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Original Research Article

Hypertensive patients' adherence to pharmacological and non-pharmacological treatment methods, in Turkey

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ABSTRACT

Background: The present study was aimed at determining hypertensive patients' adherence to pharmacological and non-pharmacological treatment methods and factors affecting their adherence.
Methods: This cross-sectional study was conducted with 418 patients aged 18 and over who met the inclusion criteria. Adherence to pharmacological and some non-pharmacological treatment methods is the dependent variable of the study. Data were collected using the personal information form, Morisky medication adherence scale. In the analysis, descriptive statistics, the chi square test, and logistic regression analysis were used. The significance level was accepted as $p<0.05$.
Results: The rate of adherence to the pharmacological treatment was 78.2%. The rates of adherence to smoking cessation, diet and physical activity were 49.0%, 55.7% and 20.6% respectively. Age, employment status and perceived health status were associated with the adherence to smoking cessation; perceived income, resort to complementary alternative treatment methods and having regular controls (check-ups) were related to the adherence to the diet, and gender and perceived economic status were related to the adherence to physical activities ($p<0.05$).
Conclusions: While approximately four out of five patients complied with the pharmacological treatment, rates of adherence to non-pharmacological treatment methods were low. Multidisciplinary intervention programs should be planned in order to regularly monitor patients at family health centers, to assess their adherence to treatment modalities and to promote adherence.

Keywords: Hypertension, Patient, Treatment, Adherence

INTRODUCTION

Hypertension is one of the common preventable public health problems that cause deaths and serious complications. The aim in the treatment of hypertension, the most important risk factor for heart diseases and stroke, and responsible for about 50% of the deaths caused by these diseases, is to keep the patient's blood pressure within the ideal limits, to prevent complications likely to occur and to increase the quality of life of the patient.[1,2] In the literature, keeping the blood pressure within the ideal limits has been indicated to reduce stroke risk approximately by 38%, congestive heart failure risk by 42%, and coronary heart disease risk by 28%.[3]

Today, despite the advanced hypertension treatment modalities and awareness of appropriate lifestyle habits, studies performed both in Turkey and in other countries

in the world in recent years report that blood pressure cannot be controlled in about 70% of adults who receive medication treatment for hypertension.[2,4,5] According to the World Health Organization (WHO), the main factor contributing to the failure of keeping blood pressure within the ideal limits is the non-adherence to pharmacological and non-pharmacological treatment methods.[2,6] Several studies conducted in countries such as China, Taiwan, Ethiopia and India to assess patients' adherence to medication treatment by using different methods report that adherence rates vary between 48% and 86%, and that non-adherence both to pharmacological and to non-pharmacological treatment methods is the most important obstacle to blood pressure control.[7-13]

Health personnel play a key role in patients' adherence to pharmacological and non-pharmacological treatment methods used for blood pressure control. It is possible to ensure patients' adherence to pharmacological and non-pharmacological treatment methods by monitoring the patient meticulously, determining the factors affecting patients' adherence to the treatment and planning attempts to eliminate these factors.[14]

In Turkey, a small body of research has been conducted on the adherence to pharmacological and non-pharmacological methods, and on factors affecting the adherence, which will shed light on the planning of community oriented attempts to increase adherence to the hypertension treatment.[12,15] Therefore, the present study was aimed at determining adherence to pharmacological and non-pharmacological treatment methods used for hypertension control among hypertensive patients aged 18 years and over, and factors affecting their adherence.

METHODS

Type of the study

The study is cross-sectional.

The population and sample of the study

The minimum sample size required for the study was calculated as 384 using the formula "$n=(t^2.(Pq)/d^2)$" used to calculate sample size for unknown population. Then, taking into account the fact that some respondents might be excluded due to several reasons, it was decided to include 10% more people as substitutes; thus, 422 patients were targeted to contact. For the calculations, 0.95% confidence level, 5% standard deviation and 50% unknown prevalence value (because, in Turkey, there is no study conducted at national level to determine the adherence rate of patients with hypertension) were used.

