	1,00-4,33-5,00[f,h]
Öğrenciye Göre Ekonomik Durumu	p=0,852**	p=0,727**	p=0,190**	p=0,865**	p=0,287**
Kötü	2,00-3,23-4,52	1,00-4,00-5,00	1,00-2,83-4,50	1,00-2,33-5,00	1,00-4,00-5,00
Orta	1,00-3,45-5,00	1,00-4,22-5,00	1,00-2,16-5,00	1,00-2,33-5,00	1,00-4,66-5,00
İyi	2,00-3,38-5,00	2,00-4,33-5,00	2,00-4,33-5,00	1,00-2,66-5,00	1,00-4,66-5,00
Çok İyi	1,33-3,90-5,00	1,33-4,33-5,00	1,33-4,33-5,00	1,33-2,33-5,00	1,67-3,80-5,00
Küresel İklim Değişikliği Konusunda Endişe Duyuyor Musunuz?	**p=0,001***	**p=0,001***	p=0,901*	p=0,305*	**p=0,001***
Evet	1,00-3,50-5,00	1,00-4,33-5,00	1,00-2,16-5,00	1,00-2,33-5,00	1,00-4,66-5,00
Hayır	2,14-3,04-4,90	2,11-3,55-5,00	1.00-2.16-5.00	1,00-2,33-5,00	1,67-4,00-5,00
Tıp Eğitimi Süresince Eğitim Aldınız Mı?	p=0,466*	p=0,647*	p=0,276*	p=0,381*	p=0,939*
Evet	1,33-3,57-4,90	1,33-4,11-5,00	1,00-2,25-5,00	1,00-2,50-5,00	1,00-4,66-5,00
Hayır	1,00-3,38-5,00	1,00-4,33-5,00	1,00-2,16-5,00	1,00-2,33-5,00	1,00-4,33-5,00
Küresel İklim Değişikliği Konusunda Bilginiz Var Mı?	**p=0,001***	**p=0,001***	p=0,092*	**p=0,050***	**p=0,001***
Evet	1,00-3,47-5,00	1,00-4,33-5,00	1,00-2,16-5,00	1,00-2,50-5,00	1,00-4,66-5,00
Hayır	1,52-3,09-5,00	1,78-4,00-5,00	1,00-2,00-5,00	1,00-2,00-5,00	1,00-4,00-5,00

KİD: Küresel İklim Değişikliği Min: Minimum, Mak: Maksimum
**Mann Whitney U Testi, **Kruskal Wallis Analizi*
a. b'den farklı; c, d'den farklı; e, f'den farklı; g,h'den farklı

Tartışma

Küresel iklim değişikliğinin oluşturduğu riskler ve öngörülen olumsuz etkilerin yıllar içinde kümülatif olarak artacağı tahmin edilmektedir. Bu etkilerin azaltılması konusunda önlem alınmadığında gelecek yıllarda daha ciddi etkilerle karşılaşmamız nedeniyle daha karmaşık ve yönetilmesi zor durumlarla karşılaşılacaktır (17). Bu önlemlerin alınması için toplumun önemli gruplarında farkındalık düzeylerinin saptanması ve bu farkındalığın arttırılması gerekmektedir.

Çalışma grubundaki öğrencilerin %80,6'sı KİD konusunda bilgisi olduğunu ifade etmiştir. KİD konusunda elde edilen bu bilginin kaynağının önemli bir kısmını sosyal medya ve internet oluşturmaktadır. Hindistan'da 2022 yılında 903 tıp fakültesi öğrencisi ile yapılan kesitsel bir araştırmada, öğrencilerin %90'ı iklim değişikliğinin çevresel etkilerini bildiğini, bu bilginin kaynağını en yüksek oranda internet ve televizyon olarak ifade etmişlerdir (18). Ülkemizde 2021 yılında üniversite öğrencilerinde yapılan kesitsel bir çalışmada çalışmamızla benzer şekilde öğrencilerin büyük çoğunluğu iklim değişikliğine ilişkin bilgilere internet ve sosyal medya üzerinden ulaştığını ifade etmişlerdir (19). Çin'de 2017 yılında tıp fakültesi öğrencilerinde yapılan bir araştırmada öğrencilerin %94,5'i KİD konusunda bilgi kaynağını internet olarak belirtmiştir. Ek olarak öğrencilerin %87,2'si iklim değişikliğiyle ilişkili potansiyel sağlık risklerine karşı yeterli bilgiye sahip olmadığını düşündüğünü ifade etmiştir (14). Günümüzde internet ve sosyal medyanın etkin ve yaygın kullanılması öğrencilerin de bilgi kaynağı olarak interneti kullanmasına neden olabilir.

Araştırmaya katılan öğrencilerin beşte dördü küresel iklim değişikliğinden endişe duyduğunu ifade etmiştir. 2018 yılında Amerika Birleşik Devletleri'nde (ABD) sağlık alanında okuyan öğrencilerde yapılan kesitsel bir çalışmada öğrencilerin %90'dan fazlası iklim değişikliğinin sağlık etkileri konusunda endişeli olduğunu ifade etmiştir (20). Ülkemizde 2020 yılında sağlık bilimleri fakültesinde eğitim gören öğrencilerde yapılan araştırmada öğrencilerin %88,2'si küresel ısınma konusunda endişe duyduğunu ifade etmiştir (21). Benzer şekilde dünya genelinde 41 ülkeden 424 kişinin katıldığı bir araştırmada katılımcıların %78'i KİD konusunda yüksek düzeyde endişeli olduğunu belirtmiştir (22). Sağlık profesyonellerinin iklim değişikliğinin sağlık etkileri nedeniyle karşılaştığı hasta sayısının artması ve hasta profilinin değişmesi gibi durumlarla sık karşılaşması sonucunda endişe düzeyleri yüksek çıkmış olabilir. Araştırmamızda KİD konusunda endişe duyanların farkındalık düzeyi endişe duymayanlardan yüksek saptanmıştır. Benzer şekilde lisans ve lisansüstü eğitim alan öğrencilerde yapılan uluslararası bir çalışmada bireylerde endişe düzeyi ile farkındalık düzeyi arasında pozitif yönde korelasyon saptanmıştır (22). Ülkemizde 2022-2023 yılları arasında hemşirelik fakültesinde okuyan öğrencilerde yapılan kesitsel bir çalışmada iklim değişikliği farkındalığı ile artan ekolojik kaygı arasında anlamlı pozitif bir korelasyon bulunmuştur. Bu bulgu çalışmamızla uyumlu şekilde doğal ve beşeri ortama etkiler ile enerji tüketimi ilişkisi alt boyutlarında da görülmüştür (23). İklim değişikliği konusunda endişe duymaları bu konudaki farkındalıklarını arttırarak korunmaya yöneltmiş olabilir.

Çalışma grubundaki kadınlarda KİD farkındalığı erkeklerden daha yüksektir. Ülkemizde ve yurtdışında yapılan çok sayıda araştırmada kadınların KİD konusunda farkındalıklarının daha yüksek olduğu gösterilmiştir (15, 24, 25, 26, 27). Ayrıca çalışmamızda doğal ve beşeri ortama etkiler alt boyutunda da kadınlarda farkındalık daha yüksek bulunmuştur. Kadınların iklim değişikliği konusundaki farkındalıklarının yüksek çıkmasının nedeni bireysel olarak çevre ve insanı etkileyen konulardaki duyarlılıkları nedeniyle olabilir.

Çalışma grubunda yaş gruplarına göre KİD farkındalığı genç yaş gruplarında daha yüksek olmasına rağmen, eğitim alınan sınıf ile KİD farkındalığı arasında anlamlı farklılık saptanmamıştır. ABD'de 2020 yılında 12 tıp fakültesinden 600 öğrencinin katılımı ile yapılan bir çalışmada preklinik, stajyer ve tıp fakültesi son sınıf öğrencilerinin iklim değişikliğinin sağlık üzerine etkilerine yönelik algıları arasında anlamlı farklılık saptanmamıştır (9). KİD farkındalık ölçeği toplam puanı ve tüm alt boyutlarda öğrencilerin öğrenciye göre ekonomik durumu göre anlamlı farklılık saptanmamıştır. Ülkemizde ve yurtdışında yapılan bazı araştırmalarda kişilerin gelirine göre iklim değişikliği farkındalığı arasında ilişki

olmadığı(14, 26), ülkemizde iklim değişikliğinin nedenleri ve hayatımıza etkileri konusundaki başka bir araştırmada da farklı olarak bilgi düzeyinin gelir düzeyi arttıkça yükseldiği görülmüştür (24). Sosyodemografik değişkenlerin iklim değişikliği farkındalığını etkilemesi beklense de küresel iklim değişikliği farkındalığı öğrencilerin kültürel ve sosyal yapısı, yaşadığı yerin iklim değişikliğinden etkilenme durumu gibi çok sayıda faktörden etkilenmesi nedeniyle öğrencilerde bazı sosyodemografik değişkenlere göre farklılık saptanmamış olabilir.

Araştırmaya katılan öğrencilerde KİD farkındalıklarının bu konuda eğitim alma durumundan etkilenmediği saptanmıştır. Farklı olarak ABD'de 2020 yılında tıp fakültesi öğrencilerinde yapılan bir öncesi sonrası çalışmasında öğrencilere iklim değişikliğinin insan sağlığı üzerindeki etkisi hakkında eğitim verildikten sonra öğrencilerin iklim değişikliğinin sağlık üzerindeki etkilerini yönetmeye hazır hissetme durumlarında anlamlı artış elde edilmiştir (28). Ülkemizde hemşirelik fakültesi öğrencilerinde yapılan kesitsel bir araştırmada çevre sorunları ile ilgili bir toplantıya katılan öğrencilerin iklim değişikliği farkındalığının daha yüksek olduğu ancak çalışmamızla benzer şekilde bu konuda herhangi bir eğitime katılan öğrencilerin farkındalık düzeyinin değişmediği görülmüştür (29). Üniversite öğrencilerine yapılacak müfredat içi eğitimin yanı sıra iklim değişikliği temalı sempozyum, konferans, yarışma gibi etkinliklerle farkındalık düzeylerinin arttırılması planlanabilir.

Çalışmamızdaki öğrencilerin üçte ikisinin KİD farkındalıkları orta düzeyde ve en düşük farkındalık küresel organizasyonlar ve anlaşmalara ilişkin alt boyutundadır. Ülkemizde üniversite öğrencilerinde yapılan çeşitli çalışmalarda da benzer şekilde öğrencilerin KİD farkındalığının orta düzeyde olduğu ve en düşük farkındalığın küresel organizasyonlar ve anlaşmalara ilişkin farkındalık alt boyutunda olduğu görülmüştür (15, 23, 30). Bu durum üniversite öğrencilerinin dünya genelinde kabul edilen anlaşmalar ve hukuki süreçler konusunda yeterli bilgiye sahip olmadığına işaret edebilir.

Bu çalışmanın bir üniversitenin tıp fakültesi öğrencilerinde yapılması, çalışmanın verilerinin ankete dayalı elde edilmesi ve öğrencilerin beyanına dayalı olması çalışmanın sınırlılıklarını oluşturmaktadır.

Sonuç ve Öneriler

İklim değişikliği sağlık sektörü de dahil tüm sektörleri olumsuz etkileyebilecek küresel bir sorundur. Çalışmamızda tıp fakültesi öğrencilerinin KİD farkındalık düzeyi orta düzeyde saptanmıştır ve bu farkındalığın yaş, cinsiyet, KİD konusundaki endişe ve bilgi durumundan etkilendiği görülmüştür. Tıp fakültesi öğrencilerinin KİD konusunda farkındalıkları ve bilgi düzeyleri KİD'in sağlık risklerini yönetebilmeleri açısından önem arz etmekledir. Ayrıca bu konuda farkındalıkları yüksek öğrencileri yetiştirmek topluma rol model olarak toplumsal farkındalığı da arttırabilir. Tıp fakülteleri bu bilgi ve farkındalığı öğrencilere aktarabileceğimiz profesyonel olarak öğrenci yetiştirebileceğimiz kurumlardır. Tıp fakültelerinde ders dışı etkinlikler olarak iklim değişikliği konulu konferanslar, yarışmalar, film gösterileri, uygulamalı grup saha çalışmaları gibi etkinlikler düzenlemek ve sosyal medya üzerinden bilgilendirici içerikler paylaşmak öğrencilerin küresel iklim değişikliği konusunda farkındalıklarını arttırabilir.

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Difficult working conditions of migrant workers: An example of an industrial area in south of Türkiye

Göçmen işçilerin zorlu çalışma koşulları: Türkiye'nin güneyinde bir sanayi bölgesi örneği

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Abstract

The integration of refugees into their work lives is crucial issue for public health.This study aimed to reveal some characteristics of the working life of Syrian refugees in Türkiye. This cross-sectional study employed the convenience sampling method to select participants in one of the provinces in Türkiye that hosts the highest number of refugees compared to its population. The data collected via a questionnaire were analyzed using the Chi-square, t test, One-way ANOVA, and Pearson correlation statistical methods. All the Syrian workers surveyed were unregistered, and 42.8% worked in the industry. Average weekly working hours were 66.2 hours, and 78.1% of the workers were paid less than the legal minimum wage. Weekly working hours or a high level of education did not lead to an increase in salary. The Syrian refugees changed jobs frequently due to poor working conditions, and 57.2% had a work accident in Türkiye. Syrian workers have been found to have adverse working conditions, including long working hours, low pay, lack of vocational training and a high risk of work accidents. It is recommended to carry out further studies together with the necessary arrangements.

Keywords: Refugees, migrant workers, occupational health, working conditions, work accident

Özet

Göçmenlerin iş hayatlarına entegrasyonu halk sağlığı için çok önemli bir konudur. Bu çalışma, Türkiye'de geçici koruma altındaki Suriyeli işçilerin çalışma hayatına ait özelliklerini ortaya koymayı amaçlamıştır. Kesitsel tipte olan bu çalışmada, Türkiye'de nüfusa oranla en fazla Suriyeli göçmeni barındıran illerden birinde kolayda örnekleme yöntemi kullanılarak katılımcılar seçilmiştir. Anket yoluyla toplanan veriler, Ki-kare, t testi, Tek yönlü ANOVA ve Pearson korelasyon istatistiksel yöntemleri ile analiz edilmiştir. Ankete katılan Suriyeli çalışanların tamamı kayıtsız çalışmakta olup, %42,8'i sanayide çalışmaktadır. Haftalık ortalama çalışma süresi 66,2 saat olup, işçilerin %78,1'i yasal asgari ücretin altında maaş almaktadır. Haftalık çalışma saatleri veya yüksek eğitim seviyesi, maaş artışına yol açmamıştır. Suriyeli işçilerin, kötü çalışma koşulları nedeniyle sık sık iş değiştirmiş ve %57,2'si Türkiye'de iş kazası geçirmiştir. Suriyeli çalışanların, uzun çalışma saatleri, düşük ücret, mesleki eğitim eksikliği ve yüksek iş kazası riskini içeren olumsuz çalışma koşullarına sahip olduğu görülmüştür. Gerekli düzenlemeler ile birlikte İleri çalışmaların yapılması önerilmektedir.

Anahtar Kelimeler: Mülteciler, göçmen işçiler, iş sağlığı, çalışma Koşulları, iş kazası

Introduction

People who leave their own country and seek asylum in a foreign country because they are afraid of being persecuted are called refugees (1). The number of refugees who started to migrate to Türkiye in 2011 because they were forced to leave their country due to the civil war in Syria or worried that they would be persecuted in their country has reached 3.76 million today (2). The fulfillment of refugee rights defined by international conventions and national laws and the process of integrating these refugees into society have led to an emergency that affects every aspect of society (3–5). Although refugees' fundamental rights and freedoms are legally protected, they may experience difficulties accessing some of their rights due to the language barrier, cultural differences, the challenging adaptation process, social exclusion, under-qualification, and similar sociological dynamics.

One of the challenges experienced by refugees is access to the labor market. Working in a paid job provides refugees with income and the opportunity to establish social relations and improve self-esteem (6). In Türkiye, the work permits of Syrian refugees (SR) under the temporary protection regime have allowed them to give protection on a momentary and renewable ground to those falling outside the toughly interpreted international law refugee definition (7,8). However, refugees generally work informally in more physically intensive, long-term, and shift jobs in the place where they migrate, with lower wages compared to the country's domestic workforce (9). These jobs are dirty and dangerous jobs requiring no qualifications (10). Although working life positively contributes to physical and mental health, the occupational environment can also harm health due to its dangers. Considering the disadvantages of refugees, such as the language barrier in the labor market, lack of occupational safety culture, unregistered employment, long working hours, and working in dangerous jobs, it can be said that refugees have an increased possibility of experiencing physical and mental health problems. Studies on refugees in working life and the difficulties they experience are essential for decision-makers to develop policies that may facilitate the integration of refugees into society and working life (3).

Children are the most vulnerable refugee group. They face poverty in the country they migrate to and have to enter working life. Child labor is an obstacle to reaching their potential and can harm their physical, mental, moral, and social development (11–13). Yet, 66.1% of 15-year-old male SRs in Türkiye are included in the labor market. There may be multiple reasons for this. For example, refugees cannot continue their education and are expected to contribute to the family budget as parents earn less than the minimum wage (3). According to the records of the Ministry of National Education, when our study was conducted, 290.403 of approximately 625.000 Syrian refugee children attended school in Türkiye (14). These rates show that refugee children who cannot be integrated into education can be integrated into the labor market as child workers.

Aim of the Study

This study was conducted to investigate the working conditions of SRs living in the southern city, Türkiye, and to analyze the problems they faced.

Research Questions

-What are the sociodemographic characteristics of SR workers?

-Are there any SR child workers?

-What are the lines of work in which SR workers are most employed?

-Are SM workers' rights regarding working conditions enforced?

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-What are the number and severity of occupational accidents SR workers have?

Material and Method

Research Setting

This study is a descriptive and cross-sectional study.The study was conducted in a southern city, Türkiye. The survey was conducted in the Small Industrial Area in the southern city.

Target Population and Research Sample

The study's target population was the SR workers in the Small Industrial Area in the southern city. In this industrial area, 6130 workers worked in food, iron and steel, forest, chemical, paper, and textile industries (15). The number of registered Syrians living in the province was 457,000, and the ratio of the Syrian population to the provincial population was 29.4% (16). Using the EpiInfo 7 program, the study sample was calculated as 301 people with a study population of 6130 workers, an expected frequency of 29%, a confidence interval of 95%, and a margin of error of 5%. Due to the difficult conditions of the study group, the study sample was relatively low compared to the minimum sample size required. Using the convenience sampling method, 201 (67%) people were reached and included in the study. A questionnaire form was prepared to be used during the face-to-face interviews. The interviews were held between 15 December 2017 and 15 January 2018.

Data Collection Procedure

The data were collected by the team of researchers and a translator by asking the questions in the questionnaire form to the SR workers who were under temporary protection and who worked in the Small Industrial Area. The data were collected using the face-to-face interview technique. The questionnaire included sociodemographic characteristics, job and working environment characteristics, vocational training and medical examinations, work accidents, and the use of personal protective equipment. The questions were posed to the participants in the workplace with the help of a translator. Each interview took about 20 minutes.

Research Variables

Independent variables:

-Age
-Level of Education
-The sector they work in
-Duration of working at the current workplace
-Weekly working hours
-Job-related training status
-The place where job-related training is received

Dependent variables:

-Occupational accident status
-Duration of working at the current workplace
-Weekly working hours
-Monthly salary

Ethical Considerations

Before the study, permission was obtained from the Çukurova University Faculty of Medicine Ethics Committee (Decision no: 21 / Date: 01 December 2017) and Local Public Health Directorate.

Data Analysis

IBM SPSS Statistics (Version 25.0, IBM Corporation, Armonk, NY, USA) program was used in the analysis of the data. The conformity of the variables in the study to normal distribution was evaluated with the Shapiro-Wilks normality test. Descriptive statistical methods (number, percentage, mean, standard deviation, median) were used in the analysis. Normally distributed measurement values were analyzed with parametric methods. Independent-sample t-test was used to evaluate the means of two independent groups and One-Way ANOVA test was used to compare the measurement values of more than two independent groups. In the analysis of categorical variables, distribution difference, and odds ratio were obtained using the Chi-square test and risk coefficient. Pearson correlation was used to reveal the relationship between quantitative variables showing normal distribution. Data were evaluated at a significance level of $p<0.05$.

Results

Of the 201 SR workers in the study, 93% were male, 69.2% were married, and 39.3% were primary school graduates. The mean age of the participants was 30.8±10.3 years, and 9.5% were younger than 18 years old. The age and educational status of the

participants have presented in Table 1. 99.5% of the participants lived outside the refugee camps, and 25.4% received social assistance from national-international organizations.

Table 1: Sociodemographic characteristics of Syrian workers

Parameters	n	%
Gender		
Male	187	93.0
Female	14	7.0
Age		
11-17	19	9.5
18-27	58	28.8
28-37	85	42.3
38-47	21	10.4
48-57	15	7.5
58 and older	3	1.5
Education Status		
Illiterate	2	1.0
Literate	42	20.9
Primary School	79	39.3
High School	32	15.9
College and above	46	22.9
Total	**201**	**100.0**

The participants mostly worked in the industry (42.8%), service (24.9%), and construction (20.4%) sectors. 96.5% of the participants were workers, while 3.5% were in administrative positions. The average duration of working at the current workplace was 10.6±16.0 months at the time of the study. 27.9% worked in the same place for 12 months or less, and 30.3% worked in the same place for 13-24 months. The average weekly working hours was 66.2±10.3 hours. 96.5% worked over 45 hours, the legal maximum weekly working time.

All the participants worked without a work permit and social security insurance. Their average salary was 306±118 USD, and 78.1% earned less than the legal minimum wage of 370 USD at the time of the study. 64.2% of the participants wanted to change their job or workplace due to poor working conditions (65.9%), low salary (15.5%), high risk of work accident (11.6%), poor relations with supervisors (6.2%), and insufficient social assistance (0.8%).

83.1% of the participants reported receiving training in Türkiye or Syria related to their job. 75.6% of participants received this training through the informal master-apprentice relationship. 56.3% of the participants who received training related to their job stated that it was sufficient. None of the participants had a periodic health examination during the working period. 65.2% of the participants used machinery in the workplace. 57.2% had a work accident in Türkiye. The work-related characteristics of the Syrian workers in the study are shown in Table 2.

Table 2: Characteristics of Syrian workers about their jobs

Parameters	n	%
Working time in current workplace		
0-12 months	56	27.9
13-24 months	61	30.3
25-36 months	36	17.9
37-48 months	30	14.9
49 months and above	18	9.0
Status of receiving education related to job		
Educated	167	83.1

Uneducated	34	16.9
Place of training related to the job		
Master-Apprentice	152	86.9
College and above	10	5.7
Vocational High School	6	3.4
Other	4	2.3
In-service workplace training	3	1.7
State of finding the education received sufficient		
Sufficient	94	56.3
Moderate	66	39.5
Insufficient	7	4.2
Occupational accident status		
Had accident	115	57.2
No accident	86	42.8
Number of Occupational Accidents		
1	22	19.1
2-4	43	37.4
5-7	23	20.0
8-10	13	11.3
More than 10	14	12.2

There was no significant relationship between age, length of work experience, weekly working hours, and the occurrence of an occupational accident. A statistically significant relationship was found between the educational level of the participants and their machine use and work accident status (Table 3). The odds ratio (OR) of having a work accident was 2.09 (1.17-3.73) for those with a secondary education level and below compared to those with a high school or higher education degree. The OR of having a work accident was 2.60 (1.47-4.63) for machine users compared to non-machine users.

Table 3: The relationship between educational status and machine use of Syrian workers and the status of having a work accident

Parameters		**Work accident**		**p**	**OR (95% CI)***
		Had accident n (%)	**No accident n (%)**		
Education Status	High school and above	36 (46.2)	42 (53.8)	**0.012**	**2.09 (1.17-3.73)**
	Middle school and below	79 (64.2)	44 (35.8)		
Machine Use	No	40 (44.4)	50 (55.6)	**0.001**	**2.60 (1.47-4.63)**
	Yes	75 (67.6)	36 (32.4)		

*Note: *Chi-Square Test, Risk coefficient; OR: Odds Ratio; CI: Confidence Interval*

The results of the correlation analysis between the age, duration of work, weekly working hours, and monthly salaries of the participants (Table 4) revealed that there was a very weak correlation between the age of the participants and the duration of working at the current workplace, a very weak correlation between their monthly salary and the period of working at their current workplace, and a weak correlation between their age and monthly salary. No correlation was found between weekly working hours and monthly salary. The statistical relationship between monthly salary and educational status was analyzed with the One-Way ANOVA test, and no statistically significant relationship was found (F=2.605, p=0.76).

Table 4: The results of the simple correlation analysis between age of Syrian workers, length of time they worked at the current workplace, weekly working hours and monthly salaries

Parameters	Age	Time worked at current workplace	Weekly working hours	Monthly salary
Age	1	0.205*	-0.330	0.254*
Time worked at current workplace		1	-0.115	0.219*
Weekly working hours			1	-0.092
Monthly salary				1

**Significance was evaluated at p<0.01 level in correlation analysis*

Discussion

Immigration from Syria started in 2011 and is the most significant global migration movement post-World War II. It also draws attention to being the largest migration movement in the post-Republican period of Türkiye (17). This situation poses many social, cultural, and economic problems. The main one among these problems is the labor market.

In the event of an emergency such as war, the temporary accommodation centers is always among the options (18). In our study, only 0.5% of workers lived in temporary accommodation centers. Different accommodation due to their jobs may have caused this rate to be low.

Cheap labor and unregistered employment of refugees is a long-standing problem (19). The employment of refugees is a problem for host countries (20).

According to the Syrian Refugee Livelihood Monitor, 31% of the SRs in Türkiye are currently included in the labor market (21). In addition, as of 2017, only 0.6% of Syrians have had a work permit (22). All the participants worked without a work permit and social security insurance. Therefore, they could not benefit from the social security rights guaranteed under the Social Insurance and General Health Insurance Law, such as the right to receive compensation in cases of work accidents and occupational disease and access to health services. 57% of the participants had a work accident, and the rate of those with more than one work accident was high. Most participants' education level was primary school and below. People at this level of education were at twice the risk of having work accidents than those with a higher education level. Most of the vocational training received by the workers was informal (master-apprentice relationship etc.). This training was insufficient since the risk of occupational accidents for those who use machines was 2.6 times higher than for those who do not.

