

The assessment of adherence of hypertensive individuals to treatment and lifestyle change recommendations

Hipertansiyonlu bireylerin tedavi ve yaşam biçimi değişimine uyumlarının değerlendirilmesi

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ABSTRACT

Objective: Most of studies about adherence in hypertension highlight the adherence to the medical treatment but do not include the adherence to the other recommendations, such as lifestyle modifications. The factors effective on adherence to each type of recommendation may differ. Accordingly, we aimed in this study to show that nonadherence to each recommendation should be assessed individually.

Methods: The study, which was designed as cross-sectional and descriptive, included 150 patients who were followed by the outpatient clinics for at least one year. A data collecting form with 44 questions was prepared by the investigators, and the patient adherence was assessed in five categories: medicine-related adherence, diet-related adherence, exercise-related adherence, measurement-related adherence and smoking related adherence. The face-to-face interview method was used to collect data. Statistical analysis was accomplished by Chi-square test and logistic regression analysis.

Results: Of 150 subjects included in the study, 94 (63%) were female and mean age was 56±12 (20-81) years. Mean duration of drug use was 6.5±6.5 years and the mean number of drugs used was 1.6±0.8. The adherence to recommendations of medication, diet, exercise, home-blood measurement and smoking were 72%, 65%, 31%, 63% and 83%, respectively. Each patient was adherent to at least one recommendation, while 11% of patients were adherent to one recommendation, 23% - to two, 29% - to three, 24% - to four and 13% - to five. According to the regression analysis, factors effective on each type of adherence were found to be different from others. The presence of three or more types of adherence was related to income level (OR= 0.297; 95%CI - 0.132-0.666; p<0.001) and presence of any other chronic disease (OR=2.329; 95% CI - 1.114-4.859; p=0.002).

Conclusion: The rates of adherence to medicine and life-style changes were generally found to be low in hypertension. The cause of nonadherence is different according to the type of adherence. Each recommendation should be assessed individually in terms of adherence.

(*Anadolu Kardiyol Derg 2009; 9: 102-9*)

Key words: Hypertension, patient adherence, lifestyle, logistic regression analysis

ÖZET

Amaç: Hipertansiyonda uyum ile ilgili araştırmaların çoğu tıbbi tedaviye uyumu aydınlatmakta, yaşam biçimi değişikliği gibi diğer önerilere uyumu içermemektedir. Her bir öneriye uyumda etkili faktörler farklı olabilir. Bu nedenle, bu çalışmada, her bir öneriye uyumun ayrı ayrı incelenmesi amaçlanmıştır.

Yöntemler: Tanımlayıcı ve enine-kesitsel olarak tasarlanan çalışmaya poliklinik düzeyinde en az bir yıldır izlenmekte olan 150 hasta alınmıştır. Araştırmacılar tarafından 44 sorudan oluşan bir veri toplama formu hazırlanmış, hasta uyumu beş kategoride incelenmiştir: İlaçla ilişkili uyum, diyetle ilişkili uyum, egzersizle ilişkili uyum, ölçümle ilişkili uyum, sigarayla ilişkili uyum. Veriler yüz yüze görüşme yöntemi ile toplanmıştır. İstatistiksel analizde Ki-kare testi ve lojistik regresyon analizi kullanılmıştır.

Bulgular: Bireylerin, yaş ortalaması 56±12 (20-81) yıl ve 94'ü kadın (%63) idi. Ortalama ilaç kullanım süresi 6.5±6.5 yıl ve ortalama ilaç sayısı 1.6±0.8 adet olarak belirlenmiştir. İlaç, diyet, egzersiz, evde kan basıncı ölçümü ve sigara ile ilişkili uyum oranları sırasıyla %72, %65, %31, %63 ve %83 bulunmuştur. Hastaların tümü en az bir öneriye uyum gösterirken, %11'inin bir, %23'ünün iki, %29'unun üç, %24'ünün dört, %1'inin beş öneriye uyum gösterdiği saptanmıştır. Regresyon analizi sonuçlarına göre, her bir uyum tipine etkili faktörlerin farklı olduğu bulunmuştur. Üç ya da daha fazla öneriye uyum, gelir düzeyi (OR= 0.297; %95GA- 0.132-0.666) ve başka kronik hastalık varlığı (OR= 2.329; %95GA- 1.114-4.859) ile ilişkili bulunmuştur (sırasıyla p<0.001 ve p=0.002).