Inclusion criteria

The present study comprised 418 patients who presented to a Family Health Center in the province of Balıkesir between September 1, 2015 and December 31, 2015, were 18 years of age or older, were diagnosed with hypertension at least six months ago, had the cognitive ability to answer research questions, and agreed to participate in the study.

Variables of the study

The dependent variables of the study are adherence to antihypertensive medication and adherence to non-pharmacological treatment methods such as controlling hypertension, smoking cessation, diet and physical activity. Of the patients, those whose Morisky medication adherence scale scores ranged between 1 and 7 were considered to comply with the treatment. Taking into account 2013. The European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) Guidelines for the management of arterial hypertension, of the participants, those who smoked at least one cigarette per day but quit smoking after having been diagnosed with hypertension were considered that they complied with the treatment.[6] Patients who stated that they were given dietary therapy by a health institute and that they followed the dietary treatment were also considered that they complied with the treatment. Patients with moderate physical activity (walking, jogging, cycling or swimming) for at least 30 minutes per day for 5-7 days per week were also considered that they complied with the treatment.[6] Patients who had checkups at intervals of six months or shorter were considered to have checkups regularly. The assessment of the Body Mass Index (BMI) was based on WHO classification and individuals with BMI of 25 kg/m^2 or more were regarded as overweight or obese.[16]

The independent variables of the study were as follows: age, gender, marital status, level of education, employment status, health insurance, perceived economic status, duration of hypertension diagnosis, duration of hypertension treatment, types of medicines used, resort to Complementary and Alternative Medicine (CAM), regular measurement of blood pressure at home, having regular checkups, presence of comorbid chronic illness, presence of complications, perceived health status, and BMI.

Data collection tools

The study data were collected with the Personal Information Form developed by the researchers based on the relevant literature which included 30 items questioning the sociodemographic and disease related characteristics of the patients and the 9-item Adherence to Morisky Medication Adherence Scale.

Morisky medication adherence scale

The Scale developed by Morisky et al. in 2003 includes 9-items. The first 8 questions of the scale are answered as "Yes" and "No", and are encoded (scored) as 1 and 0,

respectively. In the ninth question, for each item, one of the following options is marked: 1. never/ rarely, 2. occasionally, 3. sometimes, 4. usually, and 5. always. The lowest and highest possible scores to be obtained from the scale were 1 and 13 respectively. While those whose scores are between 1 and 7 are considered that they have complied with the treatment, those with a score of 8 or above are considered that they have not complied with the treatment. The scale was adapted to the Turkish population by Demirezen in 2006 and the Cronbach alpha value of the scale was calculated as 0.82.[17,18] In the present study, the Cronbach alpha value of the scale was calculated as 0.84.

Application

Before the data was collected, official permission was obtained from the institution and approval from Balıkesir University Clinical Research Ethics Committee. The purpose and scope of the study were explained to those who met the inclusion criteria and their verbal consent indicating that they agreed to participate in the study was obtained. The data were collected with the face-to-face interview technique by trained health personnel.

Analysis of the data

For data analysis, the SPSS 16.0 software (SPSS, Inc.,Chicago, IL, USA) was used. In the analysis, descriptive statistics, the chi square test and logistic regression analysis were used. In order to establish a model on adherence to pharmacological treatment, cessation of smoking, diet and physical activity, a logistic regression model was developed by using the backward elimination method. The model included variables determined to be related to dependent variables through the univariate analysis and in studies in the literature. The p value of 0.05 was considered significant.

RESULTS

The mean age of the participants was 63.89±12.65 (Min: 24, Max: 93). Of them, 62.0% were female, 69.1% were married and 49.5% were primary school graduates. 21.5% were employed in a paid job, 93.5% had health insurance and 75.6% perceived their income level as moderate (Table 1).

Table 1: Rates of adherence to pharmacological and some non-pharmacological treatment methods in terms of sociodemographic characteristics of patients.

