Original Article

The Effect of Health Literacy and Adherence to Medical Treatment on Hypertension Control in the Elderly

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Highlights

- Uncontrolled hypertension is common in elderly hypertensive individuals.
- Health literacy is higher in elderly patients with controlled hypertension.
- Increasing of health literacy affects the adherence to medical treatment positively.

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ABSTRACT

Background: Health literacy is an important factor in facilitating disease management among individuals with hypertension. This study aimed to determine the effect of health literacy on adherence to antihypertensive treatment in elderly patients with controlled and uncontrolled hypertension.

Methods: This descriptive and comparative study included 203 elderly patients diagnosed with hypertension for at least 6 months who were on antihypertensive treatment. Data were collected using a patient information form, the Health Literacy Scale (HLS), and the Medication Adherence Self-Efficacy Scale Short Form (MASES-SF).

Results: The mean age of the participants was 69.70±12.49 years. Age, duration of disease, and duration of medication use were higher in patients with uncontrolled hypertension. Moreover, patients with controlled hypertension were more likely to have regular health check-ups, watch health-related programs in the media, and research the accuracy of disease-related information (P<0.05). In addition, patients with controlled hypertension were more likely to use medication once daily, have another chronic disease, and have a family history of hypertension (P<0.05). The mean MASES-SF and HLS scores of patients with controlled hypertension were statistically higher than those of patients with uncontrolled hypertension (P<0.01).

Conclusions: Controlled hypertension showed a positive correlation with health literacy and treatment adherence. Furthermore, the health literacy level was identified as a determinant of medication adherence in elderly patients.

Keywords: Adherence to Treatment; Health Literacy; Hypertension; Elderly

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Introduction

Due to the extension of the human lifespan and the consequent increase in the number of older adults in society, the health problems of the elderly have gained importance. Hypertension has become a major health problem among this population.[1] Hypertension poses a significant burden on global health and is among the leading preventable causes of mortality and morbidity. Moreover, as one of the modifiable cardiovascular risk factors, hypertension is a serious chronic disease that increases the risk of heart, brain, kidney, and other diseases.[2]

In studies conducted with large populations across various countries, the prevalence of hypertension in the elderly has been reported to range between 41.9% and 74.9%.[3-6] According to results from Türkiye's Hypertension Prevalence Study (Prevalence, Awareness, Treatment, and Control of Hypertension in Türkiye - PatenT2), hypertension prevalence was 67.9% among individuals aged 60-69 years and 85.2% among those aged 70-79 years. Additionally, the majority of participants (71.3%) in this study had uncontrolled hypertension.[7] Uncontrolled hypertension remains a primary challenge in hypertension management due to its multi-organ effects and life-threatening complications.[8] Uncontrolled hypertension is closely associated with increased risks of myocardial infarction, congestive heart failure, stroke, dementia, chronic kidney disease, and mortality.[9] In addition, more pronounced blood pressure fluctuations in elderly patients accelerate target organ damage and contribute to geriatric syndromes, including loss of functional independence, falls, and fractures.[10] Therefore, effective blood pressure control in elderly hypertensive patients is crucial. The fundamental requirements for successful hypertension management include ensuring timely and accurate diagnosis, implementing effective lifestyle modifications, initiating appropriate medical treatment promptly, and performing regular blood pressure monitoring.[11] For elderly patients to receive effective hypertension treatment, adherence to prescribed antihypertensive medication is particularly crucial.[12] Nonetheless, treatment adherence remains suboptimal among older adults, even in countries with high health awareness and well-educated patient populations.[13] Key factors influencing treatment adherence in this population include disease acceptance, medication knowledge, perceptions and attitudes toward medication use, comorbidities, cognitive function, and health literacy.[14]

