



Factors predicting treatment compliance among hypertensive patients in an urban area

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Abstract

In chronic diseases such as hypertension which requires permanent drug use and regular control, the maladjustment with the treatment is one of the most significant obstacles for ensuring an efficient blood pressure. This study aimed to measure compliance with antihypertensive therapy in a group of patients in an urban area and to identify variables associated with compliance. This study is a cross-sectional research which is conducted to the patients diagnosed as having hypertension and over 40 years old (total 535 hypertensive patient) who were registered at İzmir, Konak Emine Bağcier Health Care Center at the date of January 1st 2014 (total 3594 patient). Sample, when the prevalence is taken as 31%, is composed of 300 hypertensive patients who have a power to represent the population with a deviation of 5%. Sample units are individuals. The data were collected through face-to-face interviews using a questionnaire form. In the questionnaire, the socio-demographic features of the patients, their attitudes, knowledge and behaviours towards hypertension disease and Antihypertensive treatment Adjustment Questionnaire were questioned. According to the 8-question questionnaire scale of Morisky, while 74% of the patients was moderately compatible, 22.7% was determined to be incompatible for the treatment. Following the search, no relation was found between age, marital status, business-education status and socioeconomic level and conformity. It was stated that treatment conformity of the people who had true and wide information about hypertension and who were informed by the doctor, who showed the behaviors of quitting cigarette, limiting salt and fat and who had a regular sleep pattern was better. It was pointed out that the greatest obstacle for regular monitoring was resulted from organizational problems about being unable to reach the treatment. Although it was not thought that diseases of the many patients were not in control, patients whose diagnosis and treatments were regulated in the second step were more compatible. Perception of the patient that her/his hypertension is under control is one of the leading factor for drug compliance/medical treatment adherence. Major element to improve the compliance is experiencing regular physician visits. In other words, regular control of a physician is essential. Finally, adoption of health promoting habits such as cessation of smoking is associated to medical treatment adherence. Medical treatment adherence may also be regarded as a part of health promotion.

Keywords: Hypertension, compliance, MMAS-8, antihypertensive treatment

Introduction

Hypertension is an important health problem with a significant mortality and morbidity [1]. Hypertension is also very common in our country. A national-based research conducted in Turkey detected prevalence of hypertension as 42.3% between 35 and 64 years of age and a gradual increase of such prevalence by aging [2]. Hypertension is believed to affect 1 billion people all over the world and to be the most common and reversible cause of heart attack, stroke, heart failure and peripheral arterial disease [3].

Clinical researches indicate that antihypertensive treatment provides a decrease of 35 to 40%, 20 to 25% and 50% in incidences of stroke, myocardial infarction and heart failure, respectively [4].

The THINK (Turkish Research of stroke Risk In hypertensive Patients) detected that blood pressure values of approximately 70% of the patients with hypertension

have higher blood pressure values than international guidelines [5].

The causes of insufficient Blood Pressure (BP) control classified in three groups includes continuation of current therapy by the physician instead of different approaches, low patient compliance to the treatment and deficiencies for approach to chronic diseases in healthcare systems. Since low treatment compliance is the most common cause among the patients, it is more important cause for insufficient BP control [6,7]. When hypertension medication adherence (compliance to hypertensive treatment) is 100%, a reduction of 32% in complication risk, a decrease of 8.5 million new cases and 72 billion dollars are expected [8].

Treatment of hypertension is a life-long process including training, lifestyle changes and medical treatment. The aim of present research was to reveal factors affecting the medication adherence in hypertension in order to find the answer of the question how to achieve an efficient treatment where the patient follows therapeutic instructions.

