

**Original Article****Hypertension and obesity in cardiology outpatients: a cross-sectional study**

Bir kardiyoloji polikliniğinde hipertansiyon ve obezite yaygınlığı: Kesitsel bir araştırma

Dincer Atıla<sup>a</sup>, Onur Dalgic<sup>b</sup>, Yasemin Kılıc Ozturk<sup>c</sup><sup>a</sup> Family Health Center No 1, Menemen, Izmir, Turkey<sup>b</sup> Medical Park Izmir Hospital, Department of Cardiology, Izmir, Turkey<sup>c</sup> Health University, Tepecik Education and Research Hospital, Department of Family Medicine, Izmir, Turkey**ABSTRACT**

**Introduction:** Atherosclerotic cardiovascular diseases are the leading causes of death worldwide. Both hypertension and obesity are frequent in Turkey and are seen in around 30% of the population. This study aimed to determine the prevalence of hypertension and to investigate its relationship with obesity in patients admitted to a cardiology outpatient clinic.

**Methods:** This descriptive cross-sectional study was conducted between the 15th of January and the 28th of February 2018 at the Medical Park Izmir Hospital Cardiology Polyclinics. Data were collected from 55 out of 256 people who were referred to the clinic on the specified dates. Data were collected about systolic and diastolic blood pressures, height, weight, gender, age category, educational status, marital status, and history of hypertension.

**Results:** Of the participants, 35 (63.6%) were men, and 20 (36.4%) were women. The mean age and body mass index values were 44.60±11.03 and 28.18±3.89kg/m<sup>2</sup>, respectively. In total, 85.4% were overweight or obese. The mean systolic and diastolic blood pressures were 140.09±7.99 mmHg and 90.69±7.07 mmHg, respectively. 31 (56.4%) patients had systolic, 34 (61.8%) had diastolic, and 37 (67.3%) had systolic or diastolic hypertension. Of those with hypertension, 26 (70.2%) were not aware of their condition. In the regression analysis, gender was the only independent factor predicting high blood pressure (p=0.005; odds ratio=6.4).

**Conclusion:** Hypertension and obesity were common among patients in the cardiology outpatient clinics. Family physicians are expected to be competent in managing common health problems and are focused on preventive health practices, and thus, they should take a more active role in the struggle against hypertension and obesity.

**Keywords:** Hypertension; blood pressure; obesity; cardiology; cross-sectional survey

**ÖZ**

**Giriş:** Aterosklerotik kardiyovasküler hastalıklar bütün dünyada erken ölüm nedenlerinin başında yer almaktadır. Türkiye’de gerek hipertansiyon, gerekse obezite yaygınlığı yüksek olup, her ikisi de %30 civarındadır. Bu çalışmada kardiyoloji polikliniğine başvuran kişilerde hipertansiyon yaygınlığının belirlenmesi ve obezite ile hipertansiyon ilişkisinin araştırılması amaçlanmıştır.

**Yöntem:** Tanımlayıcı-kesitsel tasarımdaki bu araştırma 15 Ocak – 28 Şubat 2018 tarihleri arasında Medical Park İzmir Hastanesi kardiyoloji polikliniğinde yürütülmüştür. Polikliniğe belirtilen tarihlerde başvuran 256 kişiden 55’inin verileri analiz edilmiştir. Katılımcıların sistolik ve diyastolik kan basınçları, boy, ağırlık, cinsiyet, yaş kategorisi, öğrenim durumu, medeni durum ve bilinen hipertansiyon varlığı hakkında veri toplanmıştır.