Variables (n=418)	n (%)	Adherence to pharmacological		Adherence to non-pharmacological treatment methods					
				Smoking cessation		Diet		Physical activity	
		n (%)	Test value	n (%)	Test value	n (%)	Test value	n (%)	Test value
Age									
18-44	22 (5.3)	17 (77.3)	χ^2=0.578 p=0.749	2 (2.5)	χ^2=21.319 p=0.001	3 30.0)	χ^2=2.862 p=0.239	4 (18.2)	χ^2=0.148 p=0.929
45-64	203 (48.6)	162 (79.8)		28 (34.6)		76 (55.9)		41 (20.2)	
≥ 65	193 (46.2)	148 (76.7)		42 (72.4)		72 (57.6)		41 (21.2)	
Gender									
Female	259 (62.0)	208 (80.3)	χ^2=1.728 p=0.189	28 (49.1)	χ^2=0.001 p=0.978	86 (54.4)	χ^2=0.255 p=0.613	44 (17,0)	χ^2=5.357 p=0.021
Male	159 (38.0)	119 (74.8)		44 (48.9)		65 (57.5)		42 (26.4)	
Marital status									
Single	23 (5.5)	19 (82.6)	χ^2=0.411 p=0.814	4 (36.4)	χ^2=3.023 p=0.221	8 (57.1)	χ^2=0.069 p=0.966	5 (21.7)	χ^2=1.122 p=0.571
Married	289 (69.1)	224 (77.5)		58 (53.2)		106 (56.1)		63 (21.8)	
Others*	106 (25.4)	84 (79.2)		10 (37.0)		37 (54.4)		18 (17.0)	
Level of education									
Lower than primary school	100 (23.9)	75 (75.0)	χ^2=3.794 p=0.285	14 (50.0)	χ^2=6.285 p=0.099	37 (48.7)	χ^2=2.260 p=0.520	23 (23.0)	χ^2=7.458 p=0.059
Primary school	207 (49.5)	158 (76.3)		38 (59.4)		71 (57.7)		32 (15.5)	
Junior high school	37 (8.9)	31(83.8)		9 (36.0)		15 (57.7)		11 (29.7)	
Senior high school or higher	74 (17.7)	63 (85.1)		11 (36.7)		28 (60.9)		20 (27.0)	
Employment status									
Employed	90 (21.5)	68 (75.6)	χ^2=0.482 p=0.488	6 (15.0)	χ^2=25.390 p=0.000	39 (59.1)	χ^2=0.402 p=0.526	25 (27.8)	χ^2=3.642 p=0.056
Unemployed	328 (78.5)	259 (79.0)		66 (61.7)		112 (54.6)		61 (18.6)	
Health insurance									
Yes	31 (93.5)	303 (77.5)	χ^2=1.926 p=0.165	69 (50.4)	χ^2=1.547 p=0.328**	143 (56.1)	χ^2=0.225 p=0.635	81(20.7)	χ^2=0.075 p=0.785
No	27 (6.5)	24 (88.9)		3 (30.0)		8 (50.0)		5 (18.5)	

Perceived economic condition									
Good	65 (15.6)	54 (83.1)		8 (36.4)		30 (71.4)		21 (32.3)	χ^2=6.607
Moderate	316 (75.6)	246 (77.8)	χ^2=1.524	58 (53.7)	χ^2=3.640	111 (54.4)	χ^2=6.846	59 (18.7)	p=0.037
Bad	37 (8.9)	27 (73.0)	p=0.467	6 (35.3)	p=0.162	10 (40.0)	p=0.033	6 (16.2)	

* Divorced/widowed/separated ** Fisher's exact test.

Table 2: Rates of adherence to pharmacological and some non-pharmacological treatment methods in terms of clinical characteristics of patients.

