

**Research Article**

Assessment of adherence to drug treatment and affecting factors among hypertensive patients

Hipertansif hastalarda ilaç tedavisine uyum ve etkileyen faktörlerin değerlendirilmesi



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ABSTRACT

Introduction: Adherence to antihypertensive therapy is important for blood pressure control. Poor adherence to antihypertensive drug therapy leads to the development of hypertensive complications and increase risk of cardiovascular events. The aim of this study was to assess adherence to antihypertensive drug therapy and associated factors among hypertensive patients.

Methods: A cross-sectional study was conducted on a simple random sample of 242 patients at the Family Health Center. Adherence to antihypertensive treatment was assessed using the Turkish Modified Morisky Scale (TMMS). The factors affecting the adherence to treatment were obtained with a sociodemographic questionnaire. Blood pressures of all participants were measured from both arms and the mean values were recorded.

Results: The mean age of the 242 participants was 60.95 ± 12.54 years. Mean systolic blood pressures of the participants were 139.08±20.78 mmHg and mean diastolic blood pressures were 83.63±11.88 mmHg. Adherence to antihypertensive medication was found 76.9% (non-adherence to treatment was 23.1%) and 75.6% of the participants had sufficient knowledge antihypertensive treatment.

Conclusions: We found numbers of drugs taken daily, level of knowledge about treatment and level of education to be the strongest factors affecting adherence to anti-hypertensive medication among our patients. We also found that high adherence to treatment is important for effective blood pressure control. Health workers' questioning the adherence to antihypertensive drug therapy may provide more effective blood pressure control in hypertensive patients.

Keywords: Hypertension, adherence to treatment, antihypertensive therapy

ÖZ

Giriş: Antihipertansif tedaviye uyum kan basıncı kontrolü için önemlidir. Antihipertansif ilaç tedavisine zayıf uyum hipertansif komplikasyonların gelişmesine ve kardiyovasküler olay riskinin artmasına sebep olur. Çalışmamızın amacı hipertansif hastalarda antihipertansif ilaç tedavisine uyumu ve etkileyen faktörleri değerlendirmektir.

Yöntem: Aile Sağlığı Merkezinde 242 hastadan oluşan basit rastgele örneklem üzerinden kesitsel bir çalışma yürütülmüştür. Antihipertansif tedaviye uyumun değerlendirilmesinde Türkçe Modifiye Morisky Ölçeği kullanılmıştır. Tedaviye uyumu etkileyen faktörler sosyodemografik anket formu ile elde edilmiştir. Tüm katılımcıların kan basınçları her iki koldan ölçülüp ortalamaları kayıt edilmiştir.

Bulgular: Çalışmaya dahil edilen 242 katılımcının yaş ortalaması 60,95±12,54 yıldır. Katılımcıların ortalama sistolik kan basıncı 139,08±20,78 mmHg, diyastolik kan basıncı ise 83,63±11,88 mmHg idi. Katılımcıların %75,6'sının antihipertansif tedavi bilgi düzeyi yeterli idi ve antihipertansif tedaviye uyum oranı %76,9 (tedaviye uyumsuzluk oranı %23,1) saptandı.

Sonuç: Katılımcıların antihipertansif tedaviye uyumu günlük alınan ilaç sayısı, tedavi hakkında ki bilgi düzeyi ve eğitim düzeyleri ile ilişkili bulundu. Etkin kan basıncı kontrolünde tedaviye yüksek uyum önemliydi. Sağlık çalışanlarının hipertansif hastalarının antihipertansif tedaviye uyum durumunu sorgulamaları daha etkin kan basıncı kontrolü sağlayabilir.

Anahtar kelimeler: Hipertansiyon, tedaviye uyum, antihipertansif tedavi

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Introduction

Hypertension is a medical condition in which blood pressure (BP) is persistently elevated in the arteries [1]. The hypertension is a major public health burden worldwide, causing more than 7 million premature deaths every year. Nearly 33.5% of US adults are diagnosed with high BP, and prevalence is expected to reach 37.2% by the year 2030 [2]. Clinical studies have shown that persistent increase in blood pressure significantly increases cardiovascular mortality and morbidity in hypertensive patients [3-5]. Therewithal patients with high blood pressure have higher risk of coronary heart disease, stroke, heart failure, peripheral artery disease, end-stage renal disease and all-cause mortality, when compared with hypertensive patients whose BP is controlled on therapy [4,5].