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Material and Method

Study population and Sample:

The present research is a sectional study performed on 300 patients over 40 years of age who were selected through random sampling and started to be treated because of high blood pressure from 535 patients diagnosed by essential hypertension among 3,594 individuals registered to Family Practitioner 3519079 since January, 1, 2014. Minimum sampling size was calculated as 300 with a Standard deviation of 5% within 95% of confidence level when hypertension prevalence was taken as 30.3% according to Patent 2 study [9]. Remaining 235 individuals were determined as substitutes if selected patients were not contacted. In the present study, one house was called once and the patients with contact information were invited to family health center. Totally 45 patients from substitutes were selected through a simple random method to obtain total number of 300 individuals. The questionnaires were performed through personal interviews with the patients who might sign the informed consent form during home visits by 4 interviewers who were at least 18 years old or older and were trained about the questionnaire for 30 minutes (1 session). The study was conducted by obtaining required permits from Izmir Public Health Institution. It was also received approval to a local ethics committee before the study begins.

Inclusion and exclusion criteria:

Hypertensive patients younger than 40 years, patients diagnosed with secondary hypertension, pregnant women and patients who cannot give consent were not included into the study.

Dependent variable:

Treatment compliance is dependent variable of this study. Morisky medication adherence scale with 8 questions were used to evaluate the treatment compliance.

Independent variables:

Independent variables of this study are as follows:

- 1-Sociodemographic characteristics of the patients,
- 2-Medical history and family history of the patients related to hypertension,
- 3-Type, number and usage period of antihypertensive drugs
- 4-Complaints due to hypertension
- 5-Additional chronic diseases; Diabetes, hyperlipidemia, osteoporosis, thyroid diseases, COPD (Chronic Obstructive Pulmonary Disease), Serebro-vascular Event (SVE), depression, glaucoma, cancer and others except hypertension
- 6-Total number of medications used
- 7- Believes and knowledge level of the patients about hypertension (*Evaluated by Knowledge Index of the patients*)
- 8-Methods to reduce blood pressure and frequency of use
- 9-Smoking-alcohol states of the patients
- 10-Exercise status and exercising frequency of the patients

- 11- Self-evaluation of sleep quality
- 12-Self-evaluation of medication usage habits
- 13-Causes for regular drug use and irregular drug use
- 14-Causes of antihypertensive discontinuation history, if any and period
- 15-Blood pressure measurement frequency of the patients
- 16-Last arterial blood pressure level
- 17-Features related to hypertension monitoring
- 18-Frequency of control visits
- 19-Institutions that the patients refer for hypertension as well as general health problems
- 20-Reasons for irregular monitoring
- 21-Presence of home-based monitoring tools
- 22-Investigation of lifestyle changes (Salt restriction, fat, sugar restriction, vegetable-based diet, use of oil, exercising, tea&coffee intake reduction, smoking and alcohol quitting
- 23- Body Mass Index
- 24-Self-evaluation of disease perception
- 25- Self-evaluation of health perception

Morisky Medication Adherence Scale (MMAS-8):

MMAS-8 is an 8-question version revised in 2008 including more questions to allow better evaluation of treatment non-compliance of MMAS-4 including 4 questions developed in 1986 by Morisky.

Questions 1-2-3-4-6 and 7 are scored as "Yes 0, No 1" whereas question 5 is reverse scored as "No 0, Yes 1".

Question 8 requires to mark one of 1. "never/rare"(0 points); 2. "occasionally" (0.25 points); 3. "sometimes" (0.50 points); 4. "usually" (0.75 points) and 5. "always" (1.00 points). If total score obtained from the scale was less than 6, it was considered as poor compliance whereas the score was between 6 and 8, it was evaluated as good compliance (10,11). According to validity and reliability study of the scale in original language, Cronbach alpha coefficient is 0.83. A Modified Morisky Medication Compliance Scale with 8 questions was used. Validity and reliability analyses of the scale in Turkish language by Demirezen was performed in 2003; question 6 of Morisky Antihypertensive Definition Scale with 9 questions which was not included in MMAS-8 was removed [12,13).

