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**Original Article**

# Distribution of Blood Pressure and Evaluation of Risk Factors for Hypertension among Women in Turkey

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## Abstract

**Background:** The aim was to investigate the distribution of blood pressure (BP) and evaluate some of the risk factors connected to hypertension. This study was deemed important and relevant due to the increasing importance of hypertension and cardiovascular diseases.

**Methods:** This cross-sectional survey was conducted on 4,446 women aged 40 and over who had presented themselves with any number and form of health reasons to any of the 19 primary health care (PHC) centers in a district of western Turkey between February 1st and March 31st, 2006. The Seventh Report of the Joint National Committee (JNC 7) was used for BP measurements and classifications. We performed Chi Square ($x^2$) test, variance (ANOVA) and Logistic Regression Analysis with the statistical importance of $P \leq 0.05$.

**Results:** The respondents' BPs showed an increase with age ($P< 0.001$, for each one). 56.7% of the study group had high BP. An advanced age ($P< 0.001$), obesity ($P< 0.001$), family history ($P< 0.01$), smoking ($P< 0.01$), hypercholesterolemia ($P< 0.01$), and not having health insurance ($P< 0.01$) were all deemed important risk factors for hypertension ($P< 0.001$). 6.6% of women had not had their BP previously measured. 24.5% of whose BP was high were not aware of their high BPs.

**Conclusion:** The number of the respondents at risk to hypertension was high and many people reported that they were unaware of hypertension and its risk factors. This shortfall in information and knowledge needs to be addressed by health education programs such as BP screening studies and periodical examinations targeting those at higher risk.

**Keywords:** *Hypertension, Blood pressure, Primary health care centers*

## Introduction

As current figures suggest, hypertension has become a common health and communal problem in terms of not only the individuals involved, but also for their health team and the social environment. This is due to the fact that it gives rise to serious complications such as cardiovascular, cerebrovascular and renal damage as well as having high prevalence and mortality in adults (1, 2). Worldwide prevalence estimates for hypertension may be as much as 1 billion individuals, and approximately 7.1 million deaths per year may be attributable to hypertension (3). Various studies have been conducted involving different age groups, and it has been proposed that the hypertension prevalence among adults ranged from 3.15% to 40.0% (4-7); namely, 24% for adults in the United States (5), 3.15% for the urban population of Oromos, Ethiopia (4), 20% of adults in a study conducted in multiple countries according to WHO data, and 5-40% for adults in Brazil (3, 7). Hypertension prevalences in adult females in community-based studies in a variety of countries revealed the following figures: Greece 27.1% (8), Bulgaria 34.0% (9), Iran 19.4% (10), and Oman, Egypt 38.3% (11). In Saudi Arabia, the prevalence of female hypertension was 23.9% (12), in England it was 22.8% (13), and in Mexico 18.1% (14). In Turkey, in a study conducted on 4492 women aged 35 and over in 26 cities, it was found that the prevalence was 50.0% (15). There are also major gender differences in the clinical presentation of coronary heart disease (CHD). Women, until recently, have been under-

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represented in clinical trials, raising concerns as to the applicability of current guidelines for the diagnosis and treatment of hypertensive cardiovascular disease (CD) (16).

In many studies, including those conducted in Turkey and other countries, it was reported that women had a significantly higher prevalence than men (34.1% and 15.6%, respectively) (17-19).

Hypertension is seen frequently, especially in individuals aged 40 and over, and also affects about half of the population aged 60 and over (20, 21). In Turkey, one in every 6 persons in an age group of 30 and over, and one in every 5 persons in the age group of 40 and over, are known to have had a higher Blood Pressure (BP) than the normal range, and also, that the prevalence of hypertension in adults was between 29-49% (22, 23). In urban regions of Turkey, 40.6% of all deaths are due to CD, with the most important reason for death being CD (24, 25). In women, high systotic blood pressure (SBP) strongly predicted mortality and the morbidity of CHD (26, 27).

