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The effect of educational intervention on blood pressure levels among hypertensive female patients aged over 30 and living in Sivas

Sivas ilinde yaşayan 30 yaş üzeri hipertansif kadınlarda eğitimin kan basıncı değerleri üzerine etkisi

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Abstract

Aim. The aim of this study was to determine the effects of life style modification in patients with borderline and mild hypertension who were unaware of their blood pressure elevation and have had no diet or drug therapy previously. **Methods.** The study was conducted in Emek Health Center region in Sivas between January and November 2000. It was an interventional study and involved 189 housewives aged over 30 years. Cases involved were regularly followed for 6 months. The adherences of the cases to the life style-modifications were evaluated. At the end, the results were compared with the baseline values. **Results.** All the borderline and mild hypertensive housewives had life style modifications such as nutritional education; regular exercise and giving up smoking. Of 111 cases that had borderline hypertension before education program, 49 (44.1%) were found to be normotensive, 42 (37.9%) were borderline hypertensive, and 20 were (18.0%) mild hypertensive at the end. Among 78 mild hypertensive cases, 13 (16.7%) were found to be normotensive, while 31 (39.7%) were borderline hypertensive and 34 (43.6%) were mild hypertensives. Significant improvement was found when baseline values were compared with results at sixth month. **Conclusions.** It appeared that life style modifications have favorable effects in borderline and mild hypertensive patients. Early diagnosis and treatment is very important in reducing the burden in communities. Life style modifications must be kept in mind especially in borderline and mild hypertensive cases. This will help us to avoid side effects of pharmacological agents and reduce unnecessary costs.

Keywords: Hypertension, lifestyle modification, intervention

Özet

Amaç. Bu çalışmanın amacı kan basınçlarının yüksek olduğunun farkında olmayan, daha önce diyet yapmamış ya da ilaç tedavisi almamış hafif veya sınırda hipertansiyonu olan hastalarda yaşam tarzı değişikliklerinin etkilerini incelemektir. **Yöntem.** Araştırma Sivas Emek Sağlık Ocağı bölgesinde Ocak-Kasım 2000 tarihleri arasında yürütüldü. Otuz yaş üzeri 189 ev hanımının çalışmaya alındığı bir müdahale araştırmasıydı. Katılımcılar 6 ay düzenli izlendi. Olguların yaşam şekli değişikliklerine bağlılıkları değerlendirildi. İzlem sonucu elde edilen veriler çalışma başındaki verilerle karşılaştırıldı. **Bulgular.** Sınırda veya hafif hipertansiyonu olan 189 ev hanımı, beslenme eğitimi, düzenli egzersiz ve sigarayı bırakmak gibi yaşam şekli değişikleri uyguladı. Eğitim programından önce sınırda hipertansiyonu olan 111 olgunun sonunda 49'u normotansif, 42'si sınırda hipertansif ve 20'si hafif hipertansif bulundu. Hafif hipertansif 78 olgunun 31'i sınırda hipertansif, 13'ü hafif hipertansif bulunurken 13'ü de normotansif bulundu. Altı ay sonunda elde edilen sonuçlar ilk değerlerle karşılaştırıldığında istatistiksel olarak anlamlı farklılık bulundu. **Sonuçlar.** Yaşam şekli değişikliklerinin sınırda ve hafif hipertansif hastalarda faydalı etkilere sahip olduğu görüldü. Erken tanı ve tedavi toplumlarda sıkıntıyı azaltmada çok önemlidir. Yaşam şekli değişiklikleri özellikle sınırda ve hafif hipertansif hastalarda akılda tutulmalıdır. Bu bizi farmakolojik ajanların yan etkilerinden korumada yardımcı olacak ve gereksiz harcamaları azaltacaktır.

