Factors affecting blood pressure control in women aged 15–49

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Abstract

Background: While 25% of adult women in the world are hypertensive, the percentage of women who cannot achieve blood pressure control despite taking medication is 55.9 ± 1.5%. The aim of this study was to determine the prevalence and control rate of hypertension and to detect the factors affecting this situation in women in the 15–49 age group.

Material and methods: Seven hundred women in the 15–49 age group were selected and a questionnaire was applied. Height, weight, and blood pressure were measured and spot urines were collected on the same day. 24-hour sodium excretion and daily salt intake were calculated using the Kawasaki method.

Results: While 14.3% of the women were hypertensive, only 19% of them were able to achieve blood pressure control. Fifty-eight percent of the hypertensive women use more than 15 g/day of salt and the estimated 24-hour urinary sodium excretion of these women was 311.6 ± 39.5 mmol/L. Hypertensive women using less than 5 g/day of salt were 0.3%. Salty foods consumed by the hypertensive women were pickles (55.6%), cheese (92.6%), olives (88.8%), vine leaves (71.6%), sujuk and Turkish pastrami (47.6%), and tomato paste (100%).

Conclusions: In our study, participants were consuming large amounts of salt and there was a positive correlation between salt intake and blood pressure. Therefore, all efforts for sodium restriction are very important in the management of hypertension.

Key words: blood pressure control; risk factors; salt intake; women

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Introduction

According to reports by the World Health Organization, hypertension (HT) is the most preventable cause of death and is responsible for 62% of strokes and 49% of coronary heart diseases worldwide [1]. Throughout the world, 1.13 billion people are hypertensive and 1 in 5 is women. Fewer than 1 in 5 people with hypertension have the problem under control [2]. Hypertension is a very common problem in Turkey and 32.3% of women over the age of 18 are hypertensive.

Blood pressure (BP) of only 37.3% of hypertensive women who take medication is under control [3]. The prevalence of hypertension in adults aged > 30 years is 34.6% and of the individuals with hypertension, 28.9% are under control. [4]. Excessive salt intake in the diet is one of the main factors of hypertension [1, 5]. It is estimated that reducing salt intake in the diet to 6 g/day will reduce strokes

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by 24%, coronary heart disease by 18%, and will prevent 2.5 million deaths from stroke and coronary heart disease worldwide each year [6, 7].

A sedentary life, use of salt for long life food preservation, and the increase in consumption of processed food as a result of the development of industry in the last century have caused excessive salt consumption [8]. In addition, sodium-based food additives are among the most commonly consumed substances in the world. This is because sodium salts are not only food spoilage inhibitors but can also function as inexpensive flavor enhancers in a variety of foods. Only 5–10% of consumed salt is sourced from natural food [9]. Although the World Health Organization (WHO) recommends a daily consumption of 2 g of sodium (< 5 g/ day/salt) for adults [10], salt consumption per adult reaches 18 g/day per day in Turkey [11].

Salt is used extensively in the preparation and cooking of food in the Hacılar district of Kayseri. Traditionally, summer is the time when pickled foods are prepared in salty water at a rate varying from 6% to 20% to prevent food spoilage. Foods preserved in brine include pickles, cheese, olives, and vine leaves made with various vegetables and fruits. Tomato paste, which is obtained by crushing tomatoes and red peppers and by salting and thickening them in the sun in summer to be used in the winter, and sujuk and Turkish pastrami, which are prepared using salt, are foods frequently prepared and eaten in this region.

The salt intake of individuals can be assessed by either dietary surveys or the demonstration of 24-hour urinary salt excretion [9, 12]. However, as salt intake assessed by dietary questionnaires is prone to errors, its validity is low in general [12, 13]. The most reliable and accurate method of salt intake is to determine salt excretion in 24-hour urine [12, 14]. However, 24-hour urine collection is very difficult for both patients and multi-participant studies as it may cause incomplete collections, is time-intensive, and has high costs [12, 13]. Therefore, some methods have been developed to estimate 24-hour sodium excretion from spot urine samples [15–17].