Current BP goal attainment rates remain inadequate despite our advanced antihypertensive treatment to our patients [2]. Approximately 30% of adults are unaware of their hypertension; more than 40% of individuals are untreated and two-thirds of treated patients do not have adequately controlled BP [6]. It is known that the behaviors of the patients such as using non-prescribed drugs, forgetting to take the drug, taking the drug at the wrong time, missing the appointments are the reasons of inadequate blood pressure goal [7]. Non-adherence to pharmacological treatment is recognized as an important barrier to the successful management of antihypertensive therapy [8]. Although there are many barriers to antihypertensive treatment, poor adherence to medication is considered one of the main causes of inadequate response to blood pressure (BP) [8]. Adherence to medication is an explanation of drug-taking behavior and refers to taking drugs in compliance with the time, dose and frequency prescribed by the healthcare provider. Non-adherence may lead to various clinical risks. In many studies, low adherence is associated with higher mortality and hospitalization rates than higher adherence [9-11].

The estimates of prevalence differ across studies with non-adherence rates reported from as low as 3.0% and up to 65.0%. In our country, the rates of non-adherence to antihypertensive treatment were reported as 13.2%, 22.6% and 14.0%, respectively [12-14]. Adherence to medication is determined by various aspects such as factors associated with the patient, condition, therapy, healthcare system, social/economic status and so on [9-11,15,16]. Adherence to medication is one of the most important fact of success in antihypertensive treatment thus, to improve adherence, a strategic approach to the specific cause is needed [17]. Therefore, the aim of this study was to investigate the factors affecting adherence to antihypertensive medication in our patients. In our study, the effect of sociodemographic characteristics, comorbidities and antihypertensive treatment training status on compliance with antihypertensive treatment was investigated. In addition, the relationship between the participants' blood pressure values and adherence to antihypertensive treatment was also investigated.

Methods

Study Design

This is a descriptive cross-sectional study. Before starting the study, approval was obtained from the Ethics Committee of the Medical Faculty of Firat University with the decision dated 11.10.2018 and numbered 16/18. The volunteers were informed about the study. For the volunteers who accepted to participate in the study, a consent form in accordance with the Helsinki World Medical Association Declaration was obtained.

Study Population and Sample

The population of the study consisted of receiving antihypertensive treatment patients who admitted to our family health center. Since the size of the universe is not known, the sample size is calculated from the formula ($n = t^2 * p * q / d^2$) in calculating the sample size. The incidence of non-adherence to antihypertensive therapy was reported as 20% in literature so we made a sample calculation by accepting 20% incidence of non-adherence rate [13].

$n = 1.962 * (0.2 * 0.8) / 0.05^2$. $t = 1.96$ at 95%. $q = 1 - p$.

$d =$ margin of error (5%). $n =$ sample size. $p =$ prevalence of non-adherence to antihypertensive drug treatment.

It was found that at least 245 people should be included in the study. The sample selection was randomly selected between January-June 2019 between the volunteers who participated in the study and those who met the research criteria. Our study was concluded when 250 participants were reached. Missing and incorrect data collections were excluded from the study and the study was completed with 242 participants.

Inclusion criteria

- Patients over 18 years old
- Having been diagnosed with hypertension for at least 6 months
- Receiving or recommended antihypertensive treatment
- Volunteering to participate in the study

Exclusion criteria

- Communication problems or psychiatric diagnosis
- Participants with amnesia

Data collection

The data of the study were obtained by using questionnaires filled by the participants themselves after the necessary explanations were made to the participants. The questionnaires of the illiterate participants were read by the researcher and the patient was answered. Blood pressure of all participants was measured with an aneroid sphygmomanometer from both arms after a rest period of at least 15 minutes than mean blood pressure was recorded. Systolic blood pressure ≥ 140 and diastolic blood pressure ≥ 90 mmHg were considered high blood pressure (uncontrolled blood pressure). The same

researcher performed all these procedures. The factors that might affect the participants' adherence to antihypertensive treatment were questioned with a sociodemographic questionnaire, which was consisting of 11 questions.

