KARYA JOURNAL OF HEALTH SCIENCE

journal homepage: www.dergipark.org.tr/kjhs

ADAPTATION OF HYPERTENSION TREATMENT ADHERENCE SCALE INTO TURKISH, A VALIDITY AND RELIABILITY

HİPERTANSİYON TEDAVİ UYUM ÖLÇEĞİ'Nİ TÜRKÇEYE UYARLAMA, GEÇERLİK VE GÜVENİRLİK ÇALIŞMASI

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ABSTRACT

Objective: This study was conducted to adapt the Hypertension Treatment Adherence Scale into Turkish and to assess its validity and reliability.

Method: It was conducted using a methodological design with 263 hypertension patients between January 31, 2024 and April 31, 2024. Data were collected using a Patient Information Form, the Hypertension Treatment Adherence Scale, and the Hill-Bone Compliance to High Blood Pressure Therapy Scale. The linguistic validity, content validity, and construct validity of the scale were assessed. Internal consistency was assessed using Cronbach's alpha reliability coefficient, item-total correlation, split-half method, and time invariance tests. The reliability of the scale was further assessed through test-retest measurements. Statistical significance was accepted as $p<0.05$.

Results: In this study, 58.9% of the patients were women, and 52.9% were primary school graduates. The average duration of hypertension was 10.48 ± 9.06 years and the average duration of medication use was 10.06 ± 8.90 years. The content validity index of the scale was 0.98. In the factor analysis, the Kaiser-Meyer-Olkin value was 0.759, Bartlett's test of sphericity was $\chi^2=3051.078$, $p=0.000$. In the exploratory factor analysis, the total explained variance was found to be 70.377%. The fit indices obtained from the confirmatory factor analysis indicated that the values were within acceptable and normal ranges, demonstrating a good fit. The Cronbach's alpha reliability coefficient of the scale was 0.760, while those of the subscales ranged from 0.733 to 0.930.

Conclusion: The Hypertension Treatment Adherence Scale was found to be a valid and reliable instrument for assessing treatment adherence among hypertension patients among the Turkish population.

Key Words: Hypertension, Treatment, Adherence, Validity, Reliability

ÖZ

Amaç: Bu araştırma Hipertansiyon Tedavi Uyum Ölçeği'ni Türkçeye uyarlama, geçerlik ve güvenirliğini belirlemek amacıyla yapıldı.

Yöntem: Araştırma 31 Ocak 2024-31 Nisan 2024 tarihleri arasında 263 hipertansiyon hastasıyla metodolojik tasarım kullanılarak yapıldı. Veri toplama aşamasında Hasta Bilgi Formu, Hipertansiyon Tedavi Uyum Ölçeği, Hill Bone Hipertansiyon Tedavisine Uyum Ölçeği kullanıldı. Ölçeğin geçerlik çalışmasında dil geçerliği, kapsam geçerliği ve yapı geçerliği incelendi. Ölçeğin yapı geçerliliğini belirlemek için açıklayıcı faktör analizi ve doğrulayıcı faktör analizi yapıldı. İç geçerliliği değerlendirmeye yönelik ise Cronbach alfa güvenirlik katsayısı, madde toplam korelasyonu, yarıya bölme, zaman göre değişmezlik testleri kullanıldı. İstatistiksel anlamlılık $p<0.05$ kabul edildi.

Bulgular: Bu araştırmada hastaların %58.9'u kadın, %52.9'u ilkokul mezunuydu. Hipertansiyon süresi ortalama 10.48 ± 9.06 yıl ve ilaç kullanma süresi ortalama 10.06 ± 8.90 yıldır. Bu ölçeğin kapsam geçerlik indeksi 0.98, faktör analizinde Kaiser-Meyer-Olkin=0.759, Bartlett küresellik testi $x^2=3051.078$, $p=0.000$, açıklayıcı faktör analizi sonucunda açıklanan varyans 70.377 olarak bulundu. Doğrulayıcı faktör analizine ilişkin bulunan uyum indeksi değerlerinin, normal ve kabul edilebilir değerler arasında olması uyumun iyi olduğunu gösterdi. Ölçeğin Cronbach alfa güvenirlik katsayısı 0.760, alt boyutlarının Cronbach alfa güvenirlik katsayısı ise 0.733 ile 0.930 arasında bulundu.