This article presents data from a study of the general population presenting primary health care (PHC) centers in Eskisehir, a city in western Turkey. Several studies, conducted among selected target populations, have evaluated hypertension within the Turkish primary care society. As well as hypertension, the present study also investigated the status of women in this city; however, we are unaware of any earlier studies of female related hypertension conducted among the general population of Turkey. This was the particular aim of this study. Therefore, the present study sought to address the BP distribution and sociodemographic characteristics, habits and life style related to hypertension of females in the Turkish society, as well as and to increase the awareness of both health care providers and the community.

## Materials and Methods

***General knowledge about health system of Turkey*** The Turkish health system is comprised of more than one provider, which causes complications to individuals in terms of guarantees for health. A SSK system was introduced for laborers, offering coverage to 32% of Turkey's total population. Farmers, tradesmen and housewives are covered under BAGKUR, representing 12% of the population. Officials/clerks are covered under EMEKLI SANDIGI, which covers 28% of the population. In addition, it is estimated that between 3 and 6% of Turkey's population is covered by private insurance. From the outset of the system, while working to the same aims, there has been no coordination between the various agencies, each still working independently. Due to the different bands of payment into the various General Health Insurance (GHI) services, differences in retirement regimes can be found as well as the degrees of service provided. In this way, medicines, referrals and resource policies differ.

***Setting*** Eskisehir is a semi rural province situated in the western part of Turkey, with a central population of 571,658, the city itself constituting 80.91% of total population. In the city center, 51.6% (n= 109,882) of those aged 40 and over were women. The socio-economical level of the city is average compared to other cities of the country. There are significant disparities in the socio-economic characteristics between the quarters of the city. It includes two universities, five hospitals and nineteen PHC centers in the centre, and also has a cosmopolitan structure.

***Sampling and subjects*** This study was carried out on 4,446 women agreeing to participation in the study aged 40 and over, who had presented themselves with any number and form of health reasons to any of the 19 PHC centers serving the city centre. The PHC centers are named by number, and those included were the 1st to the 19$^{th}$. Subjects were surveyed by a cross-sectional research method during a period of 2 months between February 1 and March 31, 2006. The total number of those presenting to these centers between the dates was 70,000, with 65% being females and a total of 5.158 aged 40 and over. Data was recruited during routine illness visits to local PHC institutions. All patients who agreed to participate in face to

face interviews were contacted during their visit. A total of 712 patients were unable to participate in the study due to the patients' being in a hurry, and thus did not accept our invitation to participate at that particular time.

***Procedures*** All the physicians working in PHC centers were informed of the particular aims of the study, the method for completing the questionnaires, as well as the BP, height and weight measurement techniques. Only two physicians were selected or voluntary for the study. The physicians were asked to invite the individuals presenting to PHC centers to complete a questionnaire including information on sociodemographic characteristics, family history of hypertension, status of BP measurement and prior history of hypertension diagnosis, taking antihypertensive medicine, having high cholesterol levels in clinical history, having nephropathy, diabetes mellitus (DM) or another chronic disease, nutritional habits, smoking, high alcohol consumption, physical activity habits, and some factors related to hypertension (28-31). Those who agreed to participate were given the questionnaire to complete. All subjects were told that participation in the investigation was strictly voluntary and were told that the data collected would not be used for anything except the research aim. The duration for completing the questionnaire was between 20-25 min per subject. The patients completed questionnaires in the presence of a member of the PHC physicians, with the researchers on hand to explain any questions that the patients were unable to understand. The principal investigators met weekly with the data collectors to ensure the quality of data collected.

An active life style was evaluated as being involved in a sport activity of at least a duration of one and half hours during the previous month (32), smoker as having smoked at least one cigarette per day, and excessive drinker as having reported a weekly alcohol intake (31).

Further definitions were made as follows: excessive salt intake was indicated if the individual reported the use of supplementary salt in every meal; excessive red meat intake if the individual reported consuming red meat products 3 times or more in a week; and lacking sufficient fruit and vegetable intake if they reported eating fruit or vegetables less than twice a week. Furthermore, we divided the types of oil into three classes: vegetable, animal and mixed (28, 29).