The present study aimed to determine the prevalence and control rate of hypertension in women in the 15–49 age group in the Hacılar district of Kayseri and to determine the underlying factors.

Material and methods

Study design and participants

A cross-sectional field survey was conducted on women in the15–49 age group in the Hacılar District of Kayseri Province, from February 1 to May 1, 2016. Kayseri, one of the major industrial and commercial centers in Turkey, is located in the Central Anatolian Region between the northern latitude of 38° 18′ and the eastern longitude of 36° 58′. Its elevation is 1094 m and a continental climate is prevalent in the province.

In the district, with a population of 12,376, the number of women in the 15–49 age group is 2,722. The sample size of the study was calculated as a minimum of 683, taking a tolerance value of 0.03 and a confidence level of 0.95, and it was planned to include 700 women in the 15-49 age group. Women were selected from the list of 15–49 age group women in the Hacılar Family Health Center by the Simple Random Sampling method.

Data collection

The women included in the research study were visited at their homes, their consents were obtained, and they were informed of what to do for the processes of height, weight, blood pressure measurements, and urine intake.

Data collection and all measurements were carried out in the participants' homes. A questionnaire form consisting of 32 questions was filled by the researcher, using the face-to-face interview method to maintain the quality of the data. Demographic and social characteristics, brine food consumption habits, and salt consumption were investigated with the questionnaire. For the question "How often do you eat salty foods?" the possible answers were "almost every day", "about 3–5 times a week", "once a week", or "every fifteen days". Anthropometric and blood pressure measurements, and blood and urine sampling were performed for all participants.

Blood pressure measurement

Participants' blood pressures, after resting for 10 minutes, were measured twice with an adjustable cuffed sphygmomanometer, and the average of the two measurements was taken. The participants were not allowed to smoke, exercise, eat excessively, or consume caffeine before the blood pressure measurement. A health technician, who was informed by the researcher about the study, took the blood pressure measurements. Blood pressure assessments were made by taking into account the classification accepted by WHO. Hypertension was defined as a systolic BP of ≥ 140 mm Hg or a diastolic BP of ≥ 90 mm Hg [2]. Control of HT was defined as systolic BP < 140 mm Hg and diastolic BP < 90 mm Hg [19].

Body mass index determination

Body height and weight were measured to the nearest 0.1 cm and 100 g, respectively, while wearing light clothes without shoes. Body mass index (BMI) was calculated as weight (kg) divided by the square of body height (m), and classification was made according to WHO obesity criteria. According to this classification, those with BMI < 18.5 were considered as underweight, those with a BMI of 18.5–24.9 as normal, those with a BMI of 25–29.9 overweight, and those with a BMI of ≥ 30 and above as obese [18].

Urine sample collection

Urinary sodium and creatinine concentrations were measured using a spot sample. The second urine in the morning was collected by all participants at their home. All samples were self-collected mid-stream urines by each participant using a 10 mL sterilized container. The urine samples taken were placed in ice coolers and quickly transported to the Center Laboratory of the Medical Faculty of Erciyes University and stored at –20°C until analyzed. ISE (ion selective electrode) was used for the determination of sodium in urine, and Jaffe alkaline methods were used for the determination of creatinine. The 24-h urinary sodium excretion was estimated using the following equation, as presented by Kawasaki et al. [12, 15, 19].

24-h urine sodium excretion estimation

Estimated 24-hour urinary sodium excretion (mmol)/24 h = 16.3 × [spot urine Na (mmol/L)/ /spot urine Cr (mmol/L) × estimated 24-hour urinary Cr (mg)]0.5

This equation was used for predicted creatinine (Cr) excretion for 24 h (CrPr24h) estimated based on age, weight, and height.