According to a study conducted in Denizli on the Syrian labor market, behind the ease of admission to employment was the fact that they were a labor group that consented to do cheap, informal, heavy, dangerous, and dirty work. It was revealed that Syrian women did not participate in employment due to cultural barriers. The burden of care and child labor increased when the father was not alive, or his income was not enough to support the household (23). A study in Istanbul in 2015 with 300 Syrian and 300 Turkish citizens revealed that all Syrian workers were employed without insurance, the rate of child workers under 18 was 29%, and 35% of the Syrian textile workers were unskilled (24). Our study showed that only 7% of Syrian workers were women. The rate of child labor under the age of 18 was 9.5%.

It was observed that the participants, whose stay in Denizli ranged from 1 to 5.5 years, changed between 5 and 21 jobs during this period (23). The most important reason for this was low wages rather than the working conditions. In our study, the mean duration of changing jobs was 10.6 months, and the most common reason for changing jobs was poor working conditions.

In 2017, when our study was conducted, the minimum wage in Türkiye was approximately 370 USD. In the same year, when the countries close to Türkiye and having similar GDP per capita were

analyzed, it was seen that this amount was 260 USD in Bulgaria, 310 USD in Romania, and 500 USD in Poland (25). In the study in Denizli, daily wage earners stated that their daily wages were around 11 USD, while those who received monthly salaries indicated that they had an income of about 330 USD (23). The study conducted in Istanbul revealed that the average monthly wage for Turks was approximately 520 USD, while it was ~417 USD for Syrians (24, 25). Similar to other studies, our research found the average wage as ~306 USD, which was below the minimum wage. In addition, there was no difference in salary between those with a high level of education and those with a low level of education because workers were placed in any job they could find, not according to the education they received. Because of the high competition in unskilled jobs, they have no opportunity to demand higher wages. The time the worker worked at the current workplace and increased age had a weak positive effect on the salary. This is because the wage increases naturally as the seniority in the workplace increases and older people demand more salary. However, these expectations still needed to be fully met.

In the study conducted in Istanbul (24), only 97.7% of the workers interviewed stated that they worked more than 45 hours per week, which is the legal working time. In our study, this rate was found to be 96.5%. In addition, the long working hours did not affect salaries. In other words, the Syrian workers worked beyond the legal limits and did not receive the payment they should have.

Limitations of the Study

There are some limitations in this study. First, the study was conducted in a single center, and the number of participants was relatively low. Second, due to the language barrier, the data collection process was conducted with the help of a translator. Third, due to the difficult conditions of the study group, the study sample was relatively small compared to the minimum sample size required, and caution should be exercised in generalizing the results beyond the study group. Finally, randomization could not be performed in the sample selection because there needed to be an official list of workers.

Conclusion

As a result, the conclusions based on the findings of our study can be listed as follows. To overcome the difficulties that Syrians face in working life, the causes of the problems should be eliminated. Undeclared work should be prevented. Studies on the employability of Syrians should be expanded and employment areas suitable for the qualifications of this young workforce should be created by focusing on the continuation of the education process, language, job and skills training, and capacity development.

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Quality of postnatal care service provided in Gandhi Memorial Hospital

Gandhi Memorial Hastanesi'nde gerçekleşen doğum sonrası bakım hizmetinin kalitesi

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Abstract

Half of maternal mortality and two-thirds of neonatal mortality occur during the postnatal period. Effective, high-quality intervention during the postpartum period will significantly reduce the number of maternal and neonatal deaths. This study aims to assess the quality of the postnatal care service provided at Gandhi Memorial Hospital Addis Ababa. A cross-sectional study was conducted from May-June 2022 in Gandhi Memorial Hospital, mothers attending postnatal care were interviewed. Data Analysis was done using Statistical Package for the Social Sciences (SPSS) version 24. Results were presented using frequencies and percentages, as well as bivariate and multivariate analysis was conducted and those variables with a p-value < 0.05 were considered to be statistically significant the satisfaction level of mothers was used as the measure of the quality of care provided. The respondent's ages were in the range of 16-42 years, with a mean of 27.3 ±4.59, and a median of 27, the majority between 20 years and 34 years old. Nearly all mothers who delivered by spontaneous vaginal delivery(SVD) stayed less than 24 hours in the hospital after their delivery. Being married, delivered by SVD, being informed on the procedure to be done, obtaining recommended nursing care, and, being counseled were obtained to be significant factors for maternal satisfaction with the overall quality of postnatal care provided in Gandhi Memorial Referral Hospital. Nearly half of the mothers before discharge were satisfied with the overall quality of postnatal care provided. Shortages of material resources were observed, and most of the nursing care needed to be provided for the mothers was neglected or missed.

Keywords: Quality, postnatal care, mother, neonate, Ethiopia

Özet

Maternal mortalitenin yarısı ve yenidoğan mortalitesinin üçte ikisi doğum sonrası dönemde meydana gelir. Postpartum dönemde etkili, yüksek kaliteli müdahale, anne ve yenidoğan ölümlerinin sayısını önemli ölçüde azaltacaktır. Bu çalışma, Gandhi Memorial Hastanesi Addis Ababa'da sunulan doğum sonrası bakım hizmetinin kalitesini değerlendirmeyi amaçlamaktadır. Gandhi Memorial Hastanesi'nde Mayıs-Haziran 2022'den itibaren kesitsel bir çalışma yapılmış olup, doğum sonrası bakıma katılan annelerle görüşülmüştür. Veri analizi, Sosyal Bilimler için İstatistik Paketi (SPSS) 24 Versiyonu kullanılarak yapıldı. Sonuçlar frekanslar ve yüzdeler kullanılarak sunulmuş ayrıca iki değişkenli ve çok değişkenli analiz yapılmıştır. p değeri < 0,05 istatistiksel olarak anlamlı kabul edilmiş olup verilen bakımın kalitesinin ölçüsü olarak annelerin memnuniyet seviyesi kullanılmıştır. Vaka yaşları, 16-42 yıl aralığında olup ortalaması 27.3 ± 4.59 ve medyanı 27, çoğunluk 20 yaş ve 34 yaş arası oluşmaktadır. Spontan vajinal doğum (SVD) ile doğum yapan neredeyse tüm anneler, doğumdan sonra hastanede 24 saatten az kaldı. Evli olmak, SVD ile doğum yapmak, yapılacak prosedür hakkında bilgilendirilmek ve önerilen hemşirelik bakımı görmek , Gandhi Memorial Tavsiye Hastanesi'nde sağlanan doğum sonrası bakımın genel kalitesi ile anne memnuniyeti için önemli faktörler olarak saptandı. Annelerin neredeyse yarısı taburcu olmadan önce sağlanan doğum sonrası bakımın genel kalitesinden memnun olmuştur. Maddi kaynak sıkıntısı gözlenmiş olup annelere sağlanması gereken hemşirelik bakımının çoğu ihmal edilmiş veya göz ardı edilmiştir.

Anahtar Kelimeler: Kalite, doğum sonrası bakım, anne, yenidoğan, Etiyopya

Introduction

According to the World Health Organization (WHO), a postnatal period lasts from an hour, after the delivery of the placenta until 6 weeks of delivery. Postnatal care (PNC) comprises services given to mothers and neonates right after delivery and up to 42 days of postpartum, to ensure optimum health for the mother and her infant (1).

The highest number of maternal and neonatal deaths come about in the first 28 days after delivery, with 50% of maternal and 66% of neonatal deaths occurring during the first 24 hours and the first week after birth respectively (2).

In sub-Saharan Africa, which ranks first in terms of maternal and child mortality, annually, 4.7 million mothers, neonates, and children pass away (3). Of these, more than 65% of deaths occur during the postnatal period (4).

A newborn baby's first 48 hours are a delicate time in their development and a time when many neonatal deaths occur, particularly in Ethiopia where postpartum care services are underutilized, newborn problems are seldom identified, and the use of adequate care and treatment is very low. Only 34% of Ethiopian women obtained a postnatal checkup within the first two days (5).

Postnatal care has been made available in Ethiopia along with different maternal and reproductive health programs, but its uptake in comparison to other maternity care is still very low. For instance, the most recent Ethiopian Demographic Survey (EDHS) shows that (antenatal care) ANC is used more than twice as often as PNC. ANC has a 74% coverage rate, compared to 34% for PNC (5). Even though fewer women and newborns receive appropriate postnatal care, the fundamental aspects of the care are severely underutilized. For instance, only 26.4% of cords were examined, 25.8% of temperatures were taken, 21.1% were counseled on danger signs, and 37.6% and 34.4% of breastfeeding observations were made, respectively. This comes up with the result of less coverage with poor quality of care. Since neonatal death has a direct relation with postnatal service quality provided, in 2016 neonatal mortality was 29 per 1000 lifebirths while in 2019 increased to 33 per 1000 livebirths which is 1.3 fold, despite the increment of postnatal coverage by double, which highly points toward poor quality service (6).

In Mother-Friendly recommendations every mothers have the fundamental rights to receive quality health care. Healthcare practitioners are obliged to deliver up-to-date, evidence-based care, while health management teams need to undergo regular assessment to check if the care adheres to the updated guidelines to ensure qualified care (7).

Qualified postnatal care can be provided only in situations where evidence-based nursing care along with all basic required infrastructures are fulfilled (8), which can be measured by patient outcome status and satisfaction. Different studies have shown that the majority of maternal and neonatal mortality could be reduced if women and neonates receive appropriate quality-based care (1).

Neonatal death has increased, and maternal mortality doesn't show any significant change even though the coverage of postnatal care services doubled, assessing the quality of postnatal care provided will be undoubtedly helpful in reducing maternal and neonatal death. This study will explore the quality of postnatal care provided in Gandhi Memorial Hospital, as it is one of the maternal and child referral hospitals in Addis Ababa, intending to help the hospital management teams also health care providers to identify major gaps in the care provided and also assist policymakers to develop strategies

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for potential planning and improvement of postnatal care delivery system to fulfill the basic hospital infrastructures and increase patient-centered care.

Methodology

Study Design

A quantitative cross-sectional survey approach was used to understand the standard of postnatal care offered at Gandhi Memorial Hospital. Postnatal mothers attending the hospital during the study period were targeted.

Study area and time

The study was conducted from May to June 2022 in Addis Ababa, the capital city of Ethiopia. In this study Gandhi Memorial Hospital was targeted which is one of the government referral and teaching hospitals administered by Addis Ababa Health Bureau, it is also one of the maternal and child referral hospitals in Addis Ababa located in Kirkose sub-city woreda (7).

Sample size determination and sampling technique

Single population formula was used to determine the sample size of the study. To achieve adequate precision, the sampling error of the study was taken as 5 % and 95 % confidence intervals, using this formula $N = [z_{(\alpha/2)}^2\ p\ (1-p)]/d^2$ Whereby n = sample size, $z_{(\alpha/2)} = 1.96$, p = proportion of women attending postnatal care in Addis Ababa 74% of woman access PNC based on Mini EDHS 2019, d = degree of accuracy (0.05) taken at 95% confidence limit. Therefore, a minimum of 296 participants was required to conduct the study.

The study participants were primarily classified into those who delivered by caesarian section(CS) and SVD. In which the target population was 40% from CS and 60% from SVD based on the delivery status of the hospital in the previous three months before the data collection period, then each group was selected by a simple random sampling method by writing the bed numbers available in the room in the piece of paper from 1 up to 26 for the first room and from 1 up to 12 in the second room, a piece of papers were folded equally and mixed well, then 13 out of 26 folded papers and 6 out of 12 folded papers were randomly selected by data collectors and those mothers with selected bed number and fulfilling the inclusion criteria was included in the study until the targeted population number is reached.

Data gathering tool

For data collection, a structured questionnaire was used adopted from the study conducted in Tanzania (9). The questionnaire was prepared in English and then translated to the local language Amharic by professionals again was translated back into English to check the quality and clarity of the questionnaire. Before the data collection pilot study was conducted in Zewditu Memorial Hospital which is one of the government hospitals in Addis Ababa. The reliability of the questionnaire was assessed using Cronbach's alpha (α=0.812).

Data analysis

Data Analysis was done using Statistical Package for the Social Sciences (SPSS) version 24. Different tests were used such as frequencies and percentages for categorical variables as well as cleaning data, bivariate analysis was done, whereas variables with p-values less than or equal to 0.20 as recommended by Hosmer&Lemshow (10) were considered to be candidates for multivariate analysis. Similarly, multivariate analysis was also conducted and those variables with a p-value <0.05 were considered to be statistically significant.

Satisfaction of mothers as a (dependent variable), used as the measure of the quality of postnatal care provided, the overall satisfaction was calculated from five satisfaction questions. Those who answered "satisfied" were attracted to 1 point and those who answered "not satisfied" were attracted to 0 points the demarcation threshold formula (total highest score-total lowest score)/2 + Total lowest score) (11)was used to calculate the overall satisfaction.

Ethical consideration

The ethical approval was obtained from the ethic board of Ankara Yildirim Beyazit University with approval number 2022-705, Addis Ababa Health Bureau, and Gandhi Memorial Hospital. Additionally, oral consent was obtained from participants.

Results

Descriptive Statistics

A 100% of response rate was obtained by interviewing 296 mothers who were attending postnatal care in Gandhi Memorial Hospital before

they were discharged.

The respondents' ages were in the range of (16-42 years), with a mean of 27.3 ± 4.59, and a median of 27, with the majority (86%) between 20 years and 34 years old. The respondents with the extreme ages of less than 20 years and above 35 years were (5.7%) and (9.5%) respectively. Related to their marital status almost all of the respondents were married (95.5%). Concerning their occupational status, slightly above half of the respondents were housewives 51%. In terms of their average monthly income more than half of the respondents, 61.8% have a monthly income of less than 100$ which is <5000 ETB (Ethiopian birr) translated to less than 1$ per day which is considered extreme poverty, and only 2.4% of respondents receives greater than 200$ or >=10,000 ETB. Concerning the educational status of the postnatal mothers, almost all of them were literate except 4.1%, 22.3% were at primary school level, and 38.5% were at the level of diploma or above.

Table 1: Socio-demographic characteristics of mothers

Variable	Category	Frequency	Percentage (%)
Age	<20	17	5.7
	20-34	251	84.8
	35-49	28	9.5
Marital status	Married	284	95.9
	Divorced	12	4.1
Occupation	Housewife	151	51.0
	Government- employment	45	15.2
	Private-employed	48	16.2
	Self-employed	52	17.6
The household average income per month	<=100$	183	61.8
	100-200$	106	35.8
	>=200$	7	2.4
Educational level	No schooling	12	4.1
	Primary school	66	22.3
	Secondary school	104	35.1
	Diploma and above	114	38.5

Note: 1USD$=50ETB (Ethiopian Birr) May 2022

Almost all of the mothers 91.6% who were delivered by SVD stayed less than 24 hours in the health facility before being discharged and only 8.4% of mothers fulfilled the WHO recommendation of staying in the health facility after a safe delivery which is the minimum of 24 hours. And for those who were delivered by CS 100% of them have stayed in the hospital more than one day before being discharged.

Regarding the number of children, 42.9% of mothers were primiparous. Multiparous women were interviewed regarding their previous place of delivery, except 4.5% of mothers the rest have delivered in the health facility. 85.2% of multi-parous mothers had previous PNC visits; among the mothers who had previous visits only 1 mother or 0.7% had 4 visits as recommended by WHO.

Table 2: Mothers experience regarding PNC

Variable	Category		Frequency	Percentage(%)
How long did you stay at the facility before being discharged to go home?	SVD	<24hr	163	91.6
		>=24hr	15	8.4
	CS>=24hr		118	100.0
How many children you have including this baby?	1		127	42.9
	2-3		143	48.3
	4-5		26	8.8
Where is your previous delivery place?	Health facility		170	95.5
	Elsewhere		8	4.5
Do you have a PNC visit in the previous last child?	Yes		144	85.2
	No		25	14.8
If yes how many visits you had?	1		14	9.7
	2		98	68.1
	3		31	21.5
	4		1	0.7

The quality of care provided was measured by whether the mother was satisfied or not, mothers were asked some questions in Table 3, and mothers were highly satisfied (83.8%) with the family planning counseling provided to them and least satisfied (28%) with the physical examination done on them, less than half (42.2%) of mothers were happy with the manners and attitudes of the healthcare workers, about two-thirds of mothers were satisfied by the cleanness of the facility, and almost half (48.6%) of mothers were satisfied with the information provided on exclusive breastfeeding.

Table 3: Satisfaction of mothers with the service rendered

Variable	Category	Frequency	Percentage(%)
Attitude & behavior of care providers	Not satisfied	171	57.8
	Satisfied	125	42.2
Information about family planning and postnatal follow-up visits	Not Satisfied	48	16.2
	Satisfied	248	83.8
Physical examination done	Not Satisfied	213	72
	Satisfied	83	28
Cleanliness of the facilities	Not satisfied	101	34.1
	Satisfied	195	65.9
Information on exclusive breast-feeding	Not Satisfied	152	51.4
	Satisfied	144	48.6

As satisfaction is the measure of the quality of postnatal care provided, the overall satisfaction was calculated from five satisfaction questions mothers asked. Those who answered three questions and above were grouped under satisfied and less than three questions under not satisfied. According to the data, moderate percentage 53% of moms were happy with the care they received, whereas 47% of mothers were not.

Mother's experience regarding PNC as an independent variable and satisfaction of mothers as a dependent variable was considered to perform bivariate analysis to determine the relationship at a 20% level of significance. Mode of delivery (Crude Odds Ratio (COR);95%CI;p:2.503;1.553-4.033;<0.001), explaining the procedure done on the mother and neonate (COR;95%CI;p:4.261;1.984-9.149;<0.001) and maintenance of privacy (COR;95%CI;p :3.649;1.706-7.803;0.001) was found to be statistically significant whereas having previous PNC visit in the previous child didn't.

Based on the result of a simple binary logistic analysis regarding socio-demographic characteristics of mothers, marital status and occupation of mothers were found to be significantly associated with postnatal care satisfaction of mothers at a 20% level of significance.

As a result of multivariate analysis, married mothers were 4 times more likely to be satisfied than divorced mothers (Adjusted Odds Ratio (AOR);95%CI;p:4.196;0.852-2.271;0.036).

Table 4: Socio-demographic characteristics about satisfaction with PNC services provided, multiple binary logistic regression

Variable	Category	AOR*	95%CI	*p*-value
Marital status	Married	4.196	0.852-2.271	**0.036**
	Divorced(ref)	-	-	-
Occupation	Government-employment	0.504	0.046-5.508	0.575
	Housewife	0.117	0.010-1.411	0.091
	Private-employed	0.040	0.001-1.095	0.057
	Self-employed(Ref)	-	-	-

**Adjusted Odds Ratio*

Concerning the significant relationship between the mother's experience regarding PNC and satisfaction. The mode of delivery and explanation of the procedure performed were statistically significant, at p-values of 0.008, and 0.028 respectively.

Mothers who were delivered by SVD were 1.129 more likely to be satisfied with the care provided than mothers who were delivered by CS (AOR;95%CI;p:1.129;0.256-2.969;0.008). Mothers who were told about the significance of the procedure performed on them and their neonate were 2.768 more likely to be satisfied than the mothers who were not explained (AOR;95%CI;p:2.768;0.126-2.943;0.004).

Table 5: Mothers' experience regarding PNC with their satisfaction, multiple binary logistic regressions

Variable	Category	AOR*	95%CI	*p*-value
Mode of delivery	SVD	1.129	0.256-2.969	**0.008**
	CS(ref)	-	-	-
Were you explained the various examination procedures done on you and your baby and their significance	Agree	2.768	0.126-2.943	**0.004**
	Disagree(ref)	-	-	-

Was privacy maintained during the various procedures performed on you and the baby?	Agree	1.825	1.472-1.827	0.228
	Disagree(ref)	-	-	-

*Adjusted Odds Ratio

Regarding the nursing care provided, mothers whose temperatures were measured were 2.187 times more likely to be satisfied than the mothers whose temperatures were not measured (AOR;95%CI;p:2.187;3.457-4.942;<0.001). Respondents whose respiratory rate was monitored were 1.472 times more likely to be satisfied than respondents whose respiratory rate was not monitored (AOR=1.472CI=0.511-2.041p=0.009). Mothers who were checked for excessive bleeding were 2.120 times more likely to be satisfied than mothers who were not checked for excessive bleeding (AOR;95%CI;p:2.120;0.136-4.060;<0.001). Mothers who were assisted in the positioning of their baby during and after feeding were 2.8 times more likely to be satisfied with the care provided than those who were not assisted (AOR;95%CI;p:2.832;4.881-8.670;0.001)

Table 6: Nursing care provided for the mother in relation with satisfaction, multiple binary logistic regressions

Variable	Category	AOR*	95%CI	*p-value*
Was your temperature measured regularly?	Yes	2.187	3.457-4.942	**<0.001**
	No(ref)	-	-	-
Was your respiratory rate monitored regularly?	Yes	1.472	0.511-2.041	**0.009**
	No(ref)	-	-	-
Checked for excessive bleeding within1 hour of delivery	Yes	2.120	0.136-4.060	**<0.001**
	No(ref)	-	-	-
Were your breast examined?	Yes	0.535	0.106-2.704	0.449
	No(ref)	-	-	-
Were you assisted to position your baby during and after feeding	Yes	2.832	4.881-8.670	**0.001**
	No(ref)	-	-	-

*Adjusted Odds Ratio

Resources Required for the Provision of Qualified PNC

The provision of competent postnatal care is greatly influenced by the postnatal ward's availability of resources. Due to this availability of basic postnatal equipment, drugs and logistics were checked.

Regarding basic postnatal equipment baby weighting scale, examination bed, blood pressure machine, and postnatal care room were available, but the adult weighing scale and surgical gloves were not available.

Regarding drugs, only oxytocin and family planning commodities were available the rest medications like Ferrous sulfate, cotrimoxazole tablets, paracetamol tablets, IV fluids, and antihypertensive drugs were not available.

Among the logistics PNC guidelines, the PNC register and hospital telephone were available, since the hospital is one of the regional referral hospitals in Addis Ababa, unfortunately, the hospital ambulance is not available, list on maternal and newborn care also case audit for maternal death is not available also supportive supervision list it is not available.

Table 7: Checklist of resources required for postnatal clients

Items	Available	Not available
EQUIPMENT		
Adult Weighing Scale		✓
Baby Weighing scale	✓	
Examination bed	✓	
Blood Pressure Machine	✓	
PNC room	✓	
Thermometer	✓	
Surgical glove		✓
DRUGS		
Oxytocin injection	✓	
Ferrous sulfate		✓
Cotrimoxazole tab		✓
Tab paracetamol		✓
I.V fluids		✓
Anti-hypertensive drugs		✓
Family planning commodities	✓	
LOGISTICS		
PNC guideline	✓	
PNC register	✓	
Telephone/mobile phone	✓	
Ambulance		✓

Discussion

Satisfaction is a subjective feeling where individuals announce whether their needs are fulfilled or not. And it is a sign or determinant of the perceived level of care (12). In this study, 53% of moms expressed satisfaction with the postpartum care they received which is incongruent with the study conducted in Kenyatta Hospital where 49% of mothers were satisfied (13), in contrast to other studies conducted in Nigeria and Nepal showed that majority of the mothers were satisfied with the postnatal care provided (13, 14).

Married women will experience a better postnatal period due to social, psychological, and economic support than single or divorced women (15). In this study majority of mothers were married which is in correspondence with the study conducted in Kenya and Greece(12; 16), the study reveals married women are 4 times more likely to be satisfied with the postnatal care provided than unmarried women. According to this study, 60% of mothers were delivered by SVD, and the mode of delivery was statistically significant with the perceived satisfaction of mothers, the finding was dissimilar with the study conducted in Zambia and Kenyatta National Hospital which reported no significant relationship between mode of delivery and satisfaction of mother (12, 17), the study is in correspondence with Kenyan

study and also aligns with other studies conducted on the postnatal comfort (3, 6), where mothers who delivered via SVD were1.12times more likely to be satisfied with the care provided. This may be due to mothers who deliver by CS experiencing more pain and having higher expectations of care and attention from healthcare providers.

Early discharge of a mother and her neonate from the hospital is one of the indicators of substandard quality of care since most of the postnatal components will be missed and will increase the readmission rate. This study reveals all of the mothers who were delivered by SVD stayed less than 24 hours in the hospital before they were discharged, the investigation carried out in the district of Mebya supports this conclusion. Council in which the majority of respondents were discharged before 24 hours of stay after delivery (1), also study done by Cargill, et al 2008 reported even postnatal hospital stay in developed countries has decreased overtime (9). This is mainly due to restricted hospital infrastructures like postnatal room beds and the number of health care providers. Every health care provider has an ethical and professional obligation to inform mothers about the procedure they are going to provide, it is stated as informed consent if the provider explains in a manner the mothers can understand and agree on the procedure to be provided (16). Moreover, WHO affirms patients have a full right to know about any procedure to be provided to them (7, 17) in this study only nearly a quarter (26.7%) of mothers were informed of the procedure received which is in line with the study conducted in Kenya in which mothers were minimally satisfied with informed consent (18), and this study reveals mothers who are with informed consent are 2.76 times more likely to be satisfied with the care provided than uninformed mothers which is in line with study conducted in Malawi on the quality of care on care for mothers and new babies, where maternal perceived quality was significantly related with explanation made by health personnel to the patients (19). This could be due to mothers when they are informed they feel they are recognized and valued by health care providers which boosts their satisfaction from the procedure performed.