The health literacy level is a key factor facilitating disease management in individuals with hypertension.[15] Recent studies have shown increasing interest in health literacy as it mediates blood pressure control, treatment adherence, and disease self-management.[12,16] Health literacy refers to an individual's ability to obtain, process, and understand basic health information needed to promote and maintain health.[13,17,18] This includes competencies such as following healthcare requirements, understanding medical instructions and educational materials, interpreting prescription information, and navigating complex healthcare systems.[16,19] In this context, health literacy represents both a critical source of disease-related information and a key motivator for effective disease management.[17] Research indicates that patients with adequate health literacy levels demonstrate improved quality of life and better self-management skills.[13,19] Conversely, inadequate health literacy has been consistently associated with numerous adverse outcomes, including increased hospitalizations and emergency department visits, insufficient preventive health behaviors, diminished overall well-being, underutilization of healthcare services, poor medication adherence, and impaired ability to interpret health information.[12,20,21] The literature identifies vulnerable populations most affected by inadequate health literacy, particularly elderly individuals, those with limited education, low-income groups, immigrants, and minority populations.[20,22] Notably, among older adults, inadequate health literacy has been established as a major determinant of poor health outcomes and elevated mortality risk.[13,23]

Although existing literature includes studies examining treatment adherence in hypertensive patients,[21,24,25] research investigating the relationship between health literacy levels and treatment adherence remains limited. The rising

global prevalence of hypertension, particularly among aging populations, underscores the need for interventions targeting modifiable factors like health literacy that may improve treatment adherence.

The present study aims to contribute to the literature by evaluating treatment adherence patterns in elderly patients with controlled versus uncontrolled hypertension, comparing adherence levels relative to health literacy status in both groups, and informing the development of targeted interventions to enhance disease management. Specifically, this study was designed to determine the effect of health literacy on antihypertensive treatment adherence among elderly patients with controlled and uncontrolled hypertension.

Methods

This cross-sectional comparative study was conducted with individuals aged 65 years or older who visited a state hospital in Türkiye's Central Anatolia region for examination or follow-up between August and December 2021. The study employed sampling methods consistent with previous similar research to identify controlled and uncontrolled hypertensive patients.[8,17,24] Participants were classified as having uncontrolled hypertension if their mean blood pressure measurements over 6 months showed systolic pressure ≥140 mm Hg or diastolic pressure ≥90 mm Hg, as determined by the physician researcher. The final sample included 203 elderly patients meeting the following criteria: (1) currently receiving antihypertensive treatment, (2) visiting the outpatient clinic specifically for hypertension-related health issues, (3) no diagnosis of dementia or Alzheimer's disease, (4) absence of visual, hearing, or verbal communication impairments, and (5) willingness to participate in the study.

The data were collected using three instruments: (1) a patient information form, (2) the Health Literacy Scale (HLS), and (3) the Medication Adherence Self-Efficacy Scale Short Form (MASES-SF). The patient information form, developed by the researchers based on a comprehensive literature review, contained 25 items assessing three domains: (1) personal characteristics (e.g., age, marital status, education level, occupation, and smoking/alcohol use), (2) clinical information (comorbid conditions, disease duration, and family history of hypertension), and (3) mean blood pressure values.[8,12,25,26]

HLS was originally developed by Sørensen et al.[27] The Turkish adaptation of the scale, for which validity and reliability studies were conducted by Aras and Temel 28 in 2017, consists of 25 items. This 5-point Likert-type instrument contains four subscales: (1) access to information, (2) understanding information, (3) appraisal/ evaluation, and (4) application/use. The total scale score ranges from 25 to 125 points. All scale items are positively worded without reverse scoring. Lower total scores indicate inadequate, problematic, or weak health literacy, while higher scores reflect adequate or excellent health literacy levels, with increasing scores corresponding to greater health literacy competence. In the Turkish validation study by Aras and Temel,[28] the scale demonstrated excellent reliability (Cronbach's α=0.92). In the present study, the scale showed similarly high internal consistency (Cronbach's α=0.98).