Turkish Modified Morisky Scale (TMMS) was used to assess adherence of the participants to antihypertensive treatment. The scale was first developed in 1986 by Morisky D.E. Green L.W. and Levine D.M. as a four-question questionnaire to assist family physicians in assessing adherence to antihypertensive drug therapy. The validity and reliability study of the Turkish Modified Morisky Scale was performed by Vural et al. [18]. The questions require Yes/No answers. "Yes" produces 1 point, "No" 0 point in questions 2 and 5, and "Yes" produces 0 point and "No" 1 point in other questions. If the total score of respondents for questions 1, 2 and 6 equals to 0 or 1, this means that they have low motivation, whereas a score >1 refers to high motivation. If the total score of respondents for questions 3, 4 and 5 equals to 0 or 1, this means that they have low knowledge, whereas a score >1 refers to high knowledge [18].

Statistical analysis

Statistical analysis of the data was performed using IBM SPSS 22 statistical package program. Normal distribution of data was confirmed by the Shapiro-Wilk test before further analyses. Normally distributed data are expressed as mean \pm SD in the text and table and frequency for categorical variables as percentage [n (%)]. Student's t-test was used to compare two independent groups for normal distributed data. Categorical variables were compared using Chi-squared and Fisher's exact tests, as applicable. The relationship between motivation score and number of drugs taken daily was evaluated by the Pearson correlation analysis. A p-value of less than 0.05 was considered statistically significant for all analyses.

Results

A total of 250 hypertensive patients were invited and 242 people participated. The mean age of the participants were 60.95 ± 12.54 years. 46.7% (n=113) of the participants were female and 53.3% (n=129) were male. Mean systolic blood pressures of the participants were 139.08 ± 20.78 mmHg and mean diastolic blood pressures were 83.63 ± 11.88 mmHg. The clinical and sociodemographic characteristics of hypertensive patients presented in Table 1.

Table 1. Clinical and sociodemographic characteristics of participants

Variables	N/mean	%/ SD
Age	60.95	12.54
Systolic BP	139.08	20.78
Diastolic BP	83.69	11.88
Gender		
Female	113	46.7
Male	129	53.3
Educational level		
Under high school	169	69.8
High school	73	30.2
Occupation		
Academic	162	66.9
Non-academic	33	13.6
Retired	47	19.5
Income		
Insufficient	55	22.7
Sufficient	187	77.3
Diagnosis and treatment time of HT		
< 1 year	13	5.4
1-3 year	36	14.9
3-5 year	41	16.9
5-10 year	56	23.1
>10 year	96	39.7
Average no of medications		
1 pill	41	16.9
2-4 pills	102	42.1
\geq 5 pills	99	40.9
HT nutritional and drug education status		
Have	126	52.1
Have not	116	47.9
Frequency of doctor visits for HT		
Once a month	63	26.1
Once 3 months	101	41.7
Once 6 months	23	9.5
Once a year	9	3.7
Irregular	46	19.0
Frequency of blood pressure monitoring		
Everyday	56	23.1
Once a week	101	41.7
Once a month	47	19.4

Systolic blood pressure status	Irregular	38	15.7
	Normal	115	47.5
	High	127	52.5
Diastolic blood pressure status	Normal	150	62.0
	High	92	28.0

Adherence to antihypertensive medication (high adherence) was found 76.9% (n=186). 75.6% of the participants had sufficient knowledge (high knowledge) of antihypertensive treatment (Table 2). There were statistically significant relationship between participants' education level (p=0.02) and HT knowledge level (p=0.001) with adherence to antihypertensive treatment. The mean values of both systolic and diastolic blood pressure were lower in patients with high adherence to antihypertensive treatment (Table 3).