We accepted the existence of social health insurance as an indicator of socio-economic status, since the women in the study did not want to provide information regarding their family income. After completion and collection of the questionnaire, the second phase was the recording of the individuals' BP, weight and height measurements. The individuals' BP was measured after 5 minutes' rest while seated in a chair, having their right arms raised to heart level. Two measurements were taken with an interval of 2 minutes between readings, with an average calculation taken from the 2 recordings for systolic and diastolic BPs. The BP was measured with aneroid sphygmomanometers, in addition to height and weight measurements (1).

High BP was defined as being 140/90 mmHg and over (130/80 mmHg and over in diabetics) and the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High BP (JNC 7) classification of hypertension was used. According to JNC 7, "Normal BP" is defined as SBP <120 and diastolic blood pressure (DBP)< 80 mm Hg, "Prehypertension" as SBP 120 to 139 or DBP 80 to 89 mm Hg, "Stage I hypertension, (SI)" as SBP 140-159 or DBP 90-99 mm Hg, "Stage II hypertension, (SII)" as SBP ≥160 or DBP ≥100 mm Hg, "Isole systolic hypertension, (ISH)" as SBP ≥140 and DBP <90 mm Hg and "Isole diastolic hypertension, (IDH)" as SBP< 140 and DBP ≥90 mm Hg [38]. Heights were measured with tapes, and weights with a domestic-type weighbridge. Patients were considered to be obese if they had a Body Mass Index (BMI) of 30 kg/m² or more (33).

***Legal ethical consent*** Ethical permission for the study was obtained prior to collection of data, by contacting and receiving approval from the appropriate management authority, the health directorship of the city involved. Participants were

assured of the confidentiality of their responses and provided informed consent.

***Statistical analyses*** The statistical package for social sciences (SPSS) version 11.5 (Chicago, IL, USA) was used to enter and analyze the data on a personal computer. Obtained data were evaluated by frequency and percentages ratios, variance analysis (ANOVA), Chi-square ($x^2$) and *t* tests. The measure for statistical significance was established a priori as $P< 0.05$. In the choice of variables pertaining to high hypertension, the Backward Wald Stepwise logistic regression analysis was formed from 14 variables which were significant with hypertension (age group, educational status, professional status, social health insurance, family history of hypertension, status of BP measurement, nephropathy, DM hypercholesterolemia, nutritional habits, smoking, alcohol consumption, physical activity, and obesity). A goodness of fit test was estimated by Hosmer-Lemeshow c test. According to Backward Wald Stepwise logistic regression analysis, of which the goodness of fit was highest in step 11, was accepted as evaluation results.

## Results

The mean (±SD) age of the respondents (n= 4446) was 57.39±10.58, 95% CI (Confidence Interval) of 57.08-57.70, ranging from 40 to 92 yr. The mean height was 158.95±6.28 cm, mean weight 72.26±12.25 kg, and means BMI 28.60± 4.60 kg/m$^2$. The respondents' other characteristics are given in Table 1.

86.5% of the females had an educational level of 12 yr or below, whereas only 13.5% had 12 yr and over. This figure was seen to significantly decrease as the age increased for those having attained an educational level of 12 and over. Although the educational level was 30.1% in the age group of 40-49, it was only 1.6% in the age group of 70 and over ($x^2$=431.24, df=3; $P$=0.000). 88.5% of the study population were housewives and 12.3% was deprived of health insurance.

The proportion of those smoking cigarettes either in the past or at the present time was 17.3%, those consuming alcohol 2.0%, and those regularly performing physical activity 31.8%.

21.2% of the respondents reported having consumed animal oil in meals, 4.6% using supplement salt in every meal, 59.0% consuming red meat 2 times or more in a week, 99.0% consuming fresh vegetable 2 times or more in a week, and 97.4% consuming fresh fruit 2 times or more in a week.

The proportion of those with a family history of hypertension was 48.0%, 28.6% for those not having any chronic disease such as DM, hypercholesterolemia and nephropathy. 857 patients with DM (19.3%), 631 patients with high cholesterol level (14.2%) and 104 patients with nephropathy (2.3%) reported that they had previously had hypertension.

The mean BMI of the study population was 28.60±4.60 kg/m$^2$ (95% CI: 28.46- 28.73), ranging from 14.69 kg/m$^2$ to 48.48 kg/m$^2$.