CrPr24h (mg/24 h/women) = –12.63 × age + 15.12 × weight (kg) + 7.39 × height (cm) – 79.9

After determining CrPr24h, the urinary sodium excretion in 24 hours was measured (mmol/24 h can be calculated:

16.3 × [spot urine Na (mmol/L)/spot urine Cr (mmol/l) × estimated 24-hour urinary Cr (mg)].0.5

Lastly, daily salt intake (g/day) was converted from the 24-h urinary sodium excretion (mmol/day) multiplied by 0.0585.

Normal values of 24-h urinary sodium were accepted as 40–220 mmol/24 h [12, 15]. In this study, we classified the 24-h urinary Na value as normal if from 40–220 and as high value if ≥ 220.

We classified the estimated daily salt intake as < 5 g/day, 5–9 g/day, 10–14 g/day, and > 15 g/day, based on the WHO recommendation of 5 g/day [10].

Statistical analysis

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 22.0 for Windows. Whether the data obtained from the study followed normal distribution was tested by the Shapiro-Wilks and the Lilliefors tests. The Kruskal-Wallis test and the Mann-Whitney U test were used for variables that did not follow the normal pattern of distribution and one-way analysis of variance (ANOVA) tests were used for variables with normal distribution. The mean and standard deviation of variables such as BMI, blood pressure and urinary sodium excretion were calculated.

From the results obtained from the statistical tests applied, a p-value of less than 0.05 was considered statistically significant.

Results

The socio-demographic characteristics of the women participating in the study are shown in Table 1 and their anthropometric measurements, blood pressure, urine sodium, estimated salt intake, and creatinine levels are shown in Table 2.

The average age of the participants was 38.8 ± 9.4. It was found that 63.4% of the participants were illiterate or primary school graduates, 91% were housewives, 83.3% were married, 45.8% had 3 or more children, 85.7% did not smoke, 76.9% did not do regular physical activity, and 48.4% had a BMI of 30 and above. While 58% did not restrict salt, 14.3% were hypertensive, 25% had a family history of hypertension, and 54.9% had an estimated salt rate of over 15 grams per day.

Table 3 shows how often women consumed salty and pickled foods. Among the women participating in the study, 90.7% of made tomato paste, 96.8% pickles, 94.8% pickled vine leaves, and 73% made meat products themselves.

Out of 100 women previously diagnosed with hypertension, 81 were found to have high blood pressure, while only 19 were able to control their blood pressure. Thirty-five percent of hypertensive women had a diagnosis of hypertension for 2–3 years, 20% for about 20 years, and 85% of them use a single

Table 1. Distribution of women according to their socio-demographic characteristics

Variables	Number of patients (n = 700)	Percentage (%)
Age distribution		
15–19	32	4.6
20–29	94	13.4
30–39	202	28.9
40–49	372	53.1
Educational status		
Illiterate	126	18.0
Primary school	318	45.4
Secondary school	74	10.6
High school	113	16.1
University	69	9.9
Occupation		
Housewife	638	91.2
Officer	38	5.5
Worker	12	1.7
Self-employment	12	1.6
Social security		
Yes	647	92.4
No	53	7.6
Marital status		
Married	583	83.3
Single	56	8.0
Divorced/widowed	61	8.7
Number of children		
0	92	13.1
1	87	12.4
2	201	28.7
≥ 3	320	45.8
Place of residence		
Apartment	291	41.6
Single house	409	58.4
Economic status		
High	170	24.3
Middle	474	67.7
Low	56	8.0
Smoking status		
Non-smoker	100	14.3
Smoker	600	85.7
Regular physical activity		
Yes	162	23.1
No	538	76.9
Salt consumption in meals		
Salty	159	22.7
Little salt	481	68.7
Without salt	60	8.6
Salt restriction		
Yes	294	42.0
No	406	58.0
A history of hypertension		
Yes	100	14.3
No	600	85.7

Table 2. Distribution of the women according to their anthropometric characteristics