Table 2. Adherence to medication and level of knowledge of Antihypertensive treatment

Variables	Number (n)	Percentage (%)
Adherence to Antihypertensive Medication		
Low	56	23.1
High	186	76.9
Level of knowledge		
Low	59	24.4
High	183	75.6

Table 3. Relationship between some variables and adherence to adherence to antihypertensive treatment.

Characteristics	Adherence to antihypertensive medication				Total		p-value	
	Low Mean/n	SD/%	High Mean/n	SD/%	n	%		
Age	63.27	±11.84	60.26	±12.70			0.12	
SBP (mmHg)	148.98	±23.30	136.10	±19.04			0.001*	
DBP (mmHg)	87.59	±13.32	82.52	±11.18			0.005*	
Gender								
	Female	25	22.1	88	77.9	113	100.0	0.73
	Male	31	24.0	98	76.0	129	100.0	
Education level								
	Under high school	46	27.2	123	72.8	169	100.0	0.02**
	High school	10	13.7	63	86.3	73	100.0	
Occupation								
	Academic	7	21.2	26	78.8	33	100.0	
	Non-academic	36	22.2	126	77.8	162	100.0	0.71
	Retired	13	27.7	34	72.3	47	100.0	
Income								
	Insufficient	15	27.3	40	72.7	55	100.0	0.41
	Sufficient	41	21.9	146	78.1	187	100.0	
Additional disease state								
	Have	43	22.8	146	77.2	189	100.0	0.79
	Have not	13	24.5	40	75.5	53	100.0	
HT nutritional and drug education status								
	Have	27	21.4	99	78.6	126	100.0	0.51
	Have not	29	25.0	87	75.0	116	100.0	
Frequency of doctor visits for HT								
	1 time in ≤6 months	39	20.9	148	79.1	187	100.0	
	Irregular or 1 time in ≥6 months	17	30.9	38	69.1	55	100.0	0.12
Frequency of blood pressure monitoring								
	1 time in ≤ week	36	22.9	121	77.1	157	100.0	
	Irregular or 1 time in ≥ week	20	23.5	65	76.5	85	100.0	0.92
Level of HT knowledge								
	Low	34	57.6	25	42.4	59	100.0	0.001**
	High	22	12.0	161	88.0	183	100.0	
Systolic blood pressure status								
	Normal	18	15.7	97	84.3	115	100.0	0.009**
	High	38	29.9	89	70.1	127	100.0	
Diastolic blood pressure status								
	Normal	26	17.3	124	82.7	150	100.0	
	High	30	32.6	62	67.4	92	100.0	0.006**

SBP: Systolic blood pressure, DBP: Diastolic blood pressure.

*Student's t-test, ** Chi-squared test.

As the number of medications taken daily increased, adherence to treatment scores decreased at statistically significant ($p=0.001$) (Table 4).

Table 4. Relationship between motivation score and number of drugs taken Daily

Descriptive	Mean	Standard Deviation	N
Motivation score	2.26	±0.93	242
Number of pills taken daily	3.50	±1.58	242
Correlations		Motivation score	Number of drugs taken daily
Motivation score	Pearson correlation	1	-240**
Number of drugs taken daily	Pearson correlation	-240**	1
	Sig . (2-tailed)	.000	

** Correlation is significant at the 0.01 level (2-tailed).

Discussion

Adherence to antihypertensive medications as measured using Turkish Modified Morisky Scale (TMMS) was 76.9% in our study. Education level, HT knowledge level and number of drugs taken daily were the factors showing inverse association with medication adherence. The participants with high adherence to antihypertensive therapy group had lower systolic and diastolic blood pressures than non-adherence group.

The reported adherence rate in Turkish literature were 86.8%, 77.4% and 86.0% respectively [12-14]. According to studies conducted outside Turkey adherence rates were reported as 85.0%, 61.8%, 81.4% and 77.0%, respectively [19-22]. Our findings are consistent with the findings of similar studies. In our study and in all of these studies, similar method was used, thus finding similar results showed that we obtained results consistent with the literature. According to our findings one quarter of our patients had non-adherence to antihypertensive therapy. In Hypertension, which is the most common chronic disease, one quarter of patients do not comply with the drug treatment is an important health problem.