Sonuç: Hipertansiyon Tedavi Uyum Ölçeğinin Türk toplumunda hipertansiyon hastalarının tedaviye uyumunu değerlendirebilmek için geçerli ve güvenilir bir araç olduğu belirlendi.

Anahtar Kelimeler: Hipertansiyon, Tedavi, Uyum, Geçerlik, Güvenirlik

INTRODUCTION

Hypertension, a chronic disease, is characterized by changes in arterial blood pressure and negatively impacts an individual's health, reducing both quality and duration of life. It is caused by genetic and environmental factors as well as metabolic disorders [1]. According to the 2023 data from the World Health Organization (WHO), an estimated 1.28 billion individuals aged 30-79 years worldwide have hypertension, with two-thirds of them living in low- and middle-income countries. Additionally, hypertension affects one in four men and one in five women globally and approximately 46% of individuals with hypertension are unaware of their condition. Based on these statistics, 13.8 million individuals aged 30-79 in Turkey are estimated to have hypertension [2]. Hypertension is a significant global public health issue as it leads to cardiovascular diseases, myocardial infarction, peripheral arterial disease, cerebrovascular disease, dementia, vision impairment or loss, chronic kidney failure, and early death [3,4]. Hypertension is the most critical risk factor for cardiovascular diseases, causing approximately 12 million deaths worldwide every year. Therefore, keeping hypertension under control is of great importance [5].

Patient adherence to treatment is one of the most significant factors in controlling blood pressure and preventing hypertension-related complications [6]. WHO defines adherence to treatment as patients taking their medications at the recommended dose, adhering to lifestyle changes, and following the advice of healthcare professionals [7]. Patient adherence to hypertension treatment and the control of blood pressure significantly reduces the risks of stroke, myocardial infarction, heart failure, and mortality [8]. Factors influencing adherence behavior in hypertensive patients include patient-related factors, social/economic conditions, and healthcare team-related factors [9]. The blood pressure control rate in Turkey and globally is approximately 25%, with non-adherence to hypertension treatment remaining one of the biggest challenges in managing and controlling hypertension [10,11]. The most common reasons for non-adherence to hypertension treatment include the patient's denial of the disease due to its asymptomatic nature, misinformation about the disease and treatment, unwillingness to undergo or continue treatment [11,12]. The perception that taking medication indicates worsening health, lack of knowledge about the disease, treatment, and medication dose, as well as concerns about medication side effects also affect adherence to the disease and treatment [12]. Health professionals have important duties in the management of hypertension. Nurses, especially those in constant communication with patients, play a key role in the management of hypertension [13,14].

Nurses, who play a crucial role in decision-making processes aimed at improving the quality of care, should establish individual, institutional, and professional goals to lead, ensure, and maintain treatment adherence [13]. In hypertension management, nurses contribute to better blood pressure control and treatment adherence by providing personalized care, enhancing care quality, actively involving patients in their treatment, and offering counseling and education [14,15]. By promoting healthy lifestyle behaviors, monitoring blood pressure regularly, and educating patients about medication use and disease management, nurses can support treatment adherence [16,17].

The literature indicates that measurement tools evaluating treatment adherence in hypertension patients are quite limited. In our country, there is only the Hill Bone Hypertension Treatment Adherence Scale used to evaluate the adherence of hypertension patients [18]. This scale is a measurement tool that evaluates compliance with medication, nutrition and appointments. However, in the management of hypertension, evaluation of exercise, safe and unsafe diet, smoking and alcohol use is also very important. Therefore, a particular need for comprehensive and up-to-date assessment tools that specifically measure treatment adherence in hypertension patients. Based on this necessity, the validity and reliability of the Turkish version of the Hypertension Treatment Adherence Scale (HTAS), developed by

Dehghan et al., is assessed, introducing a new measurement tool to the literature.

In addition, this adapted scale, unlike the existing scale, will allow for holistic evaluation of patients as it includes sub-dimensions that are important in individuals' adaptation to hypertension. In addition, this present study can contribute to determining the treatment adherence of hypertension patients and identifying nursing interventions aimed at improving patients' adherence to treatment. This study was conducted to adapt the HTAS into Turkish and to assess its validity and reliability.

