Original Research / Orijinal Araştırma

Investigation of The Effects of Education On Drug Compliance and Treatment For Hypertensive Patients

Hipertansif Hastalarda Eğitimin İlaç ve Tedaviye Olan Uyuma Etkisinin Araştırılması

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Abstract

Aim: The purpose of this study is to investigate the effects of the education that was given to patients diagnosed with hypertension on the correct use of their medications, their follow-up visits, and their compliance with treatment. It was also aimed to observe how blood pressure, health perception, and anxiety level changed after education. Methods: For this intervention study, a questionnaire form including sociodemographic information, hypertension history, Medication Adherence Self-Efficacy Scale-Short Form (MASES-SF), Health Perception Scale (PHS), Health Anxiety Scale (HAI), and Modified Morisky Drug Compliance Scale (MMS), was applied at the beginning. Voluntarily, one by one, patients were grouped into education and non-education. The education given was a summary prepared from various guidelines. The blood pressures were measured three months later, and the questionnaires were applied except for demographic data six months later. Results: There were 49 patients divided into each group. In the education group, the mean MASES-SF score (36.28 ± 10.08) increased to 40.65 ± 8.57 $(p<0.001)$, while the MMS knowledge level (1.63 ± 0.48) increased to 1.79 ± 0.40 $(p=0.021)$ and the motivation level (1.40 ± 0.48) increased to 1.77 ± 0.42 $(p<0.001)$. HAI score (33.10 ± 12.76) decreased to 32.24 ± 11.23 after the education $(p=0.304)$. Systolic blood pressure and diastolic blood pressure decreased significantly after six months $(p=0.003; p=0.022,$ respectively) in the education group. There were no significant changes in the blood pressure and drug compliance of the control group. Conclusion: This study showed that the knowledge-motivation level, health perception, and drug compliance increased with education.

Key words: Family practice, hypertension, anxiety, patient compliance

Özet

Amaç: Bu çalışmanın amacı hipertansiyon tanısı alan hastalara verilen eğitimin; ilaçlarını doğru kullanımına, takiplerine ve tedavi uyumlarına etkisini araştırmaktır. Ayrıca eğitim sonrasında sağlık algısının, kan basınçlarının ve anksiyete durumunun nasıl değiştiğini gözlemlemek amaçlanmıştır. Yöntem: Bu müdahale çalışmasında hastalara ilk başvuruda; hipertansiyon ile ilgili sorular, sosyodemografik bilgiler, Revize İlaca Uyum Öz-Etkililik Ölçeği-Kısa Form (MASES-SF), Sağlık Anksiyetesi Ölçeği, Sağlık Algısı Ölçeği (SAÖ) ve Modifiye Morisky İlaç Uyum Ölçeği'ni (MMÖ) içeren anket formu kullanıldı. Hastalar çalışmaya eğitim verilen ve eğitim verilmeyen olarak sırayla alındı. Çeşitli kılavuzların taranmasıyla oluşturulan bilgilerle eğitim verildi. İlk başvurudan üç ay sonra hastaların kan basınçları öğrenildi ve altı ay sonra demografik veriler hariç olmak üzere çalışmanın başında uygulanan anket formu tekrar uygulandı. Bulgular: Her gruba ayrılmış 49 hasta vardı. Eğitim grubunda, ilaç uyumu ölçeklerinden MASES-SF ölçeğinin ortalama puanı 36,28±10,08'den eğitim sonrasında 40,65±8,57 puana yükseldi (p<0,001). MMÖ bilgi düzeyi alt faktörü puan ortalaması 1,63±0,48 puandan eğitim sonrasında 1,79±0,40 puana yükseldi (p=0,021), MMÖ motivasyon düzeyi alt faktörü puan ortalaması 1,40±0,48 puandan eğitim sonrasında 1,77±0,42 puana yükseldi (p<0,001). Eğitim verilen grupta Sağlık Anksiyetesi ortalama puanı 33,10±12,76'dan eğitim sonrasında 32,24±11,23 puana geriledi (p=0,304). Eğitim verilen grupta altı aylık süreçte sistolik ve diyastolik kan basıncında anlamlı gerilemeler görüldü (sırasıyla p=0,003 ve p=0,022). Kontrol grubunda ise ilaç uyumu ve kan basıncında anlamlı bir değişiklik saptanmadı. Sonuç: Bu çalışma hastalara verilen eğitimle birlikte; bilgi-motivasyon düzeyinin, sağlık algısının ve ilaç uyumunun arttığını göstermiştir.