Patient Knowledge Index:

Knowledge index was created by addition of the data obtained from the question titles including opinions of the participants about hypertension treatment, normal blood pressure level and whether complications of hypertension disease are known. Individuals with accurate information about hypertensive treatment were scored with 1, others were scored with 0; those who answer the question about the diseases appear due to hypertension including 5 complications related to hypertension in options were scored with 1 point, those who express that they do not know were scored with 0. The knowledge index consists of 7 questions. The lowest score is 0 whereas the highest

score is 7. Individuals who obtained 0-3 points were evaluated as those who do not have accurate information and individuals who obtained 4 points or more were evaluated as individuals with accurate information.

Statistical Analysis

Statistical analysis of the data obtained was performed through Statistical Package for Social Sciences (SPSS) for Windows 15.0. Definitive statistical results of the study data were expressed as mean \pm Standard deviation. Student's t test was utilized for comparison of means in independent groups and parametric cases whereas One Way Variance Analysis was used to compared multiple groups. Categorical variable comparisons were performed through Ki-square test and Fisher's Exact Test was applied in non-parametric cases. Logistic regression was used in multiple analyses.

Table 1. Sociodemographic characteristics of the participants

		Number	%
Age Group	40-50	36	12
	51-64	144	48
	65 yaş üstü	120	40
Gender	Male	111	37,0
	Female	189	63,0
Marital status	Single	7	2,3
	Married or in relationship	200	66,7
	Divorced	22	7,3
	Widow	71	23,7
Educational Status	Literate	32	10,7
	Not literate	71	23,7
	Elementary school	165	55,0
	Middle school	13	4,3
	Highschool	8	2,7
Income-Expense Status	University	10	3,3
	Income>Expense	7	2,3
	Income=Expense	138	46,0
	Income<Expense	151	50,3

There was another individual with hypertension in house of 27.7% of the participants. Two third (75.7%) of the patients had first degree relatives with hypertension in their family. When first high blood pressure detection place was evaluated, 69.7% of the patients expressed public hospital whereas 16.7% had their blood pressure high in family health center. The place where first treatment for hypertension was started was a public hospital for 70% of the patients and family health centre for 21.0% of them.

Rate of the individuals diagnosed with hypertension within last 11 months was 4.3% whereas rate of the individuals who declare that they had hypertension for more than 5 years was 69.3%. The patients expressed that they receive antihypertensive treatment for 9.8 ± 6.8 years. Rate of the patients treated with an angiotensin receptor blocker + hydrochlorothiazid was 19.3% and rate of the patients treated with triple combination of one angiotensin converting enzyme inhibitor, one beta blocker and one calcium channel blockers was 5%. Mono-drug therapy was applied to 33.3% of the patients; 31% were treated by

Results

The participants selected for the study (300) included 189 (63%) females and 121 (37%) males. Minimum age was 40 whereas maximum age was 91 and the age average was detected as 62.8 ± 10.9 .

Approximately half of the participants (55%) were elementary school graduates whereas 23.7% of the participants were not literate. Among the patients, 33.7% of them had never gone to a school; 66.7% of them were married or have a partner and 23.7% of them were widow, 55% were housewives, 23.7% were workers and 8% were retired. Income of half of the patients (50.3%) is less than the expenses. Average number of children was 3.1 ± 2.0 (Table 1).

combined single agent and 34.7 of them were treated by multiple agents.

Rate of the patients with co-morbid conditions included 35.7% with diabetes, 28% with lipid parameter disorder, 11.3% with osteoporosis, 12.1 with thyroid function disorder, 9% with chronic obstructive pulmonary disease (COPD), 4.3% with cerebrovascular events (CVE), 21.2% with depression, 3.4% with glaucoma, 2.3% with cancer. It was detected that the participants receive 3.9 ± 1.7 medications in average.