Anahtar Sözcükler: Hipertansiyon, yaşam şekli değişikliği, müdahale

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Introduction

Hypertension is a heavy burden for public health across the world. In many countries, as many as 15-25% of the adults have high blood pressure. According to the National Health and Nutrition Examination Survey (NHANES), in US about 69% of the population whose blood pressure is greater than 140/90 mmHg is aware of it, about half are getting treatment for it, and only about one-quarter are adequately controlled [1]. Hypertension once was dealt with as a disease of its own. Later on with the help of epidemiological data, it was integrated into the major risk factors of cardiovascular diseases that are responsible for 20-50% of all-cause mortality. The objectives of controlling hypertension are primary prevention in order to prevent possible complications, early diagnosis and adequate therapy. Prevention of hypertension in a given population can be achieved mainly through elimination of risk factors and preventive measures taken for keeping blood pressures at desired levels. Blood pressure control, reducing the dosages of drugs or totally eliminating the need for drug therapy and controlling the modifiable risk factors as much as possible, should be the main target. Patient education has been essential in bringing improvements in morbidity, mortality and life quality for society. Lifestyle changes can be applied both on the individual and population base. Changing health behaviors and maintaining them are not easily adopted by the patients.

Educational programs are effective in modifying the quality of life of the hypertensive patient. In the areas of mental capacity, social participation, perceived quality of life and sexual function the experimental group showed changes in a study conducted by Rivera et al. [2].

In this study, we screened a population living in a defined area for hypertension and the subjects diagnosed and required further evaluation and therapy were directed to clinical centers. The aims of our study were to identify the cases with borderline or mild hypertension who were unaware of their disease and who therefore could not have the opportunity of having medical therapy or any dietary measure. In addition, our objective was to determine the effects of life style modifications like regular exercise, giving up smoking and dietary changes.

Material and methods

The study was conducted in the region of Emek Health Center in Sivas between February and November 2000. In our study, we selected 1800 housewives aged over 30, living in the region of Emek in Sivas. By random sampling, the houses to be visited were selected. After screening for hypertension, 315 women (%17.5) were found to have borderline hypertension and among them 200 cases accepted to enroll into the study. The ease of follow-ups made us to prefer housewives as the subjects of our study. We measured the blood pressures of the cases and asked them to answer a questionnaire after an informed consent was obtained. Cases with borderline and mild hypertension who were unaware of their condition and who were without therapy were identified. Due to ethical concerns, no control group was included.

The followings were applied to the study group:

- We encouraged the cases to lose of %10 of their body weight in 6-month period.
- We advised them to consume low fat (particularly avoiding from saturated fats like margarine or butter), and high carbohydrate diet with fruit and vegetables.

- We advised the cases with moderate and high daily salt intake to go on with salt restriction (reducing salt intake by half).
- We recommended to increase daily physical activity (e.g. walking for at least half an hour daily with exerting enough effort) and to give up smoking.
- Brochures about the subject were given to each case.

The cases were followed for 6 months. Every month we performed follow up visits. At each visit, we measured their blood pressures and recorded their body weights. Occasionally, we sometimes failed to contact some cases for follow up visits. However, all cases had at least three follow up visits. Their adherences to preventive measures were evaluated. Eleven cases were excluded from the study because of lack of compliance, changing the addresses or taking back their informed consent. At the end of the study, we compared the results with baseline values. After the study, the cases that still had borderline or mild hypertension were referred to medical centers. Body weights of cases were measured via an electronic portable scale (Tanita). Blood pressures were measured with a sphygmomanometer after a rest of 5 minutes from the right upper extremity three times with intervals of at least 3 minutes between each measurement in sitting position. Hypertension was classified according to classification recommended by WHO (Table 1) (3). Cases with systolic blood pressures 140-160 mmHg and diastolic blood pressures 90-95 mmHg were regarded as having borderline hypertension. Cases with blood pressure readings 161-180 mmHg for systolic and 96-105 mmHg for diastolic were classified as mild hypertensives.

Table 1. Classification of hypertension according to WHO for adults (over age of 18).

	Systolic*		Diastolic*
A. Normal	< 140		< 90
B. Mild Hypertension	140-180	and /or	90-105
Borderline HT	140-160	and /or	90-95
C. Moderate and severe HT	> 180	and /or	> 105
D. Isolated systolic HT	> 140	and	< 90
Borderline Isolated systolic HT	140-160	and	< 90

*Blood Pressure (mmHg)

Body mass indexes (BMI) of 20.0-24.9, 25.0-29.9, and above 30.0 were defined as normal, mild obese and obese respectively. While evaluating the physical activity, moderate amount of activity consisted the routine housework. The housewives who made no housework were regarded as having low amount of physical activity. Statistical analysis was done with Chi-square test, Wilcoxon's signed rank sum test. Statistical significance was assumed for p values <0.05.