Anahtar kelimeler: Aile hekimliği, hipertansiyon, anksiyete, tedavi uyumu

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Introduction

Hypertension is defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg in repeated measurements made by a medical professional. Multiple clinical symptoms are observed because of the persistently high blood pressure of the patients. Since it is a systemic disease that affects many organs and causes significant complications, mortality rates due to hypertension are increasing. Because of that, keeping patients under follow-up is important and thus it may reduce the burden on public health.[1,2] Regular and appropriate use of the medications and their increased knowledge of the disease helps to cope with the burden also.[1,3,4]

Medication compliance is defined as the patient's degree of following medical instructions. Adherence to any regime reflects behavior. Increasing drug adherence also increases patient safety and may be the best investment for the effective management of chronic diseases. Compliance of the patient with the treatment provided by the physician and knowing the risks that may be encountered because of insufficient drug compliance can keep the complications of this disease under control.[5] Patient education programs aim to help individuals gain new knowledge, behaviors, and attitudes that will improve their self-care. Thus, it is aimed to protect their health and prevent them from getting sick again. Via patient education besides better managing and monitoring their medical treatment and the disease, repeated admissions to the hospital can be reduced.[6]

It is important to determine drug compliance of hypertensive patients and the factors affecting this compliance to keep their treatment effective, to unnecessary drug usage, and increase their health perception. In terms of improving health outcomes, preventing labor force and economic losses, and taking into consideration the higher number of hypertension patients in primary care, studies and activities aim to increase drug compliance. For these reasons, the purpose of this study is to investigate the effects of education on hypertensive patients. It was aimed to measure the change in drug compliance, correct use of medications, anxiety level, and health perception after education. In addition, it was also aimed to keep blood pressures under control and increase awareness and self-care of the patients.

Material and Methods

The universe of this interventional study was conducted between December 2019-May 2020 and was composed of patients diagnosed with hypertension in Konya Necmettin Erbakan University Meram Medical Faculty Family Medicine Polyclinic and Cardiology Polyclinic. Patients who were under the age of 18, patients who had a diagnosis of serious additional disease (cancer, severe heart, and kidney failure, etc.), patients who have disabilities (Dementia, Alzheimer, visual and hearing problems), patients who has pregnancy-related hypertension or secondary hypertension were excluded. In addition, healthcare workers and ones who had an education, course, etc. drug compliance could not participate. Hypertension patients using medication for at least three months and those who volunteered to participate were divided into two groups: those who will receive education (A) and those who will not (B). All volunteer ones were given to each group by one. When the volunteer numbers reached 53 (A) and 52 (B) nearly at the end of the month participant collection stopped. But the study was completed with 49 patients in both groups because some patients could not finish the sixth-month follow-up. One died; the others dropped from the follow-up. The questionnaire form which was applied to the participants before the intervention had five parts: 1-Sociodemographic information form; 2-Medication Adherence Self-Efficacy Scale-Short Form (MASES-SF); 3-Modified Morisky Drug Compliance Scale (MMS); 4-Health Anxiety Scale (HAI); and 5-Health Perception Scale (PHS).

The sociodemographic information form consists of 23 questions asking about age, place of residence, income status, with whom they lived, hypertension history, the frequency of follow-up, etc.

Medication Adherence Self-Efficacy Scale-Short Form (MASES-SF): It was developed by Ogedegbe et al. and was revised by Fernandez et al. in 2008 and translated to Turkish by Hacihasanoglu et al in 2012.[7-9] The revised short form includes 13 questions and four-point Likert answer options.

Modified Morisky Drug Compliance Scale (MMS): The scale was developed in 1986 by Morisky et al. as a four-question questionnaire to assist family physicians in evaluating adherence to antihypertensive drug treatment and modified by adding two new questions.[10] The Turkish validity and reliability study was conducted by Vural et al. in 2012. In the second and fifth questions, the answer 'yes' gets one point, while 'no' gets zero points. In other questions 'yes' gets zero and 'no' gets one point inversely. If the total score of the first, second and sixth questions is above one point it indicates a high motivation level and if the total score of the third, fourth and fifth questions is above one point it means high knowledge level.[11]

Health Anxiety Scale (HAI): It is a self-report, 18-item scale developed by Salkovskis et al. and translated to Turkish by Aydemir et al.[12,13] Each item scored between 0 and 3. Higher scores indicate a higher level of health anxiety.