Providing standard care for the mother will help in averting most maternal mortality. In the study, about 82.8% of mothers' blood pressure was measured which is in correspondence with the study conducted in Kenya where almost all of the postnatal mother's blood pressure was measured (18), and also the study conducted in Swaziland on the quality of immediate postnatal care, nearly 80% of respondents blood pressure were measured (20) Another study conducted in Kenya confirms that healthcare professionals were keen in the measuring of maternal blood pressure (21), this is due to health care providers being aware on the risk of pre-eclampsia and eclampsia which is common in the first 2 days after birth (22). Only nearly a quarter of the participants' temperature was measured, which is in correspondence with research on the effectiveness of postpartum care among teenage mothers where 19% of the respondent's temperature was measured, and it is in reverse with the Kenyan study were more than three fourth of the respondent's temperature was measured (18). This could be due to the health care provider's workload or insufficient information regarding the importance of temperature measuring. Though, it is the main indicator for the presence of infection and puerperal sepsis which accounts for 10% of maternal mortality (23). Tachycardia and bradycardia are indicators of hemorrhage and commonly mothers are exposed to PPH (post-partum hemorrhage) during this period luckily majority of mothers 82.8% pulse were measured which is contrary to the Swaziland study (20), the study reveals that mothers whose temperature and pulse measured were more likely to be satisfied with the care provided, this could be, mothers feel less anxiety as their health is under conscious consideration of health care providers. Excessive bleeding was checked in 90% of mothers, which is contrary to the Kenyan study whereas only less than a quarter of mother's lochia flow was examined (18), this is due to PPH being the prominent cause of maternal mortality and health care providers had enough knowledge regarding it.

Examining the breasts of the mother will highly avert the stress of the mother, chiefly for primiparous mothers (24), as breastfeeding is their

first experience, in this study more than half of the mother's breasts were examined which is contrary to Kenyan study and findings of Ng'ang'a (2013) were only 40% of mother's breast were examined (20, 23). Healthcare providers are recommended to assist mothers to initiate breast feeding to the new born in the first 30 minutes of postpartum period (7) also they need to empower mothers regarding the importance of breastfeeding and how to manage minor breast problems before they are discharged (17). However, in this study only less than a quarter of mothers were counseled regarding breast care, and the study conducted in Kenya most of the mothers were not satisfied in the information shared on breast care, this study reveals mothers those who are counseled on breast care and minor breast management are 3.4 times more likely to be satisfied with the care provided than those who are not counseled. More than half of mothers were assisted in the positioning of babies during and after feeding which is in contrast with the study conducted in Lilongwe District of Malawi where only nearly 35% of mothers were assisted (25). The study reveals mothers who were assisted were 2.8 times more likely to be satisfied with the postnatal care provided than those who were not assisted. This could be due to half of the participants having their first baby, positioning and the way how to feed is a new experience and challenging, and being assisted will highly satisfy them.

Regarding the cleanliness of the hospital, more than half (65.9%) of the study participants were satisfied which is contrary to the study conducted in Kenyatta National Hospital in which the majority of mothers were not satisfied with the cleanliness of the hospital, also a study conducted in 13 districts of Nepal most of the mothers were not satisfied with the cleanness of the ward (12, 14).

Concerning the drugs required in the postnatal room oxytocin and family planning commodities were available where iron, paracetamol, anti-hypertensive drugs were not available which is the same with the study conducted in semi-rural and urban areas of Malawi where vitamin A and iron was not available (25). However, the study conducted in Tanzania reported all recommended drugs were available (9) almost all of postnatal equipment were available which corresponding with the study conducted in Mybeya district (9) and in contrast with study conducted in northern Ethiopia and Malawi where there is no specific Postnatal room in the facilities (28, 15).

In this study supervision was not done frequently or with recommended regular interval which is in line with the study conducted in Malawi (27). Supervision is the key for the motivation of health care providers to stick to guidelines also in the improvement of their skills (28). The study conducted in Australia reveals supervision of midwives helped in the improvement of quality care provided in relation of adhering to the procedures also has role in active support among staffs and motivation (29).

Conclusion

Overall this study found that being married, delivered by SVD, being informed on the procedure to be done, obtaining recommended nursing care, and, being counseled were significant factors for maternal satisfaction with the overall quality of postnatal care provided in Gandhi memorial referral hospital. Nearly half of the mothers were satisfied with the overall quality of postnatal care provided.

Shortages of material infrastructures were observed almost all types of equipment for the provision of postnatal care were available, however, all mothers who delivered by SVD stayed in the postnatal ward for less than 24 hours due to the restriction in postnatal rooms and beds, which is an indicator of poor quality of postnatal care provided. Moreover, most medications and logistics for the provision of postnatal care were missed.

Recommendations

-Health care providers need to go through current guidelines on maternal and newborn care for the best care provision

-Digitalization of the supervision and the hospital system, then based on the noticed gaps, different platforms need to be arranged in order to update the skill and knowledge of healthcare providers and correspondingly for the best health care providers' incentives provision.

-The hospital stay of postnatal mothers was less than the recommendation of WHO due to

restrictions on postnatal rooms and beds. This leads to the missing of most of the postnatal packages that need to be provided. Accordingly, additional rooms need to be constructed for quality provision of postnatal care.

-Addis Ababa Ministry of Health should equip the hospital based on WHO recommendations for postnatal care.

-Emergency link platforms need to be formed between early discharged mothers and the hospital since the first few days are very critical for the existence of the mother and baby.

-Qualitative research needs to be conducted for further understanding of factors that affects maternal satisfaction with the postnatal care provided.

Limitations of the study

The study is conducted in the maternal and child referral hospital of Addis Ababa, hence it cannot be representative of all maternal and child health referral hospitals in Ethiopia also other facilities. Additionally, the study only considers mothers with live births and mothers whose neonates are not admitted to the neonatal intensive care unit.

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Conflict interest

No conflict of interest.

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Bibliometric analysis of retracted papers in the field of hypertension

Hipertansiyon alanında geri çekilen makalelerin bibliyometrik analizi

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Abstract

Retraction is the act of withdrawing an academic article. The aim of this study was to comprehensively evaluate retracted publications on hypertension, one of the most prevalent chronic diseases worldwide. A search strategy was conducted in the Web of Science database. Information such as publication and retraction dates, the duration between them, the journal, the document type, the country of corresponding author, the reason for retraction and the requesting party, and the citation count were recorded. Trend analysis was used to illustrate the evolution of retracted papers over the years. The median duration of retracted papers was 681 days, with a median citation count of 6. The number of retracted publications has tended to increase over the years. The most frequently identified reasons for retraction were errors, fraud, and peer review issues. A total of 33.0% of the manuscripts mentioned funding. In terms of country distribution, China led with 29.1% retracted papers, followed by Japan and the USA. These findings underscore the detrimental impact of the length and increasing number of retraction periods on the reliability of the literature. Additionally, it highlights that this is a global issue prevalent among researchers' publications in different countries, emphasizing the need for universal attention to scientific publication ethics and research standards.

Keywords: Hypertension, high blood pressure, retraction, retracted papers

Özet

Geri çekme, akademik bir makalenin geri çekilmesi eylemidir. Bu çalışmanın amacı, dünya çapında en yaygın kronik hastalıklardan biri olan hipertansiyon ile ilgili geri çekilen yayınları kapsamlı bir şekilde değerlendirmektir. Web of Science veri tabanında bir arama stratejisi uygulanmıştır. Yayın ve geri çekilme tarihleri, aralarındaki süre, dergi, belge türü, sorumlu yazarın ülkesi, geri çekilme nedeni ve talepte bulunan taraf, atıf sayısı gibi bilgiler kaydedilmiştir. Geri çekilen makalelerin yıllar içindeki gelişimini göstermek için trend analizi kullanılmıştır. Geri çekilen makalelerin medyan süresi 681 gün, medyan atıf sayısı ise 6 olarak bulunmuştur. Geri çekilen yayınların sayısı yıllar içinde artma eğilimi göstermiştir. En sık belirlenen geri çekilme nedenleri hatalar, sahtekârlık ve hakem değerlendirme sorunları olmuştur. Makalelerin %33,0'ü fonlama belirtmiştir. Ülke dağılımı açısından, Çin %29,1 oranıyla en fazla geri çekilen makaleye sahip olup, onu Japonya ve ABD takip etmektedir. Bu bulgular, geri çekilme sürelerinin uzunluğu ve artan sayısının literatürün güvenilirliği üzerindeki olumsuz etkilerini vurgulamaktadır. Ayrıca, bunun farklı ülkelerdeki araştırmacıların yayınlarında yaygın olan küresel bir sorun olduğunu, bilimsel yayın etiği ve araştırma standartlarına evrensel düzeyde dikkat edilmesi gerektiğini göstermektedir.

Anahtar Kelimeler: Hipertansiyon, yüksek tansiyon, retraksiyon, geri çekilen makaleler

Introduction

Retraction is the act of withdrawing an academic article by the journal that originally published it. Plagiarism, duplication, fraud, author disagreements and conflicts, ethical concerns, and errors are among the various reasons why different forms of misconduct can result in the retraction of a scientific paper (1). Retracting an article after publication is among the most undesirable outcomes for a manuscript, yet it serves as a crucial indicator of the validity and authenticity of the published data. In 2009, the Committee on Publication Ethics (COPE) issued guidelines on retractions, stipulating that an article should be retracted if it is deemed unreliable, plagiarized, or for various other reasons (2). The retraction of articles in the literature serves several purposes of correcting misleading information, alerting researchers, and preventing the dissemination of erroneous data (3).

Recently, there has been a heightened emphasis on retracting scientific papers in response to revelations of scientific misconduct. As instances of authors fabricating data, plagiarizing, or engaging in other forms of misconduct come to light, the scientific community has grown increasingly vigilant. For example, a paper on cancer treatment that incorporates false and fraudulent data not only jeopardizes the integrity of scientific research but also poses risks to patients (4). The time period during which retracted publications linger in the public domain poses a risk. For example, the prevalence of misinformation surrounding diseases such as COVID-19, fueled by retracted studies, contributes to the formation of a misinformation community, particularly when these retractions are not promptly addressed in the media (5). Scientific errors, not to mention moral failings, can have significant consequences for patients, as demonstrated by the findings of studies such as these (6). Over the years, the increasing number of retracted articles has drawn attention. For instance, the retraction rate of articles listed in the PubMed database rose from 0.002% in the 1980s to 0.02% in 2009 (3).

To better understand the significance of the increase in retracted manuscripts in recent years, it is necessary to identify retraction notices and reasons for retraction (7). We believe that articles in the medical field are not thoroughly assessed for both retractions and events leading to retractions. Our aim was to comprehensively evaluate retracted publications on hypertension, examining its cause, distribution, and trends over time.

Material and Method

Search strategy

On February 5, 2024, we conducted a search on the Web of Science (WoS) database via the search strategy hypertension OR “high blood pressure” in the topic field. We then filtered the results by document type, specifically ‘retraction, retracted publication, withdrawn publication, item withdrawal’.

The Web of Science search method was “hypertension” or “high blood pressure” (all fields) and retracted publication or retraction or withdrawal or item withdrawal (document types).

Initial identification of retracted publications on hypertension was performed, and the relevant articles were saved for further evaluation. The inclusion criteria encompassed all time periods, with no restrictions. That is, all retracted articles published until our search dates of February 5, 2024, were included, covering all time periods without a specific start date. The studies excluded off-topic, repeated, and non-English articles. Two researchers (R.G. and E.K.) reviewed the titles and abstracts of the articles,

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and 57 articles related to pulmonary hypertension, portal hypertension, or intracranial hypertension in the search results were considered off-topic, with only those focusing on systemic hypertension being included. A total of 18 articles were excluded because of duplication (Figure 1).

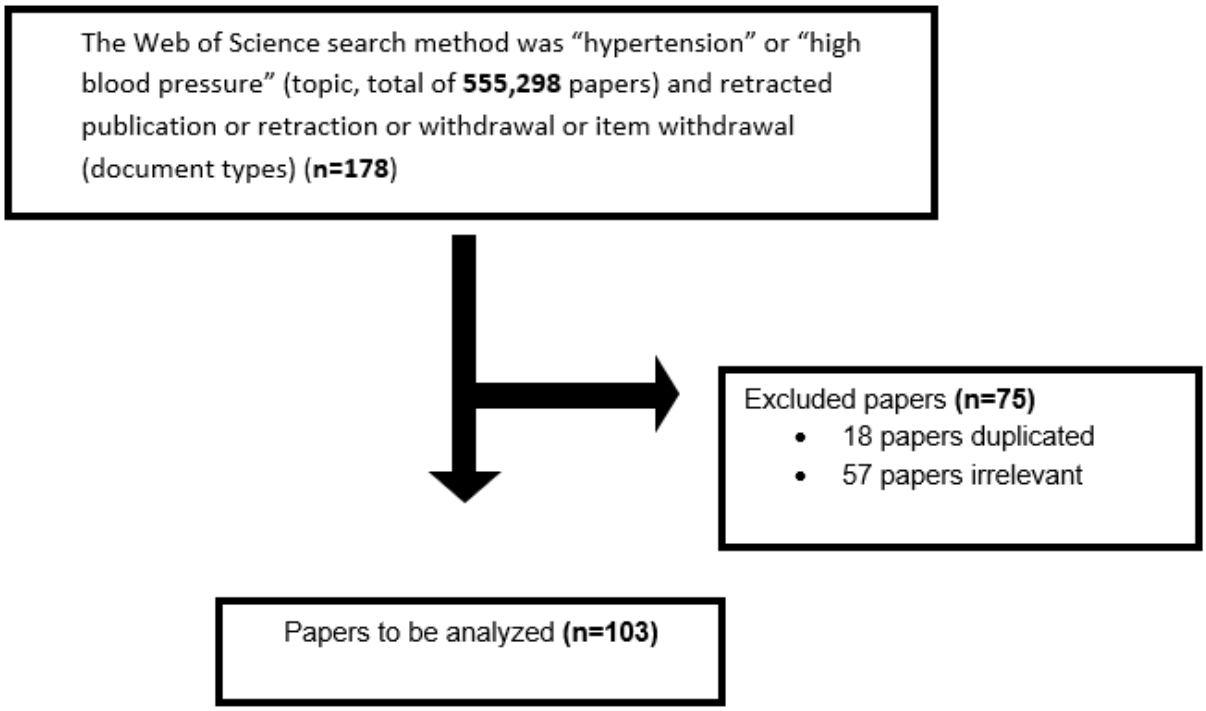

Figure 1: The flow-chart of study

Data collection and coding

In the subsequent analysis for each article, we calculated the publication date, retraction date, and duration between these dates in days. This duration was then coded as the time remaining in publication. Information such as the journal names where the retracted papers were published, the manuscript document type, the country, and the journal index of the corresponding author were recorded, along with the number of citations. In the final stage, we meticulously examined the retraction notes to identify the reasons for retraction and the author of the retraction request. The reasons for retraction were independently assessed by two researchers (R.G. and E.K.), in cases of disagreement, a final decision was reached through collaboration by the researchers. These two independent researchers came together again to discuss and finalize the decision-making process for the areas where they disagreed, both in determining the articles to be included in the study on hypertension and in the process of determining the reasons for retraction of the included articles. The median, minimum, and maximum values were calculated and presented for the variables of time in publication and the number of citations.

The criteria for retraction were determined by reviewing the literature as follows. Numerous studies with comparable methodologies exist in this field (3, 8).

i) Error (incorrect study design, inappropriate data collection, presentation, or report)

ii) Fraud (Manipulation and falsification of data, figures, cases, or images)

iii) Author disagreements and conflicts (publication without author clearance, use of bogus names, or disagreement between authors and funders)

iv) Duplication (double publishing of the same article)

v) Ethical issues (failure to acquire ethics committee clearance or participant consent)

vi) Peer-review issues (fake or biased peer review methods and other issues associated with this process)

vii) Plagiarism (individuals' scientific works, such as papers, texts, designs, tables, graphs, figures, and ideas, and facial misuse, including

self-plagiarism)

viii) Unknown (the reason for retraction was not explicitly stated)

Visualization tools and analysis

Trend analysis was employed to illustrate the evolution of retracted papers over the years. Minitab software was utilized for visualizing changes and predicting the number of retracted papers in future years. As the data processing occurred in 2024, the graph excluded the number of retracted papers for that year, considering that it was incomplete.

VOSviewer version 1.6.20 was utilized for visualizing corresponding author countries, journal sources, and keywords in retracted papers. This software is commonly employed in bibliometric research (9, 10). The node size on the map denotes the frequency density, whereas the line thickness indicates the strength of the interaction. In the overlay visualization map, node color reflects the average frequency and its variations across the years. These visualizations provide an opportunity to illustrate the distribution of parameters over time.

Ethics

This study utilized publicly available data. Since it did not involve any human or animal participants, ethics committee approval was not needed.

Results

After screening the data with the search strategy, total of 178 retracted articles were recorded. In the initial stage, 18 duplicate articles were excluded. Fifty-seven articles were excluded because they were deemed irrelevant, leaving 103 articles for analysis.

The median duration of retracted papers was 681 days (min=9, max=6696), with a median number of citations of 6 (min=0, max=1967). Retracted publications exhibited a rising trend over the years (Yt = -2.236 + 0.3744×t). According to the linear trend model, there is a predicted increase in the number of retracted papers in the future (Fig 2).

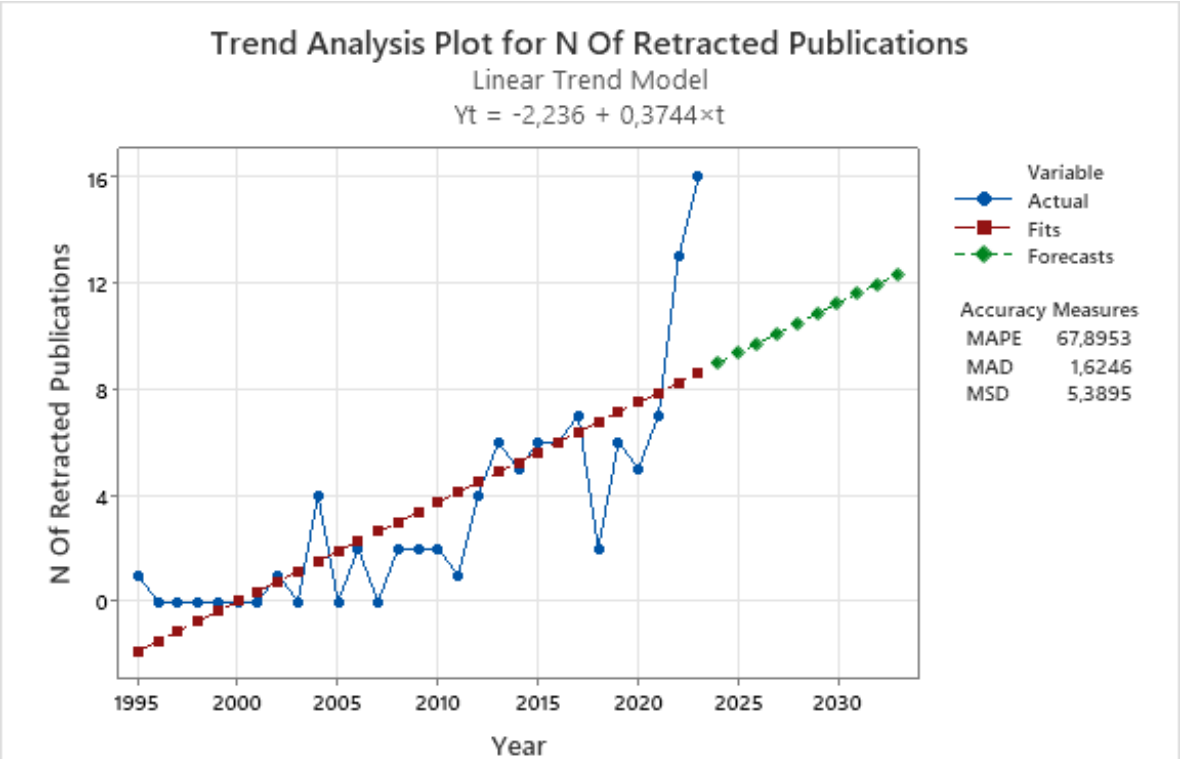

Figure 2: Trend analysis of retracted publications

After the retraction notes of the 103 papers were analyzed, the distribution in Figure 3 illustrates the reasons for retraction. The most frequent reasons identified were errors (31 papers, 30.1%), followed by fraud (18 papers, 17.5%), and peer review issues (12 papers, 11.6%). In 16 retracted papers, the reason could not be determined on the basis of the retraction notes.

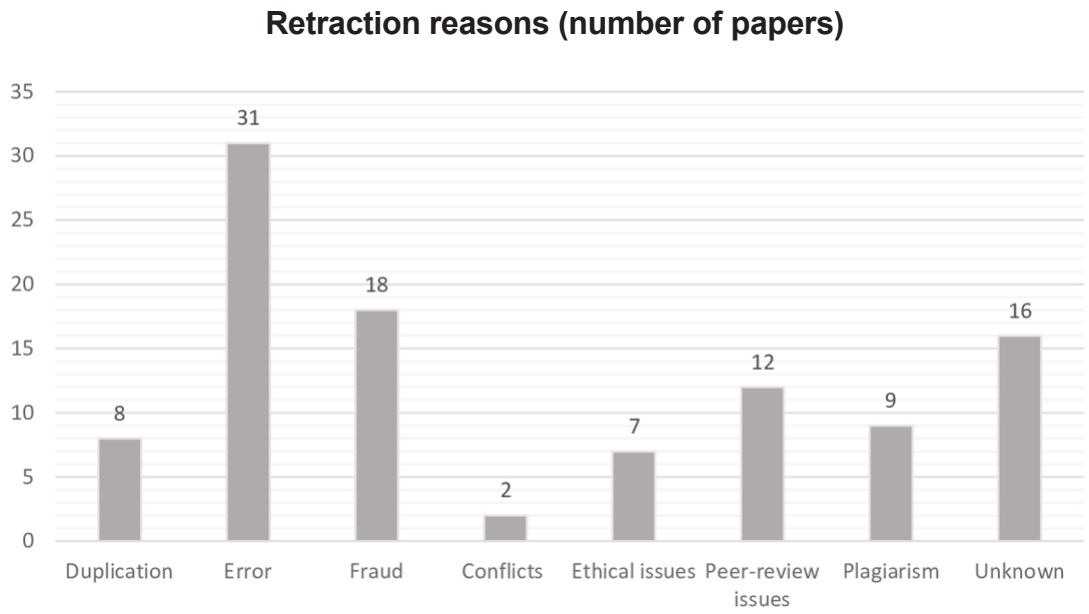

Figure 3: Retraction reasons (number of papers)

In Figure 4, the visualization depicts the type of retracted papers, the Web of Science index, and the source of the retraction request. Accordingly, the majority of retracted papers were of the original article type. Overall, 87 papers (84.5%) had Science Citation Index-expanded (SCI-e) indices, 2 papers (2.0%) had SCI-E/Social Sciences Citation Index (SSCI), 4 papers (3.9%) had SCI-E/Conference Proceedings Citation Index-Science (CPCI-S), and 10 papers (9.7%) had Emerging Sources Citation Index (ESCI) indices. In the analysis of retraction requests or decisions, 68 (66.0%) requests were initiated by publishers, 30 (29.1%) requests were initiated by authors, 1 (0.9%) request involved both publishers and authors, and 4 (3.9%) requests or decisions were unknown. Additionally, a total of 34 manuscripts (33.0%) mentioned funding in some capacity.

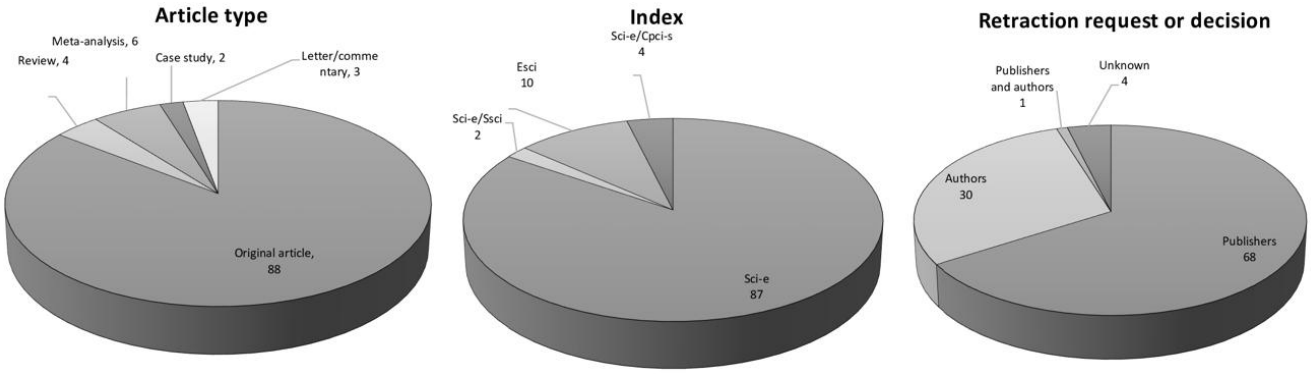

Figure 4: Representation of the Article type, Index and Retraction request or decision

Table 1 presents the countries of corresponding authors with the highest number of retracted papers. China had 30 (29.1%) retracted papers, followed by Japan (14 papers, 13.6%) and the United States of America (USA) (13 papers, 12.6%). An overlay visualization map was generated for these countries via VOSviewer. Coauthorship was chosen as the type of analysis, and countries were set as the unit of analysis. Figure 5a displays the resulting map, including 37 countries with at least one documented case. In the overlay map, which examines the distribution of retracted writings by country starting from the 2000s to the present day, China, representing the most recent years, is colored green, while the USA and Japan are colored purple, following China in terms of width but chronologically defining the older years.

Table 1: List of countries with the most retracted paper.

Countries	N*	%
China	30	29.1
Japan	14	13.6
USA	13	12.6
Italy	7	6.8
Australia	4	3.9
Germany	3	2.9
India	3	2.9
Pakistan	3	2.9
Saudi Arabia	3	2.9

**Data with 3 and more were portrayed*

Table 2 provides a list of journals where retracted papers were published. Among the 6 journals with at least 3 papers, Biomed Research had the highest number of retractions (10 papers, 9.7%), followed by the Journal of Hypertension (6 papers, 5.8%) and Hypertension (5 papers, 4.9%).