When evaluating the relationship between BMI and age groups, BMI was highest in the age group 50-59 (29.18±4.70), and lowest in the age group 70 and over (27.52±4.38) [F= 20.64, df= 3; $P$= 0.000]. A prevalence of obesity was determined in 33.2% of the subjects (1476/4446). The mean SBP of the participants was 137.70±24.10 mmHg (95% CI: 136.98- 138.40), with the mean DBP being 82.36±13.68 mmHg (95% CI: 81.96- 82.76). The distribution of systolic and diastolic BPs by age groups is given in Table 2.

According to variance analysis (ANOVA), it was determined that the mean systolic and diastolic BP values of women increased significantly as their age increased (F= 96.508, df= 3, $P$= 0.000).

16.5% of women in the study group was classified as being in the normal range of BP distribution, 26.8% as having prehypertension, 27.2% as being in Stage II hypertension, 18.2% as ISH, and 6.2% as IDH. As the mean ages increased, it was found that the level of hypertension became steadily worse ($P< 0.001$).

The proportion of those with high BP in the study group was 56.7% (2519/4446).

As age advanced, although the proportions of normotensive and prehypertensive individuals showed

a significant decrease [($x^2$= 178.505; $P$= 0.000), ($x^2$= 39.597; $P$= 0.000), respectively], the proportions of those with Stage I, Stage II and ISH showed significant increases [($x^2$= 37.856; $P$= 0.000), ($x^2$= 118.632; $P$= 0.000), ($x^2$= 93.400; $P$= 0.000), respectively]. After the age of 60, the proportion of those with IDH decreased significantly ($x^2$= 15.254; $P$= 0.002) (Unshown data in Table).

Table 3 shows the Logistic Regression Model results formed by high BP and some variables that indicated linked significant relationships. According to Logistic Model results, being older, especially in the age group of 70 and over, being deprived of social health insurance, having a family history of hypertension, being obese and having a high cholesterol level were important risk factors for women compared to the age group of 40-49.

Table 4 indicates the distribution of those with high BPs being aware of their status and those under monitoring and treatment by age groups.

It was found that the ratio of women who had never measured their tension arterial up to that point was 6.6% (293/4446) (Unshown data). 75.5% of those with high BP (1902/2519) were aware of their status, with 57.6% (1451/2519) receiving treatment, and with 8.7% of those hypertensive patients taking treatment being monitored for their BP (126/1451).

According to $x^2$ for the trend of $x^2$ results shown in Table 4, the proportions of awareness and treatment increased with age in the hypertensive patients (n= 2.519). The ratio for control of hypertension demonstrated an increase in the age group 50-59 compared to the age group 40-49 ($P$< 0.05), whereas no difference was indicated in the control of hypertension between the age group 70 and over and the age group 60-69 in the hypertensive patients under treatment ($P$> 0.05) (n= 1451).

**Table 1:** The respondents' general characteristics

| General characteristics | n=4446 | % |
|---|---|---|
| **Age group (yr)** | | |
| 40-49 | 1189 | 26.7 |
| 50-59 | 1403 | 31.6 |
| 60-69 | 1156 | 26.0 |
| 70 and over | 698 | 15.7 |
| **Educational status** | | |
| Illiterate | 492 | 11.1 |
| Literate | 397 | 8.9 |
| Primary school | 2512 | 56.5 |
| Middle school | 443 | 10.0 |
| High school | 367 | 8.2 |
| University | 235 | 5.3 |
| **Professional status** | | |
| Housewife | 3938 | 88.5 |
| Worker | 26 | 0.6 |
| Civil servant | 124 | 2.8 |
| Trades | 26 | 0.6 |
| Farmer | 4 | 0.1 |
| Unemployed | 58 | 1.3 |
| Retired | 270 | 6.1 |
| **Social Health Insurance** | | |
| Social Insurance Association | 1373 | 30.9 |
| Emekli Sandigi (Retired) | 1442 | 32.4 |
| Bagkur | 915 | 20.6 |
| Green Card | 129 | 2.9 |
| Other | 41 | 0.9 |
| No | 546 | 12.3 |

