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Relationship Between Medication Adherence and E-Health Literacy Levels in Patients with Hypertension

Hipertansiyonlu Hastaların İlaç Uyumu ile E-Sağlık Okur Yazarlık Düzeyleri Arasındaki İlişki

ORIGINAL ARTICLE

ABSTRACT

Objective: This study aims to assess the association between medication adherence and e-health literacy in patients with hypertension.

Methods: Employing a cross-sectional and descriptive design, the study included 304 hypertensive patients. Data were collected using the Descriptive Characteristics Form, the Morisky 8-item Medication Adherence Scale (MAS), and the E-Health Literacy Scale (E-HLS).

Results: Significant differences in MAS total mean scores were observed based on age, gender, current health status, the number of medications used daily, the use of non-prescription medicines, consistency in taking medications daily, engagement with health-related publications, and perceptions of the usefulness of health resources for decision-making. Similarly, E-HLS mean scores varied significantly according to factors like age, marital status, education, employment status, health insurance coverage, residence, smoking habits, the number of medications used, regular health check-ups, consistency in medication adherence, engagement with health-related publications, and perceptions of the usefulness of health resources in decision-making.

Conclusions: The study revealed that only 9.5% of patients demonstrated high medication adherence, with an overall moderate level of e-health literacy. Additionally, a significant positive correlation was found between the MAS and E-HLS scores.

Keywords: E-health literacy, hypertension, medication adherence

ÖZ

Amaç: Bu çalışmanın amacı, hipertansiyonlu hastalarında ilaç uyumu düzeyi ile e-sağlık okuryazarlığı arasındaki ilişkiyi değerlendirmektedir.

Yöntem: Kesitsel ve tanımlayıcı bir tasarımın kullanıldığı çalışmaya 304 hipertansiyon hastası dahil edilmiştir. Veriler, gelişigüzel örnekleme yöntemi ile toplanmıştır. Araştırmanın verileri, Tanıtıcı Bilgi Formu, Morisky-8 Maddeli İlaca Uyum Anketi E-Sağlık Okuryazarlığı Ölçeği (E-SOÖ) kullanılarak toplanmıştır.

Bulgular: Yaş, cinsiyet, mevcut sağlık durumu, bir günde kullanılan ilaç sayısı, reçete dışı ilaç kullanma, ilaçlarını her gün düzenli içmeye dikkat etme, sağlıkla ilgili yayınları takip etme, durumuna göre MİTUÖ puan ortalamaları arasında anlamlı farklılıklar gözlenmiştir. Yaş, medeni durum, eğitim ve çalışma durumu, sağlık güvencesine sahip olma, yaşanılan yer, sigara içme, bir günde kullanılan ilaç sayısı, sağlık kontrollerine düzenli olarak gitme, ilaçlarını her gün düzenli içmeye dikkat etme, sağlıkla ilgili yayınları takip etme durumuna göre E-SOÖ puan ortalamaları arasında anlamlı bir farklılık belirlenmiştir ($P < 0,05$).

Sonuç: Bu çalışmada hastaların sadece %9,5'lik kısmının ilaç tedavisine yüksek derecede uyum gösterdiği, e-okur yazarlık düzeylerinin ise orta düzeyde olduğu bulunmuştur. Ayrıca MİTUÖ ile E-SOÖ arasında pozitif korelasyon bulunmuştur.

Anahtar Kelimeler: E-sağlık okuryazarlığı, hipertansiyon, ilaç uyumu

Introduction

Hypertension, a chronic condition characterized by consistently elevated arterial blood pressure, is often described as a silent danger. It poses a serious public health challenge worldwide, ranking third worldwide, accounting for more than

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one-third of the global death burden.[1] Its prevalence varies globally, ranging from 12% to 82% in different countries. Alarmingly, these figures are projected to rise in the coming years. By 2025, hypertension's prevalence is estimated to increase to 24% in developed countries and 80% in developing countries.[2,3] Notably, hypertension is a significant contributor to mortality and the burden of chronic diseases. It is commonly associated with complications such as chronic kidney disease and heart failure,[3] indicating that hypertension will become a more important problem on global health. Consequently, implementing effective global measures for the management and prevention of hypertension is crucial.[4]