METHOD

Study Design and Participants

The study was conducted using a methodological design between January 31 and April 31, 2024. The study consisted of hypertension patients who applied to a state hospital in Yatağan district of Muğla Province during the period when the study was conducted. Cross-cultural validity and reliability studies recommend that the sample size be ten times the number of items in the scale [19]. Therefore, as the scale consists of 22 items, the study sample included 263 patients. The data of the study were collected by the first author and every day during the research period. The data were collected through face-to-face interviews in patient rooms at a time convenient for the patients. On average, the data collection process required approximately 15 minutes to complete.

Inclusion Criteria: Patients who voluntarily agreed to participate in the study, were over 18 years old, able to communicate and cognitively competent to answer the questions, diagnosed with hypertension for at least six months, and using at least one anti-hypertensive medication were included in the study.

Exclusion Criteria: Individuals who did not want to participate in the study, were under 18 years old, unable to communicate, cognitively incapable of answering the questions, or receiving hypertension treatment for less than six months were excluded from the study.

Outcome Measures

Data were collected using a Patient Information Form, the Hypertension Treatment Adherence Scale, and the Hill-Bone Compliance to High Blood Pressure Therapy Scale.

Patient Information Form: This form was developed by the researchers conducting a literature review [20-24]. The form consists of a total of 18 questions encompassing sociodemographic and disease-related characteristics. The individual-related questions include information about patients' sex, age, education level, marital status, occupation, socioeconomic status, primary place of residence, smoking, and alcohol use. The hypertension-related questions include the duration of hypertension, duration of medication use, number of anti-hypertensive medications used, adherence to medication regimen, presence of other chronic diseases (if any), family history of hypertension, owning a blood pressure monitor, and frequency of blood pressure measurement.

Hypertension Treatment Adherence Scale (HTAS): The scale developed by Dehghan et al. to assess treatment adherence in hypertension patients consists of six subscales and 23 items. Its subscales are as follows: the treatment adherence and monitoring subscale includes items 1, 2, 3, 4, and 5; the adherence to safe diet subscale includes items 6, 7, 8, 9, 10, 11; the avoidance of unsafe diet subscale includes items 12, 13, 14, 15; the self-medication treatment subscale includes items 16,17, 18; the activity subscale includes items 19, 20 and the smoking subscale includes items 21, 22, 23. It uses a 5-point Likert-type measurement, with possible responses being: never (1), rarely (2), occasionally (3), often (4), and always (5). Items 6, 7, 8, 14, 15, 16, 17, 20, 21 and 22 are reverse scored. The total Cronbach's alpha reliability coefficient of the original scale is 0.76, while the subscales range between 0.66 and 0.87. The lowest obtainable score from the scale is 23, while the highest is 115 points. A higher total

score indicates greater adherence to hypertension treatment by the patient [23].

Adaptation Process of the Scale

The adaptation of the scale was carried out in two stages. The first stage consists of translating the scale items from English to Turkish, submitting them to expert opinion, and pilot application.

Language Validity: To adapt the scale to Turkish culture, language validity was conducted first. In this phase, the commonly used back-translation method was utilized. Three independent language experts who were native speakers of English translated the scale items from English to Turkish. The researchers then reviewed translations and combined them into a single form. The appropriateness of the expressions was evaluated by a Turkish language expert. Afterwards, an independent English language expert back-translated the final version of the scale from Turkish to English. The back-translated scale was then delivered to the authors via email to assess whether there were any changes in meaning between the original and translated ones. Their feedback confirmed that the scale items were consistent with the original scale.