**Bulgular:** Katılımcıların 35’i (%63,6) erkek, 20’si (%36,4) kadındı. Yaş ortalaması 44,60±11,03 idi. Çalışmaya katılanlarda vücut kitle indeksi (VKİ) ortalaması 28,18±3,89 idi; %85,4 kilolu veya obez sınıftaydı. Sistolik ve diyastolik kan basıncı ortalamaları sırasıyla 140,09±7,99 mmHg ve 90,69±7,07 mmHg idi. Katılımcıların 31’inde (%56,4) sistolik, 34’ünde (%61,8) diyastolik, 37’sinde (%67,3) ise sistolik veya diyastolik hipertansiyon bulunmaktaydı. Hipertansiyon tespit edilen 37 kişiden 26’sında (%70,2) hipertansiyon öyküsü bulunmamaktaydı. Regresyon analizinde cinsiyetin yüksek kan basıncı için diğer faktörlerden bağımsız bir şekilde belirleyici olduğu saptandı (p=0,005; odds oranı=6,4).

**Sonuç:** Kardiyoloji polikliniğine başvuran kişiler arasında hipertansiyon ve obezite oranları yüksektir. Sık görülen sağlık sorunlarının yönetilmesinde yetkin olması beklenen ve koruyucu sağlık uygulamalarına odaklı aile hekimlerinin hipertansiyon ve obeziteyle mücadelede daha etkin rol almaları gerekmektedir.

**Anahtar kelimeler:** Hipertansiyon; kan basıncı; obezite; kardiyoloji; kesitsel araştırma

Received	Accepted	Published Online	Corresponding Author	E-mail
November 15, 2018	March 2, 2019	August 21, 2019	Dincer Atıla, MD	<a href="mailto:dinceratila35@hotmail.com">dinceratila35@hotmail.com</a>
<b>Correspondence</b>	1 No’lu Aile Sağlığı Merkezi Menemen/İZMİR/TURKEY			

## Introduction

Although there has been a decline in recent years especially in the USA [1] and Europe [2], atherosclerotic cardiovascular diseases, particularly coronary heart disease and ischemic stroke, are the leading causes of early death worldwide [3]. In Europe, it was reported that of all deaths before the age of 75 years, 42% in women and 38% in men were due to cardiovascular reasons [4]. Turkey is among the high-risk countries concerning cardiovascular hazard [5]. According to the Chronic Diseases and Risk Factors Prevalence Study [6], 6.4% of men and 9.8% of women had angina pectoris. On the other hand, age-adjusted prevalence of hypertension in Turkey was reported as 31.8% [7].

Obesity alone can cause various health problems or aggravate an existing health issue. For example, it is responsible for the development of hypertension, coronary heart disease (CHD), type 2 diabetes or even increase in the incidence of some malignancies [8]. Being overweight or obese is considered to be a condition that increases the morbidity associated with health problems such as osteoarthritis, sleep apnea, respiratory problems, gallbladder diseases, hypertension, diabetes, CHD, and stroke [9]. It has been known for years that overweight increases all-cause mortality [10].

It is now well understood that hypertension and obesity are serious public health concerns and risk factors for many diseases, and the relationship between hypertension and obesity has also been demonstrated in various studies [4,6,10]. In the Framingham study, both systolic and diastolic blood pressure was shown to increase progressively and significantly with the body mass index (BMI) [11].

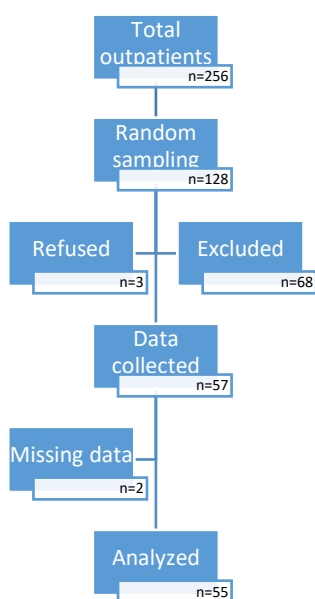
This study aimed to determine the prevalence of hypertension, and to investigate the relationship between obesity and hypertension in patients admitted to a cardiology outpatient clinic

## Methods

A descriptive cross-sectional design was planned. Ethics committee approval was obtained from the Health University İzmir Tepecik Training and Research Hospital with decision number 68 and date 10.01.2018, and institutional permission was taken dated 15.01.2018. Informed verbal and written consent was obtained from the volunteers willing to participate in the study after explaining the purpose of the research and principles of anonymity of the data received. Study reporting was done per the STROBE guidelines [12].