Sonuç: Hipertansiyonlu bireylerin ilaç ve yaşam biçimi değişimlerine uyum oranları genellikle düşük bulunmuştur. Uyumsuzluk nedeni, öneri tipine göre değişmektedir. Her bir öneri, uyuma etki eden etmenler açısından ayrı ayrı değerlendirilmelidir.

(*Anadolu Kardiyol Derg 2009; 9: 102-9*)

Anahtar kelimeler: Hipertansiyon, hasta uyumu, yaşam biçimi, lojistik regresyon analizi

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This work was presented at the 2nd Clinical Vascular Biology Congress, 26-30 April 2006, Antalya / Turkey

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Introduction

Hypertension is a chronic disease that requires lifelong treatment. Kearney et al. (1) has reported that the overall worldwide prevalence of hypertension is 26%. If the prehypertension, which was also defined as a concern for cardiovascular risk (2), had been included, the rate would be much higher. Among all the potentially modifiable risk factors for myocardial infarction in 52 countries, including our country, only smoking has exceeded hypertension (3). It is estimated to account for 6% of death worldwide (4). The cornerstone of the treatment of hypertension is the control of blood pressure (BP). Despite the enormous progress in antihypertensive medications, the control of high BP is still low. In the United States, 34% of the hypertensive population has their blood pressure not controlled at the 160/95 mm Hg threshold. The corresponding figure is not better in Canada (51%), in Spain (77%) and in England (62%) (5). The reasons of uncontrolled hypertension have been investigated in many studies. Although personal differences in responding to certain antihypertensive drugs are also possible, the major contributor to this failure is the nonadherence of the patient to the recommended treatment.

The adherence, or compliance, studies about the hypertension are frequently focused on only the pharmacological interventions. In some studies, the diet has also been interrogated (6). However, the management of hypertension is composed of many lifestyle interventions, including regular exercise and home blood pressure monitoring. The reason of nonadherence to one intervention may well be different from another. Therefore, the reasons of nonadherence to each intervention should be assessed separately.

Accordingly, in this study, the patients with hypertension were assessed for not only the adherence to the medicine, but also adherence to the lifestyle modifications, including diet, exercise and home monitorization of BP. We hypothesized that the reasons of nonadherence to each recommendation may be different, and therefore, should be assessed individually.

Methods

The design and sample of the study

This study, which was designed as a descriptive and cross-sectional one, included 150 patients of at least 20 years of age, who were on follow-up list of outpatient clinics of department of cardiology for at least one year. Those patients who were eligible for the study were directed to a nurse for a brief description of the study. Afterwards, the nurse asked the patient for participation. Those who accepted to participate signed a written informed consent after they were assured of confidentiality. They were then informed about how to fulfill the questionnaire. A nurse attended the responders during the filling process. The patients with following findings were further interrogated for poor adherence: patients with poor BP control, target organ damage, poor physical condition, obesity or conflicting answers. During the further interrogation, patients

were asked to give details about their answers. When there is a conflict between the answers, poor adherence was suspected.

Data collecting form

The adherence was assessed by self-report method. A data collecting form was prepared, piloted and refined by the investigators until the final form included 44 questions (Appendix-1). The patient adherence was assessed in five categories: medicine-related adherence, diet-related adherence, exercise-related adherence, measurement-related adherence and smoking related adherence. The questionnaire also included questions about the socio-demographic data. The data were obtained by face-to-face interview method. The education level was categorized into six levels: illiterate; literate but no graduation from any school; graduated from elementary school; graduated from junior high school; graduated from high school; graduated from a license program. The habits were classified as smoking, alcohol, smoking and alcohol, none. The income level were graded as low (income is not sufficient for usual expenses), intermediate (income level is equal to the usual expenses) and high (income level exceeding the usual expenses). Marital status was defined in three forms: single, married and divorced. The knowledge level was not assessed but they were asked about whether they had been informed about hypertension and other cardiovascular risk factors. The prescribed drug or drugs (including the number of prescribed drugs) were also asked. Chronic disease was defined as any disease that requires long-term use of medicine.

Definitions

In the study, the following definitions were used: medicine related adherence: to receive all the prescribed medications regularly in the last week; diet-related adherence: to consume a low-fat and low-sodium diet; exercise-related adherence: to exercise 30-60 minutes/days at least three times a week; measurement-related adherence: to measure the BP and record it at least once a day; smoking-related adherence: not to smoke (either never smoked or stopped smoking). The absence of these criteria was accepted as nonadherence.