Controlling hypertension is a complex process, encompassing pharmacological treatments and lifestyle modifications. For patients, adhering to prescribed medication regimens and health recommendations, such as diet and exercise, as advised by healthcare professionals, is crucial. Yet, many individuals with hypertension struggle with consistently following their medication and treatment plans. Therefore, educating patients and strengthening support mechanisms are vital to overcome the problem of medication adherence and ensure effective management of hypertension.[3,5]

The adoption of e-health (electronic health) technologies has increasing rapidly in recent years. E-health refers to the employment of information and communication technologies in enhancing health services and simplifying patient care. By providing patients with easier access to health information, these technologies improve healthcare service accessibility and supporting patient education. Additionally, the active engagement of patients and their health literacy are crucial factors in managing chronic conditions like hypertension.[6]

The level of health literacy is crucial for the effective treatment of chronic diseases, the prevention of complications, the improvement of medication adherence, and the enhancement of disease control. Patients with low health literacy levels often face significant challenges in following medication instructions, hindering regular and correct medicine usage.[7] This situation results in adverse health outcomes, engagement in risky health behaviors, and an escalation of healthcare costs.

Treatment non-adherence and health literacy contribute to a poor understanding of treatment methods, increased errors in the use of medication, challenges in accessing healthcare services, reduced rates of early diagnosis, and a decline in quality of life. These issues result in heightened mortality and morbidity rates and escalate healthcare costs due to the increased utilization of expensive services like hospitalizations and emergency care. Promoting patient engagement in treatment strategies is one of the effective ways to enhancing medication adherence.[4,8]

E-health technologies stand out as vital tools for managing hypertension and other chronic diseases to increase patients' health literacy and improve their medication adherence. E-health can positively impact health outcomes by providing patients with easily accessible information and resources. This accessibility enables more effective participation in health services and strengthens patient education.[6,9]

The purpose of this study is to explore the relationship between medication adherence and e-health literacy in patients with hypertension. Given the limited data available in current literature on this subject, this study aims to deepen understanding of how these two factors interrelate in hypertension management. Hence, it is considered to contribute to the development of more effective interventions for the management of hypertension. By focusing on both medication adherence and e-health literacy, the study may pave the way for more personalized treatment strategies. This approach is considered to be an important step to enhance treatment efficacy and improving the quality of life for patients with hypertension.

Research Questions

1. What is the medication adherence level of patients with hypertension?
2. What is the e-health literacy level of patients with hypertension?
3. Is there a relationship between medication adherence and e-health literacy levels in patients with hypertension?
4. What are the variables that affect medication adherence and e-health literacy levels in patients with hypertension?

Materials and Methods

Study Design

This study utilized a cross-sectional and descriptive design.

Study Setting

The study was conducted at Ağrı İbrahim Çeçen University Hospital's Cardiology and Internal Diseases clinics in Eastern Turkiye. Data collection took place between April 2023 and July 2023. Each clinic housed 30 beds, accounting for a total of 60 beds across both clinics.

Target Population and Sample

This study focused on patients diagnosed with hypertension and receiving treatment at the Cardiology and Internal Diseases clinics of Ağrı İbrahim Çeçen University Hospital during the designated period. The sample comprised 304 patients with hypertension who met the research criteria and consented to participate. Patients were chosen using a random sampling method, a type of non-probability sampling technique.

MAIN POINTS

- This study revealed a significant and positive relationship between medication adherence and e-health literacy.
- These findings underscore the importance of technology and digital health resources in the healthcare sector.
- Encouraging the adoption of e-health applications could enhance patients' medication adherence.
- Healthcare professionals can effectively engage patients in their treatment plans and empower them to manage their health by offering suitable education and awareness programs to enhance patients' e-health literacy.

Inclusion Criteria
The study included patients who:

- were diagnosed with hypertension,
- could effectively communicate,
- volunteered to participate.