Health Perception Scale (PHS): It is a five-point Likert-type scale consisting of 15 items and four sub-factors whose Turkish validity and reliability study was conducted by Kadıoğlu and Yıldız.[14,15] The four sub-factors of the scale are 'control center', 'self-awareness', 'certainty' and 'the importance of health'. Scale items are answered as 'strongly agree (5)', 'agree (4)', 'indecisive (3)', 'disagree (2)' and 'never agree (1)'. Control center measures where a person sees himself in controlling his health, and whether his health is attributed to factors or beliefs other than himself, such as luck and fate. Second, 3rd, 4th, 12th, and 13th items are reversed. Certainty aims to understand whether the person has an idea about what he or she should do to be healthy. The sixth, 7th, 8th, and 15th items are reversed. Self-awareness is defined as the factors that affect health such as exercise and healthy nutrition and is represented by, includes 5th,10th, and 14th items. The importance of health shows how much the person attaches to his health and is assessed by the 1st, 9th, and 11th items.[15] The education program was prepared according to the guidelines of the Turkish Endocrine and Metabolism Association, the American Heart Association (AHA), and the Turkish Hypertension and Kidney Diseases Association and was conducted with the patients in a special room for at least ten minutes, followed by questions and answers. Briefly, the education program included information about how to use and the importance of using drugs regularly, probable side effects, and how to deal with them. All patients were called by phone for follow up and the questionnaire form was applied once again after six months except for demographic data. There was no change in drug therapy on course with all patients.

Blood pressure values of the patients were noted at the beginning, three months, and six months after the beginning. The blood pressure of the patients was measured by the researcher at the beginning of the study. Due to the COVID-19 pandemic, the third-month and sixth-month follow-ups were redesigned. If possible, in family health centers, if not in pharmacies or at home control blood pressure followed up. The laboratory test (renal function tests, blood sodium, potassium, urinalysis) at the beginning and in the sixth month were also taken in family health centers or the hospital and recorded from the database.

The study was approved by the ethics committee of Necmettin Erbakan University Meram Medical Faculty with the date of 04.10.2019 and the number 2019/2102.

SPSS (Statistical Package for Social Sciences for Windows) 24.0 program was used for statistical analysis. Shapiro Wilk-W test, Kolmogorov Smirnov test, skewness and kurtosis values were used to show the normality distribution of the data. Continuous variables were expressed as mean and standard deviation while categorical data were expressed as frequency and percentage in descriptive statistics Chi-square test was used for comparison of categorical data. In the comparison of quantitative data that met the normal distribution assumption Independent Samples-T Test and One-Way Anova tests, Mann Whitney-U and Kruskal Wallis tests that did not meet the normal distribution assumption were used. Paired-Samples T Test in normally distributed groups and Wilcoxon Signed-Rank Test was used in groups that did not show the normal distribution in statistical evaluation of the comparison of questionnaires made after the education with the first questionnaires. Statistical correlation between two variables was determined by the Pearson correlation test. Statistical significance was accepted as $p < 0.05$.

Results

The data of 98 patients diagnosed with hypertension were evaluated. The two groups (A and B) had the same number of patients (n=49; 50%). The mean age of the patients was 61.88±10.91 years and 55.1% (n=54) of them were women. The internal consistency coefficient (crα) was 0.94 for the original form of MASES-SF, calculated as 0.73 in this study [8]. While the validity and reliability study for MMS was not originally calculated, crα was calculated as 0.72. The crα of the original HAI scale was 0.91 and 0.94 in the present study. The crα of original PHS was 0.77 and 0.63 in this study [12,14].

While the mean score of the MMS knowledge sub-factor in women was 1.75±0.43, it was 1.56±0.50 in men (p=0.046). The MMS motivation level sub-factor score of the newly diagnosed patients (between 3 months and 1 year) was the highest at 1.85±0.37 (p=0.039). MMS motivation sub-factor increased in parallel with the number of hypertension drugs used daily (p=0.022). In addition, an inversely proportional relationship was found between the mean PHS self-awareness sub-factor score and the number of daily hypertension drugs (p=0.008). The PHS self-awareness sub-factor score of patients with a family history of hypertension was 10.50±1.95, while the score of patients without a history of hypertension was 9.63±2.11 (p=0.027). Table 1

shows the comparison of the mean scores of the scales with sociodemographic characteristics and information about hypertension.

It was found that as the knowledge and motivation levels of the patients increased, their medication compliance increased significantly. The systolic blood pressure of the patients in the education group at the first admission was 136.42±20.75 mmHg, while it became 130.2±13.22 mmHg three months later and was found to be 126.53±12.95 mmHg in the last controls. Diastolic blood pressure was measured as 85.18±12.84 mmHg at the first admission, 81.83±8.14 mmHg three months later and 80.40±9.28 mmHg at the last controls (Table 2).