When exercise status for at least thirty minutes was asked to the patients, 59.7% of the patients replied that they never exercise and 8.7% of them stated that they exercise daily. The patients averagely exercise for 2.4 ± 2.1 days per week. The patients were investigated if they apply lifestyle changes by 5-likert scale. Salt restriction was considered neither good nor bad by 34.7% of the patients, fat restriction was considered very good by 48.0%, sugar restriction was considered neither good nor bad by 25% of the patients; vegetable-based diet was considered very

good by 45% of the patients; tea&coffee restriction was considered slightly bad and cessation of smoking & alcohol drinking was considered as very good by 71% of the patients whereas exercising was considered very bad by 31% of the patients. Furthermore, 66.3% of the patients obtain information from a physician and 30.7% of them obtain information from their pharmacists. When self-medication use habits of the patients were asked to evaluate, almost half of them (48.3%) replied as very good and 2.3% replied as very bad.

Among regular drug users, 63.3% replied the cause of regular use of their medications as hypertension is an important disease whereas 7.7% was informed by their physicians. Eighty one individuals who are irregular drug users or state no use of drugs constitute 27% of the patients. In such non-user drug, 64.1% of non-users believe that hypertension do not harm and 14.8% depend on absence of symptoms and complaints. The question “how

do you define your sleep quality?” was evaluated by 5-likert scale; 5.7% of them replied as very bad, 33% replied as very good whereas 41.0% replied as neither good nor bad. Mean systolic blood pressure value was 135.1 ± 15.8 mmHg and mean diastolic blood pressure value was 86.9 ± 10.6 mmHg. Among all patients, 66% of them believe that their disease is under control and 62.7% of them expressed that their current health status is very good. Average body weight of the patients between minimum value of 45 kg and maximum value of 125 kg was 78.2 ± 13.3 kg. From BMI perspective; 44% of the patients were over-weighted, 40.3% of them were obese and 3.7% of them were morbid obese. According to this study data, 74.3% of the patients were detected as compliant and 22.7% of them were detected as low-compliant (Table 2). Significant associations related to drug compliance was provided in Table 3, 4, 5.

Table 2. Distribution of individuals with hypertension according to hypertension treatment compliance /medication adherence

Medication Adherence (Morisky score)	n	%
Low compliance (<6)	68	22,7
Adequate Compliance (>6)	224	74,6
Irrresponent	8	2,7
Total	300	100,0
Average Morisky Total Score: $5,96 \pm 1,84$		

Table 3. Association of hypertension medication adherence with Healthcare Service providing

Health Services Provision		Medication Adherence (Morisky score)		Chi - square(χ^2)	P value
		≥ 6	< 6		
Place Where High Blood Pressure was Detected First	Primary care Center / Pharmacy	40(65.6%)	21(34.4%)	6,69	0,035
	Public or University Hospital At Home/Other	177(80.1%) 9(90%)	44(19.9%) 1(10%)		
Place Where Treatment was started first	Family Health center/Other	41 61.2%	26 38.8%	13,9	0,00
	Public or University Hospital	187 %82,7	39 %17,3		
Place of Hypertension Monitoring	Hospital/ Family Health center	138(81,7%)	31(18,3%)	4,12	0,042
	Nowhere/At Home	94(71,8%)	37(28,2%)		

Table 4. Association of medication adherence of hypertension with health improvement behavior

Health Promotion Behavior	Medication Adherence (Morisky score)		Chi -square (χ^2)	P Value
	≥ 6	< 6		
Salt restriction			7,56	0,023
Bad	50(65,8 %)	26(34,2%)		
Neither good nor bad	85(81,7%)	19(18,3%)		
Good	95(80,5%)	23(19,5%)		
Fat restriction			6,64	0,036
Bad	15(57,7%)	11(42,3%)		
Neither good nor bad	68(81,9%)	15(18,1%)		
Good	145(77,5%)	42(22,5%)		
Cessation of smoking-alcohol			6,64	0,027
Bad	36(66.7%)	18(33.3%)		
Neither good nor bad	7(58.3%)	5(41.7%)		
Good	186(80.5%)	45(19.5%)		

Table 5. Association of medication adherence with knowledge and disease self-control behavior.