Exclusion Criteria
The study excluded patients if they:

- had been on medication for less than three months,
- exhibited cognitive disorder
- had chest pain, shortness of breath, palpitation complaints, or
- were illiterate.

Data Collection Tools
Descriptive Characteristics Form
This form, created by the researchers, comprised 23 questions designed to gather information on participants' age, education level, gender, current disease, socio-economic condition, medicine use, number of medicines, and so on.

The 8-Item Medication Adherence Scale
This scale, originally developed by Morisky et al.[10] and its Turkish validity and reliability were conducted by Aşılar et al.[11] Cronbach's alpha value was reported to be 0.79, and it was found to be 0.83 in the present study. The 8-item Medication Adherence Scale consists of eight questions designed to assess patient self-reported medication usage behaviors, including identifying potential barriers to treatment adherence. The scoring system allocates 0 points for a "yes" response and 1 point for a 'no' response to questions 1, 2, 3, 4, 6, and 7. Conversely, for question 5, 0 points are given for a 'no' response and 1 point for a 'yes' response. For question 8, a response of 'never/rarely' earns 1 point, while other responses receive 0 points. The total score can range from 0 to 8, with 8 points indicating high adherence, 6-7 points indicating moderate adherence, and a score below 6 indicating low adherence.

The E-Health Literacy Scale
The E-Health Literacy Scale, originally developed by Norman and Skinner,[12] underwent Turkish validity and reliability testing by Gencer et al.[13] This scale comprises eight items within a singular factor. The scale has 8 items and one factor. Cronbach's alpha value was reported as 0.91, and it was found to be 0.94 in the present study. The scale does not include any reverse-scored items. Interpretation of the scale is based on both total and mean scores, where higher total scores indicate a higher level of e-health literacy. Responses to the items are measured on a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Data Collection
Data for this study were gathered through face-to-face interactions, following the receipt of verbal consent from each volunteer participant. Completing each questionnaire took approximately 10-15 minutes.

Data Analysis
The data were analyzed using the SPSS 20.0 version (Chicago, USA) software package. To test for normality distribution, skewness and kurtosis coefficients were employed. Analysis of individual characteristics involved descriptive statistical methods, including percentage, standard deviation, arithmetic mean, and min-max values. T-test was used for independent groups, as well as ANOVA test, Cronbach's alpha reliability, and Pearson correlation analysis.

Ethical Considerations
Before commencing this study, approval from the Scientific Research Ethics Committee of Ağrı İbrahim Çeçen University (Approval Number: E-95531838, Date: 28.12.2022) was obtained, and the institutional permission was granted (Permission Date: 02.03.2023, Number: E-42190979). We obtained verbal consent from each participating patient diagnosed with hypertension after providing them with thorough information about the study. Furthermore, our research adhered strictly to the principles outlined in the Declaration of Helsinki.

Results
The MAS general mean score of patients with hypertension was 4.54±2.47 and the E-HLS mean score was 23.98±7.82. While only 9.5% of the patients showed a high level of adherence, 34.2% showed moderate adherence, and 56.3% showed low adherence (Table 1).

Analyzing MAS mean scores based on patients' descriptive features that patients aged 76 years or older, male, who perceived current health status well, using 10 or more medicines daily, not using non-prescription medicines, taking their medicines regularly each day, frequently following health-related publications and broadcasts, and valuing health-related resources for making health decisions exhibited higher MAS mean scores. These difference in mean score was statistically significant ($P < 0.05$) (Table 2).

The analysis of the E-Health Literacy Scale (E-HLS) mean scores among patients with hypertension, in relation to their descriptive characteristics revealed that higher E-HLS mean scores were observed in patients aged 45-55 years, who were single, had a university-level or higher education, were employed, had health insurance, resided in urban areas, were non-smokers, used between 1-3 medicines daily, underwent regular health check-ups, consistently took their medicines daily, frequently engaged with health-related publications and broadcasts, and valued health-related resources for making health-related decisions. The difference in these mean scores was statistically significant ($P < 0.05$) (Table 2).