**Table 2:** The distrubition of the systolic and diastolic BPs of the females by age groups

| Age groups (yr) | n | Systolic Blood Pressure (mm/Hg)[a] X±SD (95%CI) | Diastolic Blood Pressure (mm/Hg)[b] X±SD (95%CI) | |
|---|---|---|---|---|
| 40-49 | 1189 | 128.38 ± 21.68 (127.14-129.61) | 78.81 ± 13.30 | 78.05-79.56 |
| 50-59 | 1403 | 137.68 ± 24.09 (136.42-138.95) | 83.47 ± 13.73 | 82.75-84.19 |
| 60-69 | 1156 | 142.90 ± 23.84 (141.52-144.27) | 84.12 ± 13.46 | 83.35-84.90 |
| 70 and over | 698 | 144.98 ± 23.35 (143.24-146.71) | 83.28 ± 13.55 | 82.27-84.29 |
| Total | 4446 | 137.70 ± 24.09 (136.99-138.40) | 82.36 ± 13.68 | 81.96-82.77 |

X: Mean, SD: Standard Deviation, CI: Confidence Interval, a: Variance analysis (ANOVA): F=105.477, df=3, $P$= 0.000 for mean systolic blood pressure, b: Variance analysis (ANOVA): F=38.206, df=3, $P$= 0.000 for mean diastolic blood pressure

**Table 3:** Logistic Regression Model results formed by high BP and some variables that showed significant relationships with it (Step 11- Backward Wald)

| Risk factors | B | Wald | SD | P | OR | CI% |
|---|---|---|---|---|---|---|
| **Age groups (yr)** | | | | | | |
| 40-49 | | 218.654 | 3 | 0.000 | | |
| 50-59 | 0.716 | 76.343 | 1 | 0.000 | 2.046 | 1.742-2.402 |
| 60-69 | 1.141 | 165.100 | 1 | 0.000 | 3.131 | 2.630-3.726 |
| 70 and over | 1.271 | 147.481 | 1 | 0.000 | 3.565 | 2.904-4.377 |
| **Social health insurance** | | | | | | |
| No | 0.254 | 6.829 | 1 | 0.009 | 1.289 | 1.066-1.559 |
| **Smoking cigarettes** | | | | | | |
| Yes | 0.247 | 8.488 | 1 | 0.004 | 1.280 | 1.084-1.511 |
| **Family history of hypertension** | | | | | | |
| Yes | 0.195 | 9.301 | 1 | 0.002 | 1.215 | 1.072-1.377 |
| **Body Mass Index (kg/m$^2$)** | | | | | | |
| <25 | | 49.840 | 2 | 0.000 | | |
| 25-29.99 | 0.374 | 20.225 | 1 | 0.000 | 1.453 | 1.235-1.710 |
| ≥30 | 0.631 | 49.824 | 1 | 0.000 | 1.879 | 1.577-2.238 |
| **Hypercholesterolemia** | | | | | | |
| Yes | 0.313 | 11.434 | 1 | 0.001 | 1.367 | 1.140-1.639 |

(Hosmer-Lemeshow test: $P$=0.234)

**Table 4:** Distribution of those with high BPs being aware of their status and those under monitoring and treatment by age groups

| | **Awareness* n=2519** | | **Treatment** n=2519** | | **Control*** n=1451** | |
|---|---|---|---|---|---|---|
| **Age groups** | **Yes** | **no** | **Yes** | **no** | **Yes** | **no** |
| | **n %** | **n %** | **n %** | **n %** | **n %** | **n %** |
| 40-49 | 293 (63.3) | 170 (36.7) | 216 (46.7) | 247 (53.3) | 22 (10.2) | 194 (89.8) |
| 50-59 | 596 (73.8) | 212 (26.2) | 464 (57.4) | 344 (42.6) | 49 (10.6) | 415 (89.4) |
| 60-69 | 629 (81.4) | 144 (18.6) | 483 (62.5) | 290 (37.5) | 41 (8.5) | 442 (91.5) |
| 70 and over | 384 (80.8) | 91 (19.2) | 288 (60.6) | 187 (39.4) | 14 (4.9) | 274 (95.1) |
| *Total* | 1902 (75.5) | 617 (24.5) | 1451 (57.6) | 1068 (42.4) | 126 (8.7) | 1325 (91.3) |
| | $x^2$=60.423; df=3; p<0.001 | | $x^2$=32.069; df=3; p<0.001 | | $x^2$=8.005; df=3; p<0.05 | |