Variables	Number or mean ± SD	Percentage (%)
BMI [kg/m^2]		
BMI categories	29.4 ± 5.9	
Normal weight (18.5–24.9)		
Overweight (25.0–29.9)	150	21.5
Obese (≥ 30)	211	30.1
Body weight [kg]	339	48.4
Body height [cm]	74.8 ± 14.5	
BP categories	158 ± 0.1	
Normotensive		
Hypertensive	619	88.4
BP [mm Hg]		
Systolic BP	81	11.6
Diastolic BP	115.6 ± 16.4	
Spot urinary	73.3 ± 10.3	
Na [mmol/L]		
Creatinine [mg/dL]	154.0 ± 64.3	
Estimated 24-hour urinary sodium excretion [mmol/L]	114.0 ± 62.4	
Normotensive	267.8 ± 60.2	
Hypertensive	266.9 ± 59.1	
Estimated daily 24 h urinary sodium categories [mmol/L]	274.2 ± 68.8	
40–220	170	24.3
≥ 220	530	75.7
Estimated daily salt intake [g]	15.7 ± 3.5	
Salt intake categories [g/day]		
< 5	2	0.3
5–9	26	3.7
10–14	288	41.1
> 15	384	54.9

BMI — body mass index; BP — blood pressure

drug. As much as 96% of these women reported that they take their medication regularly.

The factors associated with blood pressure in the study population are presented in Table 4.

Among the hypertensive women, 92.6% were in the 40–49 age group ($p < 0.001$), 91.3% did not attend school or graduate from primary school ($p < 0.001$), 63% had 3 or more children ($p < 0.011$), 80.2% were married ($p < 0.05$), 67.9 % had a BMI ≥ 30 and above ($p < 0.001$), 54.3% used conscious salt restriction ($p < 0.05$), 58% used salt above 15 g/day ($p < 0.005$), 55.6% consumed pickles ($p < 0.005$), 92.6% consumed pickled cheese ($p < 0.05$), and 57.8% consumed sausage-salami ($p < 0.005$) (Tab. 4).

91.4% of the women who do regular physical activity are walking for physical activity. 58.5% of women with conscious salt restriction are in their 40s ($p < 0.05$), 51.9% are exercising ($p < 0.005$),

Table 3. Relationship between women's pickled food consumption and blood pressure

Pickled foods	Blood pressure		p
	Normotensive n (%)	Hypertensive n (%)	
Pickles			
Never	169 (27.3)	36 (44.4)	
Everyday	76 (12.3)	10 (12.3)	
3–5 times a week	35 (5.7)	2 (2.5)	0.012
1–3 times a week	218 (35.2)	17 (21.0)	
1 time in 15 days	121 (19.5)	16 (19.8)	
Cheese			
Never	94 (15.2)	6 (7.4)	
Everyday	475 (76.6)	72 (88.9)	
3–5 times a week	23 (3.7)	1 (2.5)	
1–3 times a week	27 (4.5)	2 (1.2)	0.051
1 time in 15 days	–	–	
Olives			
Never	41 (6.6)	9 (11.2)	
Everyday	510 (82.4)	62 (76.5)	0.699
3–5 times a week	21 (3.4)	3 (3.7)	
1–3 times a week	41 (6.6)	6 (7.4)	
1 time in 15 days	6 (1.0)	1 (1.2)	
Vine leaves			
Never	152 (24.6)	23 (28.4)	
Everyday	6 (1.0)	–	
3–5 times a week	3 (0.5)	1 (1.2)	0.492
1–3 times a week	13 (2.1)	3 (3.7)	
1 time in 15 days	445 (89.2)	54 (66.7)	
Soudjouk pastrami			
Never	270 (43.6)	42 (51.9)	
Everyday	8 (1.3)	1 (1.2)	0.097
3–5 times a week	11 (1.8)	–	
1–3 times a week	128 (20.7)	18 (22.2)	
1 time in 15 days	202 (32.6)	20 (24.7)	
Tomato paste			
Never	–	–	
Everyday	610 (98.5)	79 (97.5)	0.071
3–5 times a week	7 (1.0)	–	
1–3 times a week	2 (0.3)	2 (2.5)	
1 time in 15 days	–	–	