Content Validity: Content validity was performed to determine whether the scale items sufficiently assessed the relevant topic. For content validity, the Davis technique (1992) was used, where experts evaluated each item as 1= item is appropriate, 2= item should be slightly revised, 3= item should be substantially revised, and 4= item is not appropriate. Through this technique, the CVI for the items was obtained by dividing the number of experts who marked options (1) and (2) by the total number of experts. To determine the CVI of the scale items, feedback was obtained from 10 faculty member specialized in nursing fundamentals and internal medicine nursing and one internal medicine physician. In the Davis technique, a CVI value of 0.80 is considered the acceptable threshold [25]. The CVI values for the scale items ranged from 0.72 to 1.00, with the total CVI being 0.98. "Do you eat votive foods if available?" was removed from the scale after obtaining approval from the original scale developer, due to its cultural inappropriateness and low content validity (CVI= 0.72) in the context of Turkish culture. This item was removed after content validity and was not applied to the sample. There were no revised items except for the item that was recommended to be removed after expert opinion. The Turkish version of the HTAS, tested for validity and reliability, consists of six subscales and 22 items.

Pilot Study: To evaluate the clarity of the scale items, a pre-test was conducted with 25 patients and these data were not included in the sample. At this stage, no changes were made to the scale items because feedback was received that the scale items were understandable.

Second Phase: In this phase, 263 hypertension patients were reached. Exploratory and confirmatory factor analysis and reliability analyses were performed.

The Hill-Bone Hypertension Treatment Adherence Scale (HBTS): This scale developed by Kim et al. (2000) [24], was adapted into Turkish by Karademir et al. (2009) for validity and reliability testing [18]. Using a 4-point Likert-type measurement, it consists of three subscales and 14 items. The subscales are medication adherence, including items 1, 2, 9, 10, 11, 12, 13, and 14; nutrition, including items 3, 4, and 5; and appointment, including items 6, 7, and 8. The possible responses on the scale are: never, sometimes, often, and always. The obtainable score from the scale ranges from 0 to 42. Patients who score zero on the scale are considered to be adherent to treatment, while patients with scores higher than zero are considered non-adherent to treatment. The Cronbach's alpha reliability coefficient of the Turkish version of the scale is 0.83. In the current study [24], this value is also 0.83.

Ethical Approval

Permission to use the scale, developed by the original authors and used as the parallel form in this study, was obtained via email from the researchers. Ethical approval for the study was granted by the Scientific Research and Publication Ethics Committee of Muğla Sıtkı Koçman University (date: 15.11.2023, approval number: 142) and permission was obtained from the institution where the study was conducted. Necessary information was provided to volunteering patients who met the inclusion criteria and provided their written informed consent, being told that their personal data would be protected and they could withdraw from the study at any time. This study was conducted in accordance with the principles of research and publication ethics of the World Medical Association Declaration of Helsinki, adhering to the Ethical Principles for Medical Research Involving Human Subjects 2013/64 general assembly decisions.

Statistical Analysis

The study data were analyzed using SPSS 22.0 and LISREL 8.80 software. The data were analyzed using numbers, percentages, minimum and maximum values, mean and standard deviation. The content validity index (CVI) was used to assess the content validity of the scale based on expert opinions and Kendall's W analysis was used to evaluate the agreement between experts. To determine the construct validity of the scale, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed. Prior to factor analysis, the suitability of the sample size for factor analysis was evaluated using the Kaiser-Meyer-Olkin (KMO) test and the correlation between items was assessed using Bartlett's sphericity test. To assess the reliability of the scale, Cronbach's alpha reliability coefficient, item-total correlation coefficient, group comparison of upper and lower 27%, parallel form equivalence, and test-retest methods were used. The statistical significance level was set at a 95% confidence interval and p<0.05.

RESULTS

Descriptive Characteristics of the Patients (n= 263)

The mean age of the patients was 62.68±13.14 (Min= 27 years- Max= 93 years), with 58.9% being female, 79.1% married, 52.9% being primary school graduates, and 39.9% being housewives. The mean duration of hypertension among the patients was 10.48±9.06 years (min= 6 months, max= 51 years), with 55.9% having income equal to their expenses and 59.3% living in a village. The mean duration of medication use was 10.06±8.90 years (min= 6 months, max= 51 years), with 74.9% using one medication, 89.7% using their medication regularly, 57% having an additional chronic condition, and 28.1% of those with chronic conditions having diabetes. In addition, 66.2% of the patients had a family history of hypertension, 81% had a blood pressure measuring device at home, 62% were nonsmokers, and 72.2% did not take alcohol (Table 1).