This research was carried out between January 15 and February 28, 2018, at the Medical Park Izmir Hospital Cardiology polyclinics. The clinic has a total of 30 beds and serves daily 90 outpatients with nine cardiologists.

Applicants of the cardiology outpatient clinics during the study period were participants of the study. Between January 15 and February 28, 2018, a total of 256 people were admitted to the polyclinic. Among the applicants, those under the age of 18 and older than 70 years, who had a history of diabetes mellitus, hyperlipidemia, valvular heart disease, heart failure, cardiac arrhythmia, who had a known disease which could cause weight change (malignancy, hypo/hyperthyroidism, advanced organ failure), or drug use (antipsychotics, antidepressants, glucocorticoids), and patients with impaired general condition (suspected malignancy, advanced chronic diseases) were excluded. From the remaining patients, every second patient was invited to participate in the research using the appointment lists and random number tables. After the exclusion criteria were applied, data were collected from 57 people who agreed to participate in the study, and data were analyzed for 55 patients (Figure 1).



**Figure 1.** Participant flow chart.

A post hoc sample size calculation demonstrated that 55 subjects were required to determine an expected frequency of 28% with a 90% confidence interval and a 10% margin of error in a universe with unknown population size [13].

The main outcome measures of the study were systolic and diastolic blood pressures. Other variables examined included height (kg), weight (cm), gender, age category, educational status, marital status, and the history of hypertension.

The World Health Organization (WHO) classifies obesity according to the Body Mass Index using the formula “weight (kg)/height (m)<sup>2</sup>” [14]. The recommended classification of obesity for adults per BMI is as follows: Low: <18.5 kg/m<sup>2</sup>; Normal: 18.5-24.9 kg/m<sup>2</sup>; Overweight: 25.0-29.9 kg/m<sup>2</sup>; Obese: ≥30.0 kg/m<sup>2</sup>; Grade 1 Obese: 30.0-34.9 kg/m<sup>2</sup>; Grade 2 Obese: 35.0-39.9 kg/m<sup>2</sup>; and Class 3 obese: ≥40 kg/m<sup>2</sup>. Data on the demographic variables were collected with a questionnaire using a face-to-face interview technique.

In the survey, brief information about the research was given to make sure that the research data was obtained correctly, and the participants were told that their identities would not be written on the data collection form. To prevent bias, the data was checked and debugged after entering into the computer.

Body weight was measured while standing, with light clothes and without shoes using a portable Seca-brand digital scale (Seca Corp., Chino, CA, USA), which can measure up to 100 grams. The height was measured with a 1-mm-sensitive measure attached to the wall, without shoes, the heels adjacent, and the head up. In the study group, blood pressure measurements were performed after at least five minutes resting, in the sitting position, preferably from the right arm, the cuff at the heart level and covering around 80% of the arm circumference, using an Erka-brand perfect aneroid mercury sphygmomanometer (ERKAMETER 3000, Bad Tölz, Germany) and an Erka T stethoscope (ERKA, Bad Tölz, Germany). Care was taken to ensure that the participants had not consumed coffee or tobacco before the measurements. Systolic blood pressure 140 mmHg and above and diastolic blood pressure 90 mmHg and above was defined as Hypertension per the JNC 7 criteria [15].

### Statistical methods

The data were analyzed with the SPSS 25.0 (SPSS Inc., Chicago, IL, USA) software. The results were presented as frequencies, percentages, means, and standard deviations. Conformity of the numerical variables to the normal distribution was investigated by the Shapiro-Wilk test. Chi-Square (or Fisher's exact test), independent samples t-test, and one-way ANOVA were used for pairwise comparisons. The binary logistic regression analysis was used for multivariate comparisons. The statistical significance level was accepted as  $p < 0.05$ .