In the education group, the average MASES-SF score was 36.28±10.08 at first, while it was found to be 40.65±8.57 after education (p<0.001). The MMS level of knowledge sub-factor was 1.63±0.48 at first, and 1.79±0.40 after education (p=0.021), and the mean score of the MMS motivation level sub-factor was 1,40±0.48 at first, this score was measured as 1.77±0.42 after the education (p<0.001). In the education group, the PHS subfactors mean scores of the control center, precision and self-awareness increased statistically (p=0.002, 0.049, 0.001, respectively), The comparisons of all scales used in the education group and the control group in the six-month period are shown in Table 3.

The cut-off value of the blood pressure values of the participants was established as systolic 140 mmHg and diastolic 90 mmHg. The mean MASES-SF score of the study group was 36.83±8.76 (min:20, max:52) and the mean MASES-SF scores of patients whose systolic blood pressure were under control or not were 38.82±9.03; 34.68±7.99, respectively (p=0.019). Table 4 shows the relation between MASES-SF Scale and blood pressure.

Table 1. Comparison of the mean scores of the scales with sociodemographic characteristics and information about hypertension

			MASES-SF	HAI	PHS				MMS			
					Control center	Certainty	Self awareness	Importance of health	Knowledge level		Motivation level	
		n*	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Low≤1 n(%)	High>1 n(%)	Low≤1 n(%)	High>1 n(%)
Age	≤54 years	27	35.92±8.82	34.70±13.08	12.11±2.57	11.25±2.94	10.14±2.16	11.29±2.46	10(37)	17(37)	13(48.1)	14(51.9)
	55-64 years	32	38.90±9.54	33.50±9.92	13.06±3.18	11.56±2.66	10.53±1.62	11.28±2.66	9(28.1)	23(71.9)	15(46.9)	17(53.1)
	≥65 years	39	35.76±7.94	33.07±11.84	12.46±2.93	10.53±2.63	9.82±2.29	10.56±2.72	13(33.3)	26(66.7)	21(53.8)	18(46.2)
	p		0.268	0.879	0.448	0.271	0.380	0.415	0.761		0.822	
Gender	Female	54	38.27±8.72	35.59±12.09	12.14±3.03	10.94±2.83	10.22±2.19	11.25±2.54	13(24.1)	41(75.9)	23(42.6)	31(57.4)
	Male	44	35.06±8.57	31.29±10.43	13.06±2.73	11.22±2.64	10.04±1.90	10.68±2.72	19(43.2)	25(56.8)	26(59.1)	18(40.9)
	p		0.071	0.108	0.122	0.614	0.457	0.282	0.073		0.155	
Living place	City center	84	37.23±8.87	33.05±11.45	12.41±2.92	11.23±2.79	10.15±1.96	10.83±2.71	24(28.6)	60(71.4)	41(48.8)	43(51.2)
	Out of city center	14	34.42±7.89	37.28±11.66	13.42±2.84	10.07±2.23	10.07±2.67	12±1.88	8(57.1)	6(42.9)	8(57.1)	6(42.9)
	p		0.269	0.102	0.232	0.141	0.728	0.125	0.041		0.773	
Level of education	Primary school and lower	61	35.77±8.32	34.04±12.34	11.98±2.87	10.37±2.65	10.18±2.08	11.19±2.80	21(34.4)	40(65.6)	34(55.7)	27(44.3)
	Secondary school and above	37	38.59±9.28	33.02±10.16	13.51±2.78	12.21±2.51	10.08±2.04	10.67±2.32	11(29.7)	26(70.3)	15(40.5)	22(59.5)
	p		0.123	0.944	**0.011**	**0.001**	0.988	0.345	0.796		0.211	
Working status	Working actively	23	36.65±9.25	32.34±9.67	13.30±1.98	11.82±3.03	10.08±2.42	11±2.06	9(39.1)	14(60.9)	12(52.2)	11(47.8)
	Not working	75	36.89±8.66	34.06±12.06	12.33±3.12	10.84±2.62	10.16±1.95	11±2.79	23(30.7)	52(69.3)	37(49.3)	38(50.7)
	P		0.909	0.801	0.083	0.132	0.644	1	0.615		0.812	
Economical situation	Income is hardly enough/not enough	3	34.66±12.50	44.66±16.65	12.33±0.57	8.66±2.51	9.66±1.15	12.00±3.00	1(33.3)	2(66.7)	1(33.3)	2(66.7)
	In balance with income and expenses	63	35.98±8.47	33.93±12.03	12.47±3.16	10.58±2.43	10.38±1.93	11.04±2.70	23(36.5)	40(63.5)	32(50.8)	31(49.2)
	Income is more than expenses	32	38.71±8.99	32.09±9.67	12.75±2.57	12.25±2.96	9.71±2.31	10.81±2.52	8(25)	24(75)	16(50)	16(50)
	P		0.327	0.325	0.904	**0.005**	0.299	0.739	0.519		0.837	