Variables (n=418)	n (%)	Adherence to Pharmacological		Adherence to Non-Pharmacological Treatment Methods					
				Smoking cessation		Diet		Physical activity	
		n (%)	Test value	n (%)	Test value	n (%)	Test value	n (%)	Test value
Duration of diagnosis									
<1 year	31 (7.9)	26 (83.9)		4 (33.3)		14 (82.4)		5 (16.1)	
1-5 years	135 (34.5)	109 (80.7)		24 (49.0)		46 (54.8)		29 (21.5)	
6-10 years	122 (31.2)	88 (72.1)	χ^2=5.419	16 (38.1)	χ^2=6.684	38 (48.7)	χ^2=6.613	24 (19.7)	χ^2=0.921
≥11 years	103 (26.3)	86 (83.5)	p=0.144	21(65.6)	p=0.083	44 (57.9)	p=0.085	24 (23.3)	p=0.820
Duration of the treatment									
<1 year	34 (8.8)	29 (85.3)		4 (30.8)		13 (81.3)		6 (17.6)	
1-5 years	137(35.3)	109 (79.6)		24 (49.0)		46 (54.1)		29 (21.2)	
6-10 years	118 (30.4)	86 (72.9)	χ^2=5.583	16 (39.0)	χ^2=7.978	38 (48.7)	χ^2=6.334	23 (19.5)	χ^2=1.013
≥11 years	99 (25.5)	84 (84.8)	p=0.134	20 (69.0)	p=0.046	43 (59.7)	p=0.096	24 (24.2)	p=0.798
Types of drugs									
1	269 (64.4)	214 (79.6)		39 (43.3)		99 (58.6)		58 (21.6)	
2	110 (26.3)	89 (80.9)	χ^2=7.120	21 (58.3)	χ^2=2.969	34 (45.3)	χ^2=5.151	19 (17.3)	χ^2=1.044
≥3	39 (9.3)	24 (61.5)	p=0.028	12 (57.1)	p=0.227	18 (66.7)	p=0.076	9 (23.1)	p=0.593
CAM use		97 (79.5)	χ2=0.165	23 (52.3)	χ2=0.273	29 (33.7)	χ2=24.710		χ2=1.077
Yes	122 (29.2)	230 (77.7)	p=0.684	49 (47.6)	p=0.602	122 (65.9)	p=0.000	29 (23.8)	p=0.299
No	296 (70.8)							57 (19.3)	
Measuring blood pressure at home									
Yes	330 (78.9)	262 (79.4)	χ^2=1.248	57 (51.8)	χ^2=1.409	125 (55.6)	χ^2=0.014	74 (22.4)	χ^2=3.283
No	88 (21.1)	65 (73.9)	p=0.264	15 (40.5)	p=0.235	26 (56.5)	p=0.904	12 (13.6)	p=0.070
Having regular checkups									
Yes	90 (21.5)	69 (76.7)	χ^2=0.165	12 (40.0)	χ^2=1.216	46 (71.9)	χ^2=8.863	18 (20.0)	χ^2=0.023
No	328 (78.5)	258 78.7)	p=0.685	60 (51.3)	p=0.270	105 (50.7)	p=0.003	68 (20.7)	p=0.879
Comorbidities									
Yes	293 (70.1)	230 (78.5)	χ^2=0.042	56 (50.5)	χ^2=0.392	105 (51.2)	χ^2=6.909	61(20.8)	χ^2=0.036
No	125 (29.9)	97 (77.6)	p=0.839	16 (44.4)	p=0.531	46 (69.7)	p=0.009	25 (20.0)	p=0.850
Perceived health status									
Good	94 (22.5)	77 (81.9)	χ^2=2.399	10 (45.5)	χ^2=8.084	36 (59.0)	χ^2=0.636	25 (26.6)	χ^2=2.910
Moderate	200 (47.8)	150 (75.0)	p=0.301	30 (39.5)	p=0.018	66 (53.2)	p=0.727	36 (18.0)	p=0.233
Bad	124 (29.7)	100 (80.6)		32 (65.3)		49 (57.0)		25 (20.2)	
BMI									
Underweight / normal	139 (33.3)	109 (78.4)	χ^2=0.004	35 (61.4)	χ^2=5.751	45 (58.4)	χ^2=0.323	29(20.9)	χ^2=0.011
Overweight / obese	279 (66.7)	218 (78.1)	p=0.948	37 (41.1)	p=0.016	106 (54.6)	p=0.570	57 (20.4)	p=0.918

Of the participants, 26.3% were diagnosed with hypertension 11 or more years ago, 25.5% took medication for hypertension for 11 years or longer, 64.4% stated that they used only one type of medication, 29.2% resorted to CAM besides pharmacological treatment, 78.9% stated that they measured blood pressure at home, 21.5% stated that they had regular checkups, 70.1% had a chronic disease such as heart disease, diabetes and stroke co-morbid with hypertension, 22.5% perceived their health as good and 66.7% were overweight or obese (Table 2).