Validity

This study conducted EFA to determine the construct validity of the scale. To assess the suitability of the data for factor analysis, the KMO test was performed (KMO=0.759). The adequacy of the sample size was evaluated using Bartlett's test of sphericity (x^2=3051.078, p=0.000). When the scale was analyzed with six factors, as in the original scale, the factor loadings of all items were above 0.40 and the explained variance was 70.38% (Table 2). The scale was deemed valid as a six-factor structure.

After completing the EFA, CFA was conducted to get more precise findings, establishing a structural equation model. The calculated fit indices for the model of the scale were as follows: x^2/SD= 2.13, GFI=0.95, AGFI=0.93, CFI=0.98, RMSEA=0.066, and SRMR=0.071, which indicate a good fit (Table 3). The factor loadings of the subscales and items of the HTAS are presented in the PATH diagram (Figure 1).

Table 1. The distribution of patients' sociodemographic and disease characteristics (n=263)

Descriptive Characteristics		n	%
Gender	Female	155	58.9
	Male	108	41.1
Marital Status	Married	208	79.1
	Unmarried	55	20.9
Educational status	Literate	44	16.7
	Primary school	139	52.9
	Secondary school	54	20.5
	University	26	9.9
Profession	Worker	30	11.4
	Officer	22	8.4
	Housewife	105	39.9
	Farmer	17	6.5
	Self-employment	10	3.8
	Retired	79	30.0
Income status	Income less than expenditure	96	36.5
	Income equal to expenditure	147	55.9
	More income than expenditure	20	7.6
Place of residence	Village	156	59.3
	District	90	34.2
	City	17	6.5
Number of medicines used	1 medicine	197	74.9
	2 medicines	61	23.2
	3 medicines and above	5	1.9
Medication use	Yes	236	89.7
	No	27	10.3
Presence of additional chronic disease	Yes	150	57.0
	No	113	43.0
Chronic disease type*	Diabetes mellitus	74	28.1
	Cancer	8	3.0
	Respiratory system diseases	42	16.0
	Cardiovascular diseases	49	18.6
	Renal diseases	13	4.9
Presence of hypertension in the family	Yes	174	66.2
	No	89	33.8
Having a blood pressure monitor	Yes	213	81.0
	No	50	19.0
Frequency of blood pressure measurement	Every day	31	11.8
	Once a week	51	19.4
	When I feel uncomfortable	148	56.3
	Ever	33	12.5
Cigarette Use	Yes	38	14.4
	Dropped out	62	23.6
	No	163	62.0
Alcohol Use	Yes	24	9.1
	Dropped out	49	18.6
	No	190	72.2

*SD:Standard deviation; *:More than one option checked, n:Number of samples*

Reliability

The Cronbach's alpha reliability coefficient values for the subscales of the HTAS were as follows: treatment adherence and monitoring subscale (0.870), self-medication treatment subscale (0.930), adherence to safe diet subscale (0.733), avoidance of unsafe diet subscale (0.768), activity subscale (0.805), and smoking subscale (0.900). The overall Cronbach's alpha reliability coefficient for the HTAS was 0.760. The item-total correlation values for all items of the HTAS were positive (Table 2).

In the parallel form equivalence test, there was a significant, negative and high correlation between the scores obtained from the HTAS and the HBAS (p<0.05). The Spearman's Rho coefficient used as the parallel form equivalence coefficient was 0.753, indicating that the desired level of correlation between the two forms was achieved (Table 4). A test-retest was administered to 87 randomly selected patients from the sample group after two weeks, determining the Pearson correlation coefficient (r= 0.806, p<0.05) between the scores of the patients (Table 5). The difference between the upper and lower 27% quartile scores of the scale was statistically significant (t=-36.282, p= 0.000).
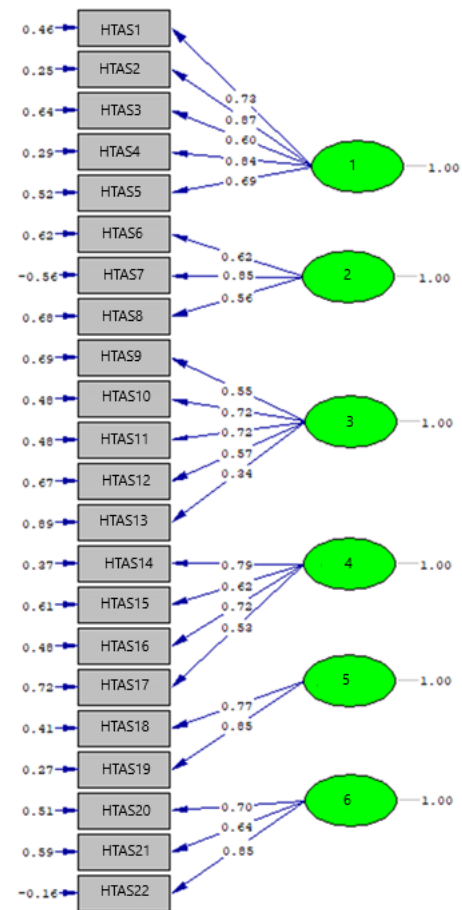
Chi-Square=414.14, df=194, P-value=0.00000, RMSEA=0.066