Table 1.(continued)

		n										
Marital status	Married	84	36.36±8.95	33.83±11.29	12.80±2.91	11.04±2.66	10.01±2.09	10.97±2.69	30(35.7)	54(64.3)	44(52.4)	40(47.6)
	Single	14	39.64±7.17	32.64±13.21	11.07±2.55	11.21±3.26	10.92±1.73	11.14±2.28	2(14.3)	12(85.7)	5(35.7)	9(64.3)
	p		0.197	0.339	**0.039**	0.834	0.116	0.828	0.092		0.386	
Who lives with	Alone	9	38.88±7.80	34.11±13.35	13.11±3.25	10.77±3.03	10.22±1.71	11±2.44	2(22.2)	7(77.8)	3(33.3)	6(66.7)
	Family-friend	89	36.62±8.86	33.61±11.40	12.50±2.90	11.10±2.72	10.13±2.10	11±2.66	30(33.7)	59(66.3)	46(51.7)	43(48.3)
	p		0.464	0.946	0.556	0.738	0.850	1	0.470		0.290	
Additional illness	Yes	69	37.02±8.76	34.75±12.28	12.39±2.82	10.88±2.62	9.97±1.98	11±2.77	22(31.9)	47(68.1)	34(49.3)	35(50.7)
	No	29	36.37±8.88	31.06±9.13	12.96±3.15	11.51±3.00	10.55±2.21	11±2.29	10(34.5)	19(65.5)	15(51.7)	14(48.3)
	p		0.739	0.424	0.377	0.299	0.067	1	0.988		1	
Where the patient gets her blood pressure measured	Home	63	38.23±8.52	33.79±11.70	12.82±3.04	11.42±2.80	10.01±2.07	10.77±2.75	17(27)	46(73)	30(47.6)	33(52.4)
	Pharmacy	10	30.60±7.32	34.40±13.30	12.50±1.64	10.50±2.50	10.40±1.50	11±2.53	6(60)	4(40)	7(70)	3(30)
	Family Health Center	25	35.80±8.94	33.04±10.74	11.92±2.99	10.40±2.59	10.36±2.25	11.56±2.34	9(36)	16(64)	12(50)	12(50)
	p		**0.028**	0.986	0.427	0.224	0.620	0.458	0.122		0.401	
Disease duration from diagnosis	3 months- 1 year	7	37.42±11.5	27.71±7.22	12.42±3.30	12.14±2.34	10.28±1.11	11.42±2.93	2(28.6)	5(71.4)	1(14.3)	6(85.7)
	2-5 years	29	36.03±8.74	34.68±10.90	12.75±2.82	11.10±3.02	10.31±1.75	10.37±2.65	13(44.8)	16(55.2)	19(65.5)	10(34.5)
	6-10 years	17	40.17±8.92	32.76±10.45	12.47±1.87	11.23±2.81	10.11±2.57	11.17±2.50	4(23.5)	13(76.5)	8(47.1)	9(52.9)
	11-15 years	17	33.58±8.31	30.23±9.33	12.11±2.95	9.94±2.24	10.47±1.50	11.17±2.87	7(41.2)	10(58.8)	11(64.7)	6(35.3)
	≥16 years	28	37.46±7.98	36.96±10.11	12.71±3.53	11.35±2.71	9.75±2.50	11.32±2.53	6(21.4)	22(78.6)	10(35.7)	18(64.3)
	p		0.267	0.678	0.961	0.368	0.885	0.676	0.302		**0.031**	
History of hospitalization due to HT*	Yes	26	35.15±8.19	34.65±11.86	12.26±2.82	10.50±2.83	10.07±2.71	11.53±2.51	10(38.5)	16(61.5)	13(50)	13(50)
	No	72	37.44±8.93	33.30±11.45	12.66±2.96	11.27±2.69	10.16±1.79	10.80±2.66	22(30.6)	50(69.4)	36(50)	36(50)
			0.255	0.471	0.555	0.217	0.543	0.225	0.622		1	
History of HT in the family	Yes	57	37.78±8.77	33.07±10.59	12.47±2.78	11.21±2.90	10.50±1.95	11.35±2.61	15(26.3)	42(73.7)	29(50.9)	28(49.1)
	No	41	35.51±8.67	34.48±12.78	12.68±3.13	10.87±2.52	9.63±2.11	10.51±2.60	17(41.5)	24(58.5)	20(48.8)	21(51.2)
	p		0.206	0.751	0.729	0.556	**0.027**	0.120	0.174		1	
Number of drugs used per day	1 drug	48	36.04±9.15	32.91±11.15	12.95±2.50	10.68±2.86	10.62±1.99	11.22±2.71	18(37.5)	30(62.5)	30(62.5)	18(37.5)
	2 drugs	28	36.14±9.53	34.92±10.19	11.35±2.69	11.46±2.74	10.17±1.86	11.21±2.75	11(39.3)	17(60.7)	13(46.4)	15(53.6)
	≥3 drugs	22	39.45±6.39	34.00±8.79	13.22±3.65	11.40±2.44	9.04±0.10	10.22±2.22	3(13.6)	19(86.4)	6(27.3)	16(72.7)
	P		0.284	0.346	0.032	0.400	**0.008**	0.297	0.072		**0.019**	