The mean score the participants obtained from the Morisky medication adherence scale was 5.26±2.38 (Min: 2.00, Max: 12.00). The proportion of the patients who complied with the pharmacological treatment according to the cut point was 78.2%. The rates of the participants' adherence to non-pharmacological treatment

methods such as smoking cessation, diet and physical activity were 49.0%, 55.7% and 20.6% respectively.

Of the socio-demographic characteristics, age, gender, marital status, level of education, employment status, health insurance and perceived economic status did not lead to any statistically significant differences between the participants in terms of their adherence to the pharmacological treatment (p>0.05). Compared to the other categories of the socio-demographic characteristics, adherence to smoking cessation was significantly higher among the participants in the age group of 65 and over, adherence to diet was significantly higher among the participants who perceived their economic condition as good, and adherence to physical activity was significantly higher among the male participants and the participants who perceived their economic condition as good (Table 1, p<0.05).

Table 3: Factors affecting adherence to pharmacological therapy in logistic regression analysis.

Variables (n=418)		β	SE	P	OR (%95.00 CI)
Age (years)	-	0.023	0.011	0.136	1.12 (0.74-1.45)
Gender	Male				1.00
	Female	-0.125	0.279	0.655	0.88 (0.51-1.52)
Level of education	Lower than primary school				1.00
	Primary school	-0.091	0.312	0.771	0.91 (0.49-1.68)
	Junior high school	-0.627	0.578	0.278	0.53 (0.17-1.66)
	Senior high school or higher	-0.786	0.470	0.094	0.46 (0.18-1.14)
Employment status	Employed				1.00
	Unemployed	0.824	0.317	0.514	1.27 (0.88-3.21)
Health insurance	No				1.00
	Yes	0.850	0.629	0.177	2.34 (0.68-8.02)
Perceived economic condition	Good				1.00
	Moderate	0.441	0.387	0.798	1.83 (0.92-1.81)
	Bad	-0.054	0.324	0.841	1.11 (0.79-2.41)
Duration of the treatment	-	0.051	0.032	0.216	1.42 (0.91-1.53)
Types of drugs	≥3				1.00
	1	0.054	0.304	0.860	1.06 (0.58-1.92)
	2	0.738	0.473	0.119	2.09 (0.83-5.28)
Having regular checkups	Yes				1.00
	No	0.835	0.211	0.178	1.12 (0.88-1.46)
Comorbidities	No				1.00
	Yes	-0.042	0.299	0.889	0.96 (0.53-1.73)
Perceived health status	Good				1.00
	Moderate	0.378	0.346	0.276	1.46 (0.74-2.87)
	Bad	-0.020	0.395	0.960	0.98 (0.45-2.13)

Hosmer and Lemeshow test: 0.211, Nagelkerke R square: 0.215, Omnibust test p:0.000.

The rate of adherence to pharmacological treatment was significantly lower in the participants who took three types of drugs for hypertension (p<0.05) than that in the participants who took one and two types of drugs. Compared to the other categories of the socio-demographic characteristics, adherence to smoking cessation was significantly higher among the participants who took medication for hypertension for 11 years or more, who perceived their economic condition as bad and who were underweight or healthy weight according to BMI,, and adherence to diet was significantly higher among the participants who did not resort to CAM, who had regular checkups, who did not have a chronic illness co-morbid with hypertension (p<0.05). There were no statistically significant differences between the categories of the clinical characteristics in terms of the participants' adherence to physical activity (Table 2, p>0.05).