Results

All cases were housewives and 111 of them (%58.7) had borderline, 78 of them (%41.3) had mild hypertension. Mean age of the cases was 49.1±11.6. Distributions of the cases according to risk factors are given in Table 2.

Eighty-one percent of the cases belonged to 30-59 age group. In case of educational status, %54.4 of the cases had a degree of primary school and %3.2 had university degree. According to body mass index, 46.6% were obese. Among the cases, 32.8% had high daily salt intake (>8 grams per day), 63.5% had moderate (3-8 grams per day) and 3.7% had low daily salt intake (<3 gram per day). Twenty-three of 62 cases (%37.1) with high daily salt intake and 38 of 120 cases with moderate daily salt intake (%31.7) and 1 of 7 cases with low daily salt intake had normal blood pressures at the end. Seven of 17 cases with low amount of physical activity had normalized their blood pressures (%41.2). In the group with moderate amount of activity, 55 of 172 cases had normal blood pressures at the end of the study (%39.5).

Ninety-one percent of the cases had moderate levels of physical activity, %13.2 was smoking, %2.1 of them were taking oral contraceptives, %14.8 had menopause and none had alcohol consumption. In case of dietary habits, polyunsaturated fats (%51.9) were preferred more in fried food. In other dishes saturated fats (%74.6) were mostly chosen. Among the study group, 53.4% of woman had family history of hypertension.

Table 2. Distribution of cases according to risk factors (n=189).

Risk Factors	Number	%
Age		
30-39	48	25.4
40-49	52	27.5
50-59	53	28.1
60-69	25	13.2
70+	11	5.8
Education		
Illiterate	53	28.1
Primary school	103	54.4
Secondary school	9	4.8
High school	18	9.5
University	6	3.2
BMI		
Normal	25	13.2
Mild obese	76	40.2
Obese	88	46.6
Daily salt intake		
High	62	32.8
Moderate	120	63.5
Low	7	3.7
Physical activity status		
Sedentary	17	9.0
Moderate range of activity	172	91.0
Smoking		
Smoker	25	13.2
Non-smoker	164	86.8
Alcohol		
Yes	0	0
No	189	100.0
Oral contraceptives		
Yes	4	2.1
No	87	46.0
Menopausal woman	98	51.9

In Table 3, classifications according to blood pressure measurements of last follow-up visit are given.

Table 3. Classification of hypertension of cases according to values at baseline and the last follow-up visit.

	Last visit							
Before training	Normotensive		Borderline HT		Mild HT		Total	
	n	%*	n	%	n	%	n	%**
Borderline HT	49	44.1	42	37.9	20	18.0	111	58.7
Mild HT	13	16.7	31	39.7	34	43.6	78	41.3
Total	62	32.8	73	38.6	54	28.6	189	100.0

SD = 1 (Borderline and mild hypertensive groups are merged during group testing).
$\chi^2 = 30.26$, $p<0.01$
*Raw percent, **Column percent.

At the end of the study, 62 of 189 cases (%32.8) returned to normotensive levels. Among

111 cases that were borderline hypertensives before the training, 49 (44.1%) became normotensive, 42 (%37.9) became borderline hypertensive, and 20 (18%) became mild hypertensive after the education. Of 78 cases with mild hypertension at the beginning, 13 (%16.7) were normotensive, 31 (%39.7) were borderline hypertensive and 34 (%43.6) were mild hypertensives at the end of the study. The beneficial effects of training were significant in borderline and mild hypertensive cases in respect to baseline values ($p<0.01$). The improvement was particularly obvious in cases with borderline hypertension.

The mean values of BMI, systolic and diastolic blood pressures are given in Table 4.

Table 4. Mean systolic and diastolic blood pressures and BMI of cases at baseline and last follow-up visit.