Table 1.(continued)

		n	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	n(%)	n(%)	n(%)	n(%)
Knowing the effect of HT	Know	40	38.60±8.63	34.95±10.41	13.07±2.85	11.77±2.48	9.87±2.39	10.90±2.55	11(27.5)	29(72.5)	13(32.5)	27(67.5)
	Not know	58	35.62±8.71	32.77±12.24	12.20±2.93	10.58±2.82	10.32±1.79	11.06±2.70	21(36.2)	37(63.8)	36(62.1)	22(37.9)
	p		0.098	0.141	0.149	**0.034**	0.540	0.757	0.494		**0.008**	
Frequency of checking HT	1 time in 3 months	50	37.26±8.41	32.86±10.47	12.42±3.13	11.54±2.50	10.16±1.77	11.22±2.38	14(28)	36(72)	21(42)	29(58)
	1 time in 6 months	28	36.14±9.31	34.42±13.77	12.07±2.53	9.71±2.57	10.25±2.31	11.32±3.11	8(28.6)	20(71.4)	18(64.3)	10(35.7)
	≥Once a year	20	36.75±9.21	34.60±11.02	13.60±2.74	11.80±2.96	9.95±2.41	10±2.36	10(50)	10(50)	10(50)	10(50)
	p		0.866	0.916	0.181	**0.007**	0.761	0.161	0.193		0.165	
Getting regular exercise	Yes	14	38.42±7.99	30.00±7.30	13.50±2.79	12.14±3.27	10.35±2.49	10.71±2.36	4(28.6)	10(71.4)	6(42.9)	8(57.1)
	No	83	36.57±8.90	34.27±12.00	12.40±2.92	10.89±2.62	10.10±1.99	11.04±2.68	28(33.3)	56(66.7)	43(51.2)	41(48.8)
	p		0.446	0.337	0.196	0.115	0.561	0.663	0.722		0.773	
Smoking	Using actively	17	37.23±11.06	33.58±11.09	12.58±3.00	11.29±2.33	9.47±2.42	10.58±2.34	7(41.2)	10(58.8)	6(35.3)	11(64.7)
	Never used	58	36.87±8.54	34.94±10.33	12.50±3.10	11±2.77	10.12±1.95	11.31±2.70	18(31)	40(69)	30(51.7)	28(48.3)
	Quitted	23	36.43±7.73	30.78±9.53	12.69±2.45	11.08±3.02	10.69±1.96	10.52±2.62	7(30.4)	16(69.6)	13(56.5)	10(43.5)
	p		0.959	0.183	0.964	0.928	0.179	0.375	0.718		0.376	
Body Mass Index	Normal (18.50-24.99)	10	36.60±9.46	36.40±15.47	11.70±2.98	11.50±3.89	11.30±2.11	11.40±2.87	4(40)	6(60)	4(40)	6(60)
	Overweight (25.00-29.99)	28	36.78±9.21	31.39±8.64	12.17±3.09	10.96±2.65	10.28±1.69	10.82±2.51	9(32.1)	19(67.9)	16(57.1)	12(42.9)
	Obese (>30)	60	36.90±8.58	34.38±10.01	12.88±2.82	11.05±2.60	9.88±2.16	11.01±2.68	19(31.7)	41(68.3)	29(48.3)	31(51.7)
	P		0.994	0.222	0.357	0.867	**0.039**	0.837	0.875		0.594	

-*Hypertension. n: Number. Mean±SD: Mean±Standart Deviation
-Independent Samples T-test in binary groups meeting the normal distribution assumption. One-Way Anova test in more than two groups;
-Mann Whitney U test was used in paired groups that did not meet the normal distribution assumption. and Kruskal Wallis test was used in more than two groups.
-Chi-square test was used as analysis.