Table 2: List of journals with the most retracted paper.

Journal	N*	%
Biomed Research International	10	9.7
Journal of Hypertension	6	5.8
Hypertension	5	4.9
Journal of Human Hypertension	4	3.9
Hypertension Research	3	2.9
Journal of the American Society of Hypertension	3	2.9

**Data with 3 and more were portrayed*

In Figure 5b, an overlay visualization map was generated for the most frequently used keywords in retracted articles, illustrating the distribution of keywords extending to 2024. When the overlay map was made according to the most common keywords of the retracted articles included in the study, the graph of the keywords represented by purple and green colors in terms of time and frequency was shown.

Figure 5a: Co-authorship (type of analysis) countries (unit of analysis) overlay visualization map

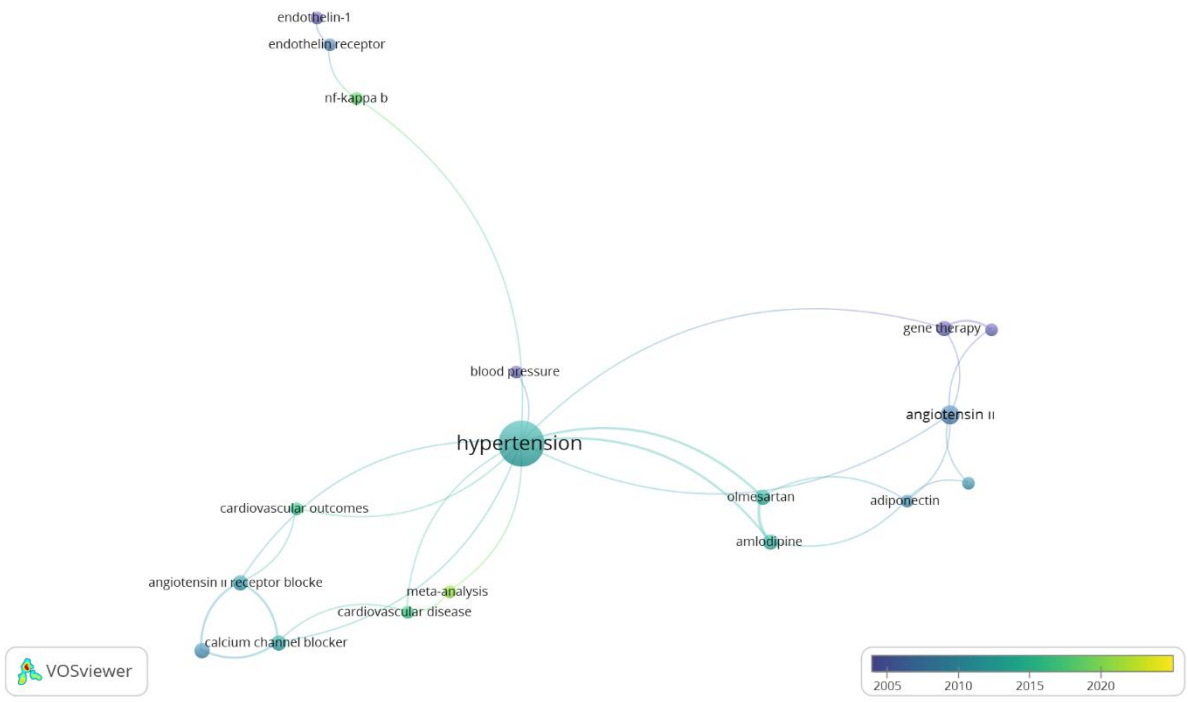

Figure 5b: Co-occurrence (type of analysis) of keywords (unit of analysis) overlaid on the visualization map

Discussion

Retraction contributes to the enhancement of the literature by rectifying inaccurate and misleading information, notifying researchers about papers containing substantially flawed data, and impeding the dissemination of erroneous information (11). This study, encompassing the analysis of 103 papers, is recognized as the first knownattempt to scrutinize retracted literature related to hypertension. Our findings reveal an upward trajectory in retracted papers over the years, and the applied linear trend model suggests a prospective surge in their numbers. The increasing retraction of manuscripts in recent years may be attributed to various factors, including heightened awareness in the scientific community or an increase in profit-driven practices such as scientific errors, fabrication, plagiarism, and interference in the peer-review process. These increases may also be due to the increase in the number of articles in the literature (12) or to the increased use of the internet and software and the increased examination of articles in electronic media. The integration of artificial intelligence in article production poses potential scientific hazards (13). New experiences have been gained regarding why and how artificial intelligence usage poses scientific risks today. In recent years, numerous cases have been observed where AI produced undesirable outcomes. The use of artificial intelligence in academic writing can lead to both errors and ethical violations. Researchers, as well as journal editors and reviewers, are responsible for identifying, defining, mitigating, and controlling AI-related errors. However, it is challenging to determine the extent and manner of AI usage in the present day (14, 15).

Ensuring the accuracy and reproducibility of scientific articles is paramount. Therefore, we advocate the implementation of rigorous control mechanisms to maintain the integrity of scientific outputs. Both the editorial and referee processes, as well as postpublication scrutiny, could benefit from more stringent multistage controls, and the integration of artificial intelligence may aid in uncovering scientific errors and distortions. In our study, the predominant reasons for retraction were identified as errors (30.1%), fraud (17.5%), and peer review issues (11.6%). While our categorization of reasons for retraction aligns with similar methodologies found in the literature, it is important to acknowledge that the spectrum of reasons for retraction may extend beyond those we have specified. Gaudino et al. reported different primary reasons for retraction in the biomedical literature, with duplication

(23.5%), plagiarism (13.9%), and data fabrication (12.1%) being the most prevalent factors (16). In a neurology study, fabrication emerged as the predominant reason, constituting 29.11% of the retracted articles (17). The most common reasons for retraction in the ophthalmic literature are fraud, plagiarism and data error (2). Koçyiğit et al. identified plagiarism, duplication, and error as the most prevalent reasons for retraction in the Turkish biomedical literature (3). In the PubMed database for 2012, out of 2,047 retracted biomedical and life sciences research articles, 21.3% were attributed to errors. The most prevalent reasons for retraction included fraud (43.4%), double publication (14.2%), and plagiarism (9.8%) on the basis of this extensive search (18). While the causes of retraction may exhibit slight variations across different scientific fields, countries, or subjects in the literature, they generally share similarities with each other.

The median number of citations for the retracted papers in our study was 6 (min=0, max=1967). The withdrawal of an article from publication involves a series of control processes, and this procedure can sometimes be extended over several years. Retracted papers, on average, remained in publication for a median duration of 681 days. This poses a significant concern, as even though the dissemination of misinformation from retracted paper ceases, numerous papers referencing it continue to be published without a proper warning system in place. This cumulative effect contributes to the unregulated propagation of misinformation. Therefore, it is crucial to place a high emphasis on scrutinizing citations to retracted manuscripts. Despite the general rule that retracted scientific papers should not be used or cited, we observed a considerable number of citations to retracted articles on hypertension. Some papers, even though retracted, continue to be cited, and they remain in circulation. In certain instances, the citing article is cited instead of the original article, further perpetuating the dissemination of incorrect information (19).

The retracted papers identified in our study were primarily of the original article type, with a majority falling under the Sci-E/SSCI/CPCI-S category. In terms of retraction invitations, a significant proportion (66.0%) originated from publishers, whereas authors were less commonly involved. In certain instances, both publishers and authors were involved in the retraction process. The loss of citations in prior studies is mitigated when authors self-report errors (20). The importance of retraction notes is paramount; they should offer comprehensive details regarding the reason for retraction and specify who initiated the retraction. To be clear, freely accessible, and easily located, retraction notes should be seamlessly linked to the original retracted article for transparency and accessibility (3).

The corresponding author country of the retracted articles was taken into consideration, with China leading at 29.1%, followed by Japan and the USA. The 103 analyzed articles were sourced from 70 different journals across 37 countries. The excess in retracted articles in these countries can be explained by the total article volumes of these countries. As a reference, in the study in which 90,308 original articles in the field of hypertension were included over a 20-year period between 1998 and 2018, the USA represented 30.3% of all articles, Japan 10.8%, China 9.1%, the United Kingdom 6.9%, and Germany 6.4% (21). A study conducted in the field of orthopedics revealed that the articles with the highest number of retractions originated from China (31%), followed by the USA (17%) and Italy (14%) (22). In a comprehensive report covering various subjects and analyzing scientific articles from 2001--2010, the top-ranking countries were the USA, China, Germany, Japan, and India, in that order (23). Retractions can be compiled from the Retraction Watch website, and certain studies utilize data from this source. A study conducted between 2013 and 2015, which analyzed retractions listed on the website, identified the USA, China, and Japan as the countries with the highest number of retracted papers (24). When examining retraction numbers, it becomes apparent that leading countries facing this challenge are consistently similar. Factors such as a nation's high overall volume of articles, developmental level, or cultural influences may contribute to the increased occurrence in specific regions. The data reveal that retracted papers constitute a global issue and are prevalent among researchers across various countries. Addressing this issue necessitates

universal attention to upholding scientific publication ethics and research standards.

Upon analyzing the journals publishing the retracted papers, Biomed Research, Journal of Hypertension and Hypertension emerged as the most common. The reasons for a greater number of retractions in these journals may vary significantly, ranging from peer review issues to a well-developed scientific accuracy control mechanism within the journal. The journals that most frequently had retracted publications in the field of hypertension were generally journals with a hypertension mission. The reason for the high number of retracted articles in these journals may be that, as expected, articles on the subject of "hypertension" are published more in these journals.

In our study, 34 out of 103 retracted manuscripts had some form of funding, representing a potential economic loss for these papers in terms of their contribution to the scientific literature. Notably, comprehensive bird's eye view studies on funding in the literature are lacking. This could be a potential avenue for future research, prompting researchers to focus on the economic implications and contributions of funding to retracted manuscripts.

In our study, we exclusively utilized the Web of Science as a singular database. While other databases, such as PubMed, EMBASE, COMBASE, and Scopus, could have been considered, our decision was influenced by the perceived reliability of citation indicators within the WoS database, on the basis of our experience and findings in the literature (25). In our study, two of the reasons for retraction were either unclear in the retraction notes or absent altogether, posing challenges in determining the cause of retraction. Additionally, it is crucial to acknowledge that this study is observational, and despite efforts to ensure objectivity with two independent assessors, the assessments inherently carry a subjective element. Different assessors might interpret the reasons for retraction differently.

Conclusions

Ensuring the accuracy and reproducibility of scientific articles is paramount. Therefore, an effective review mechanism for manuscripts is essential. Editors and reviewers bear significant responsibility not only in the acceptance process but also in the retraction process. To prevent erroneous manuscripts from persisting in publication, sharing raw data files in the appendices of publications and transforming readers into auditors can serve as proactive measures against manuscripts that may have evaded the peer review process.

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A psychometric analysis of the adaptation of the integrative health and wellness assessment to Turkish

Entegratif sağlık ve refah değerlendirmesinin Türkçe'ye uyarlama çalışmasına ilişkin psikometrik bir analiz

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Abstract

Nurses/nurse coaches working in health promotion need tools that can be used to holistically assess the emotional, physical, nutritional, spiritual, etc. status of adults.The aim of this study was to perform a validity and reliability study for the Integrative Health and Wellness Assessment developed by the International Nurse Coach Association in 2011, (McElligott & Turnier, 2020) and to adapt it to Turkish culture. The research was performed from February-May 2023 with individuals who volunteered to participate. An online survey was sent to adult individuals over 18 years of age living in Türkiye. In total, data for 699 individuals were analyzed. Data collection tools included the information form and the Integrative Health and Wellness Assessment. For adaptation to Turkish, the steps prepared and refined in several studies by the World Health Organization were followed. Statistical analyses were performed with SPPS and R Project. Validity analyses included content and construct analyses, while reliability analyses used the Cronbach alpha and omega coefficients. The Kaiser-Meyer-Olkin value (KMO=0.936) was at acceptable levels and significant correlation structure was observed with Bartlett's sphericity test ($\chi2=6478.783$, $p<0.001$). The results of factor analysis found item load values from 0.859-0.522 for 31 items in a structure of 6 subdimensions (emotional awareness, health responsibility, nutrition, exercise, spiritual and avoiding harmful habits). This structure explained 64.929% of the total variance. As a result of the analyses, the scale is suitable for use to assess the integrative health and wellness of adult individuals and the Turkish form was concluded to be valid and reliable.

Keywords: Integrative health, wellness, validity, reliability, nursing

Özet

Sağlığı geliştirmek ve teşvik etmek için çalışan hemşireler/hemşire koçları, yetişkin bireylerin duygusal, fiziksel, beslenme, spritüel v.s durumunu bütünsel olarak değerlendirmek için kullanılabilecek araçlara ihtiyaç duyarlar. Bu çalışmanın amacı, 2011 yılında Uluslararası Hemşire Koçları Derneği tarafından geliştirilen Bütünsel Sağlık ve Zindelik Değerlendirmesi'nin geçerlik ve güvenirlik çalışmasını yapmak (McElligott & Turnier, 2020) ve Türk kültürüne uyarlamaktır. Araştırma, Şubat-Mayıs 2023 tarihleri arasında gönüllü olarak katılan bireylerle gerçekleştirilmiştir. Türkiye'de yaşayan 18 yaş üstü yetişkin bireylere çevrimiçi anket gönderilmiştir. Toplamda 699 bireyin verileri analiz edilmiştir. Veri toplama araçları bilgi formu ve Bütünsel Sağlık ve Zindelik Değerlendirmesi'dir. Türkçeye uyarlama için Dünya Sağlık Örgütü'nün çeşitli çalışmalarda hazırlayıp geliştirdiği adımlar izlenmiştir. İstatistiksel analizler SPPS ve R Projesi ile yapılmıştır. Geçerlik analizlerinde içerik ve yapı analizleri yapılmış, güvenirlik analizlerinde ise Cronbach alfa ve omega katsayıları kullanılmıştır. Kaiser-Meyer-Olkin değeri (KMO=0,936) kabul edilebilir düzeyde olup, Bartlett'ın küresellik testi ile anlamlı korelasyon yapısı gözlenmiştir ($\chi2=6478,783$, $p<0,001$). Faktör analizi sonucunda 6 alt boyutlu yapıda (duygusal farkındalık, sağlık sorumluluğu, beslenme, egzersiz, maneviyat ve zararlı alışkanlıklardan kaçınma) 31 madde için madde yük değerleri 0,859-0,522 arasında bulunmuştur. Bu yapı toplam varyansın %64,929'unu açıklamaktadır. Analizler sonucunda ölçeğin yetişkin bireylerin bütüncül sağlık ve iyilik halini değerlendirmek için kullanılmaya uygun olduğu ve Türkçe formunun geçerli ve güvenilir olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Bütünleştirici sağlık, sağlıklı yaşam, geçerlilik, güvenilirlik, hemşirelik

Introduction

In their 1948 definition of health, the World Health Organization (WHO) emphasized that health was not just the absence of disease or disability but also full physical, mental and social wellness. The National Center for Complementary and Integrative Health defines the term integrative health to include complementary approaches to mainstream health services (1). Integrative health represents an approach to lifelong individual and social health and deals with the interrelations between all areas related to health including body, mind and spirit. At the same time, it is accepted that health is shaped not just by health services but by elements like personal behavior, genetic factors and protective and risk factors (e.g., economic status, reaction to stress and working conditions). Integrative health is accepted as being affected by factors impacting health, physical, social and economic environment, in addition to environmental and social conditions, state policies and social values. Additionally, considering evidence-based information, integrative health advocates for person-based health services involving appropriate health professionals, different disciplines, traditional healing methods and therapeutic approaches (2).

The term “wellness” was first defined in the literature in a book called High Level Wellness as an integrated approach focused on bringing the potential of individuals to the highest level. Wellness is a concept related to all aspects of life; physical health, social interactions, emotional and mental capacity and spirituality, etc. Perceived wellness represents a reflection of general health levels, in addition to the special needs of the person (3). Wellness does not aim to replace existing health practices but rather to complement them. Nearly all wellness practices serve well-being rather than medical needs. In this context, the integrative health and wellness understanding gains an important role within nursing practice. Nurse coaching, emerging as an innovative health-developing intervention to improve health behavior and increase self-management of chronic disease, has taken its place as an innovative approach to the concept of integrative health. Nurse coaches facilitate individuals’ healing and well-being by utilizing coaching principles and integrative healing methods that encompass the body, mind, emotions, spirit, and environment (4). A professional nurse coach integrates coaching competencies into any area of nursing practice to assist individuals and/or groups in realizing their potential and to facilitate the process of change or development. The process of change is based on the inner awareness developed by the individual before it manifests externally and is sustained as effective change (4, 5). In Türkiye, coaching was officially recognized as a profession in the Official Gazette dated June 29, 2013, and numbered 28692 (6). In Türkiye, some institutions, organizations, and universities organize certificate programs under the titles of life coaching, health coaching, and diabetes nurse coaching at predetermined times. These programs provide certification to nurses and healthcare professionals who wish to work in these fields. Additionally, there are nurses in Türkiye who serve as holistic nurse coaches (7, 8).

Nurses working as coaches, especially, must use an integrative approach when working with a client/patient. At this point, nurses/nurse coaches working to develop and encourage health require tools that they can use to assess the status of individuals. Using these tools also supports evidence-based implementations in nursing practice. Evidence-based tools are required to develop nursing/coaching assessment

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and to facilitate client-coach interviews through in-depth thought and additionally assist in developing and measuring action-focused goals (9). While diverse scales measure health (10-13) and wellness (12), in Türkiye there is no scale tool assessing integrative health and wellness and supporting self-reflection and assessment as defined by the theory of integrative nurse coaching (TINC). The role of the nurse coach is to develop with each day to meet needs in relation to health and welfare in our country and the world. At this point, there is a need to adapt the valid and reliable Integrative Health and Wellness Assessment (IHWA) to Turkish society for use when coaching clients and hence, this study was performed. The aim of this research is to perform a validity and reliability study for the Integrative Health and Wellness Assessment developed adapt it to Turkish culture.

Material and Method

Research type

This study was methodological research with the aim of testing the validity and reliability of the Integrative Health and Wellness Assessment at Turkish culture.

Participants

The sample for the research comprised literate individuals older than 18 years who volunteered to participate in the research from February-May 2023. The sample number for the scale development study was determined to be 699 people, volunteering for the study, based on the need for the sample to include 5-10 times the number of items on the scale on average and as data would be divided in two for exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (13). Participants were reached online through e-mail and social media. Online questionnaires were distributed to the participants and no personal identity information was solicited. It was explicitly communicated in writing to all participants that their responses would be exclusively utilized for the purposes of this research, and not for any other context.

Data Collection

As data collection tools, an information form and the Integrative Health and Wellness Assessment were used.

Information form: This was prepared by the researchers and included 10 questions about sociodemographic features. Questions were related to sex, age, weight, height, educational status, marital status, and income level of participants, how they perceived their health, whether they thought they were healthy considered as a whole and presence of chronic disease.

Integrative Health and Wellness Scale (IHWA): The IHWA, developed in 2011, was based on a self-assessment tool initially developed by Lynn Keegan and Barbara Dossey (1988), the Theory of Integral Nursing (14), and the Theory of Integrative Nurse Coaching (TINC) (15). The initial self-assessment tool reviewed six areas of wellness: physical, mental, emotions, spirit, relationships, and choices (14,16) and was refined over the past 23 years based on respondent feedback and content experts in holistic nursing.

While various tools measured health and wellness, there were no tools that measured health and wellness as defined by the TINC. Therefore, the IHWA tool was developed to support self-assessment and self-reflection on the eight dimensions of wellness defined by the TINC. These dimensions include (1) life balance and satisfaction, (2) relationships, (3) spiritual, (4) mental, (5) emotional, (6) physical (nutrition, exercise, weight management), (7) environmental, and (8) health responsibility (15).

The 36-item short form of the Integrative Health and Wellness Scale was developed by McElligott et al. (10). The IHWA assists in assessing health behavior through self-reflection and provides information for the coaching relationship. The short form takes about 10 minutes to complete, uses a 5-point Likert-type scale ranging from 1 (never) to 5 (always) and is scored by adding up the total for each area with higher scores indicating higher levels of wellness. Total scores on the 36-item IHWA tool can range from 36 to 180.

Translation of the Original Integrative Health and Wellness Assessment into Turkish-Adaptation process

Before the adaptation of the IHWA, permission to use the scale was obtained via e-mail from the researchers who developed the scale. The adaptation process followed the steps prepared and refined in several studies by the WHO (17, 18).

1. Translation: Translation was completed independently by two experts with native Turkish and good level of English. The experts were academics in health sciences faculties and were familiar with the terminology of the scale (19, 20). One expert was informed about the topic, while the other was not. The topic, aim and things required were explained to the informed translator. The other translator was requested to translate naturally without bias (21). After the translation was complete, both versions were summarized and translations were compared to create a common text. Semantic, idiomatic, conceptual, linguistic and contextual differences were assessed (22).

2. Semantic Explanations: Considering differences in linguistic and cultural structures, scale items were revised for suitability for Turkish society (18).

3. Expert panel: The aim of this step is to identify and resolve inadequate statements in the translation and inconsistencies between the two languages (17, 23). In line with the recommendation by WHO, the original scale and translation were sent to four experts after the translation process. Here, experts were identified as people who knew both languages and cultures, scale content and scale adaptation methods (18). Experts were requested to respond to each item with responses of “unsuitable (1)”, “item should be adapted for suitability (2)”, “suitable but requires small changes (3)” and “very suitable (4)”. Responses from experts are interpreted as having good CVI score if 80% of all items have scores of 3 and 4 (12). In line with the responses from the four experts, 96% of items had scores of 3 and 4.

4. Retranslation: The retranslation was made by 2 independent translators who knew Turkish but whose native language was English, not included in the first translation and with no information about the scale (20, 21). After completing the retranslation process, the researchers compared the two versions to determine differences between the retranslation and the original scale. Small grammar differences were ignored. Analysis by the researchers and translators did not identify any semantic differences in the scale items and the translation was satisfactory.

5. Pilot Application and Cognitive Review: The pilot application was completed with 30 people with similar characteristics to the target group, in line with recommendations made by WHO. Participants were requested to reach the questions aloud, make a short explanation about the meaning of each item and rate it. The aim was to be sure that each item on the scale was understood in the same way by each participant (22). After the pilot application, no changes were made to the scale. It was determined that the demographic feature questionnaire and the Turkish form of the IHWA can be answered within 8–10 minutes. Individuals participating in the pilot application were not included in the sample.

6. Final Version: The final version of the Turkish scale was obtained after these five stages.

7. Documentation: The adaptation process for the scale is reported based on WHO recommendations (17).

The Likert graph allowing participants to state how much they agree or disagree with a certain item is shown in Figure 1.

Statistical Analysis

The evaluation of the demographic characteristics of the individuals participating in the study was performed with the SPSS (Statistical Package for Social Sciences) 27.0 package program.

Exploratory Factor Analysis and Confirmatory Factor Analysis of the Integrative Health and Wellness Assessment

Exploratory factor analysis (EFA) was implemented using principal axis factoring and varimax rotation techniques to check the sub-dimensions of the Integrative Health and Wellness Scale. While implementing EFA, Pearson correlation matrix was chosen (12).

Reliability was assessed utilizing Cronbach Alpha, omega and inter-reliability (ICC) coefficients. After EFA and reliability analyses, confirmatory factor analysis (CFA) was performed to validate the obtained structure. The first 350 observations in the dataset were used for EFA (24). For CFA, construct validity was examined for the remaining sample set of 349 observations. Analyses were performed with R Software (25). Also, the psych package was used for reliability and EFA (26), while the Lavaan package was used for CFA (15). Analysis of data used the IBM SPSS 27 and R-Project (IBM Corp. Released, 2021, 26) programs.

Ethical Approval

This study, with participation on a voluntary basis, was conducted in accordance with all ethical procedures/standards and the Declaration of Helsinki. The study was approved by Yildirim Beyazit University Heath Science Ethics Committee (Research code: 2022:1132, Approval number: 06.10.2022-14).

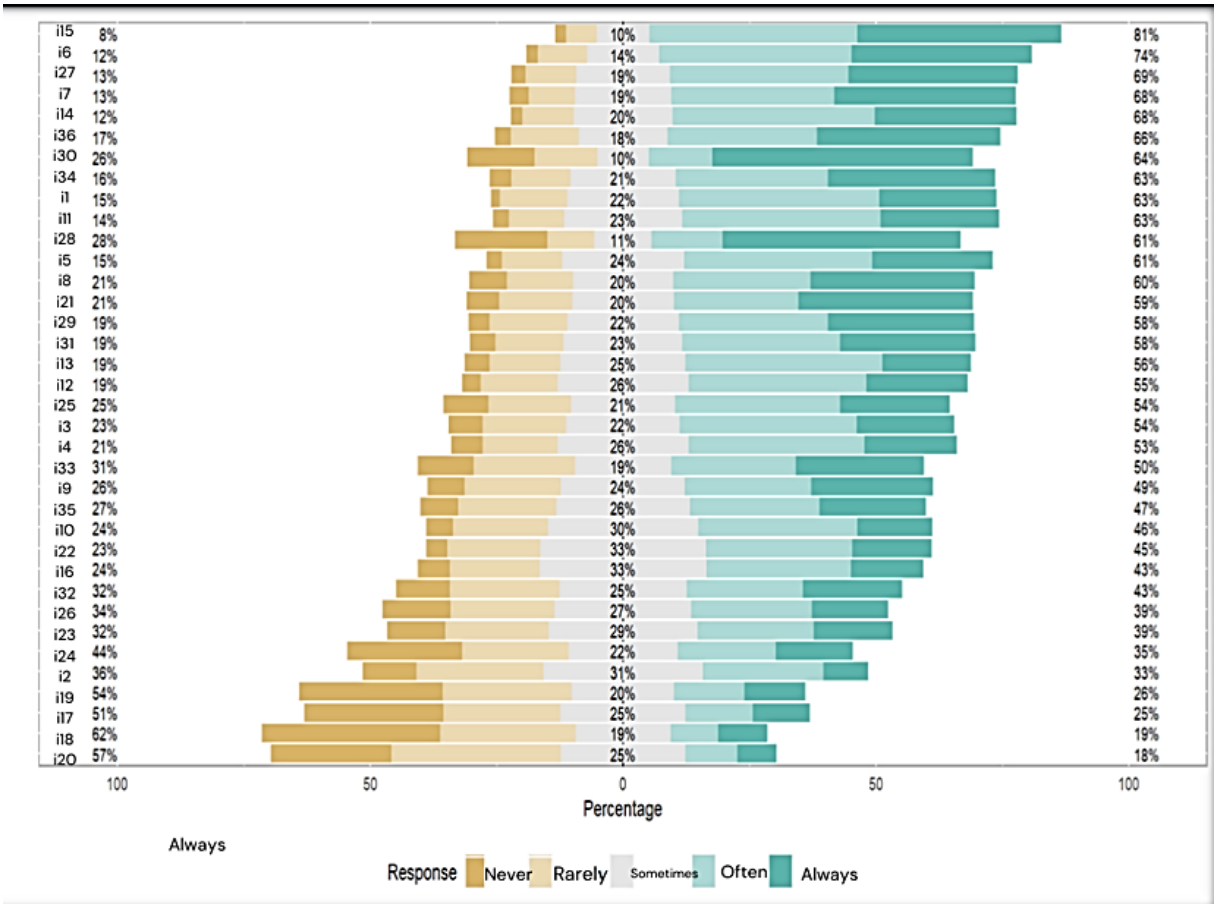

Figure 1: Likert graph for participant responses to items on the Integrative Health and Wellness Assessment

Results

The results obtained from the validity and reliability study of the IHWA are investigated under three headings of descriptive features of participants, validity findings and reliability findings.