Knowledge of Hypertension and Self-control Behavior		Medication Adherence (Morisky score)		Chi-square (χ^2)	P value
		≥ 6	< 6		
Information Index	Those With Accurate Information About Hypertension	178(80,9%)	42(19,1%)	6,632	0,01
	Those Without Accurate Information About Hypertension	52(66,7%)	26(33,3%)		
Cause for Irregular Use of Antihypertensive Drugs	HT is an Important Disease	161(84.7%)	29(15.3%)	37,05	0,00
	Because They were informed by a Physician	23(100,0%)	0(,0%)		
	Other	48(55,2%)	39(44.8%)		
Smoking Status	Smoker	37(66,1%)	19(33.9%)	6,687	0,035
	Former Smoker	68(85.0%)	12(15.0%)		
	Non-smoker	124(77.0%)	37(23.0%)		
Self-evaluation of Drug Use	Very Bad-Bad	1(6.7%)	14(93.3%)	104,6 8,012	0,00 0,018
	Neither Good Nor bad	12(31.6%)	26(68.4%)		
	Quite Good	83(85.6%)	14(14.4%)		
	Very Good	131(90.3%)	14(9.7%)		
Is Hypertension Under Control? Self-evaluation	Bad	10(83,3%)	2(16.7%)	15,89	0,00
	Neither Good Nor bad	41(64.1%)	23(35.9%)		
	Good	179(80.6%)	43(19.4%)		
Sleep Order	Very Bad-Bad	35(58.3%)	25(41.7%)	16,79	0,01
	Neither Good Nor bad	98(79.7%)	25(20.3%)		
	Quite Good-Very Good	97(84.3%)	18(15.7%)		
Control visit Frequency for Hypertension	Every 1-3 Months	37(60.7%)	24 (39.3%)	23(15.2%)	
	Every 6 months	128(84.8%)	23(15.2%)		
	Annually	44(81.5%)	10(18.5%)		
	Never	23(67.6%)	11(32.4%)		

In univariate statistical analyzes: Results of 4 individual models created in multi-variable analyses were presented in Table 6. Model 1 indicates health improvement behaviors, Model 2 shows healthcare services received, Model 3 indicates effects of variables measuring self-perception of the patient to be able to control the treatment on treatment compliance. Final model (Model 4) shows an analysis of significant variables obtained from first 3 models.

An association with the place where first high blood pressure was measured and medication adherence was detected in the present study. According to this, treatment compliance of the patients who had higher blood pressure results through measurements at home was observed higher. The patients who had first higher blood pressure values detected in a public or university hospital were detected as more compliant than those who have learned about their high blood pressure in a primary care center ($p=0,035$).

In this research, compliance of the patients whose treatment was started in a public or university hospital were observed more ($p=0,00$). The hypertension information index which was based on collection of the

data obtained from question titles including patients' opinions about hypertension treatment, normal blood pressure value and whether complication of hypertension is known was found correlated with hypertension medication adherence.

A statistically significant correlation was observed on compliance of the patients who state that they should be treated continuously ($p=0,001$).

The compliance in former smokers were found more than those who never smoked and less than those who are currently smokers ($p=0,035$). A significant association was detected between compliance and lifestyle changes including salt restriction ($p=0.023$) fat restriction ($p=0.036$) and cessation of smoking & alcohol ($p=0.027$). There was not any correlation between compliance and often use of primary care center for hypertension ($p>0.05$).

The obstacles to access a treatment such as treatment costs, far location of the institution, a busy physician, arranging an appointment and not being invited for control visits decrease the compliance for the patients who believe that they are not regularly monitored. Hypertension medication adherence of the patients who believe that they are monitored regularly was detected more ($p=0.019$).