Table 2. Analysis of the changes in the blood pressure values and blood test results of the education and control groups during the six-month period

	EDUCATION GROUP (n=49)			CONTROL GROUP (n=49)		
	1st Month Mean±SD	6th Month Mean±SD	p	1st Month Mean±SD	6th Month Mean±SD	p
Systolic BP* mmHg	136.42±20.75	126.53±12.95	**0.003**	135.61±12.69	137.12±15.2	0.670
Dyastolic BP mmHg	85.18±12.84	80.40±9.28	**0.022**	84.04±9.68	85.81±12.47	0.471
Sodium mmol/L	139.85±2.38	139.67±2.76	0.641	139.16±2.5	139.12±2.96	0.798
Potassium mmol/L	4.43±0.48	4.46±0.53	0.798	4.42±0.48	4.40±0.42	0.870
Urea mg/dL	35±10.61	34.14±7.51	0.555	36.34±10.42	39.13±16.4	0.267
Creatinin mg/dL	0.86±.021	0.86±0.23	0.955	0.93±0.25	0.97±0.23	0.150

*Blood Pressure. Mean±SD: Mean±Standart Deviation
- Paired-Samples T-Test was used in normally distributed groups and Wilcoxon Signed-Rank Test was used in groups that did not show normal distribution.

Table 3. Investigation of the change of MASES-SF. MMS. HAI and PBS in education and control groups in the six-month period

	EDUCATION GROUP (n=49)				CONTROL GROUP (n=49)			
	1st Month	6th Month	Z/T	p	1st Month	6th Month	Z	p
	Mean±SD	Mean±SD			Mean±SD	Mean±SD		
MASES-SF	36.28±10.08	40.65±8.57	-4.093	**<0.001**	37.38±7.27	37.08±6.60	0.798	0.429
MMS Knowledge level	1.63±0.48	1.79±0.40	-2.3	**0.021**	1.71±0.45	1.63±0.48	-1.265	0.206
MMS motivation level	1.40±0.48	1.77±0.42	-4.243	**<0.001**	1.59±0.49	1.63±0.48	-0.557	0.564
HAI	33.10±12.76	32.24±11.23	-1.027	0.304	34.22±10.23	35.22±9.20	-1.981	**0.048**
PHS Control center	11.85±2.83	12.75±2.90	-3.316	**0.002**	13.26±2.86	13.71±2.82	-1.232	0.224
PHS Certainty	10.59±3.04	11.08±2.88	-2.020	**0.049**	11.55±2.32	11.34±2.22	1.606	0.115
PHS Self-awareness	10.61±2.05	11.40±2.63	-3.365	**0.001**	9.67±1.97	9.71±1.93	-1	0.317
PHS Importance of health	11.04±2.95	11.53±2.75	-1.210	0.077	10.95±2.29	10.77±2.08	1.543	0.130

- Paired-Samples T-Test was used in normally distributed groups and Wilcoxon Signed-Rank Test was used in groups that did not show normal distribution.

Table 4. Relation between MASES-SF Scale and blood pressure

	n	Mean±SD	t	p
Systolic Blood Pressure				
<140 mmHg	51	38.82±9.03	2.395	**0.019**
>140 mmHg	47	34.68±7.99		
Diastolic Blood Pressure				
<90 mmHg	60	38.53±90	2.471	**0.015**
>90 mmHg	38	34.15±7.74		

n: Number. Mean±SD: Mean±Standart Deviation
- Independent Samples-T Test was used for analysis.

Discussion

It is thought that drug compliance can be increased in chronic diseases, especially hypertension, by having information about the diseases and the drug regimens they use.[16] This study includes an educational intervention, unlike previous hypertension medication compliance studies. Although it is stated in the literature review that the medication compliance of patients should be increased with education, the number of studies on appropriate education and follow-up programs for patients is very few. In addition, the fact that hypertension does not mean 'just having high blood pressure' but there are many social and psychological aspects like health perception and anxiety, affecting and triggering the disease to think about for proper management. From this perspective, this study seems to be the first one measuring patients' health perception, anxiety levels, and their relations to drug compliance and health outcomes. We believe that this study differs from previous drug compliance studies by directly showing the change in the health outcomes of the patients because of the education and this is the most powerful aspect of this study. In sum, it can be said that this study may make important contributions to the literature in terms of providing a holistic approach to hypertension.

This study shows that patients with uncontrolled blood pressure had lower drug compliance than patients with normal blood pressure. Similar to the presented study, patients with controlled systolic and diastolic blood pressure were found to have higher drug compliance.[9] Once again, raising patient awareness about their medication seems to have a positive effect on compliance and health outcomes.