Statistical analysis

All statistical analysis was made by using Statistical Package for the Social Sciences (SPSS)®-version 13 (Chicago, IL, U.S.A.) on Windows Vista and Web-based Interactive Statistics program of Statpage available on <http://statpages.org/>. The categorical variables were expressed as percentages; continuous variables were expressed as mean±1 standard deviation. The factors that are effective on adherence were assessed by binary logistic regression analysis using forward stepwise with likelihood ratio method. The predictive models were obtained by binary logistic regression analysis. The binary logistic regression analysis included only those parameters with p value <0.05 in Chi-square analysis. The power of independently-related parameters and predictive models were expressed as odds ratio (OR) with 95% confidence intervals (CI). The statistical significance was set at

0.05. In the binary logistic analysis the following parameters were included as factors: (1) age, (2) gender, (3) marital status, (4) body mass index, (5) income level, (6) education level, (7) the time since the first diagnosis of hypertension, (8) the time since first prescription of antihypertensive medicine, (9) the number of antihypertensive medicines the patient is currently using, (10) whether any of antihypertensive medicine has been changed within the last year, (11) being informed about the prescribed antihypertensive medicine(s), (12) presence of any other chronic disease, (13) the time on the day that the patient is taking the antihypertensive medicines, (14) having certificate of exemption from costs of antihypertensive medicine. In addition, each type of adherence was also used as a factor in the analysis of other type of adherences.

Results

The study included 150 patients. Of them, 94 (63%) were female and mean age was 56 ± 12 (20-81) years. Mean duration of prescribed drug use was 6.5 ± 6.5 years and mean number of drug used was 1.6 ± 0.8 (1-4). Of 150 patients, 13% were illiterate; 7% were literate without graduation; 45% were graduated from elementary school; 7% were graduated from junior high school; 18% were graduated from high school and 10% were graduated from a license program. The income level was low in 18%, intermediate in 73% and high in 9%. Both smoking and drinking was present in 5% while 29% were only smoking, 1% was only drinking and 65% were neither smoking nor drinking. The accompanying other chronic diseases were: coronary artery disease (9.3%), diabetes mellitus (13.3%), cerebrovascular accident (1.3%) and other unclassified diseases such as osteoarthritis, chronic obstructive lung disease or depression (12.7%). The medications were angiotensin converting enzyme inhibitors (46.7%), diuretics (38.7%), beta-adrenergic blockers (24.7%), calcium channel blockers (21.3%), angiotensin receptor antagonists (21.3%), direct vasodilators (6%), centrally acting vasodilators (2%), antidiabetics (13.3%), lipid lowering (16%), antiaggregants (35.3) and antidepressants (6%).

The adherence rates are shown in Figure 1. The adherence was least in exercise, followed by measurement, diet, medicine and smoking, respectively. The distribution of the number of adherence categories is shown in Figure 2. Each patient was adherent to at least one of the recommendations, while only 13% were adherent to all recommendations. The association between each adherence category is shown in Table 1. It seems that exercise-related nonadherence is mostly associated with other forms of nonadherence.

Predictors of adherence to medicine and lifestyle changes

Logistic regression analysis demonstrated that the medicine-related adherence was found to be independently related (Table 2) to the time of day of taking the medicine (morning is better; OR=3.834; 95% CI-1.768-8.328; $p < 0.001$); presence of exemplification from expenses of medicine (presence is better; OR=3.504; 95% CI-1.640-7.487, $p = 0.009$); presence of exercise-related adherence (exercising is better; OR =3.692; 95% CI

-1.262-10.713; $p = 0.023$) and presence of any other chronic disease (presence is better; or:2.767; 95% CI-1.219-6.257; $p = 0.035$). The diet-related adherence (Table 3) was independently related to income level (higher is better; OR=5.273; 95% CI-2.388-11.630; $p = 0.001$); being informed (informed is better; OR=14.477; 95% CI-5.021-41.410; $p = 0.002$) and exercise-related adherence (exercising is better; OR=9.900; 95% CI - 3.037-31.984;