3.1. Descriptive features of individuals

The demographic features of participants are shown in Table 1. The mean age of individuals was 29.49±10.19 years, mean weight 65.64±13.81 kg, and mean height 164.60±14.80 cm. Of participants, 84.7% were women. Among participants, 61.8% were university graduates and 20.6% had received postgraduate education. Of participants, 56.5% were single, 50.6% had income equal to expenditure, 51.2% stated they were healthy overall and 20.7% had chronic disease (Table 1).

Table 1: Demographic features of individuals

Demographic Information		n	%
Sex	Woman	592	84.7
	Man	107	15.3
Education	Primary education	14	2.0
	High school	109	15.6
	University	432	61.8
	Postgraduate	144	20.6
Marital status	Married	304	43.5
	Single	395	56.5

Income	Income less than expenditure	203	29.0
	Income equal to expenditure	354	50.6
	Income more than expenditure	142	20.4
General health	Good	385	55.0
	Moderate	270	38.6
	Poor	44	6.4
State of being healthy overall	Yes	358	51.2
	No	341	48.8
Chronic disease	Yes	145	20.7
	No	554	79.3

3.2. Validity

3.2.1. Exploratory Factor Analysis

In the study, EFA was first conducted to evaluate the construct validity of the scale, followed by CFA to test the validity of the confirmed factor structure. According to the preliminary results for EFA, Bartlett's test of sphericity was significant (χ^2=6478.783, sd=465, p<0.001) and the Kaiser-Meyer-Olkin test sampling the adequacy value (KMO=0.936>0.900) was quite high. The number of factors was selected with the Kaiser rule based on the correlation matrix.

When the factor analysis results are assessed, a structure with 6 factors with eigenvalues greater than 1 was obtained. It is expected that the difference between the highest load value for an item in one factor and the highest load value for the same item in any other factor will be high and it is recommended that this difference be at least 0.15 (27). According to the EFA results, the factor load values for two items were identified to be very close to each other in two separate factors (item 10: 0.548 and 0.467; item 27: 0.460 and 0.444). After removing the two items, EFA was repeated for 34 scale items. According to the result, the factor load values for three items had very close values in two separate factors (item 7: 0.585 and 0.471; item 25: 0.574 and 0.466; item 26:0.579 and 0.446). Three scale items were removed and the factor analysis results for the 31-item scale are presented in Table 2. The load values for all items within the factors were higher than 0.40 (27). After the five items were removed from the analysis, the factor loads for the remaining items had differences greater than 0.15, so the final EFA results did not have a cross load problem (25). For all items, the communality values were higher than 0.30 (28). The result of factor analysis found a 6-factor structure, different to the original scale, that appeared to explain 64.929% of the total variance (Table 2).

Table 2: Factor loads and communality values for EFA results

Item no.	Factor-1	Factor-2	Factor-3	Factor-4	Factor-5	Factor-6	Communality
15	0.752						0.651
6	0.724						0.610
14	0.702						0.601
5	0.691						0.618
12	0.635						0.591
4	0.631						0.603
13	0.628						0.599
1	0.626						0.567
11	0.600						0.582
3	0.591						0.543
16	0.559						0.589
34		0.806					0.781
33		0.792					0.702

35		0.721					0.771
36		0.640					0.673
31		0.604					0.674
32		0.537					0.521
29		0.516					0.597
21		0.432					0.497
24			0.707				0.555
22			0.679				0.746
23			0.653				0.618
20			0.508				0.517
18				0.870			0.836
19				0.804			0.743
17				0.794			0.785
9					0.800		0.782
8					0.715		0.711
2					0.469		0.566
28						0.803	0.737
30						0.799	0.749
% variance explained	19.137	9.442	13.532	6.892	9.676	6.248	Total Experienced Variance 64.929

VER: Variance explanation rate

3.2.2. Confirmatory factor analysis (CFA)

The CFA results related to factor loads and t values for scale items obtained for research data from the second sample are presented in Figure 2. When the factor loads for the scale are examined, there was no item below 0.30 and factor load were between 0.93 and 0.51 within acceptable limits (Figure 2).

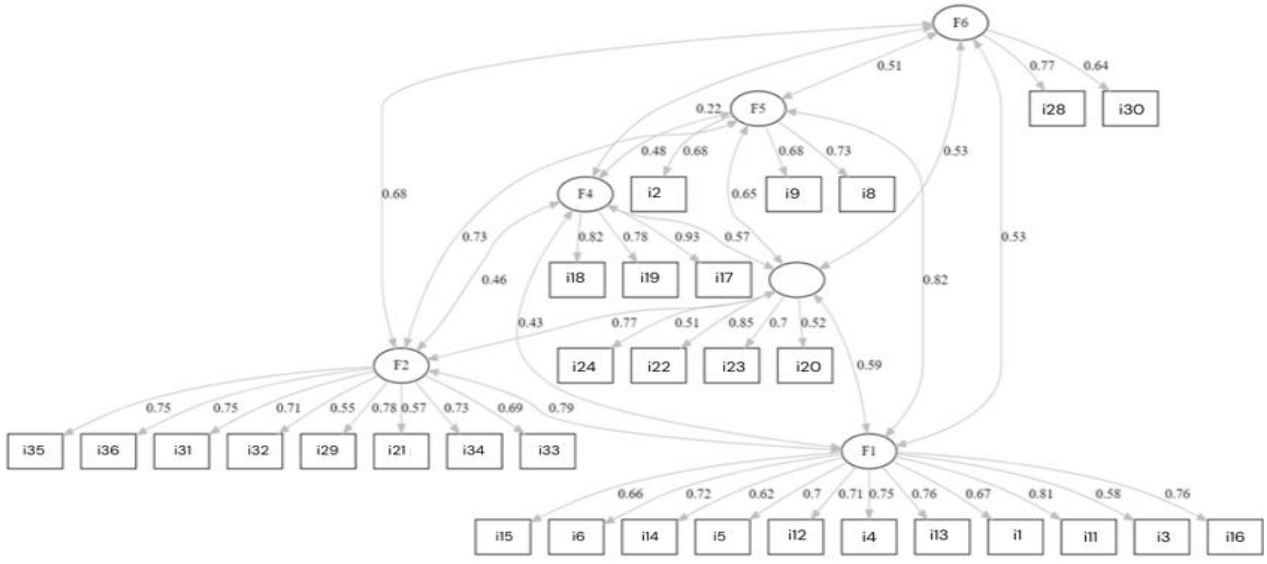

Figure 2: CFA results

Table 3 shows the standardized factor loads and significance results for all items in the six subdimensions obtained from the CFA results. According to these results, all items on the scale were collected in the subdimensions in a statistically significant way ($p<0.05$) and standardized factor loads were positive. The load values obtained from CFA results were positive and significant indicating that all items were correctly located in the subdimensions in terms of construct validity. When the t statistics related to the items are investigated, all items were significant at 0.01 levels (Table 3).

Table 3: Factor load statistics for items as a result of CFA

Factor	Item		Standardized factor load	p
Emotional awareness	15	I listen to other people's feelings and respect them.	0.655	<0.001
	6	I easily express my love and concern for people I care about.	0.716	<0.001
	14	I try to be forgiving.	0.618	<0.001
	5	I express my feelings for others in appropriate ways.	0.702	<0.001
	12	I want help/support when needed.	0.709	<0.001
	4	I am comfortable sharing my feelings/thoughts without feeling guilty.	0.746	<0.001
	13	I accept situations and events outside of my control.	0.763	<0.001
	1	I am satisfied with the integration between my job, my family, my friends and myself.	0.667	<0.001
	11	I determine realistic targets for my job.	0.813	<0.001
	3	I have satisfactory relationships.	0.580	<0.001
	16	I can healthily distance myself from unwanted feelings (anxiety, worry, fear and anger).	0.763	<0.001
Health responsibility	34	I am aware of my risk factors for illness.	0.730	<0.001
	33	I know my blood pressure, triglyceride, cholesterol and glucose levels.	0.693	<0.001
	35	I am interested in developing my health plan (health screening, drugs, supplements, exercise, nutrition, etc.)	0.755	<0.001
	36	I know I am the key to my general health and fitness.	0.752	<0.001
	31	I investigate extraordinary physical signs or symptoms when they occur.	0.708	<0.001
	32	Every night I have 7 hours or more of quality sleep.	0.551	<0.001
	29	I can do my activities in daily life and I can work.	0.775	<0.001
	21	I drink 6-8 glasses of water per day.	0.572	<0.001
Nutrition	24	I preserve my weight at what I think is my ideal weight.	0.514	<0.001
	22	I consume healthy foods (e.g., whole, unprocessed, organic).	0.846	<0.001
	23	I eat with awareness (focus on food and am not busy with other thigs or I don't eat in front of the television).	0.698	<0.001
	20	I eat at least 5 portions of fruit and vegetables per day.	0.523	<0.005
Exercise	18	I do muscle strengthening activities for all major muscle groups (legs, back, trunk, shoulders, arms) on 2 or more days per week (e.g., free weights, machines, resistance bands, body weight exercises or lifting heavy loads).	0.820	<0.001
	19	I perform moderate intensity aerobic activity for at least 150 minutes (2 hours and 30 minutes) at least once per week (e.g., fast walking or any activity that requires heavier breathing with increased heart rate).	0.775	<0.001
	17	I do stretching or flexibility activities on 2 or more days per week.	0.931	<0.001

Spiritual	9	I spend time on affirmations, prayer and meditation.	0.682	<0.001
	8	I feel linked to a higher power.	0.725	<0.001
	2	I use daily strategies to manage stress (like breathing, stretching, relaxation, meditation and daydreaming).	0.676	<0.001
Avoiding harmful habits	28	I have no addiction to any substance or behavior (alcohol, nicotine, drugs, sex, food, gambling, shopping, exercise, internet).	0.766	<0.001
	30	I avoid smoking, using electronic cigarettes or inhaling harmful substances into my lungs.	0.636	<0.001

The model fit indexes for CFA for X^2/df, RMSEA, CFI, TLI, NFI, GFI and AGFI show perfect fit and the construct validity for the Integrated Health and Wellness Assessment was confirmed (Table 4). Table 4 gives the goodness of fit indexes for the CFA findings from the scale. The calculated x^2/SD ratio was 1.109841, which is below 2. All the GFI=0.983, CFI=1, AGFI=0.980, TLI=1, and NNFI=1 index results obtained as a result of CFA for the 6-factor scale were above 0.9. RMSEA=0.018 is below 0.05.

Table 4: Goodness of fit indexes for CFA results

X^2	SD	(x2/SD)	GFI	CFI	AGFI	TLI	NNFI	RMSEA
465.023	419	1.109841	0.983	1	0.980	1	1	0.018

3.3. Reliability

According to the reliability analysis, all items had positive corrected item-total correlations, and while the removal of two specific items (item2, iem 21) led to a minor increase in Cronbach's alpha values, this increase was deemed negligible. Given the already high reliability coefficients and to preserve the coherence and integrity of the scale, no items were removed (Table 5). In our study, the Cronbach alpha reliability coefficient value were calculated to assess the internal consistency reliability of the scale and the internal consistency coefficient was α=0.946 for the whole scale. For the emotional awareness dimension, these values were α=0.916, for health responsibility α=0,898, for nutrition α=0.772, for exercise α=0.876, for stress/spiritual α=0.762, and for avoiding harmful habits α=0.715 (Table 5).

Table 5: Descriptive statistics and reliability analysis results

Item	Scale dimension	Mean ± SD	Corrected item correlation	Alpha when item removed	Alpha
15	Emotional awareness	4.085±0.956	0.728	0.907	0.916
6		3.948±0.973	0.707	0.908	
14		3.765±1.008	0.674	0.910	
5		3.660±0.981	0.732	0.907	
12		3.520±1.058	0.712	0.908	
4		3.437±1.089	0.700	0.909	
13		3.454±1.068	0.742	0.906	
1		3.668±0.947	0.711	0.908	
11		3.677±0.976	0.726	0.907	
3		3.460±1.09	0.671	0.910	
16		3.194±1.058	0.698	0.908	

34	Health responsibility	3.740±1.098	0.824	0.877	0.898
33		3.360±1.298	0.737	0.885	
35		3.325±1.188	0.845	0.874	
36		3.817±1.102	0.763	0.883	
31		3.608±1.111	0.757	0.882	
32		3.148±1.22	0.617	0.895	
29		3.614±1.113	0.718	0.886	
21		3.637±1.249	0.559	0.900	
24	Nutrition	2.894±1.310	0.585	0.757	0.772
22		3.311±1.05	0.770	0.672	
23		3.088±1.192	0.720	0.690	
20		2.420±1.888	0.583	0.751	
18	Exercise	2.400±1.345	0.876	0.774	0.876
19		2.608±1.357	0.772	0.860	
17		2.688±1.340	0.804	0.838	
9	Spiritual	3.812±1.027	0.691	0.647	0.762
8		4.114±0.964	0.685	0.661	
2		3.266±1.106	0.528	0.830	
28	Avoiding harmful habits	3.645±1.523	3.645	0.565	0.715
30		3.702±1.499	3.702	0.548	

SD: Standard deviation, alpha: Cronbach alpha reliability coefficient.

Discussion

In this study, validity and reliability studies were performed for Turkish culture for the short-form 36-item Integrated Health and Wellness Assessment was developed by McElligott et al. (10).

Before suggesting that a new scale is ready to collect data, a pilot study should be performed. It is necessary to perform the pilot application with a group with the same features as the sample (29). In line with this information, interviews were held with 30 participants with the same features (in terms age and gender) as the target group, who voluntarily accepted participation in the research. As a result of the pilot application, there was no item which could not be understood, so scope validity was ensured without changing any of the scale items.

With the aim of determining the construct validity, data were divided in two (50:50 ratio) and EFA and CFA were performed (9). In the study, EFA was first conducted to evaluate the construct validity of the scale, followed by CFA to test the validity of the confirmed factor structure. With the aim of determining the suitability of data for factor analysis, the KMO and Bartlett tests were used. If the KMO value is above 0.60 and the Bartlett test is significant, the data is suitable for factor analysis (30). According to the KMO sample suitability value of 0.936 and the Bartlett sphericity test, there was a statistically significant correlation structure between the items and the data were suitable for factor analysis.

The six factors obtained according to Horn's parallel method explained 64.929% of the total variance. As this rate was above 50%, it indicates the EFA results are adequate (31). This rate shows that the scale items can be accepted as they are within the expected explanation percentage rates. As a result of EFA, the difference between factor loads was smaller than 0.15, so there was no cross-load problem in the final EFA results (32). The communality values for all items were above 0.40. When the EFA results are assessed in general, it was concluded that the scale items can be collected accurately in statistical terms in six subscales. Items with item-total correlations of 0.40 and above show that they are able to measure the

desired feature (27). The factor loads for the scale, targeted for development, were higher than 0.40, which indicates it is able to measure the feature of the subscale in which the items are included.

When CFA is performed, it is recommended to examine several goodness of fit indexes, factor loads, and t statistics and then create a path diagram. When goodness of fit indexes are investigated, X^2/df, CFI, GFI, AGFI, TLI, NNF and RMSEA should be at the desired levels. X^2/df criterion of 3 or less, CFI criterion of 0.95 and above, NFI criterion of 0.95 and above, GFI, AGFI and TLI criteria of 0.90 and above, and RMSEA criterion of 0.05 or less are assessed as perfect fit (33, 34). When the path diagram is investigated, the 31-item and 6-subdimension scale structure had good fit.

Reliability shows a scale makes accurate measurements without errors (33). In this study, to measure internal consistency in the reliability analysis, the Cronbach alpha and omega coefficient methods were used. In adaptation studies for Likert-type scales, the Cronbach alpha coefficient is frequently used to determine the homogeneity of the scale and all subdimensions of the scale (35). In scales with multiple factors, it is recommended to calculate the omega reliability coefficient as an alternative to the Cronbach alpha values (36). The Cronbach alpha (α) coefficient values are assessed as not reliable from 0.00-0.40, low reliability from 0.40-0.60, very reliable from 0.60-0.80 and high degree of reliability for 0.80-1.00 (36, 37). In line with this information, the Cronbach alpha coefficients for the scale subdimensions were from 0.715 to 0.916. Thus, the Cronbach alpha coefficients for the IHWA were above 0.80 indicating high degree of reliability and the Cronbach alpha and omega coefficients for the subdimensions of the scale were above 0.60 indicating a very reliable scale.

When the Cronbach alpha values for the scale subdimensions are examined, the values were α=0.916 for emotional awareness related to integrative health and wellness, α=0.898 for health responsibility, α=0.772 for nutrition, α=0.876 for exercise, α=0.762 for spiritual and α=0.715 for avoiding harmful habits. Generally if the Cronbach alpha coefficient is 0.65 and above, it is accepted as sufficient (38, 39).

In our study, the original scale was adapted to Turkish society with different item and subdimension numbers. The items were collected in factor 1 emotional awareness (items 15, 6, 14, 5, 12, 4, 13, 1, 11, 3, 16), factor 2 health responsibility (items 34, 33, 35, 36, 31, 32, 29,21), factor 3 nutrition (items 24, 22, 23, 20), factor 4 exercise (items 18, 19, 17), factor 5 spiritual (items 9, 8, 2) and factor 6 avoiding harmful habits (items 28, 30). The subdimensions were renamed by paying attention to the items included in them.

Conclusions

In conclusion, the results of this study aiming to adapt the Integrative Health and Wellness Assessment for Turkish society determined that the Turkish version of the Integrative Health and Wellness Assessment was a valid and reliable scale containing 31 items in 6 subdimensions. This scale, adapted for Turkish adult individuals, may be an important assessment tool providing information about their health and wellness. The scale is specifically designed for use with adult individuals and is thought to be particularly beneficial for nurses, nurse coaches, and postgraduate students in nursing. In line with the results of the research, researchers planning studies related to the topic are recommended to perform studies with larger and more diverse sample groups (e.g., individuals with chronic diseases, students, health employees, etc.) and compare these findings with the research results. Additionally, repeating the study with a broader age range and more homogeneous sociodemographic groups is suggested to further evaluate the scale's generalizability and applicability across different populations

Limitations of the Study

The limitations of the study include the fact that the majority of the respondents were young and the sociodemographic characteristics were heterogeneous.

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Examining adolescents' perception of social stigma related to COVID-19 according to their personality types

Ergenlerin kişilik tiplerine göre COVID-19 ile ilişkili sosyal damgalama algısının incelenmesi

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Abstract

The aim of this study is to examine the level of adolescents' perceptions of social stigma associated with COVID-19 in terms of personality types and some demographic variables.1248 students from three high school in a province in Turkey included in the study. In this cross-sectional design study, demographic characteristics questionnaire, items related to COVID-19 social stigma, and Ten-Item Personality Scale were used for data collection. Shapiro Wilk test, Student t test, Chi-Square test and Spearman correlation analysis were conducted to determine associations between social stigma perceptions and demographic variables and personality characteristics. In this study, 37.9% of participants reported experiencing social stigma related to COVID-19. It has been determined that there is a relationship between demographic variables, personality types and perceptions of social stigma associated with COVID-19. Additionally, a positive and significant relationship was found between COVID-19 Social Stigma and Openness to Experience and Emotional Balance scores. In this study, it was found that adolescents who are open to experience and emotionally stable have a higher perception of social stigma related to COVID-19. Our results showed the necessity of interventions aimed at adolescents' expression of their emotions and the negative effects of stigma.

Keywords: Adolescent, perception, COVID-19, personality, social stigma

Özet

Bu çalışmanın amacı; ergenlerin COVID-19 ile ilişkili sosyal damgalanma algı düzeylerinin kişilik tipleri ve bazı demografik değişkenler açısından incelemektir. Araştırmaya Türkiye'nin bir ilindeki üç lisede öğrenim gören 1248 öğrenci dahil edildi. Kesitsel tasarımlı bu çalışmada veri toplama işlemi için demografik özellikler soru formu, COVID-19 sosyal damgalanmasıyla ilişkili maddeler ve On Maddeli Kişilik Ölçeği kullanıldı. Sosyal damgalanma algıları ile demografik değişkenler ve kişilik özellikleri arasındaki ilişkileri belirlemek amacıyla Shapiro Wilk testi, Student-t testi, Ki-Kare testi ve Spearman korelasyon analizi uygulandı. Bu çalışmada katılımcıların %37,9'u COVID-19 ile ilgili sosyal damgalanma yaşadığını bildirmiştir. Demografik değişkenler ile kişilik tipleri ve COVID-19 ile ilişkili sosyal damgalanma algıları arasında bir ilişki olduğu belirlenmiştir. Ayrıca COVID-19 döneminde Sosyal Damgalama ile Deneyime Açıklık ve Duygusal Denge puanları arasında da pozitif ve anlamlı bir ilişki saptanmıştır. Bu çalışmada deneyime açık ve duygusal açıdan istikrarlı olan ergenlerin, COVID-19 ile ilgili sosyal damgalanma algısının daha yüksek olduğu saptanmıştır. Elde ettiğimiz sonuçlar ergenlerin duygularını ifade etmelerine ve damgalanmanın olumsuz etkilerine yönelik müdahalelerin gerekliliğini göstermiştir.

Anahtar Kelimeler: Adolesan, algı, COVID-19, kişilik, sosyal damgalanma

Introduction

The concept of stigma is a complex one, it can be conceptualized it as a combination of negative stereotypes, prejudices and discrimination (1). Adolescence is a time when the influence and importance of peer relationships and opinions increases significantly, making adolescents more susceptible to stigma (2). Adolescence is a time when individuals are most sensitive to stigma and most likely to develop mental disorders. In this reason, during to adolescence period recognizing variables that influence stigma can identify issues that need to be targeted and help reduce stigma in a timely and effective manner (3). Humankind has encountered outbreaks of varying prevalence and severity throughout history, such as the 1918 Spanish flu, the 1994 Indian plague, the 2003 SARS outbreak, and the 2009 Mexican H1N1 pandemic. During these outbreaks, individuals were discriminated against, labeled, and/or experienced a loss of status due to a perceived connection with the respective diseases (4, 5). COVID-19 outbreak, which surfaced at the end of 2019, had both physical and psychosocial impacts on individuals. The rapid spread of misinformation and rumors, even faster than the outbreak itself, led to detrimental effects, including social stigmatization (6). One of the most prevalent psychosocial issues during pandemics or outbreaks is social stigma, which induces widespread fear and dehumanizes individuals affected by the disease (7, 8). Individuals facing this stigma have encountered diminished psychological well-being, a lower quality of life, heightened socioeconomic burdens, harassment, violence, bullying, disability, shame, and feelings of self-doubt. The prevailing negative sentiments, stereotypes, and assumptions have discouraged them from adopting healthy behaviors (9). The measures implemented in response to the outbreak, such as social distancing, the use of personal protective equipment (such as glasses and masks), and travel restrictions, have contributed to a sense of 'othering' among individuals (10). The perception of social stigma varies from person to person, and this difference can be attributed to personality factors. The factors of personality is influenced by both hereditary and environmental factors (11). Personality refers to the traits that encompass the psychological processes of individuals, including their feelings, thoughts, and behaviors (11) as well as the impact of various reactions and attitudes that have formed as a reflection of their personalities (12). There are numerous models that are used to describe personality. One of them is the five-factor personality model with the dimensions of openness to experience, conscientiousness, extraversion, agreeableness and emotional stability (13).

One of the groups most affected by environmental and biological variables in the formation of personality is adolescents. They are easily influenced by their social environment and peers and have a high tendency to risk taking behavior and dysfunctional mental health, and they are vulnerable to danger due to these characteristics. Also they are one of the priority risks group that posed a risk to public health due to their strong social ties and difficulties in adapting to the implementation of isolation measures (14). The psychological needs of adolescents who are at high risk of transmitting infections in outbreaks have been ignored in most countries (15). So the lack of information on personal and sociodemographic variables associated with stigma and pandemics on adolescents, we examined the relationship between their some demographic variables and personality types during COVID-19.

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Material and Method

This cross-sectional study was conducted with high school students in a western province of Turkey from January to June 2022. The inclusion criteria for the study required participants to be enrolled in a high school located in the city center of Eskisehir, aged between 14-18, willing to volunteer, without any chronic illness, and not diagnosed with a psychiatric condition.