Table 4. Parameters associated with the blood pressure of the women

Variables	Blood pressure		p
	Normotensive n (%)	Hypertensive n (%)	
Age distribution			
15–19	32 (5.2)	–	
20–29	93 (15.0)	1 (1.2)	0.000
30–39	197 (31.8)	5 (6.2)	
40–49	297 (48.0)	75 (92.6)	
Educational status			
Illiterate	79 (12.8)	47 (58.0)	
Primary school	291 (47.0)	27 (33.3)	0.000
Secondary school	73 (11.8)	1 (1.2)	
High school	112 (18.1)	1 (1.2)	
University	64 (10.3)	5 (6.3)	
Number of children			
0	85 (13.7)	7 (8.6)	
1	79 (12.8)	9 (11.1)	0.011
2	187 (30.2)	14 (17.3)	
≥ 3	268 (43.3)	51 (63.0)	
Marital status			
Married	518 (83.7)	65 (80.2)	0.026
Single	54 (8.7)	2 (2.5)	
Divorced /widowed	47 (7.6)	14 (17.3)	
Family history of hypertension			0.047
Yes	148 (23.9)	27 (33.3)	
No	471 (76.1)	54 (66.7)	
BMI categories			
≤ 24.9	147 (23.7)	3 (3.7)	0.000
≥ 25– ≤ 29.9	188 (30.4)	23 (28.4)	
≥ 30	284 (45.9)	55 (67.9)	
Conscious salt restriction			
Yes	250 (40.4)	44 (54.3)	0.012
No	369 (59.6)	37 (45.7)	
Salt intake [g/day]			
< 5	–	2 (2.5)	
5–9	23 (3.7)	3 (3.7)	0.001
10–14	259 (41.8)	29 (35.8)	
> 15	337 (54.4)	47 (58.0)	

BMI — body mass index

and 50.9% have a hypertensive person in their family ($p < 0.005$).

The parameters associated with the urinary sodium excretion levels of the participants are presented in Table 5.

Overall, the 24-h urinary sodium excretion was 267.8 ± 60.2 mmol/day and daily salt intake was 15.7 ± 3.5 g/day. Twenty-four-hour urinary sodium excretion values of only 24.3% of the participants were normal. As seen in this table, there is statistical parallelism between the salt intake and the urine sodium excreted ($p < 0.001$). It was statistically observed that the estimated 24-hour urine sodium excretion of women increased more in older ($p < 0.05$), higher BMI ($p < 0.001$), married ($p < 0.001$), uneducated or primary school graduates ($p < 0.05$), and consuming salty food ($p < 0.05$) (Tab. 5). We see the same features in hypertensive women.

The factors affecting the inability to control hypertension are given in Table 6. These factors are: being in the 40–49 age group (OR: 3.50, 95% CI: 1.57–7.77), having a low level of education (OR: 0.58, 95% CI: 0.46–0.74), and not making a conscious salt restriction (OR: 0.57, 95% CI: 0.34–0.959).

Table 5. Parameters associated with the urinary sodium excretion levels of the women