According to the logistic regression model, one-unit increase in the patient's age led to a 1.89 fold (95.00% CI: 1.18-2.54) increase in adherence to smoking cessation. Adherence to smoking cessation was 2.58 (95% CI: 1.56-3.91) times higher in the participants who were unemployed and 1.41 (95% CI: 1.18-3.87) times higher in the participants who perceived their health as poor (Table 4). Adherence to diet was 1.96 (95% CI: 1.07-3.41) times higher in the participants who perceived their health as good, 4.65% (95.00% CI: 2.49-8.67) times higher in the participants who did not resort to CAM, and 2.44 (95.00% CI: 1.33- 4.47) times higher in the participants who had regular checkups (Table 5). Adherence to physical activity was 2.14 (95% CI: 1.29-3.54) times higher in the male participants and 3.27 (95.00% CI: 1.09-4.78) times higher in those who perceived their economic condition as good (Table 6).

Table 4: Factors affecting adherence to smoking cessation in the logistic regression model.

Variables (n=418)		β	SE	P	OR (%95.00 CI)
Age (Years)	-	0.107	0.072	0.037	1.89 (1.18-2.54)
Gender	Female				1
	Male	-0.006	0.594	0.992	0.99 (0.31-3.19)
Level of education	Lower than primary school				1
	Primary school	-0.898	0.721	0.213	0.41 (0.11-1.67)
	Junior high school	-0.526	0.954	0.581	0.59 (0.09-3.83)
	Senior high school or higher	-0.506	0.908	0.577	0.60 (0.10-3.57)
Employment status	Employed				1
	Unemployed	2.026	0.553	0.003	2.58 (1.56-3.91)
Health insurance	No				1
	Yes	-0.441	0.838	0.462	0.64(0.43-1.88)
Perceived economic condition	Good				1
	Moderate	1.161	0.895	0.195	3.19 (0.56-6.45)
	Bad	-0.205	0.628	0.744	0.82 (0.24-2.79)
Duration of the treatment	-	0.121	0.091	0.147	1.19 (1.07-2.63)
Having regular checkups	Yes				1
	No	0.411	0.141	0.121	1.04 (0.77-2.83)
Comorbidities	No				1
	Yes	-0.21	0.58	0.717	0.81 (0.26-2.53)
Perceived health status	Good				1
	Moderate	0.395	0.718	0.582	1.48 (0.36-4.36)
	Bad	0.019	0.017	0.032	1.41 (1.18-3.87)
BMI	Underweight / normal				1
	Overweight / obese	0.181	0.0114	0.157	1.14 (1.03-1.98)

Hosmer and Lemeshow test: 0.196, Nagelkerke R square: 0.223, Omnibust test p=0.000.

Table 5: Factors affecting adherence to recommended diet in logistic regression model.

Variables (n=418)		β	SE	P	OR (%95.00 CI)
Age (Years)	-	-0.002	0.015	0.918	0.99 (0.97-1.03)
Gender	Female	-0.341	0.293	0.244	1
	Male				0.24 (0.40-1.26)
Level of education	Lower than primary school				1
	Primary school	-0.185	0.337	0.582	0.83 (0.43-1.61)
	Junior high school	-0.655	0.577	0.256	0.52 (0.17-1.61)
	Senior high school or higher	-0.509	0.453	0.261	0.60 (0.25-1.46)
Employment status	Employed				1
	Unemployed	0.097	0.368	0.793	1.10 (0.54-2.26)
Perceived economic condition	Bad				1
	Moderate	0.384	0.024	0.011	1.96 (1.07-3.41)
	Good	0.661	0.124	0.147	1.43 (0.94-1.97)
Duration of the treatment (years)	-	-0.028	0.018	0.11	0.97 (0.94-1.01)
CAM use	Yes	1.537	0.317	0	1
	No				4.65 (2.49-8.67)
Having regular checkups	No	0.893	0.309	0.004	1
	Yes				2.44 (1.33-4.47)
Comorbidities	No	1.024	0.34	0.113	1
	Yes				1.78 (0.83-3.42)
Perceived health status	Good	0.285	0.38	0.454	1
	Moderate	-0.027	0.42	0.948	1.33 (0.63-2.80)
	Bad				0.97 (0.43-2.22)
BMI	Underweight / normal	0.384	0.141	0.357	1
	Overweight / obese				1.19(0.92-2.94)

Hosmer and Lemeshow test: 0.188, Nagelkerke R square: 0.229, Omnibust test p:0,000.