The study encompassed high school students in the city center, comprising 33,080 students across 88 high schools. The sample size for this study was calculated as minimum 960 using Minitab 16.0 statistical package program (Power of test: 0.796, p=0.50, Comparison p:0.25, Alpha=0.05). Employing the cluster sampling method with a design effect of 2 to mitigate pattern effects, the target sample size for representative results was set at 1920. Each school was treated as a cluster, and a randomization method was employed to select schools until the target sample size was reached. A total of 1890 students from Sehit Hasan Onal Vocational and Technical Anatolian High School (n=380), Beyhan Rifat Cikillioglu Anatolian High School (n=840) and Odunpazari Mustafa Kemal Ataturk Vocational and Technical Anatolian High School (n=670). Written consent was obtained from participants by providing information about the study's purpose during designated lesson times, resulting in the participation of 1248 students (66.03%). Data collection utilized a questionnaire comprising three parts. The first part encompassed demographic characteristics of the students and details related to COVID-19 infection. The second part included questions assessing the level of social stigma related to the COVID-19 disease, while the third part incorporated the 'Ten-item Personality Type Scale. In the scoring of the second part "1 point" was given to each "yes" answer. The points obtained from the questionnaire varied between 0-20. The DUMMY variable with a mean of 0.0001 and a standard deviation of 0.00001 was derived, which showed a normal distribution in accordance with the data. The students were divided into 2 clusters by K-Means cluster analysis due to their knowledge scores. Then, the scores were evaluated by ROC analysis. Positive likelihood ratio (sensitivity/1-specificity) was used to determine the cut-off score (sensitivity = 0.457 and 1-specificity=0.396) (16). The scores 4.5 and above were considered as "social stigmatized". The third part consisted of "Ten-item Personality Inventory (TIPI)". TIPI was developed by Gosling et al. (2003) and the Turkish validity and reliability study was conducted by Atak in 2013. The scale consisted of 5 sub-dimensions (E–Extraversion, A–Agreeableness, C–Conscientiousness, ES–Emotional Stability, and O–Openness to Experience). Questions 5 and 10 pertained to Openness to Experience, questions 3 and 8 to Conscientiousness, questions 1 and 6 to Extraversion, questions 2 and 7 to Agreeableness, and questions 4 and 9 to Emotional Stability (17, 18). The dominant personality trait was determined by evaluating the scores from each sub-dimension. In the analyses, only the total scores of the sub-dimensions were calculated, with the highest score indicating the dominant personality trait. Questionnaire was filled in 15-20 minutes. We express our gratitude to the participants and their families for granting permission.

Data were evaluated with Minitab and SPSS (version 15.0) Statistical Package programs. The conformity of the data to the normal distribution was evaluated using the Shapiro Wilk test. Student t test, Chi-Square test, Spearman correlation analysis were used for statistical analysis. $p<0.05$ was accepted as statistical significance.

For this study, ethical committee approval has been taken with decision date 2/17/2022 decision number: 45 from University of Eskisehir Osmangazi.

Results

In our study, 37.9% of adolescents experienced social stigma associated with COVID-19, while 62.1% did not. The age of the study group ranged from 14 to 18, with a mean of 15.57±1.43. Among the participants, 902 (72.3%) were women, and 431 (34.5%) were in the 9th grade. The income status of 946 participants (75.8%) was moderate. Among the students, 731 (58.6%) had mothers who were primary-secondary school graduates, while 47.9% had fathers with a high school education. Additionally, there were 102 individuals in their families diagnosed with psychiatric illness (Table

1). Previous COVID-19 infection, 63.5% reported that at least one person in their family had been in contact with COVID-19, and 77.9% had been quarantined due to COVID-19 (Table 2).

Table 1: Demographic characteristics of the adolescents

Parameters	COVID-19 Social Stigma			
	Yes n(%)	No n(%)	Total n(%)	X^2/p
Age group(year)				
≥14	203(61.0)	203(39.0)	333(26.7)	1.153/0.562
15-16	194(38.9)	305(61.1)	499(40.0)	
≤17	267(64.2)	149(35.8)	416(33.3)	
Gender				
Female	338(37.5)	564(62.5)	902(72.3)	0.254/0.615
Male	135(39)	211(61.0)	346(27.7)	
Education/grade				
9th grade	161(37.4)	270(62.6)	431(34.5)	1.192/0.755
10th grade	124(39.6)	189(60.4)	313(25.1)	
11th grade	131(38.5)	209(61.5)	340(27.2)	
12th grade	57(34.8)	107(65.2)	164(13.1)	
Income status				
High	99(37.4)	166(62.6)	265(21.2)	0.181/0.914
Middle	585(61.8)	361(38.2)	946(75.8)	
Low	13(35.1)	24(64.9)	37(3.0)	
Mother's graduate				
Illiterate	13(35.1)	24(64.9)	37(3.0)	1.633/0.652
Primary	269(36.8)	462(63.2)	731(58.6)	
High school	169(39.3)	261(60.7)	430(34.5)	
University	22(44)	28(56)	50(4.0)	
Father's graduate				
Illiterate	11(35.5)	20(65.5)	31(2.5)	1.216/0.749
Primary	181(36.4)	316(63.6)	497(39.8)	
High school	236(39.5)	362(60.5)	598(47.9)	
University	45(36.9)	77(63.1)	122(9.8)	
Working mum				
Yes	154(38.5)	246(61.5)	400(32.1)	0.90/0.764
No	319(37.6)	529(62.4)	800(67.9)	
Working dad				
Yes	422(38.4)	676(61.6)	1098(88.0)	1.102/0.294
No	99(66.0)	51(34.0)	150(12.0)	
Psychiatric illness in the family				
Yes	52(43.3)	68(56.7)	120(9.6)	1.665/0.197
No	421(37.3)	707(62.7)	1128(90.4)	

Table 2: Other demographic characteristics of the adolescents

Parameters	Social Stigma Associated with COVID-19			
	Yes n(%)	No n(%)	Total n(%)	X^2/p
Chronic illness				
Yes	49(10.4)	91(11.7)	140(11.2)	0.564/0.453
No	424(38.3)	684(61.7)	1108(88.8)	
Having COVID-19 before				
Yes	204(36.8)	350(63.2)	554(44.4)	0.491/0.483
No	269(38.8)	425(61.2)	694(55.6)	
Contact with COVID-19				
Yes	376(38.7)	596(61.3)	972(77.9)	1.143/0.285
No	97(35.1)	179(64.9)	276(22.1)	
Death in family after contracting COVID-19				
Yes	105(37.9)	172(62.1)	277(22.2)	1.126/0.956
No	368(37.9)	603(62.1)	971(77.8)	
Physically disabled				
Yes	8(36.4)	14(63.6)	22(1.8)	0.022/0.881
No	465(37.9)	761(62.1)	1226(98.2)	
Total	**473(37.9)**	**775(62.1)**	**1248(100)**	

Of the participants, 77.6% answered 'yes' to the sixth question ('If I have COVID-19, it would be thought that I will transmit it to others'). This question had the highest rate of affirmative responses (Table 3). In the study, the mean scores of TIPI and its sub-dimensions were analyzed. A statistically significant difference was found between the mean score of Openness to Experience and COVID-19 Social Stigma ($p<.05$). The mean score of Openness to experience was 8.29±3.06 and Conscientiousness was 8.84±3.03. The correlation analysis of the COVID-19 Social Stigma and TIPI Scale sub-dimensions were conducted. There was a positive and significant relationship between the COVID-19 total score and the Openness to Experience and Emotional Stability ($p<0.05$) (Table 4).

Table 3: The responses of the students to the Items about social stigma associated with COVID-19

Items about Social Stigma Associated with COVID-19	Yes n(%)		No n(%)	
I hesitate to go to the hospital because of COVID-19 disease.	224	17.9	1024	82.1
If I have COVID-19, I want to hide it from others.	60	4.8	1188	95.2
If I am diagnosed with COVID-19, it is thought that my relatives got the disease.	881	70.6	367	29.4
I hesitate people around me to know that I have friendships with people who had threated for COVID-19.	106	8.5	1142	91.5
If I have COVID-19, I do not want to go to the crowded places for a long time because I'm uncomfortable with the way people look at me.	275	22.0	973	78.0
If I have COVID-19, it would be thought that I will contract it to the others.	968	77.6	280	22.4

I don't want to tell people that I have COVID-19 to avoid negative reactions.	81	6.5	1167	93.5
The looks of my neighbors and friends bother me because of having COVID-19.	228	18.3	1020	81.7
If I have COVID-19, some people think I'm not adapting protective measures.	526	42.1	722	57.9
If I have COVID-19, some people think I'm irresponsible towards the community.	347	27.8	901	72.2
I am ashamed of what people would think if I need treatment for COVID-19.	173	13.9	1075	86.1
If I haveCOVID-19, I would be discriminated by my friends.	82	6.6	1166	93.4
I am ashamed to be as risky in “HES code” interms of COVID-19.	79	6.3	1169	93.7
If I have COVID-19, I would be discriminated socially.	202	16.2	1046	83.8
If I have COVID-19, people thinkthat’s my fault.	463	37.1	785	62.9
If I have COVID-19, I think I would be denied by others (eg.friend, colleague, darling or couple)	98	7.9	1150	92.1
If I do not adapt protective measures, people would think that I am not reliable.	206	16.5	1042	83.5
If I have COVID-19, people expectless responsibility of me.	177	14.2	1071	85.8
If I have COVID-19, it would be thought that I am an gerious and want to hurt people around me.	77	6.2	1171	93.8
If I have COVID-19, it would be thought that I am a burden to the community.	129	10.3	1119	89.7

**HES code: is a code that identified people with high risk of COVID-19 infection.*

Table 4: Comparisoning dimensions of personality with social stigma associated with COVID-19

Sub-dimensions	**Social stigma Associated with COVID-19**		
	Yes Mean±SD	**No Mean±SD**	**t test/p**
Openness to experience	8.29±3.06	7.63±2.67	**3.699/<0.001**
Conscientiousness	8.84±3.03	8.70±2.92	0.875/0.382
Extraversion	8.30±2.53	8.39±2.36	0.339/0.714
Agreeableness	8.67±2.96	8.63±2.82	0.249/0.803
Neuroticism	8.99±3.13	8.94±2.99	0.433/0.665

Discussion

The pandemic adversely impacted not only the physical health but also the sociological and psychological well-being of individuals (19). One of matter the negatively affect the emotional, mental, and physical health of individuals is social stigma (20). In the study, four out of ten adolescents had COVID-19 infection, seven out of ten had at least one family contact, and three out of ten were social stigmatized associated with COVID-19. Also adolescents who have the personality trait of openness to experience had more social stigma.

It has been noted in the literature that adolescents are more likely than other age groups to contribute to the spread of COVID-19 (21). In our study, 44.4% of the participants had a confirmed COVID-19 infection, 63.5% reported having at least one family member who had contact with COVID-19, and 77.9% acknowledged being in contact themselves. Socialization and peer influence are very important in adolescence and their risk perception is quite low (22). These reasons may have contributed to the spread of the COVID-19 outbreak through adolescents. The exposure to infection, contact with infected individuals, and the experience of isolation, along with facing social stigmatization due to the psychological burdens of having relatives who died after contracting COVID-19, have collectively impacted the quality of life for individuals (23). In our study, 473 (37.9%) of adolescents reported experiencing social stigma associated with COVID-19. The global frequency of people experiencing social stigma is reported to range from 15.9% to 40.90% (23-25). Social stigma and discrimination are the factors affecting people's mental health in the COVID-19 outbreak (26). The social, economic and educational differences could be the main factors affecting the formation of social stigma. It was reported in other studies that individuals under 20 years of age with little symptoms of COVID-19 had a lower level of social stigma perception, while individuals over 65 years of age had higher (27). We found in our study that age did not impact the perception of social stigma. As similarity Duan, Bu and Chen (2020) reported age was not a risk factor for social stigma. Zhang et al (2021) stated that young participants were less likely to approve of social stigmatizing. Erdogan and Ersoy (2022) reported that age was a variable that affected social stigma perceptions. Our findings have shown that there was no statistical difference between gender. As similarity Erdogan and Ersoy (2022) reported that gender was not variable that affected social stigma perceptions. In our study, the difference between education, income status and social stigma was not found to be significant. In our study, no statistical difference was found between the educational status of the mothers, and fathers, having a job, having psychiatric illness in the family and social stigma. It could be explaining that our study group consisted of young participants under the age of 18 with low risk perception. They were generation z, which constituted the under-18 group known as digital natives, and is result-oriented. What matters to them is how much exposure they are to the events (28).

For infectious diseases, early diagnosis, treatment opportunities and taking necessary preventive measures are effective ways to control hereby the contagiousness would be reduced. On the other hand, although social distancing is an effective way to reduce morbidity and mortality, it may increase the Social stigma towards affected populations unintentionally (29, 30). In our study, 77.6% of the participants answered yes to the statement "If I have COVID-19, it is thought that I will contact it to the others". This meant negative thoughts or behaviors caused by being labeled or marginalized by others were about to happen. Our study supported the findings of Zhang et al. (2021). They reported that individuals who had COVID-19 were held more responsible for contagiousness and spread of the disease (24). Outbreaks such as COVID-19 are known to increase fear of infection and social stigma and discrimination against people as they spread around the world (31). In light of our findings, we can say that the adolescents in our study group also experienced similar threats.

Another aim of this study was to determine whether there was a relationship between social stigma and personality types. Because social stigmatization could be shaped with personal characteristics. In our study, there was a statistically significant difference between having the personality type of openness to experience and COVID-19 social stigma. Considering that individuals with openness to experience were developed in terms of imagination, emotionality and curiosity, the high levels of social stigmatization associated with COVID-19 were expected. In the study as the perception of COVID-19 social stigma increased, the score of openness to experience also increased. A similar finding was also valid for the emotional stability. It defined individuals as calm, self-confident, or live to the extremes, angry, depressed and insecure. Uncertainties and unknowns of

the infection threatened the safety of individuals. The findings we obtained might be similar to the characteristics of personality types. Also it might have caused COVID-19 to be perceived as a threat and the social stigmatization score to be high for individuals who were predominate emotionally. Our findings were in line with Smith, Zhu and Fink (2017) (32). In addition, there are also studies supporting our findings that people who feel angry, wrathful or desperate were more likely to perceive social stigmatizing ideas (24).

The limitation of this study is that the calculated sample could not be reached. Another limitation is the expected seasonal feature that adolescents experience in expressing their emotions. Our study was conducted for an age group within 14-18. It may be evaluated for other ages such as younger than 14, too.

Conclusion

In our study, we aimed to evaluate the level of social stigma of adolescents who are the target group in terms of social stigmatization during the COVID-19 outbreak. As far as we know, there is no other study in the literature examining the relationship between social stigma and epidemics in the 14-18 age group. So our study is a unique study due to the sample group and the absence of an example in the literature. Although the level of exposure of adolescence to disease was low, their potential for social stigmatization was high and they should be informed in this regard. Adopting effective, practical measures for adolescents can help to keep themselves and their loved ones. Also talking about “acquiring” or “contracting” COVID-19, not talking about “transmitting COVID-19” “infecting others” or “spreading the virus” were recommended as it implies intentional transmission and assigns blame. And communication with adolescents by sharing sympathetic narratives that humanize the experiences and struggles of individuals or groups affected by the virus because the way we communicate can affect the attitudes and perceptions of the others.

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Evaluation of musculoskeletal system in caregivers of rehabilitation patients: A cross-sectional study

Rehabilitasyon hastalarının bakımverenlerinde kas-iskelet sisteminin değerlendirilmesi: Kesitsel bir çalışma

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Abstract

Musculoskeletal health is an important component of physical health. It was aimed to assess the musculoskeletal system involvement, fatigue, and quality of life among caregivers of various patient groups in this study. The study comprised 55 caregivers, consisting of 37 female and 18 male, with an average age of 41.24±12.25 years. The individuals' musculoskeletal, neck, and low back pains, musculoskeletal discomfort, posture, spinal functionality, low back disability, neck disability, fatigue, and quality of life were assessed using the Numeric Rating Scale, Cornell Musculoskeletal Discomfort Questionnaire, New York Posture Rating Scale, Spine Functional Index, Oswestry Disability Index, Bournemouth Questionnaire, Fatigue Severity Scale, and Short Form-36 questionnaires, respectively. All parameters evaluated were similar among caregivers of orthopedic, pediatric, and neurological patients (p>0.05). Significant correlations were observed among the parameters of musculoskeletal pain, neck pain, low back pain, musculoskeletal discomfort, posture, spinal functionality, neck and low back disability and fatigue severity in individuals (from -0.267 to 0.754). Additionally, significant correlations were found between the subscales of SF-36 and these parameters, ranging from -0.273 to 0.754. The musculoskeletal system is affected in all caregivers, and caregivers across different patient groups exhibit similar effects.

Keywords: Caregiver, low back, musculoskeletal, neck, pain

Özet

Kas-iskelet sağlığı, fiziksel sağlığın önemli bir bileşenidir. Bu çalışmada çeşitli hasta gruplarının bakımverenlerinde kas-iskelet sistemi katılımını, yorgunluk ve yaşam kalitesini değerlendirmek amaçlandı. Çalışmaya yaş ortalaması 41,24±12,25 yıl olan 37 kadın ve 18 erkekten oluşan toplam 55 bakımveren dahil edilmiştir. Bireylerin kas-iskelet, boyun ve bel ağrıları, kas-iskelet rahatsızlığı, postür, omurga fonksiyonelliği, bel sakatlığı, boyun sakatlığı, yorgunluk ve yaşam kalitesi sırasıyla Sayısal Derecelendirme Ölçeği, Cornell Kas-İskelet Rahatsızlığı Anketi, New York Postür Derecelendirme Ölçeği, Omurga Fonksiyon İndeksi, Oswestry Sakatlık İndeksi, Bournemouth Anketi, Yorgunluk Şiddeti Ölçeği ve Kısa Form-36 anketleri kullanılarak değerlendirildi. Değerlendirilen tüm parametreler, ortopedik, pediatrik ve nörolojik hastaların bakımverenleri arasında benzerdi (p>0,05). Bireylerde kas-iskelet ağrısı, boyun ağrısı, bel ağrısı, kas-iskelet rahatsızlığı, postür, omurga fonksiyonelliği, boyun ve bel sakatlığı ve yorgunluk şiddeti parametreleri arasında anlamlı korelasyonlar gözlendi (-0,267 ila 0,754 aralığında). Ayrıca, Kısa Form-36 alt ölçekleri ile bu parametreler arasında -0,273 ila 0,754 aralığında anlamlı korelasyonlar bulundu. Kas-iskelet sistemi tüm bakımverenlerde etkilenmiştir ve farklı hasta gruplarının bakımverenleri benzer etkiler sergilemektedir.

Anahtar Kelimeler: Bakımveren, bel, kas-iskelet, boyun, ağrı

Introduction

The care provided by caregivers can delay or prevent hospitalization (1), reduce the length of stay in the hospital (2), and reduce expenditure on inpatient and long-term care services (3). Nevertheless, it has been demonstrated that delivering thorough care impacts the physical and psychological well-being of caregivers. Unpaid caregivers might experience worse mental health compared to those who are not caregivers (4). In addition, their physical health may be worse (5), they may exhibit unhealthy behaviors (6), and they may experience higher morbidity and mortality compared to non-caregivers (7). It should not be surprising that the decrease in the physical health of the caregiver is an indicator of discontinuation (8).

Musculoskeletal health is essential for maintaining overall physical well-being. Research shows that caregivers might be prone to musculoskeletal symptoms and injuries, possibly due to the physical demands of caregiving. In a study of unpaid caregivers in rural regions, participants reported physical challenges like fatigue, back pain, and headaches associated with caregiving duties (9). Among unpaid caregivers of adults with multiple sclerosis, 31% experienced physical injuries, while 49% reported physical exhaustion due to caregiving (10). Research on unpaid caregivers of paralyzed veterans found that 24% sustained injuries during care, and 30% encountered issues such as muscle strains and bruising (11).

While numerous studies have investigated musculoskeletal disorders, their prevalence, and the affected disease groups among unpaid caregivers from various perspectives (10, 12–16), there is limited research that thoroughly assesses the musculoskeletal system and examines the specific musculoskeletal characteristics of caregivers of rehabilitation patients. Consequently, this study 1) hypothesized that caregivers are notably affected by musculoskeletal issues, and 2) explored whether caregivers of different patient groups experience varying levels of impact.

Material and Method

Individuals

This study was designed as a cross-sectional and descriptive study, aiming to evaluate the musculoskeletal health, fatigue, and quality of life of caregivers of individuals with orthopedic, pediatric, and neurological conditions. Due to the cross-sectional nature of the study, causal relationships between the variables cannot be established, and the findings are intended to provide a descriptive analysis of the parameters evaluated. The data for this study were collected using a structured questionnaire over a six-month period between May 2, 2023, and November 2, 2023. This timeframe included spring, summer, and fall seasons in Turkey, which could potentially introduce seasonal variability in caregiving activities or caregivers' musculoskeletal health, fatigue, and quality of life. For example, increased physical activity during warmer months or environmental factors such as temperature and daylight duration might have influenced the results. No specific measures were implemented to control for potential seasonal effects during the data collection phase. However, the inclusion of participants across different seasons aimed to capture a more diverse range of caregiving experiences and reduce the likelihood of bias related to a single seasonal period. Future studies could address this limitation by employing longitudinal designs or by analyzing seasonal effects more explicitly.

Post-hoc power analysis was performed using G*Power (version 3.1.9.7), with

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the effect size evaluated through the Modified Oswestry Disability Index in caregivers. According to the analysis, when the statistical significance of the two-way hypothesis test alpha was taken as 5% and the confidence interval was 95%, the effect size was found to be Modified Oswestry Disability Index and the power of the study (1-β) was found to be 86%. Fifty-five volunteer caregivers participated in the research. The inclusion criteria were: (1) being a family member of the individual they care for (e.g., child, mother, or father), (2) having no physical disabilities, and (3) the ability to understand and complete the questionnaire. Exclusion criteria included individuals under the age of 18, those with a physician-diagnosed history of mental illness or symptoms, and non-family caregivers.

This study's target population consisted of family caregivers providing care to rehabilitation patients in Turkey. The sample was drawn using a non-probabilistic convenience sampling method, as participants were recruited based on their availability and willingness to participate. This method was chosen due to its practicality and accessibility to caregivers within the study's timeframe and resources. While this approach limits the generalizability of the findings to all caregivers, it provides valuable insights into the musculoskeletal health of this specific group.

The participants in this study were divided into three groups based on the type of patient they provided care for: orthopedic, pediatric, and neurological.

Orthopedic group: Caregivers providing care to individuals with musculoskeletal or joint disorders, such as fractures, arthritis, or post-surgical recovery.

Pediatric group: Caregivers supporting children with congenital or acquired conditions, such as cerebral palsy or developmental delays, often requiring long-term care.

Neurological group: Caregivers assisting patients with neurological conditions, such as stroke, multiple sclerosis, or spinal cord injuries.

These groups were selected due to the differing physical and psychological demands associated with caregiving in each context. Participants were recruited through rehabilitation centers and clinics specializing in these patient groups. Group-specific characteristics, such as caregiving duration and patient needs, were analyzed to identify their potential impact on caregivers' musculoskeletal health and quality of life.

All participants provided informed consent before taking part in the study. The ethical approval was obtained from the Clinical Research Ethics Committee of Tokat Gaziosmanpasa University (decision date and no: 13 April 2023, 93116987-271). The study is available on ClinicalTrials.gov (NCT05839795).

Outcome measures

Data for the study were collected with data tools that could be filled in by individuals themselves. In this study, the dependent variables included musculoskeletal-related pain, posture, spinal functionality, low back disability, neck disability, musculoskeletal discomfort, fatigue severity, and quality of life. These variables were assessed using validated scales as described below.

The independent variables were demographic and caregiving-related characteristics, such as age, gender, body mass index (BMI), caregiving duration, patient disease group (orthopedic, pediatric, or neurological), smoking, and alcohol use. These were analyzed to examine their relationship with the dependent variables and identify potential predictors of musculoskeletal system involvement and quality of life among caregivers.

After questioning the sociodemographic information of the individuals, they were asked to fill in the following outcome measures:

Numeric Pain Rating Scale (NPRS): Musculoskeletal-related pain was evaluated using the NPRS, which ranges from 0 (no pain) to 10 (worst possible pain). The score reflects the value reported by the participant on the scale (17).

New York Posture Rating Chart (NPRC): The NPRC, established in 1958, was used to assess individual posture. This scale evaluates body alignment in the anatomical position by dividing the body into 13 segments and permitting assessment from two viewpoints: anterior and lateral. Scoring is based on a 1-3-5 scale, where 1 indicates severe deviation, 3 signifies minor deviation, and 5 represents correct posture. The total score ranges from 13 to 65, with higher scores reflecting better posture (18).

Spine Functional Index (SFI): The SFI is a 25-item scale developed to evaluate the impact of

spine-related symptoms on functionality. Each item is scored as 0, 0.5, or 1. The total score is expressed as a percentage, with scores closer to 100 indicating normal spinal function (19). The Turkish version of this scale has been validated and its reliability established (20).

Modified Oswestry Disability Index (MODI): The MODI includes 10 questions that address pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, travel, and changes in pain over time, with each question providing 6 response options. Participants choose the option that most accurately represents their condition, scoring between 0 and 5 points per question. The total score is presented as a percentage, where higher percentages denote greater functional limitation and lower percentages indicate better functional status (21). The Turkish version of this scale has been validated and its reliability (22).

Bournemouth Questionnaire (BQ): The BQ evaluates several dimensions related to neck pain, including severity, effects on family and social life, depression, anxiety, kinesiophobia, and pain management. It consists of 7 questions, each scored from 0 to 10 (23). The Turkish version has been validated and its reliability tested (24).

Cornell Musculoskeletal Discomfort Questionnaire (CMDQ): The CMDQ assesses musculoskeletal discomfort in 18 regions, focusing on frequency, severity, and disability (25). The Turkish version has been validated and its reliability confirmed (26).

Fatigue Severity Scale (FSS): Fatigue among caregivers was assessed using the FSS. Participants rate their level of agreement with each of the 9 items on a scale from 1 (strongly disagree) to 7 (strongly agree). The total score ranges from 9 to 63, with a score of 36 or higher indicating severe fatigue (27). The Turkish version of the scale has been validated and its reliability confirmed (28).