Table 1. Medication Adherence and E-Health Literacy Scale Mean Scores of Patients with Hypertension (N = 304)

Scales	X±SD	
Morisky Medication Adherence Scale total mean score	4.54±2.47	
Morisky Medication Adherence Status	n	%
Low level of adherence (Morisky <6)	171	56.3
Moderate level of adherence (Morisky 6-7)	104	34.2
High level of adherence (Morisky 8)	29	9.5
E-health Literacy Scale total mean score	23.98±7.82	

Table 2. Comparison of the Total Scale Mean Scores according to the Descriptive Characteristics of Patients with Hypertension (N=304)

	n	%	MAS $\overline{X}$ ±SD		E-HLS $\overline{X}$ ±SD	
Age 62.62± 9.21 (min48-max84)						
45-55	82	27.0	4.13±2.48	f=4.758	27.50±5.81	f=22.32
56-65	114	37.5	4.29±2.41	***P*=0.003**	25.53±7.54	***P*=0.000**
66-75	82	27.0	4.93±2.43		20.20±7.48	
76 and over	26	8.5	5.88±2.16		18.00±7.68	
Gender						
Female	182	59.9	4.21±2.45	t=-2.863	24.31±7.74	t=0.896
Male	122	40.1	5.03±2.42	***P*=0.004**	23.49±7.95	*P*=0.371
Marital Status						
Single	38	12.5	4.13±2.50	f=1.143	26.02±5.56	f=7.781
Married	230	75.7	4.53±2.41	*P*=0.320	24.34±7.99	***P*=0.001**
Divorced/widowed	36	11.8	5.00±2.13		19.50±7.28	
Education level						
Primary school	144	47.4	4.06±2.45	f=2.056	21.65±8.14	f=8.800
Secondary school	80	26.3	4.56±2.42	*P*=0.106	25.70±7.44	***P*=0.000**
High school	47	15.5	4.75±2.79		26.27±5.93	
University and above	33	10.8	5.14±2.31		26.57±6.71	
Employment status						
Employed	94	30.9	4.26±2.40	t=-1.308	26.22±6.92	t=3.395
Unemployed	210	69.1	4.66±2.49	*P*=0.192	22.98±8.01	***P*=0.001**
Having health insurance						
Yes	249	81.9	4.58±2.46	t=0.593	24.61±7.64	t=3.050-
No	55	18.1	4.36±2.52	*P*=0.554	21.10±8.07	***P*=0.002**
Income level						
Income less than expenses	91	29.9	4.76±2.42	f=2.935	22.65±7.89	f=2.846
Income equal to expenses	193	63.5	4.28±2.56	*P*=0.055	24.31±7.88	*P*=0.060
Income more than expenses	20	6.6	3.55±2.23		26.85±5.92	
Place of residence						
Province	224	73.7	4.60±2.51	f=0.099	25.33±7.32	f=15.12
District	58	19.1	4.45±2.28	*P*=0.906	21.01±8.20	***P*=0.000**
Village	22	7.2	4.43±2.38		18.04±7.17	
Smoking						
Yes	112	36.8	4.26±2.42	t=-1.484	22.32±7.98	t=5.017
No	192	63.2	4.70±2.48	*P*=0.139	26.82±6.68	***P*=0.000**
Current health status						
Good	64	21.1	5.68±2.35	f=13.881	24.42±7.80	f=2.358
Moderate	198	65.1	5.26±2.20	***P*=0.000**	24.18± 7.72	*P*=0.096
Poor	42	13.8	4.05±2.41		21.57±7.83	
Number of medicines used daily						
1-3	123	40.5	4.13±2.68	f=6.186	25.82±6.69	
4-6	115	37.8	4.45±2.30	***P*=0.000**	25.23±8.04	f=17.303
7-9	56	18.4	5.16±2.16		18.75±6.98	***P*=0.000**
10 and more	10	3.3	7.10±0.56		18.20±5.69	
Use of non-prescription medicines						
Yes	80	26.3	3.93±2.28	t=-2.575	25.05±8.25	t=1.422
No	224	73.7	4.75±2.50	***P*=0.011**	23.60±7.65	*P*=0.156
Having regular health check-ups for the disease						
Yes	205	67.4	4.68±2.40	t=1.475	24.76±7.62	t=2.514
No	99	32.6	4.24±2.58	*P*=0.141	22.37±8.04	***P*=0.012**
Paying attention to taking medicines every day regularly						
Yes	136	44.7	5.67±2.165	t=10.272	26.33±6.70	t=-4.878
No	168	55.3	3.14±2.08	***P*=0.000**	22.08±8.16	***P*=0.000**