Medication adherence was detected more in the patients with a better sleep level within the scope of present research ($p=0.00$). The patients with a good drug using habits were found highly compliant to the treatment ($p=0.00$). Hypertension medication adherence of all of the patients who were informed by a physician was found good

($p=0.00$). The patients who are monitored in a healthcare institution were found highly compliant than those who are monitored at home or are not monitored ($p=0.04$).

Hypertension medication adherence was detected high in the patients who believe that they are under control ($p=0.018$).

Table 6- Multi-variable analyses of the factors affecting medication adherence.

Model 1- Health promotion behaviors					
	B	p	OR	CI 95%	
Smoking	-,523	,006	,593	,408	,861
Salt restriction	,217	,252	1,243	,857	1,802
Fat restriction	,100	,658	1,105	,711	1,718
Fixed	1,577	,022			
Model 2- Healthcare Services					
	B	p	OR	CI 95%	
Place HT was detected first	,594	,091	1,812	,910	3,609
First treatment arrangement place	-,126	,744	,882	,416	1,871
HT monitoring place	-,552	,054	,576	,328	1,010
Cause for irregular monitoring	-,158	,410	,854	,586	1,243
Fixed	,704	,304			
Model 3- Hypertension Self-control variables					
	B	p	OR	CI 95%	
Cause for irregular drug use	,255	,127	1,291	,930	1,791
Cause for irregular monitoring	-,015	,928	,985	,709	1,368
Perception of management	,487	,041	1,628	1,021	2,597
Frequency of control visits	-,311	,040	,732	,544	,987
Fixed	-,348	,733			
Model 4- Combined model*					
	B	p	OR	CI 95%	
Perception of management	,593	,014	1,809	1,126	2,906
Frequency of control visits	-,382	,014	,683	,504	,925
Smoking	-,492	,011	,611	,419	,891
Fixed	1,507	,108			

*All variables of the first three models are included in the final model.

Discussion

This research was performed on the patients over 40 years of age who receive any antihypertensive therapy to gather the data about sociodemographic data and patient attitudes, habits and hypertension related to compliance on the basis of the fact that compliance is a recoverable problem and improvements may be detected during blood pressure controls when factors disturbing the compliance; and to evaluate whether the data obtained affect the hypertension medication adherence.

The present study consisted of the patients referring to a family health center serving in Kadifekale region of Izmir which allows immigrants much with an average age of the patients 62.8 ± 10.9 who are known to receive antihypertensive treatment. Majority of the patients were in the middle-advanced age group with half of the patients graduated from elementary school and 33.7% of them without any education, consisting of married, retired individuals or housewives most of whom have a healthcare insurance by 97% and who state less income than expenses. Dominancy of female participants (68%) may depend on the fact that half of them were housewives,

women refer to healthcare institutions more and rely questionnaires more.

An article published by American Heart Association (AHA) Journal in 2009 detected a significant association between compliance of the patients with hypertension and sociodemographic data including age, gender and race [14]. In such study, almost a significant association was found between compliance and gender. Male patients were detected slightly more compliant than women ($p<0.078$). There was not any significant correlation between Morisky medication adherence scale and other sociodemographic data.

In the present study, a higher medication adherence was detected in the group who notice high blood pressure during measurements made at home. This finding indicates that the patients in this group are more aware against hypertension and obtained a sphygmomanometer before acquiring the disease or at least one patient with hypertension is around. In the present research, 75% of the patients were detected to have at least one relative with hypertension who was alive or dead. We interpret such outcome that an increase might arise in compliance attitude

of the patients as a result of personal characteristics and observations ($p=0.035$).

The hypertension medication adherence in the patients who had higher arterial blood pressure detected in a public or university hospital were found more than those who had their high blood pressure detected in a primary care center. Moreover, more compliance was observed in the group whose first treatment was arranged in a public hospital. The patients tend to continue their treatment in the place where they were first diagnosed. The fact that there are opportunities missed to diagnose chronic diseases is crucial [15]. In a region which allows immigration and have a younger population, infectious diseases, protective healthcare services for infants, pregnant women and children occupy a significant part of a physician's daily work. Many studies conducted in our country report that primary care centers are insufficient to investigate chronic risk factors such as smoking, exercise and obesity [16, 17].