	BMI	SBP	DBP
Before training (n= 189)	30.3 ± 5.4	154.7 ± 16.0	94.5 ± 11.5
Last follow-up visit (n= 189)	30.9 ± 6.5	143.2 ± 20.5	87.8 ± 11.2
Statistical significance	p> 0.05	p< 0.01	p> 0.01

The baseline values of BMI, systolic and diastolic blood pressures were 30.3±5.4, 154.7±16.0 and 94.5±11.5 respectively. At last follow-up visit the mean values were 30.9±6.5, 143.2±20.5 and 87.8±11.2, respectively. Significant decrement was found in both systolic and diastolic blood pressures at the end according to baseline ($p< 0.01$). There were no significant changes in BMIs of cases at the end of the study period ($p>0.05$).

The blood pressure measurements according to baseline characteristic are given in Table 5.

Table 5. Status of hypertension (HT) at last follow-up according to baseline characteristics.

Blood pressure status at last visit						
	Normotensive		Borderline HT		Mild HT	
	n	%	n	%	n	%
Age groups						
30-39	22	45.8	15	31.3	11	22.9
40-49	18	34.6	21	40.4	13	25.0
50-59	14	26.4	21	39.6	18	34.0
60+	8	22.2	16	44.4	12	33.4
χ^2=7.07 p>0.05						
BMI						
* Normal	15	60.0	7	28.0	3	12.0
Overweight	26	34.2	30	39.5	20	26.3
Obese	21	23.9	36	40.9	31	35.2
χ^2= 12.6 p< 0.05						
Daily salt intake						
High	23	37.1	22	35.5	17	27.4
Moderate	38	31.7	50	41.7	32	26.7
Low	1	14.3	1	14.3	5	71.4
χ^2= 7.32 p> 0.05						
Physical activity						
Low	7	41.2	5	29.4	5	29.4
Moderate	55	39.5	68	39.5	49	28.0
χ^2= 0.81 p> 0.05						

* Significantly different.

According to these data, normotensives are more frequent in the age group of 30-39 (%45.8), but a statistically significant difference does not exist ($p> 0.05$). The body mass indexes (BMI) did not significantly differ at the baseline and at the end. However, the

cases with normal BMİ showed significantly better improvement compared to others. Among cases with normal BMI normalization of blood pressure was more frequent ($p< 0.05$). In normotensive and borderline hypertensive cases the BMI did not change significantly during the study period ($p> 0.05$). In mild hypertensives the BMI were significantly high at the end of the study ($p< 0.05$). Improvement in hypertension did not correlate with status of physical activity, education, daily salt intake, fat consumption, family history of hypertension and smoking ($p> 0.05$). At the end of the study 41.2% of cases with low-grade physical activity, 48% of smokers and 48.5% of cases that were graduated from secondary school or higher were found to be normotensive. Seven of 17 cases with low amount of physical activity had normalized their blood pressures (%41.2). In the group with moderate amount of activity 55 of 172 cases had normal blood pressures at the end of the study (%39.5). The relative efficiency values according to baseline characteristics were given in Table 6.

Table 6. The relative efficiency (RE) values according to baseline characteristics.

Blood pressure status at last visit						
	Normotensive		Hypertensive			
	n	%	n	%	RE	CI
Age groups $\chi2= 1.0$ $p>0.05$						
30-39	22	37.9	36	62.1	1.24	0.82-1.89
40+	40	30.5	91	69.5		
BMI $\chi2= 9.67$ $p< 0.05$						
Normal	15	60.0	10	40.0	2.09	1.40-3.13
Obese	47	28.7	117	71.3		
Daily salt intake $\chi2= 0.77$ $p> 0.05$						
High	23	37.1	39	62.9	1.21	0.8-1.83
Moderate	39	30.7	88	69.3		
Physical activity $\chi2= 0.59$ $p> 0.05$						
Low	7	41.2	10	58.8	1.29	07-2.37
Moderate	55	32.0	117	68.0		