(*Continued*)

Table 2. Comparison of the Total Scale Mean Scores according to the Descriptive Characteristics of Patients with Hypertension (N=304) (*Continued*)

	n	%	MAS $\overline{X}$ ±SD		E-HLS $\overline{X}$ ±SD	
Following publications about health						
Never	57	18.8	3.89±2.53	f=4.294	16.77±7.15	f=32.349
Rarely	86	28.3	4.74±2.34	***P*=0.005**	23.11±6.85	***P*=0.000**
Sometimes	111	36.5	4.96±2.36		26.64±6.87	
Often	50	16.4	5.00±2.39		27.78±6.34	
Frequency of following health broadcasts on TV						
Never	46	15.2	3.98±2.49	f=3.310	16.04±6.43	f=28.889
Rarely	83	27.3	4.73±2.47	***P*=0.020**	23.00±7.53	***P*=0.000**
Sometimes	115	37.8	4.91±2.50		26.19±6.57	
Often	60	19.7	4.93±2.30		27.20±7.07	
How useful are health resources when you are making health-related decisions?						
Not useful	98	32.3	4.10±2.54	f=5.712	20.22±7.96	f=38.179
No idea	77	25.3	4.54±2.52	***P*=0.004**	22.03±7.37	***P*=0.000**
Useful	129	42.4	5.28 ±2.10		28.00±5.93	

Table 3. The Relationship Between Medication Adherence and E-Health Literacy Scales of Patients with Hypertension (N=304)

Morisky medication adherence scale	E-health literacy scale
r	0.282
P	0.000

The correlation between MAS and E-HLS was found to be significant and positive ($P < 0.000$) (Table 3).

Discussion

In this study, a majority (56.3%) of participants exhibited a low level of medication adherence. This finding aligns with other studies, such as one conducted by Terline et al.[14] in an African country, which reported that 64.4% of patients demonstrated low medication adherence. Similarly, Mebrahtu et al.[15] identified a medication non-adherence rate of 72.8%.

Oori et al.[16] observed that medication adherence among patients with hypertension tends to increase with age. Similarly, Tong et al.[17] reported medication adherence rates of 71% in the 40-50 age group and 78% in those aged 65 and over.

Analysis of studies on this topic generally indicates higher medication adherence among male participants, aligning with the findings of this study.[9,18] However, some studies have reported better medication adherence in female participants.[16,19] These varying results suggest that medication adherence may be influenced by gender. The precise impact of gender on medication adherence remains unclear, and the divergent findings in the literature highlight the need for further investigation. Given these complexities, health professionals should adopt a multifaceted approach while creating individualized treatment plans based on gender and developing more effective interventions to improve patients' medication adherence.

Patients perceiving their current health status as good have been reported to exhibit higher medication adherence.[20,21] Generally, those who view their health positively feel healthier and approach treatment with a more optimistic outlook. This perception likely influences their regularity in taking medications and adherence to treatment plans.