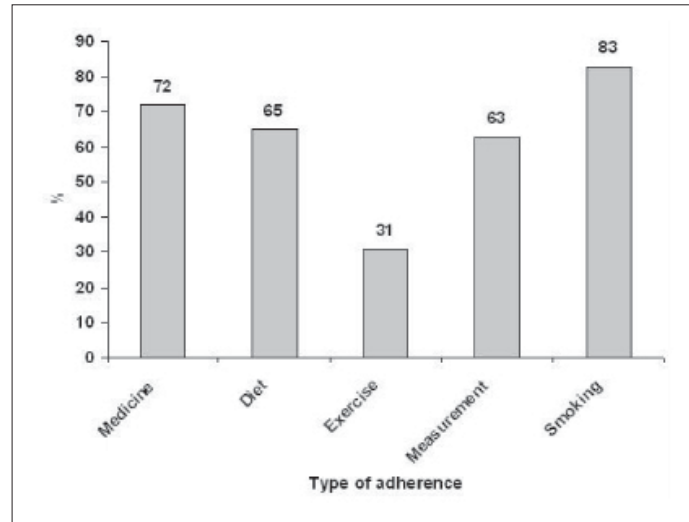


Figure 1. The adherence rates of the patients

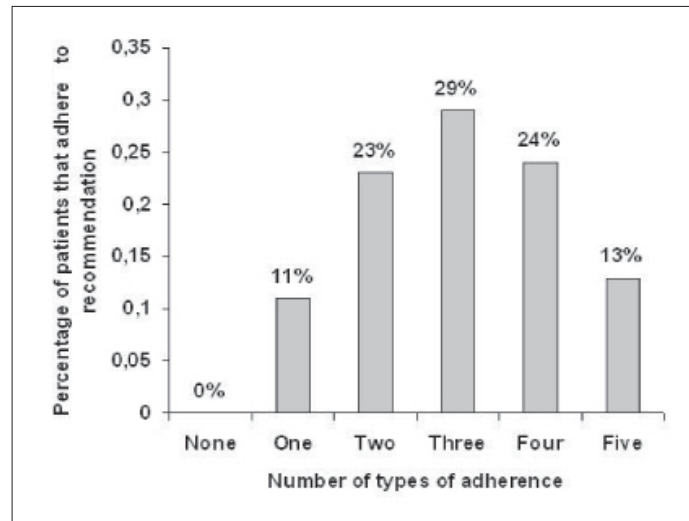


Figure 2. The distribution of number of nonadherence to recommendations. It should be noted that only 13% were adherent to all recommendations

Table 1. The concomitance of each category of nonadherence

Nonadherence category	Accompanying nonadherence category				
	Medicine	Diet	Measurement	Exercise	Smoking
Medicine	100%	35%	50%	90%	25%
Diet	36%	100%	54%	92%	11%
Measurement	35%	37%	100%	89%	14%
Exercise	32%	32%	45%	100%	14%
Smoking	40%	11%	32%	64%	100%

Table 2. Predictors of medicine-related adherence

Factor	p (Chi- square)	Odds Ratio	95% CI limits		p (logistic regression analysis*)
			Lower	Upper	
Chronic disease	0.011	2.767	1.219	6.257	0.035
Time of medicine on day	0.001	3.504	1.640	7.487	0.009
Certification of exemption	0.001	3.834	1.768	8.328	<0.001
Adherence to exercise	0.011	3.692	1.262	10.713	0.023
Adherence to HBM	0.050	1.973	0.952	4.090	0.098
Predictive model		6.791	2.492	18.466	<0.001

Logistic regression analysis
 * Factors that are written in italic form are independently related to the adherence
 **Only those factors, statistically different between groups with and without medicine-related adherence and Chi-square p values<0.05 are included in the logistic regression analysis; variables not included in analysis due to absence of statistically significant differences are: age >65 years, gender, marital status, education level, income level, HT duration>5 years, anti-HT duration> 5 years, anti-HT number, adherence to smoking, BMI>25 kg/m2, and being informed
 anti-HT- antihypertensive medicine, HT- hypertension, BMI- body-mass index, HBM- home blood pressure measurement