***Awareness**= As any prior diagnosis of hypertension by a health care professional. ****Treatment**= As a self-reported use of pharmacological medication for the management of high BP within the 2 weeks preceeding the participant's interview. *****Control**= As having an average SBP less than 140 mmHg and an average DBP less than 90 mmHg in the context of the pharmacological treatment of hypertension.

## Discussion

This paper reports data pertaining to risk factors related to high BP and the distribution of BP among a general woman population in a primary care-based study in Eskisehir, western Turkey.

In this study, it was determined that the mean systolic and diastolic BP values of women increased significantly with the increase of their age ($P< 0.001$ each one), and that being in the age group 70 and over in particular was an important risk for hypertension. This finding is in line with the results of some studies: In a cross-sectional point prevalence study of 45,125 random consecutive primary care attendees conducted in a representative nationwide sample of 1912 primary care physicians in Germany, the prevalence of hypertension was seen to increase with age (34). Bovet et al. (2002) found that BP increased after the age of 45 in adults in Dar es Salam, Tanzania (35) in a study on older women, and in Tel Hashomer, Israel, Rosenthal and Oparil (2000) also reported that BP increased (27). Similar results have also been reported in our country in studies on the distribution of BPs (17, 36, 37). Furthermore, in the TURKSAHA study, the aim of which was to investigate the practice of antihypertensive medications in primary care units on 16.270 Turkish patients, it was found that those aged 65 and over were a risk group for hypertension (38). As women age, a reason for this age-related BP increase among women, particularly systolic hypertension, could be the exasperation of hypertension by the menopause. In particular, postnatural menopausal women displayed higher CD risk factors such as hypercholesterolemia, systolic hypertension, overweight, tobacco smoking, C-Reactive Protein (CRP) and depression (39, 40). Recent experimental and epidemiological evidence supports the hypothesis that oestrogen deficiency may induce endothelial and vascular dysfunction and potentiate an age-related increase in systolic pressure, possibly as a consequence of the reduced compliance of the large arteries (41).

The proportion of women with hypertension was 56.7% in the current study. Hypertension prevalences in females in community-based studies in three neighboring countries of Turkey and others are as follows: Greece 27.1% (9), Bulgaria 34.0% (9), Iran 19.4% (10), Oman, Egypt 38.3% (11). In Saudi Arabia, the prevalence of female hypertension was 23.9% (12), and in England 22.8% (13). The prevalence of hypertension in this study was higher than that of other countries. One explanation for this reason could be that this study was a primary care based study, not community based. Another reason for higher prevalence could be due to the fact that the subjects in this study were older than many similar studies. In addition, as an explanation for these differences, it may be said that socioeconomic inequalities, the different educational characteristics of PHC physicians between the countries, the unsuitability of the antihypertensive drugs used or their combination with other drugs, having a high obesity rate in the study area, insufficient physical activity and an abundance of uneducated women existing all had a role to play in prevalence figures (42).

In the current study, according to logistic model results, the frequency of hypertension seen, compared to the reference age groups, increased significantly with age. This finding is consistent with many studies: A study in Oman, Egypt showed that female subjects aged 60 and above were more likely to be hypertensive than those below sixty (11). A study conducted in a region of north-western Turkey showed that hypertension prevalence increased with age (37). The reasons for this could be that as age increases, CD, kidney diseases, DM, and the blockage of coroner arteries due to the accumulation of cholesterol also increase (43).