Figure 1. HTAS Turkish version PATH diagram

DISCUSSION

Adherence to treatment is crucial in the management of hypertension. The validity and reliability study of the Turkish version of the HTAS, developed to assess treatment adherence among hypertensive patients, was conducted and the findings were discussed the findings were discussed only with the original scale since it was not adapted to other languages.

Table 2. Factor analysis, item-total correlations and Cronbach's alpha reliability coefficients findings of HTAS (n=263)

Items	Mean	SD	Factor Loading	Item- total correlation	Cronbach's αlfa
Medication Adherence and Monitoring Subscale	-	-	-	-	**0.870**
Do you take your antihypertensive medication based on its prescription?	4.22	1.36	0.855	0.460	0.740
Do you take blood tests as regularly as prescribed by your physician?	3.88	1.39	0.900	0.562	0.732
Do you control your blood pressure weekly?	2.87	1.61	0.644	0.464	0.738
Do you refer to your doctor to monitor your blood pressure status every 3-6 months?	3.39	1.50	0.819	0.556	0.731
Do you refer to your doctor on predetermined appointments?	3.90	1.41	0.803	0.467	0.739
Safe Dietary Adherence Subscale	-	-	-	-	**0.733**
Do you eat boiled foods?	3.15	1.08	0.741	0.286	0.752
Do you comply with a low salt diet?	3.46	1.44	0.579	0.474	0.738
Do you eat high fiber foods and vegetables daily?	3.65	1.22	0.661	0.414	0.744
Do you eat fruits daily?	3.84	1.14	0.737	0.311	0.751
Do you eat whole grain products such as barley bread daily?	3.38	1.21	0.708	0.144	0.761
Avoiding Unsafe Diets Subscale	-	-	-	-	**0.768**
Do you eat fast foods such as sandwiches and pizza?	4.21	1.15	0.759	0.295	0.752
Do you eat sugar, sugar cubes, or sweets?	3.48	1.18	0.701	0.261	0.754
Do you eat junk foods such as chips and cheese puff?	3.66	1.07	0.881	0.275	0.753
Do you drink coffee?	3.00	1.39	0.712	0.152	0.762
Self-Medication Subscale	-	-	-	-	**0.930**
Do you ever purchase and continue your previous antihypertensive medication without referring to your physician?	4.63	0.98	0.962	0.194	0.757
Do you sometimes stop taking your medication due to any reason?	4.33	1.10	0.878	0.333	0.750
Do you increase or decrease the dosage of your medication without consulting your physician?	4.64	1.01	0.957	0.166	0.759
Activity Subscale	-	-	-	-	**0.805**
Do you do exercises such as walking, swimming, or cycling 4-7 days per week?	2.47	1.46	0.880	0.029	0.772
Do you exercise or walk for about 30-60 minutes each time?	2.60	1.45	0.887	0.050	0.770
Smoking Subscale	-	-	-	-	**0.900**
Do you smoke cigarettes?	4.48	1.25	0.925	0.257	0.754
Do you smoke hookah?	4.65	1.07	0.920	0.237	0.755
Are you constantly exposed cigarette smoke?	4.20	1.25	0.869	0.367	0.747
HTAS	-	-	-	-	**0.760**
Variance Explained (%)	15.977	12.290	11.692	11.423	11.10
Total Variance Explained (%)			**70.377**		

n:Number of samples, SD:Standard deviation, HTAS:Hypertension Treatment Adherence Scale