Discussion

Changes in lifestyle are rational, promising ways of lowering the blood pressure and reducing the cardiovascular risk in many hypertensives. The first measure in all over-weight hypertensives is weight reduction. The benefit of extensive changes in lifestyle, including information on health, daily endurance training, healthy eating habits and reduction of alcohol intake has been confirmed by many authors (4). Several randomized trials have been conducted concerning life-style changes. In one of them, nurse-provided health and life style advice during home visits to elderly people was effective in reducing blood pressure (5). Community based life style-modification programs that consisted of mild aerobic exercise and a mild hypocaloric diet are considered effective for reducing cardiovascular risk factors. Okazaki et al. stated that individuals who already had one or more mild cardiovascular risk factors still could be candidates for such programs (6). Lifestyle modifications proven to lower blood pressure are recommended by many working groups (7). The role of lifestyle modifications as both preventative and adjunctive means to lower blood pressure has been reaffirmed by many investigators (8-10). Recently diabetes mellitus, hyperlipidemia, hypertension and atherosclerotic diseases have been defined as typical life style-related diseases (11). Food intake has been found to be important in the prevention of hypertension in the elderly (12). Furthermore several attempts have been made in order to substitute life style management for pharmacological control of blood pressure. In a pilot study in Australian general practice, it was stated that cessation of drug therapy might be an important motivating factor to achieve weight loss in motivated patients willing to trial a lifestyle approach (13). In our study, we evaluated

hypertensive cases that were unaware of their status and therefore who received no drug or diet therapy. Our study group included 189 cases that were all housewives. We gave them a training program composed of dietary recommendations like having regular exercise, giving up smoking, avoiding excessive salt and saturated fat intake. After 6 months of follow-up 62 of 189 cases (32.8%) who had borderline or mild hypertension, were found to be normotensive at the end. At the end of the study, a significant improvement in blood pressures compared to baseline values was noticed. In clinical trials focusing life style modifications, combined effects of restriction of sodium and alcohol, regular exercise and reduction in total body weight are evaluated. At the end, it was shown that the incidence of hypertension reduced by 20-54% (14-16). These results are in concordance with our study. Achieving blood pressure control was more prevalent in highly educated group and in those with a high salt intake at the baseline. The beneficial effect of education on health was more apparent.

Hypertension is an important public health problem, with some variability of its epidemiological properties in different populations. In a study conducted by Erem et al. the prevalence of systolic BP> or =140 mmHg was reported as 12.0% and of DBP> or =90 mmHg was 8.2% in Turkish population living in city of Trabzon (17). In a study conducted in order to estimate the prevalence of hypertension and to determine the hypertension awareness, treatment and control rates in Aydın, a Turkish province the estimated prevalence of hypertension was 29.6% (for BP > or =140/90 mmHg or on treatment). Overall, 57.9% of hypertensive individuals were aware that they had high BP, and 82.1% of aware hypertensives were being treated with antihypertensive medications. But only, 19.8% of treated hypertensives were under control (systolic pressure <140 mm Hg and diastolic pressure <90 mm Hg) indicating that hypertension is highly prevalent in Aydın, Turkey, and the detection and control of hypertension is unsatisfactory. In addition, housewives, unemployed, and the less educated individuals had greater mean systolic and diastolic blood pressure (18).

Turkish adults have the pattern of causes of death similar to a developed population, although the process of industrialization is ongoing, the structure of its population is young and overall cholesterol levels are comparatively low. Since several adverse factors exhibit a rising trend, primary and secondary prevention of cardiovascular disease must assume a much higher priority in various issues in Turkey than it currently does (19). Age is among the most important risk factors of HT and the incidence of HT increases with age. In addition, in our data, with increasing age the mean systolic and diastolic pressures increased. When examining the efficacy of education in controlling the blood pressure in the given age groups, one can see that 30-39 age group achieved a success rate of %53.4 and with increasing age the response to non-pharmacological therapy decreased and after age of 60 only %22.2 of cases could have normalized blood pressures. Therefore, ages of the patients should be considered enough while evaluating the therapy options.

Obesity is not more prevalent among the children of lower socioeconomic classes in Turkey as a developing country. In addition, independent of anthropometrical structure, diastolic and systolic blood pressures were shown to be related to the socioeconomic status in childhood age groups and both values were determined to decrease in accordance with a decrease in the socioeconomic level (20).