Table 3. Predictors of diet-related adherence

Factor*	p (Chi- square)	Odds Ratio	95% CI limits		p (logistic regression analysis**)
			Lower	Upper	
Education level	0.017	2.957	1.152	7.452	0.189
Income level	<0.001	5.273	2.388	11.630	0.001
HT duration>5 years	0.028	0.493	0.254	0.960	0.458
Anti-HT duration> 5 years	0.015	0.450	0.231	0.879	0.341
Being informed	<0.001	14.477	5.021	41.410	0.002
Adherence to exercise	<0.001	9.900	3.037	31.984	0.002
Adherence to HBM	0.001	3.072	1.546	6.106	0.260
Predictive model		12.800	4.634	35.085	<0.001

Logistic regression analysis
 * Factors that are written in italic form are independently related to the adherence
 **Only those factors, statistically different between groups with and without diet-related adherence and Chi-square p values <0.05 are included in the logistic regression analysis; variables not included in analysis due to absence of statistically significant differences are: age >65 years, gender, marital status, anti-HT number, BMI>25 kg/m2, chronic disease, time of medicine on day, certification of exemption, adherence to smoking, and adherence to medicine
 anti-HT- antihypertensive medicine, HT- hypertension, BMI- body-mass index, HBM- home blood pressure measurement

p=0.002). Exercise-related adherence (Table 4) was associated with education level (higher is better; OR=6.951; 95% CI-2.935-16.484; p<0.001); diet-related adherence (being on diet is better; OR =9.900; 95% CI-3.037-31.984; p<0.001) and medicine-related adherence (OR=3.692; 95% CI-1.262-10.713; p=0.001). Measurement-related adherence (Table 5) was related to being informed about medicine (informed is better; OR=8.514; 95% CI-3.397-21.219; p=0.003) and education level (higher is better; OR=7.364; 95% CI -2.243-23.957; p=0.017). Smoking related adherence (Table 6) was related to age (older is better; OR=10.227; 95% CI-1.684-61.196; p<0.001) and education level (lower is better; OR=0.115; 95% CI -0.045-0.293; p=0.001). The presence of three or more types of adherence (cumulative adherence) (Table 7) was related to income level (lower is better; OR=0.297; 95% CI -0.132-0.666; p<0.001) and presence of any other chronic disease (presence is better; OR=2.329; 95% CI-1.114-4.859; p=0.002).

Discussion

The study has revealed that the adherence rates are low in patients with hypertension. One of the most important problems encountered in the follow-up of chronically-ill patients is the lack of adherence to the recommended treatment (7). The adherence is defined as the extent to which a patient adheres to the recommendations (8). To examine this problem, a lot of studies have been performed. A common feature of these studies is that the emphasis is laid on only the medicine, and therefore, other modalities of the treatment, such as lifestyle modifications, are often neglected. Hypertension is one of the mostly prevalent chronic diseases in the world. Both the JNC VII and ESH/ESC guidelines dictate that nonpharmacological interventions are of equal importance in the management of hypertension (9, 10). However, in most of the studies, the focus is made on only the medicine.

Table 4. Predictors of exercise-related adherence

Factor*	p (Chi- square)	Odds Ratio	95% CI limits		p (logistic regression analysis**)
			Lower	Upper	
Education level	<0.001	6.951	2.935	16.484	<0.001
Being informed	0.004	3.395	1.550	7.176	0.559
Adherence to medicine	0.011	3.692	1.262	10.713	0.001
Adherence to diet	<0.001	9.900	3.037	31.984	<0.001
Adherence to HBM	0.002	4.048	1.598	10.193	0.542
Predictive model		12.100	3.721	38.985	<0.001

Logistic regression analysis
 * Factors that are written in italic form are independently related to the adherence
 **Only those factors, statistically different between groups with and without exercise-related adherence and Chi-square p values <0.05 are included in the logistic regression analysis; variables not included in analysis due to absence of statistically significant differences are: age >65 years, gender, marital status, income level, HT duration>5 years, anti-HT duration> 5 years, anti-HT number, chronic disease, time of medicine on day, certification of exemption, BMI>25 kg/m2, and adherence to smoking
 anti-HT- antihypertensive medicine, HT- hypertension, BMI- body-mass index, HBM- home blood pressure measurement

Table 5. Predictors of home blood pressure measurement-related adherence

Factor*	p (Chi- square)	Odds Ratio	95% CI limits		p (logistic regression analysis**)
			Lower	Upper	
Education level	<0.001	7.364	2.243	23.957	0.017
Being informed	<0.001	8.514	3.397	21.219	0.003
Adherence to diet	0.002	3.072	1.546	6.106	0.105
Adherence to exercise	0.003	4.048	1.598	10.193	0.131
Predictive model		7.385	3.280	16.569	<0.001