Table 6: Factors affecting adherence to physical activity in logistic regression model.

Variables (n=418)		β	SE	P	OR (% 95.00 CI)
Age (Years)	-	-0.008	0.013	0.551	0.99 (0.96-1.02)
Gender	Female				1
	Male	0.758	0.258	0.003	2.14 (1.29-3.54)
Level of education	Lower than primary school				1
	Primary school	0.557	0.336	0.098	1.75 (0.90-3.71)
	Junior high school	0.146	0.497	0.769	1.16 (0.44-3.06)
	Senior high school or higher	0.123	0.408	0.763	1.13 (0.51-2.52)
Employment status	Employed				1
	Unemployed	0.164	0.33	0.619	1.18 (0.62-2.25)
Perceived economic condition	Bad				1
	Moderate	1.185	0.559	0.034	3.27 (1.09-4.78)
	Good	0.806	0.315	0.071	2.24 (0.96-3.16)
Duration of the Treatment	-	0.128	0.551	0.844	1.27(0.79-2.86)
Having regular checkups	No				1
	Yes	0.195	0.294	0.507	1.22 (0.68-2.16)
Comorbidities	No				1
	Yes	0.876	0.323	0.117	2.40 (0.97-4.52)
Perceived health status	Good				1
	Moderate	0.393	0.318	0.217	1.48 (0.79-2.76)
	Bad	0.41	0.362	0.257	1.51 (0.74-3.06)
BMI	Underweight / normal				1
	Overweight / obese	0.381	0.249	0.157	1.88(0.91-3.44)

Hosmer and Lemeshow test: 0.192, Nagelkerke R square: 0.232, Omnibust test p=0.000.

DISCUSSION

In this present study, in which adherence to pharmacological and non-pharmacological treatment were studied, approximately 80% of the participants complied with the pharmacological treatment. Rates of adherence to pharmacological treatment range between 52% and 87% in studies conducted in Turkey and between 48% and 84% in studies conducted abroad.[7,8,12,15,19-24] The WHO has reported that rates of adherence to pharmacological treatment by hypertension patients vary between 20% and 80%.[25] Thus, it can be concluded that the rate of adherence to pharmacological treatment in this present study conducted in a semi-urban region in Turkey overlaps with the rates reported in the literature.

In this present study, there was no association between adherence to pharmacological treatment and socio-demographic characteristics. Similarly, in some studies in the literature, adherence to pharmacological treatment is not associated with socio-demographic characteristics.[7,21,22,26]

On the other hand, some studies have indicated that sociodemographic characteristics such as age, gender, level of education, perceived income status are related to adherence to the pharmacological treatment.[3,21,26] For example, while adherence to treatment increases in some studies as the age increases it decreases in other studies.[8,23,27] In these studies, an increase or decrease in the rate of adherence to the treatment with age may be due to the presence of comorbid chronic diseases, perceived health status, or differences in giving or receiving health care.[7,24] While gender is not a determinant for the rate of adherence to the pharmacological treatment in some studies the adherence rate is high in women in other studies.[8,19] In the present study, although not significant, the rate of adherence was high in women as in the literature.[10,21] This can be explained by the fact that men are busy with the outdoor activities which causes them to forget to take their medications. While in some of the studies in the literature, income and education levels are not related to adherence to treatment, in some other studies, rates of adherence to pharmacological treatment are reported to increase as income and education levels increase.[12,21,22] In this present study, although not statistically significant, the rate of adherence to pharmacological treatment was higher in the participants with good economic status and higher education level. Given that the majority of the participants who had regular checkups and perceived their income status as good had a high school or higher education level, this finding can be interpreted as a sign of inequality in access to health services. As geographical and economic access to health services increases, so does the utilization of health services.[21] Another finding that can be interpreted in a similar way in this present study is that the rate of adherence to pharmacological treatment was high in those who did not have the social insurance, which may have been because of the fact that they meticulously complied with the pharmacological

treatment due to economic concerns. Although not statistically significant, in the present study, in line with findings in the literature, the rate of adherence to pharmacological treatment decreased as the types of drugs taken by the participants increased; on the other hand, the rate of adherence increased in those who measured blood pressure at home.[8]