Short Form-36 (SF-36): The SF-36 is a commonly used generic instrument for evaluating quality of life. It encompasses 8 health dimensions through 36 items, including physical functioning, role limitations (due to physical and emotional issues), social functioning, mental health, vitality, pain, and general health perception (29). The Turkish version of the SF-36 has been validated and its reliability confirmed (30).

Statistical analysis

Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 22.0. Data were reported as mean ± standard deviation (X±SD), median, or percentage (%). The One-Sample Kolmogorov-Smirnov test was employed to determine whether data distribution was parametric or nonparametric. One-Way ANOVA was used for comparing independent groups when parametric test assumptions were satisfied, while the Kruskal-Wallis Test was applied when these assumptions were not met. Fisher's Exact Test and the Chi-Square Test were used for categorical variables. Relationships among continuous variables were evaluated using Pearson correlation analysis. Correlation coefficients were categorized as excellent (0.81–1.00), very good (0.61–0.80), good (0.41–0.60), poor (0.21–0.40), and weak (0.00–0.20) (31). Statistical significance was defined as $p < 0.05$.

Results

Fifty-five individuals with an average age of 41.24±12.25 years were included in this study. Descriptive characteristics of the individuals are listed in Table 1. There was no difference between continuous and categorical variables, except for length of caregiving. Pediatric individuals' caregiving duration was more than other groups.

Table 1: Descriptive characteristics of the individuals

Parameters	Orthopedic (n= 17)	Pediatric (n= 22)	Neurological (n= 16)	p
	Mean±SD	Mean±SD	Mean±SD	
Age (years)	41.29±12.87	39.00±10.90	44.25±13.44	0.435 [α]
Weight (kg)	71.24±12.85	72.68±11.54	72.13±11.52	0.932 [α]
Length (m)	1.70±0.08	1.63±1.10	1.66±0.05	0.054 [α]

BMI (kg/m²)	24.50±3.09	27.26±4.20	26.28±4.18	0.097 α
Caregiving duration (months)	45.53±85.42	118.95±91.91	37.00±47.36	**0.003** α
Parameters	**n (%)**	**n (%)**	**n (%)**	**p**
Gender				
Female	9 (52.9)	18 (81.8)	10 (62.5)	0.145 λ
Male	8 (47.1)	4 (18.2)	6 (37.5)	
Marital condition				
Single	6 (35.3)	2 (9.1)	2 (12.5)	0.115 §
Married	11 (64.7)	20 (90.9)	14 (87.5)	
Educational background				
Primary school	4 (23.5)	8 (36.4)	4 (25.0)	0.670 §
Middle school	3 (17.3)	2 (9.1)	2 (12.5)	
High school	9 (52.9)	10 (45.5)	5 (31.3)	
Associate degree	0 (0)	1 (4.5)	1 (6.3)	
Bachelor degree or above	1 (5.9)	1 (4.5)	4 (25.0)	
Smoking				
Yes	7 (41.2)	5 (22.7)	6 (37.5)	0.424 λ
No	10 (58.8)	17 (77.3)	10 (62.5)	
Alcohol use				
Yes	2 (11.8)	2 (9.1)	1 (6.3)	1.000 §
No	15 (88.2)	20 (90.9)	15 (93.8)	

SD: Standard deviation; α : One-Way ANOVA Test; §: Fisher's Exact Test; λ: Chi-Square Test

It is stated in Table 2 that there was no difference among the groups in terms of musculoskeletal pain, neck pain, low back pain, musculoskeletal discomfort, posture, spinal functionality, neck and low back disability, quality of life and fatigue severity scores.

Table 2: Comparison of musculoskeletal pain, neck pain, low back pain, musculoskeletal discomfort, posture, spinal functionality, neck and low back disability, quality of life and fatigue severity among groups

Parameters	**Orthopedic (n= 17)**	**Pediatric (n= 22)**	**Neurological (n= 16)**	**p**
	Mean±SD	**Mean±SD**	**Mean±SD**	
MP	3.29±2.44	2.77±2.64	3.19±2.43	0.790 α
NP	2.65±2.32	1.91±2.24	3.06±2.52	0.314 α
LBP	3.59±2.85	2.73±2.80	3.31±2.98	0.632 α
CMDQ	39.12±56.89	55.70±89.78	70.34±132.65	0.942 β
NPRS	50.94±10.00	52.45±5.12	54.19±6.86	0.613 β
SFI	74.35±20.45	76.91±19.07	70.13±25.40	0.632 α

MODI	15.18±14.27	18.00±17.09	15.33±15.96	0.822 α
BQ	12.12±13.95	13.18±12.06	15.38±13.81	0.771 α
SF-36 physical functioning	78.53±22.55	76.82±16.44	78.44±24.41	0.959 α
SF-36 role limitations from health problems	78.68±33.00	59.09±35.81	65.63±46.44	0.292 α
SF-36 role limitations from emotional problems	71.57±37.16	57.58±43.86	54.17±46.94	0.459 α
SF-36 energy/ fatigue	54.71±20.88	53.47±19.53	40.94±19.60	0.096 α
SF-36 emotional well-being	60.00±20.98	60.36±18.35	48.00±17.47	0.105 α
SF-36 social functioning	77.21±24.70	73.30±18.21	64.84±32.67	0.359 α
SF-36 bodily pain	73.82±21.98	62.16±22.14	70.16±19.33	0.224 α
SF-36 general health perceptions	60.29±18.58	63.64±18.27	56.88±25.02	0.606 α
FSS	3.79±3.59	3.35±1.90	3.51±2.70	0.971 β

SD: Standard deviation; MP: Musculoskeletal pain; NP: Neck pain; LBP: Low back pain; CMDQ; Cornell Musculoskeletal Discomfort Questionnaire; NPRS: New York Posture Rating Scale; SFI: Spine Functional Index; MODI: Modified Oswestry Disability Index; BQ: Bournemouth Questionnaire; SF-36: Short Form-36; FSS: Fatigue Severity Scale; α : One-Way ANOVA Test; β: Kruskal Wallis Test

There was a significant and poor positive correlation between musculoskeletal pain and BQ scores, as well as between low back pain and BQ scores. Conversely, there was a significant and poor negative correlation between low back pain and NPRS scores, NPRS and MODI scores, and SFI and FSS scores. Significant and strong positive correlations were observed between musculoskeletal pain and neck pain, musculoskeletal pain and low back pain, musculoskeletal pain and CMDQ, musculoskeletal pain and MODI, neck pain and low back pain, neck pain and CMDQ, neck pain and MODI, low back pain and MODI, CMDQ and MODI, CMDQ and BQ, and NPRS and SFI scores. In contrast, there were significant and strong negative correlations between musculoskeletal pain and NPRS, musculoskeletal pain and SFI, neck pain and NPRS, neck pain and SFI, low back pain and SFI, and CMDQ and SFI scores. Additionally, significant and strong positive correlations were found between neck pain and BQ, as well as MODI and BQ scores, while significant and strong negative correlations were observed between NPRS and BQ, SFI and MODI, and SFI and BQ scores (from -0.267 to 0.754) (Table 3).

Table 3: Correlation among musculoskeletal pain, neck pain, low back pain, musculoskeletal discomfort, posture, spinal functionality, neck and low back disability and fatigue severity

	NP	LBP	CMDQ	NPRS	SFI	ODI	BQ	FSS
MP	**0.505****	**0.561****	**0.454****	**-0.446****	**-0.587****	**0.478****	**0.391****	0.153
NP		**0.561****	**0.417****	**-0.562****	**-0.579****	**0.468****	**0.754****	0.145
LBP			0.100	**-0.341****	**-0.522****	**0.446****	**0.306***	0.139
CMDQ				-0.204	**-0.438****	**0.479****	**0.566****	0.185
NPRS					**0.404****	**-0.394****	**-0.608****	-0.078
SFI						**-0.674****	**-0.619****	**-0.267***
MODI							**0.603****	0.160
BQ								0.236

**p< 0.05; **p< 0.001. MP: Musculoskeletal pain; NP: Neck pain; LBP: Low back pain; CMDQ; Cornell Musculoskeletal Discomfort Questionnaire; NPRS: New York Posture Rating Scale; SFI: Spine Functional Index; MODI: Modified Oswestry Disability Index; BQ: Bournemouth Questionnaire; FSS: Fatigue Severity Scale*

A significant and poor positive correlation was observed between NPRS scores and the SF-36 subscales of physical functioning, energy/fatigue, bodily pain, and general health perceptions. In contrast, significant and poor negative correlations were found between musculoskeletal pain and role limitations; musculoskeletal pain and energy/fatigue; neck pain and the SF-36 subscales of physical functioning, role limitations from health problems, energy/fatigue, and bodily pain; CMDQ and the subscales of role limitations from health problems, role limitations from emotional problems, emotional well-being, social functioning, and general health perceptions; MODI and the subscales of energy/fatigue, emotional well-being, and social functioning; and FSS and the subscales of role limitations from health problems, role limitations from emotional problems, emotional well-being, and bodily pain.

A significant and strong positive correlation was observed between SFI and the SF-36 subscales of role limitations from health problems, role limitations from emotional problems, energy/fatigue, emotional well-being, social functioning, and bodily pain. However, significant and strong negative correlations were found between musculoskeletal pain and the SF-36 subscales of physical functioning, bodily pain, and general health perceptions; neck pain and the general health perceptions subscale; CMDQ and the subscales of physical functioning, energy/fatigue, and bodily pain; MODI and the subscales of role limitations from health problems, bodily pain, and general health perceptions; BQ and the subscales of physical functioning, role limitations from health problems, role limitations from emotional problems, energy/fatigue, emotional well-being, social functioning, and general health perceptions; and FSS and the subscales of energy/fatigue and general health perceptions.

Additionally, a significant and very strong positive correlation was observed between SFI and the SF-36 subscales of physical functioning and general health perceptions, while significant and very strong negative correlations were found between MODI and the physical functioning subscale, as well as between BQ and the bodily pain subscale. (-0.273 to 0.754) (Table 4).

Table 4: Correlation of quality of life with other parameters

	PF	RLH	RLE	EF	EW	SF	BP	GHP
MP	**-0.464****	**-0.280***	-0.160	**-0.273***	-0.231	-0.120	**-0.443***	**-0.413****
NP	**-0.386****	**-0.268***	-0.064	**-0.349****	-0.119	-0.117	**-0.382****	**-0.400****
LBP	**-0.368****	-0.233	-0.109	-0.220	-0.121	0.143	-0.218	**-0.334***
CMDQ	**-0.534****	**-0.381****	**-0.274***	**-0.432****	**-0.357****	**-0.333***	**-0.542****	**-0.354****
NPRS	**0.307***	0.245	0.223	**0.288***	0.170	0.122	**0.299***	**0.384****
SFI	**0.754****	**0.552****	**0.428****	**0.506****	**0.452****	**0.517****	**0.579****	**0.640****
MODI	**-0.609****	**-0.444****	-0.219	**-0.321***	**-0.361****	**-0.379****	**-0.549****	**-0.449****
BQ	**-0.506****	**-0.596****	**-0.419****	**-0.556****	**-0.423****	**-0.435****	**-0.606****	**-0.460****
FSS	-0.259	**-0.368****	**-0.360****	**-0.443****	**-0.294***	-0.174	**-0.330***	**-0.533****

**p< 0.05; **p< 0.001. PF: SF-36 physical functioning; RLH: SF-36 role limitations from health problems; RLE: SF-36 role limitations from emotional problems; EF: SF-36 energy/ fatigue; EW: SF-36 emotional well-being; SF: SF-36 social functioning; BP: SF-36 bodily pain; GHP: SF-36 general health perceptions; MP: Musculoskeletal pain; NP: Neck pain; LBP: Low back pain; CMDQ; Cornell Musculoskeletal Discomfort Questionnaire; NPRS: New York Posture Rating Scale; SFI: Spine Functional Index; MODI: Modified Oswestry Disability Index; BQ: Bournemouth Questionnaire; FSS: Fatigue Severity Scale*

Discussion

According to the findings of the current study, while caregivers' musculoskeletal systems and quality of life were impacted, no significant differences were observed in these parameters among caregivers of different patient groups. To the authors' knowledge, this study represents a pioneering effort in comparing the musculoskeletal system, fatigue, and quality of life among caregivers of orthopedic, pediatric, and neurological patients.

It is anticipated that caregivers of orthopedic and neurological individuals would have a shorter caregiving duration compared to caregivers of pediatric individuals. Such a difference is usual, as pediatric individuals are typically diagnosed shortly after birth, particularly in conditions such as cerebral palsy. Studies have reported a higher prevalence of low back pain among caregivers of patients with spinal cord lesions, which is linked to factors including age, gender, duration of care, smoking, and history of regular exercise (32). In the current study, it was found that musculoskeletal system, fatigue, and quality of life parameters were similar among caregiver groups, irrespective of the duration of caregiving or the specific disease group for which care was provided. The caregiving process necessitates caregivers to be physically, emotionally, and mentally energized and well. However, the chronic condition of all patients receiving care may have resulted in similar effects on all caregivers.

The musculoskeletal system components examined in caregivers consistently exhibited well correlations with each other. Although no significant relationship was found with fatigue, this may be attributed to the psychosocial aspects associated with fatigue. These observed correlations highlight the importance of considering the musculoskeletal system as a whole in caregivers' well-being. The performance of repetitive challenging daily tasks, activities involving constant bending and lifting weights, can lead to musculoskeletal disorders in various body parts. A study found that parents of disabled individuals commonly experience pain in the lumbar region (33). However, it's noteworthy that effects in one area may trigger effects in other parts of the body, resembling a chain reaction. The correlation between musculoskeletal system parameters in this study provides support for this phenomenon. In a study evaluating musculoskeletal system symptoms in caregivers of older adults, it was reported that informal caregivers had been working for longer durations, had longer working hours, had fewer opportunities for leave, and lacked caregiving guidelines. The spine was identified as the region with the highest prevalence of musculoskeletal system symptoms, and the likelihood of developing musculoskeletal symptoms increased as the dependency level of the elderly individuals rose (34). Similar to the aforementioned study, it is likely that in the current study as well, being a family caregiver brings certain disadvantages that may contribute to musculoskeletal disorders and influence the development of pain in the lower back, neck, and spine. Another study investigating the effect of a physical exercise program on preventing musculoskeletal disorders in female caregivers of dependent patients highlighted a high prevalence of musculoskeletal disorders among caregivers and reported that the exercise program was effective in reducing pain intensity, lumbar disability, and cervical disability in family caregivers (35). This supports the findings of the current study and reinforces the idea that training and policies should be developed to address potential musculoskeletal disorders among caregivers.

The musculoskeletal system problems experienced by caregivers represent a significant health concern that warrants serious attention. These issues not only hinder the caregiving process but also contribute to a decline in the caregivers' quality of life. Consequently, the quality of care provided may diminish, and caregivers themselves may eventually require care (36). The musculoskeletal system components were found to be related to the subscales of quality of life, ranging from weak to strong relationships. It is plausible that an impact on the musculoskeletal system could detrimentally affect quality of life. Given that the measurements used in the evaluation focus on the musculoskeletal system, it is likely that strong relationships were found with quality of life subscales related to physical functioning, bodily pain, and general health perceptions. A study investigating the effects of low back and neck pain on posture, burnout

levels, and quality of life among formal caregivers of children with disabilities and elderly individuals found that neck pain caused changes in spinal posture, whereas low back pain did not affect spinal posture. Additionally, both low back and neck pain were found to have a diminishing impact on quality of life (37). The duration of caregiving may be considered a factor influencing pain and posture. Therefore, unlike the current study, it could be suggested that low back pain may not have a significant impact on spinal posture. The reduction in quality of life caused by low back and neck pain is similar to the findings of the current study. In a study investigating sleep quality and fatigue among caregivers of individuals with chronic diseases, it was found that caregivers experienced poor sleep quality and moderate levels of fatigue. Additionally, no significant relationship was observed between sleep quality and fatigue (38). In this study, although fatigue did not demonstrate high correlations with musculoskeletal parameters or specific aspects of quality of life, and caregivers' fatigue levels did not reach the threshold for chronic fatigue, it is undeniable that caregivers experience significant fatigue.

The aim of this study was to comprehensively evaluate the musculoskeletal system among individuals caring for rehabilitation patients and to identify which groups of caregivers were more significantly affected. A limitation of this study is that only caregivers of individuals with orthopedic, pediatric, and neurological conditions were included. Additionally, potential confounding factors, such as the presence of chronic diseases among caregivers, were not considered. These factors could have influenced the musculoskeletal health, fatigue, and quality of life outcomes, and their exclusion represents an important limitation in interpreting the results. Further research is needed to encompass caregivers of individuals from a broader range of patient groups. The findings of this study are limited in generalizability due to the inclusion of only caregivers of individuals with orthopedic, pediatric, and neurological conditions. The sample size and the recruitment method, which relied on convenience sampling, also restrict the applicability of the results to a wider population. Therefore, caution should be exercised when generalizing these findings to all caregivers, as they may not fully represent the experiences of caregivers in different cultural, social, or healthcare settings.

Conclusions

This study aimed to comprehensively evaluate the musculoskeletal system in caregivers of rehabilitation patients and determine the extent to which different groups of patients' caregivers are affected. The findings revealed that the musculoskeletal system is impacted in all caregivers, and caregivers across different patient groups demonstrate similar effects.

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Bilim iletişiminde önemli bir araç: 4-gözlü tablo

An important tool in science communication: 4-cells table

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Abstract

No matter how complex scientific methods may seem, there are simple ways and tools to understand and explain them. The four-cells table is a frequently used tool for this purpose. In fact, a four-cells table is a presentation technique prepared and used to show the relationship between the options of two variables, each with two options. It is a widely used tool to summarize the collected data and present the research findings. What makes it the subject of this article is its important function in science communication beyond being an ordinary presentation tool. In other words, its role in understanding and explaining the scientific complexities. For this purpose, seven important areas of use in medicine, epidemiology, biostatistics, machine learning and artificial intelligence are summarised. These areas are: calculating the predictive value of diagnostic tests, understanding the Bayes equation, calculating the performance of classification models in machine learning, summarising the power and errors of hypothesis tests, measuring inter-observer agreement, calculating risk in research, and visualising the Chi-Square significance test.

Keywords: 4-Cells Table, communication of science, simplification of complexity

Özet

Bilimsel yöntemler ne kadar karmaşık görünse de onları anlamanın ve anlatmanın basit yolları, araçları bulunmaktadır. Dört gözlü tablo bu amaçla sıkça kullanılan bir araçtır. Aslında 4-gözlü tablo, her biri iki seçenekli iki değişkenin seçeneklerinin birbiri ile ilişkisini göstermek amacıyla hazırlanan ve kullanılan bir sunum tekniğidir. Bu nedenle araştırma verilerinin, bulgularının özetlenerek sunulmasında yaygın biçimde kullanılan bir araçtır. Onu bu yazının konusu yapan özelliği ise sıradan bir tablo olmanın ötesinde bilim iletişimindeki önemli işlevidir. Başka bir deyişle bilimsel olanı anlamak ve anlatmak konularındaki rolüdür. Bu amaçla tıp, epidemiyoloji, biyoistatistik, makine öğrenmesi ve yapay zeka alanında önemli yedi kullanım alanı özetlenmiştir. Bu alanlar: tanı testlerinin öngörü değerinin hesaplanması, Bayes denkleminin ne ifade ettiğinin anlaşılması, makine öğrenmesinde sınıflandırma modellerinin performansının hesaplanması, hipotez testlerinin gücünün ve hatalarının ne ifade ettiğinin özetlenmesi, gözlemciler arası uyumun ölçülmesi, araştırmalarda risk hesaplarının yapılması ve Ki-Kare önemlilik testinin görselleştirilmesi şeklinde sıralanmaktadır.

Anahtar Kelimeler: 4-Gözlü Tablo, bilim iletişimi, karmaşıklığın basitleştirilmesi

Giriş

Günlük hayatımızı kolaylaştıran, dünyayı ve çevremizi daha hızlı ve daha iyi anlamamızı sağlayan pek çok araç ve yöntem konusunda fazla kafa yormayız. Sanki onlar hep varmış gibi düşünürüz. Oysa pek çoğunun arkasında uzun bir hikâye, sorunlarla baş etme ve çözüm bulma mücadeleleri, deneme-yanılma çabaları, insan aklı ve parlak zekalar bulunmaktadır. Çok sıradan gibi görünen bazı araç-gereç ve yöntemlerin olmaması durumunda ne tür güçlükler yaşanacağını genellikle düşünmeyiz ve bu normaldir. Bu anlamda başta ondalık sayılar, dört işlem olmak üzere matematik ve geometrinin temellerini oluşturan pek çok örnek sayılabilir.

Örneğin, neden sayılar için ondalık sistem var, bu sistemi kim, nasıl oluşturmuş, farklı sistemler de var mı yoksa tüm kültürlerde aynı sistemler mi var türünden "zihni sinir" soruları akla gelebilir. Yanıtlar ise aslında çok basittir. İnsan dünyayı anlamak ve işlerini kolaylaştırmak için bazı şeyleri saymaya başladığında önce doğal olarak parmaklarını kullanmaya başlamış ve on parmağı olduğundan sayı dizileri hep onun katları şeklinde oluşmuştur. (1) Ondalık sistem dışında farklı sistemlerin bulunduğu kültürler de olmakla birlikte tüm matematik bu temelde gelişmiştir. (Örneğin Kamboçya'da sayılar beşin katları şeklinde gitmektedir.) Günümüzde bilişim faaliyetlerinin temelini oluşturan sayısal sistem ise ondalık değil ikili sistemdir.

Bir başka örnek de 4-gözlü tablodur. Bazı değerleri, bilgileri tablolaştırarak sunmak ilk kez kimin aklına geldi bilinmez ama bunun da ondalık sayı sistemi kadar basit bir ihtiyaçtan kaynaklandığına kuşku yoktur.

Tablolar, toplanan verileri özetlemek, başkaları ile paylaşmak ve derli toplu sunmak amacıyla kullanılan sunum teknikleridir. Amaç bilgi paylaşımı ve sunum olduğu için bir tablo ne kadar basit ve anlaşılır ise o kadar iyi demektir. Bu anlamda en basit tablo iki seçenekli iki değişkenin ilişkisini özetleme amaçlı 4-gözlü tablodur. Tablolar, toplam haneleri hesaba katılmadan değerlerin yer aldığı hücre sayısına yani göz sayısına göre adlandırılırlar.

Çok basit olan bu yöntem tıp, epidemiyoloji, biyoistatistik ve yapay zekâ alanında bazı karmaşık bilgileri basitleştirerek anlaşılır kılmak, bulgu ve bilgilerin paylaşımını kolaylaştırmak, bunun da ötesinde yeni bilgiler üretmek için kullanılan önemli bir araç ve yöntemdir.

Aşağıda 4-gözlü tablonun farklı kullanım alanlarına ilişkin önemli örnekler sıralanmıştır.

Kullanım Alanı 1: Tanı testlerinin öngörü değerinin saptanması (2, 3)

Hastalık tanısında kullanılan tanı testlerinin gerçek durum karşısında bir duyarlılığı ve özgünlüğü söz konusudur. Örneğin, pozitif ya da negatif şeklinde iki seçenekle değerlendirilen bir test sonucunun pozitif çıktığı bir kişinin mutlaka hasta olması gerekmez. Aynı şekilde negatif çıkan bir kişi de mutlaka sağlamdır anlamına gelmez. Bu anlamda tüm tanı testlerinin gerçek durumu saptama konusunda olasılık hesapları ile ifade edilebilen öngörü değerleri vardır.

Öngörü değerleri, test sonucunda pozitif veya negatif çıkan kişilerin hangi olasılıkla gerçekten pozitif ya da negatif olduklarını gösterir. Testler yardımı ile pozitifi negatiften, hasta olanı sağlamdan ayırma konusunda asıl ihtiyaç duyulan ve önem taşıyan değerler bunlardır.

Pozitif öngörü değeri, tanı testinin pozitif bulduğu kişilerin hangi olasılıkla gerçekten pozitif yani hasta olduğunu ifade eder.

Negatif öngörü değeri ise testin negatif bulduklarının hangi olasılıkla gerçekten negatif yani sağlam olduğunun ifadesidir.

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Bir tanı testinin duyarlılık ve özgünlüğü her zaman aynı olduğu halde, incelenen hastalığın görülme sıklığına bağlı olarak öngörü değerleri değişir.
Yani, bir hastalığın tanısında kullanılan bir testin sonucu hastalığın görülme sıklığına, prevalansına bağlı olarak farklı yorumlanmak durumundadır. Başka bir deyişle tanı testlerinin sonucu koşullu olasılık hesaplarına dayanır. İşte bu hesapları anlamanın ve anlatmanın en basit yolu 4-gözlü tablodan yararlanmaktır.
Aşağıdaki tabloda (Tablo 1), hastalığı olanlar (a+c) ile olmayanların (b+d) hastalık tanısı için geliştirilen yeni bir test sonucuna göre dağılımı verilmiştir.
Bu dağılımda (a)lar gerçek hastaları, (d)ler gerçek sağlamları, (b)ler yanlış hastaları, (c)ler ise yanlış sağlamları temsil etmektedir. Gerçek hasta ve sağlamlar "altın standart" olarak adlandırılan ve tıbbi anlamda bilinen en doğru kriterlere göre hasta ve sağlam olanlardır. Yanlış olanlar ise testin hatalı şekilde hasta ya da sağlam bulduklarıdır.
Bu durumda testin hastaları bulabilme olasılığı olan Duyarlılık=a/(a+c), sağlamları bulabilme olasılığı olan Özgünlük=d/(b+d) şeklinde formüle edilir.
Testin (+) bulduğu (a+b) kadar kişinin aslında (a) kadarı pozitif olduğu için testin pozitif öngörü değeri a/(a+b), negatif öngörü değeri ise aynı mantıkla d/(c+d) olur.
Testin hem duyarlılığının hem de özgünlüğünün %100 olması durumunda tablodaki (b) ve (c) gözlerinde yer alan değerler, yani yanlış pozitif ve yanlış negatifler "0" olur, ki bu özelliği taşıyan bir tanı testi neredeyse yoktur. Varsa zaten o testin kendisi altın standart sayılmaktadır.