Logistic regression analysis
 * Factors that are written in italic form are independently related to the adherence
 **Only those factors, statistically different between groups with and without home blood pressure measurement-related adherence and Chi-square p values <0.05 are included in the logistic regression analysis; variables not included in analysis due to absence of statistically significant differences are: age >65 years, gender, marital status, income level, HT duration>5 years, anti-HT duration> 5 years, anti-HT number, chronic disease, time of medicine on day, certification of exemption, BMI>25 kg/m2, and adherence to medicine
 anti-HT- antihypertensive medicine, HT- hypertension, BMI- body-mass index, HBM- home blood pressure measurement

Table 6. Predictors of smoking-related adherence

Factor*	p (Chi- square)	Odds Ratio	95% CI limits		p (logistic regression analysis**)
			Upper	Lower	
Age >65 years	0.005	10.227	1.684	61.196	<0.001
Education level	<0.001	0.115	0.045	0.293	0.001
HT duration>5 years	0.027	3.116	1.195	8.080	0.696
Anti-HT duration> 5 years	0.029	2.923	1.121	7.579	0.712
Anti-HT number	0.002	5.508	1.860	16.178	0.053
Being informed	0.001	0.193	0.078	0.477	0,210
Chronic disease	0.013	3.993	1.348	11.736	0.768
Certification of exemption	0.007	3.430	1.393	8.434	0.054
Predictive model		21.706	4.554	101.260	<0.001

Logistic regression analysis
 * Factors that are written in italic form are independently related to the adherence
 **Only those factors, statistically different between groups with and without smoking-related adherence and Chi-square p values <0.05 are included in the logistic regression analysis; variables not included in analysis due to absence of statistically significant differences are: age >65 years, gender, marital status, income level, time of medicine on day, BMI>25 kg/m2, adherence to medicine, adherence to diet, adherence to HBM, and adherence to exercise
 anti-HT- antihypertensive medicine, HT- hypertension, BMI- body-mass index, HBM- home blood pressure measurement

Table 7. Predictors of presence of ≥3 types of adherence

Factor*	p (Chi- square)	Odds Ratio	95% CI limits		p (logistic regression analysis**)
			Upper	Lower	
Income level	0.009	0.297	0.132	0.666	<0.001
Being informed	0.019	2.502	1.157	5.392	0.054
Chronic disease	0.032	2.329	1.114	4.859	0.002
Certification of exemption	0.044	2.147	1.061	4.345	0.092
Predictive model		3.800	1.225	11.744	0.019

Logistic regression analysis
The types of adherences were not included in the analysis
* Factors that are written in italic form are independently related to the adherence
**Only those factors, statistically different between groups with and without presence of ≥3 types of adherence. and Chi-square p values <0.05 are included in the logistic regression analysis; variables not included in analysis due to absence of statistically significant differences are: age >65 years, gender, marital status, education level, HT duration>5 years, anti-HT duration> 5 years, anti-HT number; time of medicine on day, and BMI>25 kg/m2
anti-HT- antihypertensive medicine, HT- hypertension, BMI- body-mass index

In the Turkish population, the prevalence of hypertension is 27.5% for males and 36.1% for females (6). On the other hand, the control rate of hypertension is very low. Of those patients who received medical advice, only 20.7% have their BP controlled. In our study, the rate of the medicine-related nonadherence was 28%, which is very similar to that of PatenT study (25.8%) (6). The adherence to medicine was better in patients have chronic disease, who takes the medicine earlier in the day, who have certificate of exemption and who exercises regularly. The relation between adherence and number of prescribed drug has been reported but the relation was not found in our study in contrast with the literature (11).

In the management of hypertension, the diet should be poor in sodium and lipids. In our study, both diets were interrogated and the nonadherence rate was found to be 35%. It is similar to those reported in PatenT study (33.7%). The diet-related adherence was found to be better in patients whose income level was higher, who had been informed about the medicine and who were exercising. The relation between age and diet adherence is found in some studies (12) while one study denied it (13).

Approximately two thirds of the patients were not exercising regularly. In the PatenT study, adherence to recommendation of increasing exercise was found to be 35.1% in women and 54.7% in men. Patton et al. (14) have reported that 47% were adherent to recommendation of exercise; the adherence was increased to 76% by intervention. In comparison with this study, the exercise-related adherence is lower. The cultural differences may explain the difference. In the present study, exercise related adherence was better in patients whose education level is higher, who are adherent to diet and who are adherent to medicine.