MASES-SF was originally developed by Ogedegbe et al.[29] and subsequently revised and validated by Fernandez et al.[30] Hacihasanoglu et al. 28 conducted the Turkish validity and reliability study of the scale with 150 hypertensive patients. MASES-SF is a 13-item instrument designed to assess self-efficacy regarding medical treatment adherence in hypertensive patients. The scale demonstrated excellent reliability in its Turkish adaptation (Cronbach's α=0.94). Each item uses a 4-point Likert scale response format, with total scores ranging from 13 to 52. Higher total scores indicate better adherence to antihypertensive treatment.[31] In the current study, the scale showed similarly high internal consistency (Cronbach's α=0.99).

Data collection forms were administered to elderly participants by physicians using a face-to-face interview technique. Blood pressure was measured with a manual sphygmomanometer during a single session by the same nurse, who was both a member of the research team and an employee at the hospital where the study was conducted. Measurements were taken from the

patient's right or left arm, whichever showed the higher value in the initial assessment. Standard measurement conditions were ensured, including that patients were rested, had not smoked before measurement, kept their legs uncrossed, and refrained from talking during the procedure. Following blood pressure measurement, the data collection forms were completed. The data collection process, including form completion and blood pressure measurement, required approximately 25-30 minutes per participant. Data analysis was performed using SPSS 29.0 software. The Kolmogorov-Smirnov test assessed data normality. Since the data did not meet parametric assumptions (showing non-homogeneous distribution), the Mann-Whitney U test was used for comparisons between two independent groups. Categorical data were compared using the Chi-square test, with the Fisher exact test applied when expected frequencies were below five. The Spearman correlation coefficient and multiple regression analysis were used to examine relationships, given the non-homogeneous data distribution. Regression analysis also evaluated the predictive effect of health literacy on treatment adherence. The error level (α) was set at 0.05, with P-values below this threshold considered statistically significant.

Prior to conducting the research, written approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Sivas Cumhuriyet University (Decision No:2018-01/26). All participating elderly individuals received comprehensive information regarding the study's purpose and procedures. Written informed consent was obtained from each willing participant. Researchers explicitly communicated that all collected data would be used exclusively for research purposes and maintained with strict confidentiality.

Results

The participants had a mean age of 69.70±12.49 years, with 54.2% being women, 80.8% married, 37.4% primary/secondary school graduates, and 87.2% unemployed. Among the elderly participants, the mean disease duration was 11.64±6.36 years, the mean duration of medication use was 10.26±6.24 years, the mean systolic blood pressure was 139.88±18.13 mmHg, and the mean diastolic blood pressure was 83.12±12.90 mm Hg. Hypertension was controlled in 61.1% of participants and uncontrolled in 38.9%. A statistically significant relationship existed between age, disease duration, and medication use duration when making comparisons between controlled and uncontrolled hypertension groups (P<0.01).

Patients with uncontrolled hypertension showed significantly higher values for age, disease duration, and duration of medication use. Furthermore, those with controlled hypertension demonstrated a significantly greater likelihood of having regular health check-ups, watching health-related media programs, and researching disease-related information accuracy (P<0.05). Additionally, the controlled hypertension group was significantly more likely to use medication once daily, have comorbid chronic conditions, and report a family history of hypertension (P<0.05) (Table 1).

The mean MASES-SF score for elderly hypertensive patients was 36.75±10.82 (median=39). Based on the possible score range (13-52 points), this indicates above-average medical treatment adherence. For health literacy, the overall mean HLS score was 71.49±26.86 (median=70), falling below average. Subscale analysis revealed moderate scores for access to information, appraisal, and application domains, while the understanding information subscale scored below average. Importantly, patients with controlled hypertension demonstrated significantly higher total and subscale scores on both MASES-SF and HLS than those with uncontrolled hypertension (P<0.01) (Table 2).

(Table 3) presents the correlation between MASES-SF and HLS scores in older adults. A significant positive correlation emerged between HLS total scores/subscale scores and MASES-SF scores for both controlled and uncontrolled hypertension groups (P<0.001), indicating that treatment adherence increases with health literacy levels.