In our study, a statistically significant relationship was found between the level of education and adherence to antihypertensive treatment. In most of the literature data, no statistically significant relationship was reported between education level and adherence to antihypertensive treatment [12, 13, 19, 22]. Although not directly related to education level, Lubabo et al. reported that poor knowledge increases non-adherence to medication and Ramli et al. reported that low health literacy increased non-adherence to antihypertensive treatment [23, 24]. Although we have obtained evidence that adherence to antihypertensive drug treatment increases with increasing education level, however, population studies with larger samples are needed to support our claim.

In our study, we measured the level of knowledge of participants about antihypertensive drug therapy with TMMS. The level of knowledge of treatment was found to be significantly associated with adherence in our study, with better adherence observed in high level of knowledge. In three different studies examining the relationship between knowledge level and drug adherence, it was reported that as knowledge of antihypertensive therapy increased, adherence to treatment as well [13, 22, 25]. Lubbo et al. reported that low level of knowledge about treatment increased non-adherence to treatment 2.4 fold [23]. According to the literature data and our findings, it was suggested that informing the patients about the treatment might increase the adherence to the treatment.

An inverse relationship was observed between adherence and number of pills taken daily. In three studies investigating the effect of pills taken daily on adherence to treatment, adherence to treatment was reported to decrease as the number of pills increased. In the meta-analysis of Uchmanowicz et al, reported that an inverse relationship between the number of pills taken daily and adherence to treatment, similar to our findings [26]. Reducing the number of pills taken daily with drug combinations may increase the non-adherence to antihypertensive drug therapy. In a study conducted in our country in relation to adherence to treatment in hypertension, a negative correlation was found between adherence to treatment and systolic blood pressure [27].

Adherence to antihypertensive treatment is known to be important for effective blood pressure control. Therefore, we examined the relationship between adherence to treatment and blood pressure. Both systolic and diastolic blood pressure were lower in the adherence to treatment group than non-adherence to treatment group. In five different studies examining the relationship between adherence to treatment and blood pressure, it was reported that patients with adherence to treatment had lower blood pressures [8, 21, 28-30]. Our data show that blood pressure control is better in patients who are high adherence to antihypertensive drug therapy. In cases of uncontrolled blood pressure, patient compliance with treatment should be questioned. More effective blood pressure controls can be obtained by investigating and eliminating the causative factors in patients who do not comply adequately with antihypertensive drug treatment.

In conclusion, we found numbers of drugs taken daily, level of knowledge about treatment and level of education to be the strongest factors affecting adherence to anti-hypertensive medication amongst our patients. We also found that high adherence to treatment is important for effective blood pressure control. If we want to provide effective blood pressure control, we need to increase adherence to antihypertensive drug treatment of our patients and question and reduce the number of drugs taken daily. Health workers' questioning the adherence to antihypertensive drug therapy may provide more effective blood pressure control in hypertensive patients. There is a need for all health providers to incorporate a system to record the adherence to treatment and blood pressure control at every visit until the patient requires being on treatment.

We recommend that physicians question the level of adherence to treatment and the level of knowledge about treatment. Training programs for patients with hypertensive treatment to be prepared and applied at regular intervals may contribute to effective treatment. We recommend that physicians question unnecessary drug use to their patients and reduce the number of medications taken daily with combined treatments. In future studies, it is possible to make more contribution to the literature by studying educational programs and investigating the effect on effective treatment and blood pressure control. In future studies, we recommend that the effect of drug taken daily on adherence to treatment should be reduced drug and the patients should be followed up prospectively.

Limitations

The first limitation of our study was that it was a cross-sectional study and it is not representative of the general population. Besides, the study data relied on self-report. Since our patients were admitted to a single center, we may not have a homogeneous distribution. Another limitation of our study was the evaluation of participants' blood pressure measurements at admission. A single blood pressure measurement may prevent us from reaching an adequate opinion about the blood pressure status of our patients. We suggest that factors affecting of adherence to treatment and the effect of adherence to treatment on blood pressure control should be examined in larger populations with multicenter studies.

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