The measurement-related adherence in our study was found to be related to education level and being informed about medicine. The home-measured BP values, rather than clinic-measured blood pressure values, were found valuable in predicting the target organ damage (15). Accordingly, the patients are encouraged for measuring their BP values at home. However, we found that a significant fraction of the patients does not conform to this recommendation. The cognitive problems in

patients with lower education level might explain the inadequacy of adherence in these patients. Being informed about medicine may play a role in increasing home BP measurement by knowing, and therefore being afraid of, side effects of excessive lowering of blood pressure.

Limitations of the study

The main limitation in the study is that the number of subjects is low. The aim of the study was to show the difference in effective factors on adherence types, not adherence frequencies. Therefore, we included only 150 subjects. If the number of subjects were higher, the results would be more powerful. In this study, the self-report method was used. The adherence can be assessed by direct and indirect methods. An ideal method should be cheap, reliable, objective, easy-to-use and easy-to-analyze. It should also avoid dividing the phenomenon into two separate groups and should not affect the patient's behavior (16). The direct methods seem to be more reliable but they are more expensive. In addition, they have potential to influence the patient's behavior. On the other hand, the indirect methods are easier and cheaper but they are highly dependent on the patient's intention. The self-report system is the easiest and cheapest method. However, it is less reliable especially in those patients who deny poor adherence (16, 17). For this reason, we further interrogated those patients whose answers were not consistent with the objective findings of poor blood pressure control. Therefore, we still believe in that the results are valid. Presence of a good correlation with other studies held in our population also supports us. The second limitation is that the questionnaires were filled just after the control examination. Some patients increase the adherence when they are close to a control examination (white coat adherence) (18). Therefore, the adherence rate might be lower than that mentioned in the study. However, we don't think this is a very significant limitation because the adherence rates are in consistent with some other studies. Another limitation is that we used the last week as the reference time for adherence. We had to limit the time because the patients would have difficulty in remembering the earlier dates.

Conclusion

Nursing is experiencing an evolution characterized by transition from nursing as an art to nursing as a science. In its current form, the nursing is a compound of art and science. Patient education is an important responsibility of health care team members, especially the nurses. The education of

chronic disease patients should include both medicine and lifestyle changes. In this regard, hypertension, as a chronic disease, deserves a special consideration because the nonadherence rates are very high. The causes of nonadherence may differ according to the category of adherence. Therefore, each category of adherence should be evaluated individually to increase the adherence rates in hypertensive patients.

Appendix 1.

DATA COLLECTION FORM

1. Name
2. Health Insurance Foundation
3. Address
4. Phone
5. Occupation
6. Age
7. Height
8. Weight
9. Gender
10. Marital status
11. The last graduated school
12. Do you smoke?
13. (If yes) How much?
14. Do you use alcohol?
15. (If yes) How much?
16. Does your income (as a family) afford your expenses?
17. When was the diagnosis of hypertension set?
18. How long have you been using medication for hypertension?
19. How many medications do you use for hypertension?
20. Who had diagnosed hypertension (the branch of the doctor)?
21. Do you know the names of your medicines?
22. How frequent do you visit the doctor for hypertension?
23. When did you visit doctor for hypertension? (the date of the previous visit)
24. Have been informed about the medications you use?
25. How long will you use the antihypertensive medication?
26. Do you take your medicines on the time you are instructed?
27. Do you have your blood pressure measured regularly? (measurement and recording)
28. How frequent do you measure your blood pressure?
29. Do you adhere to the diet for hypertension? (salt and cholesterol)
30. Do you use herbals for hypertension?
31. Do you exercise regularly?
32. What do you do if your blood pressure rises at home?
33. In the last year, how many times did your blood rise above the level that you were disturbed?
34. At what time do you take your medications?
35. Did you take all of your medicines yesterday?
36. Did you take all of your medicines last week?
37. Who providing your antihypertensive medications?
38. Do you have "document for exemption from paying"?
39. Have you taken your medications on this morning?
40. (If not) Why?
41. Do you have diabetes?
42. Do you have heart disease?
43. Do you have cerebrovascular disease? (to be explained)
44. Do you have another disease that requires long-term medicinal treatment?

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