Table 3. Comfirmatory factor analysis resuts of the HTAS (n=263)

Index**	Normal Values	Acceptable Values	Analysis Result
x^2/SD	<2	<5	2.13
GFI	>0.95	>0.90	0.95
AGFI	>0.95	>0.90	0.93
CFI	>0.95	>0.90	0.98
RMSEA	<0.05	<0.08	0.066
SRMR	<0.05	<0.08	0.071

**x^2/SD:Chi-square/degree of freedom, GFI:Goodness-of-fit test, AGFI:Adjusted Goodness of Fit Index, CFI:Comparative fit index, RMSEA:Root Mean Square Error of Approximation, SRMR:Standardized Root Mean Square Residual

Table 4. Parallel form equivalence results (n=263)

Correlation		HTUÖ	HBTS
HTAS	r	1	-0.753
	p	-	**0.000**
HBTS	r	-0.753	1
	p	**0.000**	-

r:The Spearman's Rho coefficient, p<0.05, HTAS: Hypertension Treatment Adherence Scale, HBTS:Hill–Bone Compliance to High Blood Pressure Therapy Scale

Table 5. Test Re-test evaluation results (n=87)

Correlation		Test	Re-Test
Test	R	1	0.806
	P	-	**0.000**
Re-test	R	0.806	1
	P	**0.000**	-

r:Pearson correlation coefficient, p<0.05.

Validity is defined as the ability of a measurement tool to accurately assess the intended concept both qualitatively and quantitatively [26]. This study tested the validity of the scale by examining both content and construct validity. In scale adaptation studies, the first step to ensure cultural and linguistic equivalence is to establish linguistic validity [19,27]. To assess the linguistic validity of the HTAS, the translation-back translation method was used. After the translation, the final version of the scale was delivered to its developers for their approval. The translation process showed that the Turkish version of the scale was linguistically valid.

The CVI value calculated based on the opinions of 11 experts to determine the extent to which the items in the scale were related to assessing patients' adherence to hypertension treatment ranged from 0.72 to 1.00. Since item 10 did not meet the criterion (≥0.80) reported in the literature [25] for content validity, it was removed from the scale, while the CVI values of the remaining items were sufficient. In the evaluation of content validity, it is considered important that there is agreement among the opinions of experts, as this contributes to the reliability of content validity [28]. These findings suggest that the scale items are sufficient both quantitatively and qualitatively for measuring adherence to hypertension treatment.

Construct validity shows the extent to which a measurement tool measures the intended characteristic. One of the methods used to assess construct validity is factor analysis [29]. Factor analysis functions to reduce data, examine the dimensions measured by the scale, and determine whether the scale identifies the same dimensions across different groups [30]. In the present study, both EFA and CFA were conducted to test the construct validity of the scale. To assess whether the data from the sample were appropriate for factor analysis, the KMO test value needs to be close to 1 and at least ≥0.60. In Bartlett's test of sphericity, a significance level is desired to be less than 0.05 [31]. In the current study, the calculated KMO value of 0.760 and the Bartlett's test significance value (x^2=3051.078, p=0.000) indicate that the sample size is sufficient and the data are appropriate for factor analysis.

In the EFA, the calculated load values for each factor represent the correlation between the factor and the variable, and the variables loaded on the factor can also be used to explain the desired notion [31]. Factor loadings above 0.30 and variance explained around 40-60% are considered adequate [32]. The original scale was reported to have six factors, with all item factor loadings above 0.40 and a total explained variance of 61.69% [23]. In the present study, however, the scale has the same factor structure as the original scale, with factor loadings above 0.40 and an explained variance of 70.38%. The HTAS has six factors, with sufficient factor loadings for the items and the explained variance is at the desired level.