Multiple regression analysis revealed that both overall health literacy scores and appraisal

subscale scores significantly predicted treatment adherence (R=0.54, R^2=0.289, F=20.163; P<0.01). These factors accounted for 29% of the variance in treatment adherence, demonstrating that higher health literacy levels positively influence adherence. Notably, the access to information, understanding information, and application subscales of HLS did not show significant effects in the regression model.

The analysis revealed that health literacy accounted for 25% of the variance in treatment adherence among elderly patients with controlled hypertension, and 32% among those with uncontrolled hypertension. Moreover, the appraisal and application subscales emerged as additional determinants of treatment adherence, specifically in the uncontrolled hypertension group (P<0.05) (Table4).

Table 1. Comparison of hypertension-related characteristics between patients with controlled and uncontrolled hypertension

Characteristics	General		Controlled hypertension (n=124)		Uncontrolled Hypertension (n=79)		
	M±SD		M±SD		M±SD		[a]P
Age (year)	69.70±12.49		61.45±13.09		67.24±10.63		-3.296; 0.001
Disease duration (year)	11.64±6.36		7.46±5.36		10.49±7.33		-3.389; 0.001
Duration of drug use	10.26±6.24		6.91±4.98		10.37±7.36		-4.002; 0.001
	n	%	n	%	n	%	[b]P
Disease knowledge							
Yes	121	59.6	75	62.0	46	38.0	0.102; 0.749
No	82	40.4	49	59.8	33	40.2	
Regular health check-up attendance							
Yes	108	53.2	74	68.5	34	31.5	5.366; 0.021
No	95	46.8	50	52.6	45	47.4	
Daily medication frequency							
One	60	29.6	47	78.3	13	21.7	11.010; 0.004
Two	114	56.2	60	52.6	54	47.4	
Three	29	14.3	17	58.6	12	41.4	
Engagement with health-related media programs							
Yes	118	58.1	82	69.5	36	30.5	22.246; 0.001
No	51	25.1	17	33.3	34	66.7	
Sometimes	34	16.7	25	73.5	9	26.5	
Verification of disease information accuracy							
Yes	44	21.7	37	84.1	7	15.9	18.464; 0.001
No	140	69.0	72	5.4	68	48.6	
Sometimes	19	9.4	15	78.9	4	21.1	
Presence of other chronic diseases							
Yes	132	65.0	70	53.0	62	47.0	10.297; 0.001
No	71	35.0	54	76.1	17	23.9	
General health assessment							
Good	111	54.7	75	67.6	36	32.4	5.651; 0.059
Middle	59	29.1	34	57.6	25	42.4	
Bad	33	16.3	15	45.5	18	54.5	
Hypertension-related hospitalizations (past year)							
No	148	72.9	102	68.9	46	31.1	14.107; 0.001
Once or twice	55	27.1	22	40.0	33	60.0	
Family history of hypertension							
Yes	79	38.9	55	69.6	24	30.4	3.965; 0.046
No	124	61.1	69	55.6	55	44.4	
Ability to meet self-care needs							
Yes	184	90.6	115	62.5	69	37.5	1.659; 0.198
No	19	9.4	9	47.4	10	52.6	

a: Mann-Whitney U t test; b: Chi-square test; P<0.01; P<0.05

Table 2. Comparison of Medication Adherence Self-Efficacy Scale and Health Literacy Scale scores between controlled and uncontrolled hypertension patients

Scales	General	Controlled Hypertension	Uncontrolled Hypertension	[a]P
	Median (25%–75%)	Median (255–75%)	Median (25%–75%)	
Medication Adherence Self-Efficacy Scale				