The literature indicates that medication adherence escalates with the increasing number of daily medications and awareness of their side effects.[22,23] These findings imply that the complexity of treatment regimens and consciousness about potential side effects encourage patients to adhere more strictly to their medication schedules. Furthermore, studies have shown higher medication adherence among patients who refrain from using non-prescription medicines and consistently take their prescribed medications.[22,23]

In a systematic review exploring health beliefs and medication adherence among patients with hypertension, Al-Noumani et al.[24] discovered that medication adherence was greater in participants who valued health-related resources and regularly engaged with them, such as through television, health books, or receiving information from healthcare workers. Similarly, Paczkowska et al.[25] observed higher medication adherence in patients who considered health resources beneficial and sought advice from specialist doctors. These findings align with the results of the current study, suggesting that patients who actively seek health information and consult healthcare professionals are more likely to adhere to their medication regimens.

Comparing e-health literacy scale mean scores among patients with hypertension based on their descriptive features revealed that younger and single individuals had higher health literacy scores. This finding is unique as similar studies have not reported such results. For instance, other research on the topic indicated that marital status had no significant impact on health literacy levels[26], while some studies even found higher health literacy scores among married individuals.[27] These variations might be attributed to the influences of different societal norms or criteria used in these studies. Consequently, it's essential to conduct more extensive and

detailed research to understand the factors influencing health literacy, considering the diversity of societal contexts.

Guo et al.[6] observed that individuals who were employed and those with a university education or higher exhibited higher health literacy levels. Shi et al.[26] found that employed individuals had higher health literacy, and Ma et al.[28] reported higher health literacy among participants with health insurance. These findings align with the results of this study.

A study conducted in China revealed that the proximity and accessibility to health institutions influences individuals' health knowledge levels.[29] Similarly, this study found that participants residing in provincial centers exhibited higher health literacy levels. These results suggest that easy access to health services enables individuals to acquire more health information, thereby enhancing their health literacy. Additionally, the higher health literacy observed among those living in provincial centers might be attributed to the more developed health infrastructure and easier access to health information sources typically found in urban areas. This urban advantage likely provides more opportunities for health education and awareness.

Mean scores were higher in participants who did not smoke and who used 1-3 medicines daily, which is in line with the literature.[6]

Schumacher et al.[30] reported that patients possessing lower health literacy tended to have fewer office visits but more frequent emergency room visits and potentially preventable hospitalizations compared to those with adequate health literacy. The findings of this study align with these observations.

Higher e-health literacy scale mean scores were observed in participants who regularly followed health-related publications and perceived health-related resources as useful in making health-related decisions. This finding is consistent with existing literature.[31]

The correlation between the MAS and the E-HLS was found to be significant and positive, indicating that higher e-health literacy levels in patients correspond to increased medication adherence. This finding aligns with similar studies in the literature which have also identified a significant and positive correlation between medication adherence and health literacy status.[9,21,26]

Limitations of the Study

The limitations of this study must be acknowledged. It was conducted solely among patients diagnosed with hypertension and hospitalized in the Cardiology and Internal Medicine clinics of Ağrı İbrahim Çeçen University Hospital from April to July 2023. This focus on a single hospital or region limits the generalizability of the findings, suggesting the need for replication with a broader and more diverse sample. Additionally, the use of a random sampling method introduces another limitation in terms of bias.

Conclusion and Recommendations

The study demonstrated a significant and positive relationship between medication adherence and e-health literacy. Participants with higher e-health literacy were found to manage their medication treatment processes more adeptly. These results highlight the importance of the utilization of digital health resources and technologies in healthcare. Patients should be encouraged and educated to use various e-health tools, including medication reminders and online prescription tracking, emphasizing the advantages of these digital aids in managing their health more efficiently.

By implementing appropriate education and awareness programs aimed at enhancing patients' e-health literacy, healthcare professionals can encourage patients to actively engage in their treatment plans and better manage their health. This approach empowers patients to effectively utilize digital health resources, thereby enabling them to successfully adhere to their medication treatments.

Ethics Committee Approval: Ethics committee approval was received for this study from the Scientific Research Ethics Committee of Ağrı İbrahim Çeçen University (Approval Number: E-95531838, Date: 28.12.2022).

Informed Consent: Verbal consent was obtained by informing patients diagnosed with hypertension, who agreed to participate in the study, about the study's purpose.

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