Tablo 1: Tanı testi - Gerçek durum ilişkisi

Tanı testi sonucu	Gerçek durum (Altın standart)		Toplam
	Hastalık (+)	Hastalık (-)	
(+)	a	b	a+b
(-)	c	d	c+d
Toplam	a+c	b+d	a+b+c+d

Duyarlılık=a/(a+c)
Özgünlük=d/(b+d)
Pozitif öngörü değeri=a/(a+b)
Negatif öngörü değeri=d/(c+d)

a=Gerçek pozitifler
b=Yanlış pozitifler
c=Yanlış negatifler
d=Gerçek negatifler

Örnek: COVID-19 pandemisi sırasında kullanılan PCR testlerinin Duyarlılığı %67 ve Özgünlüğü %97,6 olduğuna göre %1'i enfekte olduğu tahmin edilen bir toplumda test sonucu pozitif olan bir kişinin hasta olma olasılığı nedir?
Toplumun %1'inin enfekte olmasının anlamı her bin kişinin 10'unda hastalık olasılığın olması, 990'ında ise olmaması demektir. Test hastaların %67'sinde yani 7 kişide doğru şekilde pozitif çıkacak, sağlamların ise %97,6'sında negatif çıkacak yani 966 sağlam kişiyi doğru tahmin edebilecektir.
Bu durumda test sonucu pozitif olan toplam 31 kişinin gerçekte 7'si hasta 24'ü yanlış pozitif olacağından testin pozitif öngörü değeri %22,5 olacaktır.

Tanı testi sonucu	Gerçek durum (Altın standart)		Toplam
	Hastalık (+)	Hastalık (-)	
(+)	7	24	31
(-)	3	966	969
Toplam	10	990	1000

Pozitif öngörü değeri=7/31= %22,5

Aynı tanı testi, %10'u enfekte olduğu tahmin edilen bir toplumda kullanıldığında benzer mantıkla hesap yapıldığında pozitif öngörü değerinin %75,2 olacağı görülür.

4-gözlü tablo yardımı ile akıl yürüterek kolayca yapılan bu işlemler aslında Bayezyen istatistiğin temelini oluşturan Bayes yaklaşımından başka bir şey değildir. Nitekim bir sonraki örnekte bu yaklaşımın temelini oluşturan Bayes denklemi de 4-gözlü tablo yardımı ile açıklanmıştır.

Kullanım Alanı 2: Tanı testi sonuçlarının Bayes denklemi ile ifadesi (4)

Örneğin, COVID-19 pandemisi sırasında kullanılan ve duyarlılığı %67, özgünlüğü %97,6 olan PCR tanı testi ile pozitif bulunan bir kişinin hasta olma olasılığı nedir sorusunun yanıtı bir önceki örnekte anlatılan dolambaçlı yol yerine Bayes denklemi yardımı ile koşullu olasılık hesabı yapılarak verilebilir.

Bu hesaptaki koşul hastalığın testten önceki tahmini görülme sıklığı yani önsel olasılığıdır. Test sonucu pozitif çıkan bir kişinin hasta olma olasılığı, yani pozitif öngörü değeri anlamına gelen sonsal olasılığı ise aşağıda yer alan Bayes formülü yardımıyla hesaplanır.

$$Bayes\ formülü\ P(H+IT+) = \frac{P(T+IH+)\ P(H+)}{P(T+IH+)\ P(H+)+P(T+IH-)P(H-)}$$

Bu formülde yer alan ifadelerin anlamları şu şekildedir:

P(H+IT+) : Testi pozitif olanların hasta olma olasılığı- PPV: "Sonsal olasılık"

P(T+IH+) : Hasta olanlarda testin pozitif çıkma olasılığı- "Duyarlılık"

P(H+) : Hastalık için "Önsel olasılık"

P(T+IH-): Hasta olmayanlarda testin pozitif çıkma olasılığı- "1-Özgünlük"

P(H-): Hasta olmama olasılığı: "1-Önsel olasılık"

Olasılık hesaplarının uğraş alanı olmaması nedeniyle yukarıdaki koşullu olasılık hesapları ile kafası karışacak bir hekim için aşağıdaki formül daha anlaşılır olacaktır.

$$Bayes\ formülü = \frac{p * duy}{p * duy + (1-p) * (1-özg)}$$

Yeni formüldeki sembollerin anlamı şu şekildedir:

p: Önsel olasılık

duy: Duyarlılık

özg: Özgünlük

Kullanılan testin Pozitif Öngörü Değerini (PPV) hesaplayan Bayes denkleminin bileşenleri aşağıdaki 4-gözlü tabloda yer almaktadır.

Tablo 2: Tanı testleri değerlendirilmesinde Bayes denklemi bileşenleri

Test sonucu	Gerçek durum (Altın standart)		Toplam
	Hasta	Sağlam	
(+)	p*duy	(1-p) *(1-özg)	p*duy + (1-p)*(1-özg)
(-)	p*(1-duy)	(1-p) *özg	p*(1-duy) + (1-p)*özg
Toplam	p	(1-p)	1

Bir önceki örnekte kullanılan değerler burada da kullanılırsa:

$$PPV = \frac{0{,}01*0{,}67}{0{,}01*0{,}67+(1-0{,}01)*(1-0{,}976)} =$$ %22 bulunur.

Görüldüğü gibi iki yöntemle de aynı sonuç elde edilmektedir.

Kullanım Alanı 3: Makine öğrenmesindeki sınıflandırma modellerinin performans değerlendirmesi (karışıklık matrisi, hata matrisi) (5, 6)

Makine öğrenmesinde bir sınıflandırma modelinin algoritmasının performansını anlama amaçlı görsel bir yöntem olarak 4-gözlü tablo kullanılırken daha önce tanı testlerinin öngörü değeri hesabında kullanılan mantık aynı kalır, sadece kavramların adı ve yorumu değişir. Duyarlılık yerine "bellek", pozitif öngörü değeri yerine "kesinlik" sözcükleri kullanılır. Kullanılan modelin "öngörüsü"nün "gerçek durum" karşısındaki tutarlılığı görselleştirilir ve performansı F1 puanı ile özetlenir. Oluşan tabloya karışıklık matrisi ya da hata matrisi denilir.

Aşağıda örneği verilen karışıklık matrisi aslında bir 4-gözlü tablodur ve gözlerde yer alan değerlerden hareketle şu performans göstergeleri hesaplanabilir:

- Doğruluk: (GP + GN) / (GP + GN + YP + YN)
- Kesinlik: GP / (GP + YP)
- Bellek/Hatırlama: GP / (GP + YN)
- F1-puanı: 2 x (Kesinlik x Bellek) / (Kesinlik + Bellek)
- Özgünlük: GN / (GN + YP)

"Kesinlik" pozitif öngörü değeri, "bellek" ise duyarlılık anlamına gelen kavramlardır.

Tablo 3: Karışıklık matrisi (Hata matrisi)

Öngörülen	Gerçek durum	
	Pozitif	Negatif
Pozitif	GP	YP
Negatif	YN	GN

GP: Gerçek pozitif YP: Yanlış pozitif YN: Yanlış negatif GN: Gerçek negatif

Tablodaki değerlerin yorumu

- Gerçek pozitif ve gerçek negatiflerin fazla olması: Kullanılan modelin toplam doğruluğunun yüksek olduğu anlamına gelir.
- Yanlış pozitiflerin fazla olması: Model gerçekte negatif olan durumları yanlışlıkla pozitif bulma yönünde bir yanlılığa sahiptir. Başka bir deyişle Tip I Hata miktarı yüksektir.
- YN sayısının fazlalığı: Model gerçekte pozitif olan durumları yanlışlıkla negatif bulma yönünde bir yanlılığa sahiptir. Daha teknik bir deyişle Tip II Hata miktarı yüksektir.
- F1-puan değeri: Kesinlik ve bellek değerlerinin harmonik ortalaması olan F1-puanı kullanılan modelin performansını gösterir. Sıfır ile bir arasında bir değer alır. "Bir" modelin performansının mükemmel olduğu, "sıfır" ise performansının hiç olmadığı anlamına gelir.
- F1-puanın özelliği: Formülünden de anlaşılacağı gibi modelin duyarlılık ve özgünlüğü değişmediği halde incelenen olayın prevalansındaki değişime paralel olarak F1-puanı da değişir. Yani prevalans yükselince F1-puanı da yükselir.

Örneğin bir önceki örnekte verilen değerler bir sınıflandırma modeline ait olsa idi:

Öngörülen değerler	Gerçek değerler		Toplam
	(+)	(-)	
(+)	7	24	31
(-)	3	966	969
Toplam	10	990	1000

F1-puanı= 2 x (7/31 x 7/10) / (7/31 + 7/10) =0,316/0,926 =%34 olurdu.
Yani, modelin performansı ortadır sonucuna varılmış olurdu.

Kullanım Alanı 4: Tip I ve Tip II hata ile testin gücünün anlaşılması (7)

Araştırmacıların topladıkları verileri analiz amacıyla kullandıkları önemlilik testleri vardır. Ki-kare, "t" testi, varyans analizi gibi çok sayıdaki test için kullanılan bir diğer isim "Hipotez testleri"dir. Hipotez testleri denilmesinin nedeni bu testler yapılırken ilk adım olarak bir hipotezin kurulması ve bu hipotezin test edilmesidir.

Hipotezler, olasılıklar dikkate alınarak gruplar arasında farklılık "vardır" ya da "yoktur" olarak iki şekilde kurulabilir. Tıp ve sağlık bilimlerinde geleneksel olarak test edilen hipotez "fark yoktur" şeklindeki "farksızlık hipotezi" ya da "sıfır hipotezi" olarak bilinen hipotezdir.

Analiz sonucunda bu hipotezin kabul veya ret kararına göre bulgular önem kazanır ve yorumlanır. Ne var ki hipotezin kabul ya da reddi sırasında söz konusu olabilen ve olasılık hesapları ile ölçülebilen kaçınılmaz bazı hatalar vardır.

Örneğin, gerçek durumda fark yok iken önemlilik testinin sonucunda fark var sonucuna varmak bir hatadır. Bu tür bir hata Tip I hata olarak bilinir ve "α" ile gösterilir.

Analiz sonucunda bulunan hata miktarı, ki bu da "p" ile gösterilir, 0.05'ten küçük ise farksızlık hipotezi reddedilir ve araştırma verilerinin gösterdiği farklılığın istatistiksel olarak önemli olduğu sonucuna varılır.

Tip I hatanın az olması ve farklılığın öneminden söz edebilmek için genel bir kabul olarak hiçbir zaman %5'i aşmaması beklenir.

Gerçek durumda fark yok iken fark var sonucuna varmak ise Tip II hata olarak bilinir ve "β" ile temsil edilir.
Tip II hatanın test sonucunu yorumlamak için kullanım değeri ve geleneği olmamakla birlikte testin gücünün hesabında rolü vardır.
"1-β" olarak ifade edilen "testin gücü" çalışılan örnek büyüklüğünün temsil gücünü değerlendirme anlamında önemlidir.
Testin gücünün hiçbir zaman %80 altında olmaması da genel kabul gören bir yaklaşımdır.
Karmaşık gibi görünen bu kavramların anlamını netleştirmek için 4-gözlü tablo önemli bir araçtır.

Tablo 4: Tip I, Tip II hata ve testin gücü

Hipotez testi sonucu	**Gerçek durum**	
	Fark var	**Fark yok**
Fark var (H_0 ret)	Doğru karar "Testin gücü"	Yanlış karar "Tip I hata-α"
Fark yok (H_0 kabul)	Yanlış karar "Tip II hata-β"	Doğru karar

Tablonun da karmaşık gelmesi halinde hataların anlamını akılda tutmak için şu benzetmeyi kullanmak yarar sağlayabilir:
Bir mahkemede görevli olan yargıcın sanık hakkında verebileceği kararlarda suçu olmayan birisini suçlu bulmak ya da suçsuz olan birisini suçlu bulmak şeklinde iki tür hata olabilir. Kararın insani ve vicdani anlamda kabul görmesi için suçsuz birisini suçlu bulma doğrultusundaki kararın hatasız ya da en az hata ile verilmesi arzu edilir. İşte bu hata Tip I hatadır. Gerçekten suç işlemiş birisini suçlu bulmak ise yargının gücü olacaktır.

Kullanım Alanı 5: Gözlemciler/ölçümcüler arası uyumun ölçülmesi (7)

Araştırmalarda gözlemler ve ölçümler yolu ile veri toplanırken genellikle birden çok kişi görev alır. Örneğin, kan basıncı ölçümleri, EKG değerlendirmeleri, doku materyalinin patolojik incelemeleri birden çok uzman tarafından yapılıyor olabilir. Bu yapılırken gözlemciler/ölçümcüler arasında değerlendirme farklılıkları (gözlemciler/ölçümcüler arası farklılıklar) olabilir. Hatta aynı değerlendirmeyi farklı zamanlarda yapan aynı gözlemci için bile farklılıklar söz konusu olabilir (gözlemci/ölçümcü içi farklılıklar).
Neredeyse tamamen insani özelliklerden kaynaklanan bu farklılıkları, uyumsuzlukları sıfırlamak mümkün değildir. Ancak, miktarının belirlenerek kontrol edilmesi varılan sonuçların bilimsel değeri ve yorumu açısından önemlidir. Gözlemciler/ölçümcüler arası uyumu incelemenin en basit yolu Kappa hesabı yapmaktır. Kappa 0 ile 1 arasında bir değer alabilir ve bire ne kadar yakın ise uyum o denli güçlüdür.

Kappa (k) formülü ve sembollerin anlamı aşağıdaki 4-gözlü tabloda görüldüğü gibidir:

$$k = \frac{N(a+d) - (n_1 f_1 + n_2 f_2)}{N^2 - (n_1 f_1 + n_2 + f_2)}$$

Tablo 5: Uyum testi - Kappa hesabı

İkinci gözlemci -ölçümcü	Birinci gözlemci-ölçümcü		Toplam
	(+)	(-)	
(+)	a	b	f_1
(-)	c	d	f_2
Toplam	n_1	n_2	N

Kappa değerlerinin yorumu:

k < 0	uyum yok	0.41 < k < 0.60	orta
0.00 < k < 0.2	zayıf	0.61 < k < 0.80	iyi
0.21 < k < 0.40	hafif	0.81 < k < 1.00	çok iyi

Örnek; İki oftalmolog (A ve B) 687 öğrencinin göz dibini değerlendiriyor ve aşağıdaki tabloda özetlenen sonuçlara varılıyor. Oftalmologlar arasında göz dibini değerlendirme yönünden uyum ya da uyumsuzluk ne düzeydedir?

Oftalmolog B	Oftalmolog A		Toplam
	Normal	**Anormal**	
Normal	650	12	662
Anormal	17	8	25
Toplam	667	20	687

Tablodaki değerler Kappa formülüne konulduğunda “k = 0.33” bulunur. Yani oftalmologlar arasında hafif derecede uyum bulunmaktadır.

Kullanım Alanı 6: Rölatif Risk (Risk Oranı) ve Tahmini Rölatif Risk (Odds Oranı) hesapları (2, 7)

Risk oranı prospektif tasarımlı kohort araştırmalarında, odds oranı ise başta retrospektif tasarımlı vaka-kontrol araştırmaları olmak üzere pek çok yerde kullanılan risk ölçütleridir.

Kohort araştırmalarının başlangıcında bir hastalık açısından risk altında olan ancak hasta olmayan bireylerden oluşan kohort grubu (a+b+c+d) seçilerek izlenir. Grup içerisinde hastalık etkeni ile karşılaşan (a+b) ve karşılaşmayan kişiler (c+d) belirlenir. İzlemler sonucunda etkenle karşılaşan ve karşılaşmayanlarda hastalık oluşma sıklıkları yani insidansları hesaplanır.

Araştırma sonunda etkenle karşılaşanlardaki hastalık insidansı (I_e=a/(a+b)) karşılaşmayanlardaki insidansa (I_{ne}=c/(c+d) oranlanarak etkenin hastalık oluşumundaki rolü Risk Oranı (RR=I_e/I_{ne}) şeklinde

ifade edilir. Risk oranının diğer adı Rölatif Risktir.
Vaka-kontrol araştırmalarının başlangıcında ise hasta ve sağlam kişiler bulunur ve geçmişte hastalık etkeni ile karşılaşma durumları incelenir. İnsidans hesabı mümkün olmadığı için kohorttaki yaklaşımdan farklı olarak hastaların (a/(a+c):c/(a+c) =a/c) ve sağlamların etkenle karşılaşıp karşılaşmama olasılıkları (b/(b+d): d/(b+d) =b/d) yani oddsları hesaplanarak oranlanır ve Odds Oranı (OR=axd/bxc) şeklinde ifade edilir. Bu oranın diğer adı Tahmini Rölatif Risktir.
Sözel olarak ifade edildiğinde anlaşılması zor gibi görünen bu ifadeler aşağıdaki 4-gözlü tablo şeklinde görselleştirildiğinde daha anlaşılır hale gelir.

Tablo 6: Hasta ve sağlam kişilerin etkenle karşılaşma durumları

Etkenle karşılaşma	Hasta	Sağlam	Toplam
(+)	a	b	a+b
(-)	c	d	c+d
Toplam	a+c	b+d	a+b+c+d

Risk Oranı=Rölatif Risk=RR=I_e/I_{ne} ; I_e=a/(a+b), I_{ne}=c/(c+d)
Odds Oranı=Tahmini Rölatif Risk=OR=axd/bxc

Örnek: Aşağıdaki tabloda özetlenen değerler bir kohort araştırması sonunda bulunmuş olsa I_e=0.80, I_{ne}=0.20 ve RR=0.80/0.20=4 olur. Anlamı: "Etkenle karşılaşanların gelecekte hasta olma olasılığı karşılaşmayanların 4 katıdır."
Aynı değerler bir vaka-kontrol araştırmasında bulunmuş olsa OR=(80x80) /(20x20) =16 olur.
Anlamı: "Hastaların geçmişte etkenle karşılaşmış olma olasılığı sağlamlara kıyasla tahminen 16 kat daha fazladır."

Etkenle karşılaşma	Hasta	Sağlam	Toplam
(+)	80	20	100
(-)	20	80	100
Toplam	100	100	200

Kullanım Alanı 7: 4-gözlü Ki-Kare testinin görselleştirilmesi (7)
Araştırmalarda toplanan kategorik türdeki verilerin analizi sırasında kullanılan en yaygın önemlilik testlerinden birisi Ki-Kare testidir. Ki-Kare testi 4-gözlü ve çok-gözlü düzenler için aynı formülle ancak farklı yaklaşımlarla yapılır.
Eğer iki seçenekli bir değişkenin iki gruptaki dağılım farklılığı ya da benzerliği test ediliyorsa bulgular aşağıdaki tabloda görüldüğü şekilde özetlenir.

Tablo 7: Bir değişkenin iki seçeneğinin gruplara göre dağılımı

Değişken	Grup 1	Grup 2	Toplam
Seçenek 1	G_1 (B_1)	G_2 (B_2)	G_1+G_2
Seçenek 2	G_3 (B_3)	G_4 (B_4)	G_3+G_4
Toplam	G_1+G_3	G_2+G_4	$G_1+G_2+ G_3+G_4$

G: Gözlenen değerler B: Beklenen değerler

Gözlenen değerler araştırma sonucunda bulunan ve tabloda sunulan değerlerdir. Beklenen değerler ise tablodaki her göz için basit orantı yolu ile bulunur.

Analiz sorusu: "Değişkenin seçeneklerinin dağılımı gruplar arasında farklı mıdır?", test edilmesi gereken farksızlık hipotezi ise "Değişken seçeneklerinin gruplara göre dağılımı arasında fark yoktur" şeklindedir.

Analiz için kullanılacak Ki-Kare formülü: $\chi^2 = \sum \frac{(G-B)^2}{B}$

Örnek: Bir grup kadın ve erkeğin beden kitle indeksi sonucunda obezite durumu (gözlenen değerler) aşağıdaki Tabloda görüldüğü gibi olsa:

Obezite	Erkekler	Kadınlar	Toplam
Var	6	14	20
Yok	44	36	80
Toplam	50	50	100

Farksızlık hipotezinin geçerli olması durumunda gruplar arasında fark olmayacağından toplam 100 kişiden 20'sinde obezite olduğuna göre 50 erkeğin 10'unda (B1), 50 kadının da 10'unda (B2) obezite olması beklenir. Aynı mantıkla obez olmayan 40 erkek (B3) ve 40 kadın (B4) bulunması beklenir.

Gruplar arası farklılık Ki-Kare ile test edildiğinde

$$\chi^2 = \frac{(6-10)^2}{10} + \frac{(14-10)^2}{10} + \frac{(44-40)^2}{40} + \frac{(36-40)^2}{40} = 4$$ ve p=0,047 bulunur.

Sonuçta $p<0.05$ olduğundan erkeklerle kadınlar arasında obezite durumu yönünden önemli farklılık vardır sonucuna varılır.

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The importance of literature review: Commentary on a published article

Literatür taramasının önemi: Yayımlanmış bir makaleye değerlendirme

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Dear Editor,

An article entitled “Bibliometric Analysis of Phd, Residency Dissertations and Master’s Theses in Public Health Departments in Turkey Between 1970-2022” was published in Volume 9, Issue 2 of ESTÜDAM Journal of Public Health in 2024. This study, which evaluated the theses produced in the field of public health between 1970-2022 and registered in Yöktez, is very similar to our article entitled ‘Bibliometric Analysis of Theses Made in Public Health and Registered in the National Thesis Centre of the Council of Higher Education in Turkey’, which we published in 2022 and evaluated the theses produced in the field of public health between 1970-2021 and registered in Yöktez (1, 2).

The article by Denizli et al. in 2024 states that the study was conducted ‘due to the limitation of bibliometric analyses in the field of public health in Turkey’. This statement suggests that the authors overlooked our 2022 article in their literature review.

In scientific research, it is important to correctly identify the need in the literature and to conduct a comprehensive literature review. When conducting a literature review, citing similar studies on the topic increases the reliability and scientific value of the research. In addition, ignoring existing studies makes it difficult to fully understand the contributions of new studies. However, we recognise that there are many databases and platforms in the field of medicine and health sciences. Researchers may not be able to access every database and perform the appropriate search every time for reasons such as the fact that some databases are paid for, require institutional agreements, or have licensing restrictions. However, as the study by Denizli et al. was published on the same platform (DergiPark) as the previous study mentioned above, we believe that this study is easily accessible with a practical search.

In conclusion, we believe that a comprehensive literature review and reference to similar studies will enrich the scientific discussion.

Thank you for your interest and sensitivity in this matter.

Best regards.

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Response to the letter to the editor: Clarifications on literature review and study contributions

Editöre mektuba cevap: Literatür taraması ve çalışma katkılarına ilişkin açıklamalar

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Dear Editor,

We would like to express our gratitude for forwarding the letter regarding our article to the Editor. This has provided us with the opportunity to address the reasons for not citing the study by Öztürk et al. In the following section, we present our responses to the points raised in their letter:

The data collection period for the study by Öztürk et al. was between June 1, 2022, and July 15, 2022. The submission and acceptance dates of the article are 15 August 2022 and 28 October 2022, respectively (1). In our study, the literature review and data collection phase ended on 2 August 2022 at 17:30, after which the analysis phase began and was extended to include the 2022 dissertations. The analysis phase was not only a cross-sectional analysis, but software coding was done to create a real-time dynamic database architecture in which the findings would be automatically updated as new data were entered into the system. All entries and digital footprints in our database have log records to verify this timeline. Our preliminary analyses were presented as a conference paper at the 6th International Public Health Congress held the same year, and we subsequently included new theses published in 2022 as we completed advanced analyses in 2023 (2). Thus, the literature review for our study was conducted before the publication of Öztürk et al.'s article, which had not been released during our review phase. By its publication, our study had progressed to the analysis stage.

When one of the studies started and conducted simultaneously is published earlier and the other is published later, should the late published article not citing the other be considered as a lack of literature review? A literature review is usually conducted at the beginning of the study, followed by data collection and analysis. With the exception of bibliometric analyses, systematic reviews and meta-analyses, where the subject of study is 'original articles in the literature', it should not be necessary to search the literature repeatedly throughout the entire process from the beginning to the end of a study. Systematic literature reviews and meta-analyses are typically characterized by exhaustive and comprehensive searches of all available literature. As our study focused on dissertations (doctoral, master's and specialist), rather than published original articles, we did not conduct a systematic search beyond these materials; our systematic approach was specific to dissertation studies. Although cross-referencing similar studies is valuable in terms of strengthening scientific rigor, we believe that it is incompatible with scientific practice for authors working on similar topics to put pressure on each other to cite their own studies or to consider this as an obligation.

In comparison, the study by Öztürk et al. primarily examined the research methods of public health theses, which is a valuable contribution. However, our research focused on the distribution of

research topics and trends within the public health field. Öztürk et al. conducted a brief analysis of public health issues, but the methodology for selecting these issues is not detailed. Findings on these topics were presented very briefly, with only a single table and a short paragraph dedicated to them. By contrast, our study introduced a unique classification system for public health subfields, identifying 33 sub-topics based on established textbooks and categorizing them under three main headings (main, emerging, and methodological fields) (3).

Additionally, although Öztürk et al. highlighted the importance of trend analysis in bibliometric studies in the introduction, their findings did not include a historical trend analysis beyond a single graph showing the total number of theses over time. Our study provides a unique contribution by presenting a trend analysis of public health topics over five decades, detailing the temporal changes in topic prevalence. A key differentiator of our study is the co-occurrence analysis of public health topics, which adds a distinctive layer of insight.

Another feature that distinguishes our work is the presentation format of our innovative, interactive, dynamic visualizations, which are designed to be updated with new dissertation data established on a dynamic database. We have made these interactive tools available through our research group's online platform EVREKA (https://sites.google.com/view/evrekahs) inspired by Nature's work to support future researchers and facilitate new discoveries (4).

Thank you once again for the opportunity to clarify these points, and we appreciate the scholarly exchange on this matter.

Best regards,
Yasemin Denizli

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