General	39 (26-43)	39 (29-48)	38 (26-39)	2.822; 0.005
Health Literacy Scale				
General	70 (50-93)	81 (58-99)	57 (44-78)	
Access to information	15 (10-20)	17 (13-20)	13 (9-15)	-4.532; 0.001
Understanding information	17 (11-24)	18 (13-26)	13 (10-20)	-3.600; 0.001
Appraisal/evaluation	24 (15-32)	26 (19-32)	19 (13-26)	-4.029; 0.001
Application/use	16 (11-20)	17 (13-20)	13 (8-16)	-4.137; 0.001

a: Mann-Whitney U t test; P<0.01; P<0.05

Table 3. Correlation of Medication Adherence Self-Efficacy Scale and Health Literacy Scale mean scores of the elderly

Health Literacy Scale	Medication Adherence Self-Efficacy Scale		
	General	Controlled Hypertension	Uncontrolled Hypertension
General	r=0.51; P=0.001	r=0.48; P=0.001	r=0.51; P=0.001
Access to information	r=0.49; P=0.001	r=0.49; P=0.001	r=0.43; P=0.001
Understanding information	r=0.48; P=0.001	r=0.45; P=0.001	r=0.48; P=0.001
Appraisal / evaluation	r=0.52; P=0.001	r=0.47; P=0.001	r=0.54; P=0.001
Application / use	r=0.44; P=0.001	r=0.43; P=0.001	r=0.41; P=0.001

r: Spearman correlation; P<0.01

Table 4. Multiple regression analysis of health literacy's effect on treatment adherence in elderly patients with hypertension

Variables	General				
	B	SE	ß	t	P
Access to information	-0.06	0.34	-0.03	-0.203	0.839
Understanding information	-0.55	0.33	-0.40	-1.634	0.104
Application/use	-0.76	0.39	-0.38	-1.966	0.051
Appraisal/evaluation	0.60	0.06	0.52	8.778	*<0.01*
Health Literacy Scale General	0.52	0.19	1.30	2.806	*<0.01*
	R=0.54, R^2=0.289, F=20.163; P*<0.01*				
	Controlled Hypertension				
Variables	B	SE	ß	t	P
Access to information	0.36	0.42	0.19	0.855	0.394
Understanding information	-0.26	0.45	-0.21	-0.582	0.562
Application/use	-0.31	0.47	-0.16	-0.654	0.515
Appraisal/evaluation	0.59	0.09	0.49	9.018	*<0.01*
Health Literacy Scale General	0.25	0.25	0.66	1.015	0.312
	R=0.50, R^2=0.254, F=10.109, P*<0.01*				
	Uncontrolled Hypertension				
Variables	B	SE	ß	t	P
Access to information	-0.82	0.58	-0.35	-1.416	0.161
Understanding information	-0.56	0.55	-0.31	-1.029	0.307
Application/use	-1.731	0.697	-0.798	-2.482	*0.015*

Appraisal/evaluation	0.61	0.09	0.57	7.125	*<0.01*
Health Literacy Scale General	0.88	0.29	1.88	3.031	*0.003*
	R=0.56, R^2=0.322, F=8.769; P<*0.01*				

P<0.05

Discussion

The regular use of antihypertensive medication is crucial for maintaining blood pressure control and preventing complications.[24] Despite the availability of effective treatments, suboptimal treatment adherence remains a significant barrier to achieving blood pressure control in many patients.[32,33] The present study examined potential differences in treatment adherence and health literacy levels between elderly patients with controlled versus uncontrolled hypertension, and the influence of health literacy on treatment adherence. The findings demonstrate that health literacy levels significantly correlate with treatment adherence in elderly patients with controlled hypertension, establishing health literacy as a key determinant of treatment compliance.

Medical treatment constitutes a critical component of daily life for elderly individuals with chronic conditions such as hypertension.[12] Assessing medication adherence in this population is essential for evaluating treatment effectiveness.[31] This study found that treatment adherence levels among elderly hypertensive patients were generally good, in line with findings from similar studies conducted in Türkiye.[25,26,34] Krousel-Wood et al.[24] reported high treatment adherence in 51.7% of elderly patients, while a Hong Kong study32 reported good adherence among 55.1% of hypertensive participants. These consistent findings across different populations may reflect that over half of elderly patients receive disease-specific education and maintain regular health monitoring.