The fact that there was not a significant association between socio-demographic and clinical characteristics and adherence to the pharmacological treatment in this study could be explained with the multifactorial nature of adherence to hypertension treatment. In addition, although the size of the research group was large enough to determine the 50.0% prevalence, no significant relationship was detected between socio-demographic and clinical characteristics and adherence to the pharmacological treatment could be explained by the limited strength of the study to detect relatively small differences between groups in terms of adherence to pharmacological treatment.

Another issue that is as important as adherence to pharmacological treatment in the treatment of hypertension is adherence to non-pharmacological treatment. In studies conducted on the issue, rates of adherence to non-pharmacological treatment methods were well below the desired level the rate of adherence to smoking cessation was between 18% and 83% to diet was between 36% and 69% and to physical activity was between 23% and 36%.[12,15,19,20,27] In the present study, parallel to the literature, approximately 56% of the participants complied with diet, half of the participants quit smoking, and only 21% of the participants complied with physical activity.

In the present study, the rate of adherence to smoking cessation in the advanced age and unemployed participants was high. In the literature, smoking cessation rates are reported to be high in advanced age groups.[28] A high adherence rate in unemployed patients might be due to the fact that the vast majority of them were in the advanced age group. In addition, the rate of adherence to smoking cessation was high in the participants who perceived their health as bad. This can be explained by the fact that the participants who perceived their health as bad suffered from death anxiety more.

In the present study, the rate of adherence to diet was high in patients who had a good economic status, did not resort to CAM and had checkups regularly. Similarly, in the literature, it is stated that the income status, level of education, health professionals' failure to inform patients about diet sufficiently and CAM use were determinants of adherence to diet.[12,29,30] In addition, the high level of adherence to diet in patients who had regular checkups once again demonstrates the importance of qualified patient monitoring.

Adherence to physical activity in hypertensive patients is affected by gender and income status in some studies, and by lack of facilities related to physical activity in some other studies.[12,31,32] In the literature, people employed in regular jobs are involved in physical activity more than those who are unemployed.[33] In the present study, similar to the literature, the rate of adherence to physical activity was high in the male participants and in those who perceived their income level as good. This may be due to the fact that the vast majority of those who perceived their income level as well were those who had regular paid jobs. In addition, the high rate of adherence to physical activity in male patients may be due to the fact that men spend more time outside the home than do women in Turkish society. In many studies conducted in Turkey, men's physical activity levels are reported to be higher than those of women.[34,35]

Study limitations

That the study was carried out with hypertensive patients presenting to a single health institution and that its results are applicable only to the study population is the most important limitation of the study. Another limitation of the study was that variables such as body weight and height used to calculate BMI were based on verbal reporting of the participants.

CONCLUSION

In hypertensive and non-hypertensive individuals' lifestyle, modifications, previously termed as non-pharmacologic therapy, play a major role. In the present study, approximately four-thirds of the participants complied with pharmacological treatment. In the present study, the rates of adherence to non-pharmacological treatment were not at a desired level, about half of the participants quit smoking and complied with their diet and only one-fifth of them complied with the physical activity. Given the importance of controlling blood pressure in patients with hypertension and the role of adherence to treatment modalities in the prevention of complications, these results suggest that these patients are at risk for complication development. In addition, in the present study, both the rates of adherence to treatment modalities and only about one of the patients stated that they had checkups regularly suggest that patient follow-up at Family Health Centers is not satisfactory. Therefore, regular monitoring of patients in Family Health Centers, evaluation of patients' adherence to treatment methods and planning multidisciplinary intervention programs to promote adherence should be ensured. Additional studies as well are needed to test the practicability and effectiveness of interventions suggested to enhance adherence.

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