According to Logistic Model results, being deprived of social health insurance was an important risk factor for women in terms of hypertension ($P< 0.01$). This is compatible with many studies showing that socioeconomic status was associated inversely with hypertension (35, 44). High prevalence may be due to the fact that when people are unable to present to health

centers, they cannot receive treatment, and thus cannot get regular follow-ups. Although these compatible results exist, some researchers have reported adverse findings: Ala et al. (2004) indicated that those with a higher socioeconomic status had more prevalence of hypertension (45). In addition, Atallah et al. (2006) (46) and Duda et al. (2006) (47) reported that the causal link between socioeconomic factors and hypertension is complex.

In the study group, the smoking of cigarettes caused an increase of 1.289 times in the frequency of hypertension seen ($P< 0.01$). This result is consistent with some research, however not with others: Hammoudeh et al (2005) (48) and Lorenzo et al. (2005) (49) reported that female smokers had significantly higher BP values than non-smokers. In another study, non-smoking women were more likely to have high BP than their smoking counterparts (50). However, some researchers reported that those smoking cigarette had lower BPs (51). Since there are contradictory results regarding this case, further studies are needed to better assess this result.

According to Logistic Model results, one of the important risk factors for hypertension was the existence of a family history of hypertension ($P< 0.01$). These findings are consistent with other results in both our country and other countries (36, 52, 53). It may be said that genetic factors may contribute to an estimated thirty percent of cases of essential hypertension. A large percentage of people with essential hypertension have genetic abnormalities in their peripheral arteries (arterioles)- the small arteries that supply blood to the body's tissues. This genetic abnormality makes the walls of the arteries stiff so there is greater resistance to the blood flowing through them. Some researchers have indicated that there was a multifactorial mode of inheritance in essential hypertension (54). The role of family history in hypertension merits further study.

In several studies, although it has been reported that hypertension prevalence decreased with an increase in the educational level in women (17, 36, 52, 53), according to logistic model results (37, 53), our study found that the education level of the women was found not to be significantly associated with hypertension risk ($P> 0.05$). However, those with high education levels are expected to present to PHC centers more frequently and also to assume reasonable health attitudes concerning knowledge of the importance of hypertension. These contradictory results necessitate further research.

In this study, no difference was revealed between conducting regular physical activity and hypertension prevalence ($P> 0.05$). However, the positive effect of physical training, both in primary and secondary prevention of hypertension, has been confirmed in numerous studies (28, 36). In recent years, it has been shown that participation in regular sports activity of moderate intensity suffices in bringing about a lowering of BP. Four studies in individuals with hypertension have assessed the impact of exercise training on the BPs measured while they took part in their physical activities (55-58). Two of these studies found no changes in either casual or ambulatory pressures as a result of endurance exercise training (55, 56). The two remaining studies (57, 58) reported significant reductions in both casual and ambulatory BPs with exercise training in individuals with hypertension. Thus, future studies must continue to assess the impact of exercise training on ambulatory BP in individuals with hypertension, especially in the light of the fact that our study result was not significant.

In some relevant studies, it has been indicated that the use of supplementary salt in every meal and animal oil were important risk factors for hypertension (7, 36, 52). These risk factors are of importance for hyperlipidemia and atherosclerosis, and thus for the occurrence of hypertension (59). However, in our study, the use of supplementary salt and animal oil were not found to be risk factors for hypertension ($P> 0.05$). Likewise, DM and nephropathy did not demonstrate any risk in this study for the occurrence

of hypertension ($P$>0.05). Nevertheless, in many studies, it has been reported that DM and nephropathy or renal damage caused an increased prevalence of hypertension (19, 53, 60). A reason for this discord with other studies could be that the numbers of those with DM and nephropathy in our study were rather low (%19.3 and %2.3, respectively). Another explanation may be that the duration of those illnesses may not be very long in this study.

In our study, having a high cholesterol level was determined to be an important risk factor for hypertension ($P$< 0.01). Barreto et al. (2001) also reported similar results (28). Furthermore, Galderisi et al. (2007) reported that patients with high cholesterol had higher SBP (61). In Galderisi's study, it was found that the degree of impairment in coronary vasodilator capacity was independently associated with plasma cholesterol and LDL-cholesterol (61). An elevated total/ HDL cholesterol ratio and the presence of lipoprotein constitute significant risk factors for coronary events such as hypertension (62). Given the coronary plaque burden over many years and the importance of the development of a healthy lifestyle early in adulthood to decrease coronary plaque burden, there are excellent reasons to begin prevention even with young adults (63).