Another outcome we expected was achievement of weight reduction in the cases. Blood pressure increase is closely related to body mass index. Particularly abdominal obesity is associated with HT, hyperlipidemia and diabetes mellitus. Weight reduction is an effective way of blood pressure control in cases that are obese and have an excess of 10% or more than their ideal body weight and it has beneficial effects in risk factors like insulin resistance. Therefore, obese hypertensive patients should consider participating programs targeting increase in energy expenditure and decrease calorie intake and reduction. Patients with borderline or mild hypertension should be encouraged to join such a program and apply to the therapeutic life style changes for 3-6 months before

starting pharmacological therapy. Though hard to achieve, keeping ideal weight for a long time should be the aim. In three large scaled studies, the effect of weight reduction on primary prevention has been consistently observed (14-16). Numerous epidemiological studies have shown a close relationship between obesity and hypertension. Close correlations have been reported between changes in body weight and those in blood pressure during in both male and female university students. These findings suggest the importance of body weight control not only in obese but also in normal to mildly-obese young subjects in reducing or preventing an increase in blood pressure (21).

Many investigators have reported increased incidence of HT in obese people (17). In our study, we did not find a significant change in BMIs of our cases. At last visit, rates of blood pressure control in women were 60%, 34.2% and 23.9% in cases with normal BMI and in mild obese and obese patients, respectively ($p<0.05$). At the last visit, no significant changes were observed in BMIs of normotensive patients and in patients with borderline hypertension according to baseline values. However, in cases with mild hypertension BMIs significantly increased at the end according to baseline. As a result, education program did not have an impact on weight reduction in our cases.

Dietary sodium and blood pressure levels are clearly associated with each other as stated by many investigators. Daily salt intake should not exceed 6 grams per day in order to prevent hypertension. In our study, we accepted a daily salt intake higher than 8 grams a high salt intake since, this is the limit for defining the daily-allowed intake for most official groups. A meta-analysis of 18 clinical trials has demonstrated that decrement of sodium intake by 56-105 milimoles per day causes a decrease of 4.9 and 2.6 mmHg in systolic and diastolic blood pressures in one or two months, respectively (22). In a meta-analysis of 78 trials, it is stated that in order to observe beneficial effects of sodium restriction much longer time is needed (23). According to the INTERSALT trial conducted by Stamler et al., lifelong consumption of 100-mmol/day sodium will cause the increase of blood pressure from age of 25 to 55 to be less than 9 mmHg (15). In our study, salt restriction caused much more decreases in blood pressures in cases with high baseline daily sodium intake. Of the cases with high sodium intake at the baseline 37.1% had normalized their blood pressures at the end of the study. These rates were 31.7% and 14.3% in cases with low and in cases with no sodium intake at the baseline, respectively. As a result, we can say that salt restriction is a useful non-pharmacological way of reducing blood pressure particularly in cases with borderline and mild hypertension.

We advised the cases to exercise regularly as a part of training program. Regular exercise is effective in prevention and therapy of hypertension. Physical activity protects against poor health irrespective of an increased BMI and smoking. The major clinical implications are the long-standing benefits of physical activity and not smoking (24). Risk of hypertension in sedentary normotensive population is 20-50% higher than the physically active population risk. Regular exercise decreases systolic and diastolic pressures by 5-10 mmHg. Isotonic exercises like walking are more effective than isometric exercises like weight lifting. Mild exertion like walking for 30-60 minutes 3-5 times a week may be more effective than heavy exercises like running. A meta-analysis of 22 trials in patients who were advised to do regular exercise revealed a reduction of 6.4 and 6.9 mmHg in systolic and diastolic blood pressures (25). Analysis of 30 randomized trials has shown that aerobic exercise of the lower extremities caused a reduction of 3 mmHg in systolic and diastolic blood pressures (26). Moderate amount of physical activity includes daily activities like housework and does not mean regular exercise. Therefore, walking regularly caused a reduction in blood pressure as reported by many investigators. There were not many smokers in the study group (%13.2). The study group consisted of housewives and in general, in our country housewives do not smoke. The incidence of stroke and coronary artery disease is 2-3 times higher in smokers (14). Cessation of smoking reduces the risk. For that reason the physician should encourage the

patient for giving up smoking and decrease the modifiable risk factors.

As a result, life style modifications have favorable effects in borderline and mild hypertensive patients. Early diagnosis and treatment is very important in reducing the burden in communities. Life style modifications must be kept in mind especially in borderline and mild hypertensive cases. This will help us to avoid side effects of pharmacological agents and reduce unnecessary costs. At the same time, risk factors of some chronic diseases including coronary artery disease will be eliminated by this non-pharmacological approach.

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