## Results

Of the 55 participants included, 35 (63.6%) were men and 20 (36.4%) were women. The mean age was  $44.60 \pm 11.03$  years (minimum 20, maximum 70). Of the patients, 8 (14.5%) were single, 47 (85.5%) were married, 15 (27.3%) had middle school and lower education, 19 (34.5%) were high school graduates, and 21 (38.2%) were university graduates.

The mean weight and height of the participants were  $83.38 \pm 16.17$  kg (min. 55, max. 133) and  $171.49 \pm 8.44$  cm (min. 155, max. 194), respectively. The mean BMI was  $28.18 \pm 3.89$  kg/m<sup>2</sup> (min. 19.38, max. 37.18). Most of the participants were in the overweight group; 85.4% had body weights above the normal limits (Table 1).

The mean systolic and diastolic blood pressures were  $140.09 \pm 7.99$  mmHg and  $90.69 \pm 7.07$  mmHg, respectively. Accordingly, 31 (56.4%) had diastolic 34 (61.8%) had systolic, and 37 (67.3%) had systolic or diastolic hypertension (Table 1). Of the 37 patients diagnosed with hypertension, 26 (70.2%) had no history of high blood pressure.

**Table 1.** Descriptive statistics of the studied variables.

	Mean±SD	n (%)
Systolic blood pressure (mmHg)	140.09±7.99	
Diastolic blood pressure (mmHg)	90.69±7.07	
Weight (kg)	83.38±16.17	
Height (cm)	171.49±8.44	
Body mass index (kg/m <sup>2</sup> )	28.18±3.89	
BMI classification		
Normal		8 (14.6)
Overweight		29 (52.7)
Obese		18 (32.7)
Systolic hypertension		
Absent		24 (43.6)
Present		31 (56.4)
Diastolic hypertension		
Absent		21 (38.2)
Present		34 (61.8)
Systolic or diastolic hypertension		
Absent		18 (32.7)
Present		37 (67.3)
Hypertension history		
Absent		40 (72.7)
Present		15 (27.3)

The mean BMI of patients with systolic hypertension was  $29.23 \pm 4.15$  kg/m<sup>2</sup>, while the mean BMI of patients with normal systolic blood pressure was  $26.81 \pm 3.11$  kg/m<sup>2</sup> ( $t = -2.382$ ;  $p = 0.021$ ). Although borderline significant, similar findings were present for diastolic hypertension. The mean BMI of the patients with diastolic hypertension and those with normal diastolic blood pressures were  $28.97 \pm 4.15$  kg/m<sup>2</sup> and  $26.90 \pm 3.11$  kg/m<sup>2</sup>, respectively ( $t = -1.966$ ;  $p = 0.055$ ).

Both systolic and diastolic blood hypertension were more common in men compared to women ( $p < 0.05$ ; Table 2). On the other hand, the mean BMI values were higher in males ( $28.95 \pm 4.05$ ) than females ( $26.82 \pm 3.27$ ) ( $t = -2.008$ ;  $p = 0.050$ ).

**Table 2.** Comparison of the blood pressure groups by gender

		Women		Men		Chi-Square	p
		n	%	n	%		
Systolic hypertension	Absent	15	75.0	9	25.7	12.570	<0.001
	Present	5	25.0	26	74.3		
Diastolic hypertension	Absent	13	65.0	8	22.9	9.577	0.002
	Present	7	35.0	27	77.1		

There was no statistically significant relationship between the educational status and marital status groups or BMI and systolic and diastolic blood pressures (p>0.05).

In a binary logistic regression analysis where the presence of systolic or diastolic blood pressure was used as the dependent variable and body mass index, gender, and age-range variables were used as predictors, it was found that independent of the other factors, gender was a predictor of high blood pressure (p=0.005; odds ratio=6.4; Table 3).