Variables	Sodium excretion levels		p
	n (%)	Mean ± SD	
Age distribution			
15–19	32 (4.6)	239.7 ± 43.5	0.006
20–29	94 (13.4)	270.0 ± 55.4	
30–39	202 (28.9)	261.3 ± 59.5	
40–49	372 (53.1)	273.1 ± 62.3	
Marital status			
Married	583 (83.3)	272.1 ± 60.5	0.000
Single	56 (8.0)	248.7 ± 53.2	
Divorced/Widowed	61(8.7)	243.8 ± 56.4	
Educational status			
Illiterate	126 (18.0)	266.3 ± 68.3	0.045
Primary school	318 (45.4)	274.9 ± 59.2	
Secondary school	74 (10.6)	256.7 ± 59.1	
High school	113 (16.1)	262.5 ± 57.1	
University	69 (9.9)	258.1 ± 52.9	
BMI categories			
≤ 24.9	150 (21.4)	252.1 ± 51.9	0.000
≥ 25– ≤ 29.9	211 (30.1)	267.1 ± 55.3	
≥ 30	339 (48.4)	275.2 ± 65.3	
Pickle consumption			
Yes	495 (70.7)	271.6 ± 61.1	0.020
No	205 (29.3)	259.6 ± 57.5	
Vine leaves consumption			
Yes	525 (75.0)	270.8 ± 60.0	0.020
No	175 (25.0)	258.6 ± 60.3	
Conscious salt restriction			
Yes	294 (42.0)	261.0 ± 59.3	0.012
No	406 (58.0)	272.7 ± 60.6	
Salt intake [g/day]			
< 5	2 (0.3)	99.13 ± 0.5	0.000
5–9	26 (3.7)	153.3 ± 14.9	
10–14	288 (41.1)	220.8 ± 24.0	
> 15	384 (54.9)	311.6 ± 39.5	

BMI — body mass index; SD — standard deviation

Table 6. Factors associated with the lack of control of hypertension

	Odds ratio	95% CI Lower–Upper	p
Age (older age, 40–49)	3,503	1.577–7.779	0.002
Educational status (lower level of education)	0.587	0.463–0.745	0.000
Conscious salt restriction (failure to apply salt restriction)	0.570	0.341–0.954	0.032

CI — confidence interval

Discussion

This study investigated the incidence of HT, control rate, and related factors in women living in the Hacılar region of Kayseri, Turkey. This study is a very comprehensive assessment for this region.

One of the main findings in this study is that 14.3% of the population between the ages of 15–49 in this region is hypertensive and another main finding is that blood pressure control is found at a low rate of 19%. Studies have shown that women are better at treating hypertension than men are, but worse in controlling it, and the rate of control decreases as age increases [20, 21].

The reason why the percentage of hypertensive women in our sample was lower as compared to the whole country is that we recruited people under 18 years of age. When looking at the common characteristics of hypertensive women living in this region, it is seen that 92.6% were 40–49 years old, 91.3% did not go to school or graduated from primary school, 80.2% were married, 67.9% of them had a BMI of 30 and above, 63% had 3 or more children, and 33.3% had a family history of hypertension. In addition, 55.6% of them consumed pickles, 92.6% consumed homemade pickled cheese, and 58% consumed more than 15 g/day salt per day. In studies conducted in Turkey, the rate of hypertension in women was 32.3% and these women were older, obese, generally primary school graduates, did less physical activity, and did not restrict salt. It was also seen that 37.3% of these women could control their hypertension [3].

According to a study conducted in Iran, the frequency of hypertension in women was found to be 32.5% and their BMI 28.4% [22]. In Indians, it was observed that 10.9 % of women between the ages of 15–49 were hypertensive, and these hypertensives were older, obese, married individuals, and had low education levels [23].

There are several objective and reliable methods for assessing salt intake, such as 24-h urinary sodium excretion measurement, food consumed record, and weighing method. The most valuable method is to look for sodium in the 24-h urine, but we preferred to look for sodium in the spot urine due to misconceptions that may occur in studies carried out on large groups. In this study, the estimated salt intake of women was calculated using the methods that have been developed to estimate 24-h sodium excretion.