DFA is used to determine if the scale items align with the factor structure. For DFA, the recommended fit indices are χ^2/df, GFI, AGFI, CFI, RMSEA, and SRMR [30]. In this current study, DFA was conducted to verify the factor loadings determined by AFA and to test the fit with the original structure. The acceptable fit indices (x^2/df=2.13, GFI=0.95, AGFI=0.93, CFI=0.98, RMSEA=0.066, and SRMR=0.071) confirmed a good model fit, validating the six-factor structure of the scale. As a result of the DFA analysis, the six-factor structure of the scale is validated and the model-data fit is good.

Reliability refers to the extent to which a measurement tool is appropriate for its purpose, produces measures at a certain level, and yields similar outcomes each time [33]. The presence of adequacy, consistency, accuracy, equivalence, invariability, and stability in a measurement tool reflects its reliability. The ability of the measurement tool to produce similar outcomes consistently over repeated measurements demonstrates the tool's invariability and consistency [34]. To assess the internal consistency of the scale, Cronbach's alpha coefficient, item-total correlations, upper-lower 27% comparison, and test-retest values were utilized.

The Cronbach's alpha reliability coefficient is the most appropriate assessment method for reflecting the general reliability structure of a scale, evaluating its internal consistency. As this value approaches +1, the reliability is deemed high [35]. In the present study, the overall Cronbach's alpha reliability coefficient for HTAS is 0.760, with subscales ranging from 0.733 to 0.930. In the original scale developed by Dehghan et al. (2020), the overall Cronbach's alpha reliability coefficient is 0.76, and the subscales range between 0.66 and 0.87 [23]. The high reliability coefficients of both the original and Turkish versions of the scale indicate that it is a reliable measurement tool.

Item analysis was performed by evaluating the difference between the lowest and highest 27% groups [36]. The scores obtained from the scale were ranked from highest to lowest and grouped into the lowest 27% and highest 27%. Independent sample t-tests were used to compare the mean scores of the groups. The result showed a significant difference (p<0.05) between the groups, indicating that the scale items are distinctive.

Item-total correlation analysis is a reliability method examining how each item of the scale correlates with the measured construct [19]. The correlation coefficient provides information about the direction and degree of the relationship between two variables. When evaluating the reliability coefficient of a measurement tool, it is considered sufficient for this value to be within positive limits [37]. The item-total correlation values for all items of the HTAS were positive. In the original version of the scale, the correlation values among its subscales were reported to range between 0.13 and 0.56 [23]. The level at which each item represents the scale shows similar characteristics in both versions.

The reliability of a measurement tool is examined using the parallel (equivalent) form method by determining the correlation value between test scores obtained from two equivalent forms-designed to measure the same characteristic-to a group either simultaneously or at different times [36]. As the correlation value increases, the equivalence of the scales increases too [27,28]. For the parallel form reliability of HTAS, the HBAS was used. The scores obtained between the scales were found to have a statistically significant, negative, and high correlation. These results demonstrate that HTAS is a consistent and reliable scale.

To test the temporal stability of a measurement tool, the results obtained at different times should be consistent. One of the methods used to determine the level of correlation between repeated measurements of the same variable is the test-retest method [38]. The test-retest method is to re-administer the scale to 25% to 50% of the sample after two to six weeks [39]. This method examines the stability level of the scores obtained from the scale over time. The correlation coefficient calculated in measurements ranges between -1 and +1, indicating the direction and degree of the correlation between variables. A minimum correlation coefficient value of 0.70 indicates that the scale is stable [19]. To assess the temporal stability of the scale, the correlation coefficient (r=0.806) obtained from a randomly selected group of 87 patients (%33) after two weeks is sufficient, demonstrating that the scale provides consistent measurements over time.

Limitations

One limitation of the study is that it was conducted in only one institution and one item was removed from the original scale due to its cultural inappropriateness and low content validity in the Turkish context. Another limitation is that the original version of the scale was developed in Iran and since no adaptation studies have been conducted in other languages, the findings can only be compared with the present study.

CONCLUSION

According to the study results, the Turkish version of the HTAS, consisting of six subscales and 22 items, has sufficient validity and reliability, confirming its suitability as a measurement tool for assessing patients' adherence to hypertension treatment. The HTAS can be used to evaluate hypertension patients' treatment adherence and further studies can be conducted on the validity and reliability of its Turkish version with different sample groups.

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