In line with increase of knowledge about hypertension, treatment compliance of the patients also increase. Many studies indicate that informing the patient about the disease increase the hypertension medication adherence [18,19].

A statistically significant correlation was detected in compliance of the patients who state requirement of continuous treatment of hypertension. A significant association was detected between medication adherence of the patients and patients who are aware about normal blood pressure range ($p=0.002$). Among aforesaid patients, those who are aware that untreated hypertension may result with stroke, sudden death and kidney failure were detected with better compliance ($p=0.014$ $p=0.037$ and $p=0.037$, respectively). There was not any correlation between compliance and awareness of the patients about hypertension as a cause of heart attack and heart failure ($p>0.05$).

There was not any association detected between hypertension medication adherence and being aware of heart attack and heart failure complications; we observed that compliance increase in those who have knowledge about detailed complications such as kidney failure, sudden death and stroke. Enlarging on the information content seems to be an important criteria on compliance [20].

In the present study, medication adherence in former smokers was found higher than non-smokers; and the lowest compliance was observed in smokers. Many studies comparing smokers and non-smokers in terms of hypertension showed that smokers are less aware of hypertension diagnosis. Non-smokers or former smokers are more aware about healthcare and they visit their physicians more frequently [21,22].

Results of National Household Research (NHR) (2003) detected that one of each five individuals in Turkey has a

sedentary lifestyle, 15.9% of the population have an insufficient physical activity. In the present research, 59.7% of the patients do not exercise. Although the researches conducted on physical activity and hypertension are not consistent, over and inaccurate nutrition and physical immobility underlie the obesity. Average body weight of the patients in the present research is 78.2 ± 13.3 kg. Obese state of the patients is an indicator for in compliance to the lifestyle changes for control of hypertension. There was not any significant correlation between exercise and compliance in the present research ($p>0.05$).

Hypertension medication adherence was detected more in the patients with better sleep level ($p=0.00$). Rate of the patients who do not evaluate the sleep quality well was 61%. Within this scope, obstructive sleep apnea (OSA) is a disorder detected in about 10 to 50% of healthy and hypertensive population. The association between obstructive sleep apnea (OSA) and hypertension is causal independent from obesity, exercise and smoking. If hypertension developed as a result of OSA is left untreated, risk of cardiovascular event is 3-fold higher [23]. Furthermore, antihypertensive agents may cause depression and sleep quality disruption. Patients with poor sleep quality deserve to be examined more [24].

A significant association was found between medication adherence and answers obtained from self-evaluation of the patients about medication use habits ($p=0.00$). When simply self-evaluation of the patients are asked during clinical practice, the answers may guide the physician as a valuable data.

A significant association was detected between hypertension medication adherence and beliefs and experiences of the patients. To believe that hypertension is an important disease increase the medication adherence. In a study conducted by Ogedegbe et al. on African American patients with hypertension in 2003, rate of blood pressure control was detected lower in the patients who consider that medications are unnecessary if no symptoms of hypertension exists [25].

Higher medication adherence rates especially in the group who are informed by a physician indicate active and significant role of training on patient attitudes and behaviors. The present study also detected belief on importance of the disease as a major cause for regular drug use.

Patients who discontinue/change medications by suggestions of a physician were detected more compliant than those who discontinue/change medication by their own will. There are articles reporting that physicians may increase patient compliance and hypertension control by avoiding unnecessary drug changes and limiting number of the tablets to be taken [26,27].