The estimated salt intake in the Hacilar region in Kayseri, Turkey is approximately 15 g/day. This is well above the mean value of < 5 g/day recommended by WHO. Accordingly, sodium excretion is approximately 267.8 ± 60.2 mmol/day. As a result of these calculations, those with the highest sodium excretion in the urine are the 40–49 age group (273.1 ± 62.3 mmol/day), married (272.1 ± 60.5

mmol/day), no school (266.3 ± 68.3 mmol/day), being a primary school graduate (274.9 ± 59.2 mmol/day), obese (275.2 ± 65.3 mmol/day), those who consume pickles (271.6 ± 61.1 mmol/day) and vine leaves (270.8 ± 60.0 mmol/day) as pickled food, those who do not consciously restrict salt (272.7 ± 60.6 mmol/day), and those who consume more than 15 g/day of salt per day (311.6 ± 39.5 mmol/day). In a study conducted in Turkey, 24-hour urinary sodium excretion of women 274.3 ± 135.1 mmol/day and the daily salt intake 18.1 g/day were observed. It was reported that these women were obese, of a lower educational status, and older [11]. In a study in Japan, sodium excretion in 24-hour urine samples was found to be 174 mmol/day [24]. In two separate studies conducted in Brazil, the daily salt intake of women living in Brazil was 9.08 g/day [25] while the salt intake of African women living in Brazil was 4.5 g/day and sodium excretion was 203.1 ± 84.9 mmol/day [14]. These hypertensive people were older, with low education levels, obesity, and the prevalence of hypertension was 21.3% [14]. In China, more than half of the population (53.4%) was overweight or obese and 22.9% had hypertension. In the population, the mean 24-hour urinary sodium excretion was 235.7 (mmol) [26]. In the 24-hour urine samples, 134.7 mmol/day sodium excretion and 8.8 g/day salt intake were observed in Chinese women, who migrated to Italy. In this study, the rate of hypertension in women was reported to be 38%, and only 19% could control their blood pressure with medication [27]. In Norway, sodium excretion of 3.53 g/day and salt intake of 7.55 g/day in 24-hour urine samples were observed in women [13]. 24-hour sodium excretion in Australia was observed as 2.718 mg/24 hr, and salt intake as 6.41 g/day [28]. In general, salt intake in the world is seen well above the WHO recommended value of < 5 g/day.

In our study, 81 of 100 women was still hypertensive, even if drug therapy was administered. It can be assumed that advanced age, high BMI, low education level and excessive salt consumption could cause this situation. Frequent consumption of pickled and high-salt foods in these regions indicates that the control of hypertension will be very difficult. Changes in eating habits and lifestyle are necessary to control blood pressure.

The observation that high blood pressure is seen more frequently in people with low education levels may be attributed primarily to the fact that people with low education are in the advanced age group. In addition, we have the opinion that a low education level is an important factor in gaining healthy eating habits and creating awareness of protecting one's own health.

One of the most important implications of the study is the mistakes made by hypertensive patients, which make blood pressure control difficult. Believing that herbs such as garlic, parsley, and lemon will lower their blood pressure instead of antihypertensive drugs and not accepting that the treatment will last a lifetime, use of antihypertensive drugs belonging to neighbors and relatives, not having information about the drug used, or changing medication without consulting a doctor are some of the most common mistakes.

The limitation of this study was that the gold standard for measuring sodium excretion was not used. Instead, we tried to estimate the 24-hour condition with the formula of sodium value obtained with spot urine.

Conclusion

Since obesity and salt intake are two reversible causes of high blood pressure, weight control and salt restriction are required for good blood pressure control. Advanced age is also an important risk factor for hypertension. There is no chance to stop aging, but we think that salt restriction, weight control, and an active life that start at a very early age may delay or prevent negative effects of aging.

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Ethical approval

The study was approved by the Erciyes University Faculty of Medicine Ethics Committee on 15/08/2014 with approval number 2014/495. In addition, the Turkish Public Health Agency of Family Medicine Training and Development Department of the Presidency gave approval (02/11/2014 2014.5729.2090 / research permit No. 229).

Consent

After explaining the study to the participants, their consent was obtained.

Conflicts of interest

The authors declare that they have no conflicts of interest. We confirm that this work is original and it has not been published elsewhere. All authors contributed to this study and we declare that all authors agree with the content of the article.

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