In the present study, consistent with many studies showing that obesity was of importance for hyperlipidemia and atherosclerosis and consequently for causing the occurrence of hypertension, obesity was an important risk factor for hypertension ($P$< 0.001) (18, 19, 28, 34, 35, 38, 45). Some researchers have indicated as a reason for this that obesity, especially truncal obesity, was related to insulin resistance, insulin resistant led to hyperinsulinemia, with ultimately hyperinsulinemia triggering the mechanisms causing hypertension (59, 64). The overall prevalence of hypertension was found to increase directly with advancing age and increasing BMI. Although hypertension was found to be more common in men overall (4.81+/-0.50% in men, 4.12+/-0.37% in women), it was more common in women over 70 yr of age (65).

In our study, it was found that 6.6% (293/4446) of the respondents had not previously had their BP measured (Unshown data). One explanation for this could be that many citizens in our country are deprived of social health insurance, with the widespread low socioeconomic characteristics of the country, and thus that these agents prevent individuals from presenting to health centers. Another reason may be that people give a lower importance to their health, and that the level of social awareness was low.

In a survey conducted one year prior to the presented study in our country (36), the proportion of those who had not had their BP measured was 29.8%. This decline in a period of one year shows that the level of social awareness and usage of health services or utilization of available resources increased with the passing of time.

In our study, 75.5% (1902/2519) of those who had high BP were aware of their status and it was determined that, with age, the proportion of those who were aware of their illnesses increased significantly (p<0.001). This is in line with some studies that have shown that the proportion of awareness ranged between 39%-73% (19, 35). On the other hand, these results indicate that a patient population of 25% is not aware of their status and that they are at the risk of cardiovascular illnesses.

In the present study, 57.6% (1451/2519) of hypertensive females were under treatment, and it was determined that the proportion of those who had received medical treatment increased with age ($P$<0.001). One reason for this could be that hypertension intensifies with the onset of age, and due to the discomfort caused by this intensification of hypertension, the individual affected is then spurred on to contact their PHC centers, thus causing the individual to become aware of their status. From a different point of view, it shows that the proportion of treatment for hypertensive patients was rather low, and that these individuals were facing serious risks. In a study by Velazquez Monroy et al (2002), this proportion was 46.6% (19), with 26.2% by Bovet et al. (2003) (66).

8.7% (126/1451) of the hypertensive patients were under treatment and regular control, and it was found that the proportion of hypertension under control increased significantly as age increased ($P< 0.05$). In many studies, it has been reported that between 6.4%-27.6% of hypertensive patients were placed on a monitoring program (18, 19, 35, 53).

It was determined that the awareness of women ($P< 0.001$), and the proportion of those being treated ($P< 0.001$) increased with age ($P< 0.001$). These results indicated that being of a more advanced age was an important factor in terms of both increase of awareness and seeking treatment, and also that with age the level of consciousness of health or BP increased.

We are well aware of the limitations of the present survey. Firstly, the sample was selected from individuals already having a reason to visit PHC centers, and also from one limited geographic area, in a single city centre of Turkey, and therefore the sample may not be representative of all the women in the city centre and Turkey, respectively. Another limitation included its cross sectional nature that does not allow reason-result relations. The third limitation on the data was the use of the self-reporting system, with the exception of measurements employed in this survey. This may have given rise to bias. The last limitation was that this survey did not permit comparison of hypertension between men and women. This might have restricted the hypertension knowledge about the general population of the city. However, our main aim at the outset of the research was to determine the risk factors for hypertension in only women since this disease is more prevalent than in men according to large epidemiological surveys (67).

In conclusion, these results suggest that there is a need for further educational programmes offering information on BP and the risk factors of hypertension, screening studies for the early diagnosis and treatment of BP to be offered at periodic intervals, and the routine measurement of BP in the course of physical examinations for those aged over 40 in particular in PHC centers. Public health awareness of simple measures, such as a low salt diet, exercise, and avoiding obesity, to maintain normal arterial BP need to be implemented by primary health care providers.

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