Those who have their hypertension monitored with higher hypertension medication adherence emphasize the importance of sustainability for management of a chronic disease such as (p=0.042). The cause for lower compliance rates in the group who have control visits by every 1 to 3 months may be due to the patients who are invited to control visits more frequently in the patients who cannot achieve optimum blood pressure levels. Researches indicate increase of compliance by increase in hypertensive period [28]. Researches report that control rates are lower either by specialists or primary care physicians [29].

Although many studies report that hypertension medication adherence/drug compliance monitored by family practitioners is low, there was not any association between medical center selection and compliance [30]. A research conducted in Karaman about drug compliance and knowledge level of 194 patients and patients referring to primary care center in a region allowing immigrants and serving for a younger population in 2005 detected that 1 of 3 patients are non-compliant to the treatment and patients should be informed about the drugs and disease more [31].

In the aforesaid research, the patients expressed that they preferred family care center for general health problems and hypertension. Medication adherence was found higher in the patients who believe that they are regularly monitored. Causes such as treatment costs, far location of the institution, busy work of the physician, not arranging an appointment were specified as most important factors affecting drug compliance. The compliance was detected very low in the group who report that they cannot Access to treatment due to the causes mentioned in the present study [32].

Since hypertension is usually an asymptomatic disease and the treatment is established to reduce total cardiovascular or renal risks, it is difficult to convince a patient for the treatment without any disturbing complaint. Compliance of the population who even does not want any treatment or discontinue the medication, does not need monitoring because of absence of complaints is more than those who cannot access to the treatment. A sphygmomanometer exists in 70% of the patients. The group with hypertension diagnosed and receive an antihypertensive treatment were asked their last blood pressure levels. Thirty-five percent (35%) of the patients declared that they measure their blood pressure at least once a month whereas almost half of the patients monitor their blood pressure when they feel bad. According to this, average systolic blood pressure was detected 135.1 ±15.8 mmHg and diastolic blood pressure was detected 86.9±10.6 mmHg. The present research is not at optimal level according to JNC 8 guideline. Hypertension treatment is not receiving an antihypertensive treatment only. Lower compliance to lifestyle changes such as salt and fat restriction, exercise, cessation of smoking is known [33]. Higher treatment

compliance was observed in those who care for salt restriction, reduce fat in meals and adopt cessation of smoking in the research. In the present study, 62.75% of the patients defined their health status as very good and no association was found between compliance and self-evaluation.

Hypertension medication adherence prevalence to antihypertensive drug treatment has a wide distribution range like 19 to 87% [34]. In the present study, 74.6% of the patients were found compliant whereas 22.7% of them were found with low compliance. Causes for treatment non-compliance were demonstrated as lack of Access to the treatment (Treatment costs, far location of medical center, busy work of the physician, not arranging an appointment) and absence of disturbing complaints. In a study where the studies conducted in Spain between 1975 and 2011 were reviewed, treatment compliance was detected as 74.8% and 25.62% of the patients were detected non-compliant to antihypertensive treatment [35]. There are studies reporting compliance increase because of single dose form of combined treatments [36].

One of the limitations of the present study is performance of this study on the patients registered to same family practitioner and lack of patients registered on different family practitioners. The study universe was selected to avoid ethical problems to work with patients of different family practitioners as well as patient access and communication difficulties. Hypertension may progress without any symptoms or complications for a long period. Treatment adoption is difficult during asymptomatic period. Therefore, patient compliance is very important in treatment of high blood pressure. Role of the physician is very important to increase patient compliance. The primary care should be supported to increase evaluation and management of hypertension, training of the patients about hypertension should be a part of primary healthcare services.

Conclusion

The findings of this study concludes as: Perception of the patient that her/his hypertension is under control is one of the leading factor for drug compliance/medical treatment adherence. Major element to improve the compliance is experiencing regular physician visits. In other words, regular control of a physician is essential. Finally, adoption of health promoting habits such as cessation of smoking is associated to medical treatment adherence. Medical treatment adherence may also be regarded as a part of health promotion.

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