Compared to the previous studies using the same scale (MASES-SF) in the literature it can be said that drug compliance of the patients is at a moderate level. The drug compliance and age relationship yielded different results in previous studies suggesting that it may vary depending on the region where the patients live or their cultural level. In the study, we presented no significant difference was found between the age groups and the medication compliance of the patients. In a drug compliance study conducted on patients using multiple drugs in a district of Konya, researchers found that drug compliance decreases with age.[17] On the contrary, Özdemir et al. found higher drug compliance in geriatric outpatient clinics. The authors similar to the study we presented claimed that education on hypertension drug treatment in that outpatient clinic was the reason for higher compliance.[18] But if it is an age aspect Mollaoğlu et al. did not find a significant difference between treatment compliance and age, They explained the rising positive attitude towards antihypertensive drugs with advancing age as the acceptance tendency of treatment by aging, and this was explained by the tendency of individuals to accept treatment.[19] In favor of their explanation, Cingil et al. in their study with 194 hypertensive patients, individuals under the age of 49 were using their drugs more irregularly than patients aged 50 years and over.[20]

Similarly, the effect of gender seems to give different results in different studies. There was no significant relationship between gender and drug compliance we could define in this study, but women's drug compliance scores were higher than men's. Özdemir et al. and Demirbaş et. al., also noted no difference.[17,18] But Mollaoğlu et al. and Kankaya et. al. reported lower drug compliance in men. Kankaya et. al. attributed this difference to the fact that women are taking more responsibility in society, living more properly within a program compared to men.[19,21] In addition women in this study were more knowledgeable about hypertension than men. But it should be added that Kara et al. did not find a relationship between gender and level of knowledge.[22] It can be said that gender differs depending on the socioeconomic, and educational levels of the study group.

From an educational perspective, drug compliance seems to be getting better with increasing academic education although the difference was not significant, in the study presented. In any chronic disease like hypertension, the duration of the illness is important in drug compliance. In this study, the motivation level of newly diagnosed hypertensive individuals was higher. In favor of these results, Demirbaş et. al noted that as the duration of the disease diagnosis increases, the patient's motivation and knowledge level about treatment decreases.[17] It can be assumed that the duration of diagnosis prolongs patients getting used to living with their illnesses and they internalize their illnesses. Therefore, they disrupt their treatment due to the perception of their situation as normal.

No significant relationship was found between the number of drugs used and drug compliance in this study, but drug compliance scores of the patients using three or more drugs were higher. Differently, Mollaoğlu et al. found higher drug compliance in those who were using a single drug.[19] In the present study, the motivation of the patients was increasing significantly as the number of hypertension drugs used daily increased. However, the health awareness of the patients varied inversely with the number of drugs used. In addition, the motivation level of the patients who knew the effects of hypertension on the body was found to be higher. In

two studies, contrary to the presented study, as the number of drugs used increased, the motivation and knowledge level of the patient about treatment decreased.[17, 22] Studies with larger study populations and long-term follow-up are needed to clarify age, gender, and academic education level.

In this study; there was no significant relationship between age, duration of drug use, academic education level, and motivation-knowledge level similar to Kara et al.[22] Lee et al. found a negative correlation between young age, short duration of drug use, and drug compliance.[23] These results are surprising because very important known concepts such as the academic education level and the duration of drug usage are not affecting the motivation to use drugs properly.

The health awareness of the patients with a family history of hypertension was high and it may be due to the experiences transferred from family, in this study. Similarly, Ergün et al. showed that patients with a family history have sufficient knowledge about hypertension regardless of some factors.[16]

A study from China reported a negative relationship between poor perception of health status and drug compliance.[23] But the presented study could not find a significant relationship between perception of health and drug compliance. This difference may come from different cultural effects.

Lulebo et al. showed that in patients with poor knowledge of the complications of hypertension, non-adherence to antihypertensive treatment was 2.4 times higher.[24] Drug compliance can be improved by organizing education programs for elderly hypertensives and calling for controls periodically.[21] In this study, because of the educational intervention drug compliance increased significantly at the end of six months. The blood pressure of the patients who received educational intervention decreased significantly. As a result of their awareness, there was a significant increase in their perception of their health, but their anxiety levels did not change.

Considering the limitations of the study; the relatively low number of patients, the inability to perform the third control face-to-face with patients due to the COVID-19 pandemic, and because of the pandemic again compulsory getting some patients' blood tests in different hospitals may be noted.

Conclusion

Hypertension is one of the most common diseases in family medicine practice. Because of it, family physicians have an important effect on managing these patients. By educating their patients and helping to increase patients awareness about their health, the blood pressure of the patients can be kept under control more easily and more economically. Once more it is clear that health outcomes are strongly related to patient education and family physicians' willingness to patient education had a huge effect than they think to have.

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