**Table 3.** Logistic regression equation computer output.

	B	SE	Wald	P	Odds Ratio	95% CI	
						Lower	Upper
Body mass index	0.076	0.088	0.742	0.389	1.079	0.908	1.283
Sex	1.863	0.664	7.861	0.005	6.443	1.752	23.698
Age interval			1.225	0.542			
Age interval (1)	0.866	0.784	1.221	0.269	2.379	0.511	11.061
Age interval (2)	0.347	0.801	0.188	0.665	1.415	0.295	6.798
Constant	-1.518	2.459	0.381	0.537	0.219		

SE=Standard error; CI=Confidence interval.

## Discussion

This study demonstrated that 67.3% of the patients who applied to the cardiology outpatient clinic had high systolic or diastolic blood pressures, and 85.4% of the body weights were above normal. The study confirms that obesity is a significant risk for high blood pressure, but when the investigated factors were examined together, sex emerged as the main determinant of high blood pressure.

More than a quarter of the adult population in the world is known to be hypertensive [16]. Studies in Turkey with nationwide samples reported 31.8% [7], 33.7% [17], and 41.7% [18] hypertension prevalence. Despite its high occurrence and the associated morbidity and mortality rates, people are not sufficiently cognizant of this disease. It was reported that only half of the patients were aware of their disease, and in turn, only half of these were under regular control and treatment [19,20].

Since the sample of our study was selected from individuals who were admitted to a cardiology outpatient clinic, the prevalence of hypertension was expected to be higher than the general population. On the other hand, the fact that 70% of the individuals participating in this study were not aware of their diseases suggests that the level of consciousness and awareness of the society on hypertension is low. Oskay et al. [21] reported that 87% of the patients in a primary care health center could not correctly identify the thresholds of high blood pressure.

In addition to being an important health problem affecting all societies, there has been a lot of research about high blood pressure because it is a serious cause of morbidity and mortality. While previous research focuses more on the treatment of hypertension [22], it is noteworthy that preventive and protective practices are at the focus of recent studies [23,24]. Raising awareness of the public about high blood pressure, providing regular blood pressure measurements, promoting a diet restricted of salt, sugar, and fat and rich in vegetables and fruits, regular daily physical exercise, keeping body weight in healthy limits, regular use of antihypertensive medications, and developing effective policies to fight hypertension are among the preventive measures [25].

Risk factors for high blood pressure include age, male sex, body weight, insulin resistance, diabetes, family history, and lipid disorders [26]. An excess of risk in men disappears after age 60 [27]. In our study, the multivariate analysis showed that the risk of hypertension is 6.4 times in men compared to women. However, the fact that gender is an unmodifiable risk factor suggests focusing on other, sex-related risks. As an example, in this respect, men should be consulted more rigorously about healthy body weight.

Another issue that should be on the agenda related to hypertension is the social cost of this disease. It is not only responsible for 3% of all disease burden and is the sixth leading cause of death at the national level [28], but it also constitutes 10% of the health expenditures worldwide [24]. Additionally, four of the nine goals of the United Nations to reduce noncommunicable chronic diseases are associated with hypertension [29]. Although there were no morbid obese participants in our study, having 85.4% of the individuals above normal body weight is more than alarming. According to the Turkey Metabolic Syndrome Survey conducted in 2004 [18] the prevalence of obesity in the Turkish community was 30.4%. The Turkey Nutrition and Health Survey conducted in 2010 [30] demonstrated that the proportion did not change and remained at 30.3%. In the same study, the rate of overweight and obese patients was reported as 64.9%. Although Turkey has conducted a wide range of campaigns to combat obesity through the Directorate General of Public Health (<https://hsgm.saglik.gov.tr/tr/obezite>), our results indicate that obesity continues to be a threat.



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