Health literacy has emerged as a critical contemporary issue due to its significant impact on disease knowledge, self-care behaviors, hospitalization rates, chronic disease management, and mortality among elderly populations.[20,22,23] The current study identified below-average health literacy levels in elderly hypertensive patients, with particular deficiencies in information comprehension. These findings align with existing research demonstrating inadequate health literacy among elderly individuals.[12,35] Notably, one study of hypertensive patients found that 75% had low health literacy levels,[21] while another study suggested that age-related cognitive decline might contribute to reduced health literacy.[15] The suboptimal health literacy observed in our study may reflect both the natural cognitive changes associated with aging and the relatively low educational attainment among participants.

The literature consistently identifies inadequate treatment adherence and insufficient lifestyle modifications as primary contributors to uncontrolled hypertension.[21] Our results confirmed that patients with controlled hypertension demonstrate significantly better treatment adherence, with findings consistent with existing research.[31,36] A cohort study of elderly hypertensive patients further substantiates these results, revealing 2.71-fold lower medication adherence among those with uncontrolled hypertension.[24] These collective findings underscore the critical importance of treatment adherence for effective disease management.

The present study revealed significantly higher health literacy levels among individuals with controlled hypertension, a finding consistent with existing literature. Previous research demonstrates that inadequate health literacy occurs 2.06 times more frequently in patients with uncontrolled hypertension.[21] In addition, studies examining health literacy's relationship with cardiovascular risk factors (including blood pressure and lipids) in dialysis patients have established that adequate health literacy positively influences blood pressure control.[35]

A notable cohort study implemented health literacy interventions (including educational brochures and telephone consultations) for patients with uncontrolled hypertension. While

these interventions produced no statistically significant difference in systolic blood pressure reduction at 12- and 24-month follow-ups, 17 our study confirms that enhanced health literacy correlates strongly with improved treatment adherence in elderly hypertensive patients. These results are concordant with multiple studies identifying health literacy as a key determinant of treatment adherence.[12,37,38]

A meta-analysis demonstrated a significant positive correlation between health literacy and treatment adherence.[16] Chiming with this finding, Feder man et al.[23] found that elderly individuals with limited health literacy possessed less medication knowledge, which negatively impacted their treatment adherence.

The current study was conducted at a state hospital in a rural county of Türkiye's Central Anatolia region. Several limitations should be noted. Firstly, the study included patients within a restricted timeframe. Secondly, participants were recruited without sample size calculation, potentially limiting generalizability. The results are, therefore, representative only of this specific sample. Additional limitations include reliance on self-reported data for both treatment adherence and health literacy assessments, and the lack of differentiation between essential and secondary hypertension cases.

Our results demonstrated that elderly patients with controlled hypertension exhibited superior health literacy levels compared with those with uncontrolled hypertension, confirming health literacy as a key determinant of treatment adherence. Based on these findings, hypertensive elderly patients require targeted support for both consistent medication use and health literacy improvement. Healthcare professionals should prioritize regular follow-ups after a hypertension diagnosis, drawing upon visual and auditory educational materials to enhance understanding of disease management and medication use. It is advisable that medication adherence be assessed during each clinical encounter, with concurrent evaluation of health literacy status during routine health assessments. Individualized counseling should be provided for areas of difficulty, along with verification of patients' application of health information. Particular attention should be given to delivering repeated, simplified education sessions tailored for patients with limited education. Furthermore, implementing reminder systems, such as complimentary text messages for appointments and medication schedules, could enhance health literacy and treatment adherence. Health institutions should also consider establishing dedicated health education units, where personalized educational materials are developed to match patients' varying literacy levels. Such initiatives would significantly contribute to improving health literacy among elderly patients with hypertension.

Declarations:
Ethical Approval

Ethics committee approval was received for this study from the Non-Interventional Clinical Research Ethics Committee of Sivas Cumhuriyet University (Decided No: 2018-01/26).

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Conflict of Interest

The authors declare that they have no conflict of interest.

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