

Prevalence of obesity among hypertensive patients in Primary Care Clinic, Security Forces Hospital, Riyadh, Saudi Arabia 2017–2018: A prospective cross-sectional study

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ABSTRACT

Background: Saudi Arabians suffer from overweight and obesity which contribute significantly to the poor control of hypertension (HTN). **Aim:** To compare the percentage of HTN between obese and nonobese hypertensive patients who visit Primary Care Center in Security Forces Hospital (SFH), Riyadh, Saudi Arabia between (December-February) 2017–2018 and to calculate and compare the percentage of a number of antihypertensive medication usage in groups with different body mass index (BMI). **Methods:** This study was a prospective cross-sectional study which included all hypertensive patients on medication or patients with (BP >140/90) who attended the Primary Care Center in Security Forces Hospital (SFH), Riyadh, Saudi Arabia between (December-February) 2017–2018. Data were extracted from the computerized medical records database at the hospital. According to the practice followed at the hospital, the diagnosis of obesity was achieved based on a calculation of body mass ≥ 30 . **Results:** About 56.1% of participants were females and 43.9% were males, the most prevalent age group of obese students (55.2%) was above 55 years. We also found that 2.1% of students were normal in weight whereas 1.3% of patients were underweight. A significant correlation with weight (89.02 ± 19.765) and BMI (34.742 ± 6.3818) was also noted (P value < 0.001). **Conclusion:** This study revealed that most of the HTN patients in the SFH, Riyadh, Saudi Arabia, suffer from overweight and obesity that could contribute significantly to the incidence of HTN.

Keywords: Hypertension, obesity, prevalence, Saudi Arabia

Introduction

Hypertension (HTN or HT), also known as high blood pressure (HBP), is a long-term medical condition in which the blood pressure in the arteries is persistently elevated.^[1] HBP usually does not cause symptoms.^[2] Long-term HBP, however, is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral vascular disease, vision loss, chronic kidney disease, and dementia.^[3] The mean systolic blood

pressure (SBP) was affected by increasing age and BMI, although the mean diastolic blood pressure (DBP) did not increase.^[4]

A person's weight is determined by the net result of the balance between energy intake and energy expenditure.^[5] Obesity is abnormal or excessive fat deposition with adverse consequences for health^[6] where it is a risk factor for CAD, HTN, and DM; however, not everyone with these conditions is obese, and not all the obese people have these conditions.^[5] Obesity and problems due to overweight have dramatically increased over the past three decades in the world, which are categorized according to individual body mass index (BMI), which is

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calculated as weight (kg) divided by height squared (m^2). The World Health Organization defined overweight as $BMI > 25$ (kg/m^2) and obese as $BMI \geq 30$ (kg/m^2).^[6] The mechanism by which obesity affects blood pressure can be summarized as obesity is associated with activation of both the sympathetic nervous system and the renin-angiotensin system contributing to the emergence of HTN.^[7] In addition, due to direct proportion between BMI and HTN, there is a greater increase of the prevalence of HTN in patients with high BMI and abdominal obesity than others with high BMI and no abdominal obesity.^[8]

The prevalence of HTN in Saudi Arabia is 15.2%. Besides, 40.6% of Saudis are borderline hypertensive.^[9] Obesity is also common in Saudi Arabia as has been shown in the study that 28.7% of the studied population were obese with a ≥ 30 kg/m^2 .^[10] In the primary care clinic, it was found that the prevalence of HTN increased with the increase in BMI.^[11]

Cross-sectional and longitudinal studies document an association of blood pressure with body weight and an association of blood pressure increases over time with weight gain,^[12-14] even among lean individuals.^[15] Some studies reported that obese individuals have a 3.5-fold increased likelihood of having HTN^[12] and that 60% of hypertensive adults are (>20%) overweight. It has been estimated that 60–70% of HTN in adults may be directly attributable to adiposity.^[12]

Khan *et al.* (2010), conducted a study concerned with prevalence of HTN among obese and nonobese patients with coronary artery disease and concluded that among these, a total of 111 (55.5%) were found to be hypertensive, 66 (59.46%) of these were obese, and 45 (40.54%) nonobese ($P = 0.003$). Obese patients with CAD had significantly more frequent HTN.^[13]

In Saudi Arabia Al-Turki *et al.*, (2000) conducted a similar study and they reported that 19% of the patients were their ideal weight (body mass index < 25 kg/m^2) while 35% were overweight (BMI 25–29.9 kg/m^2). Around 41% were moderately obese (body mass index 30–40 kg/m^2) and 5% were morbidly obese (body mass index > 40 kg/m^2) and concluded that overweight and obesity are coexisting risk factors amongst hypertensive and diabetic adult patients, and are an important focus for treatment and prevention of HBP and diabetes.^[16] In Aseer region, Saudi Arabia AL-Shahrani *et al.*, (2013) reported that most of DM and HTN patients in PHCCs, Aseer Region, KSA, suffered from overweight and obesity, which contribute significantly to the poor control of DM and HTN.^[17] Enlightened by the previous findings. The study will help the primary care physician to know the effect of obesity on hypertensive medication

Patients and Methods

A prospective cross-sectional study. Data were extracted using the hospital computerized medical records database and a list was generated of any hypertensive patient. This served as a sampling

frame for the study from which the final sample size was collected using a computer-based simple random sampling technique.

Study population

- 1- The study included all hypertensive patients on medication or the patients with (BP $> 140/90$) who attended the Primary Care Center in Security Forces Hospital (SFH), Riyadh, Saudi Arabia between (December-February) 2017–2018.

Inclusion criteria

- Hypertensive patients or patients with blood pressure over 140/90 who visit Primary Care Center in Security Forces Hospital (SFH), Riyadh between (December- February) 2017–2018.
- Patients with age of 30 up to 65 years.

Exclusion criteria

- Patients with secondary HTN.
- Hypertensive pregnant females.
- Post-bariatric surgery patients.

Data collection

Forms were designed, validated, and prevalidated. Pretested forms were used if available and appropriate permission would be obtained from authors through email. Electronic charts were reviewed by researcher and research assistants -if needed- after proper training and the forms would be filled. Data were extracted from the computerized medical records database at the hospital. According to the practice followed at the hospital, the diagnosis of obesity was achieved based on a calculation of BMI (weight in kg divided by the square of height in m) ≥ 30 . Charts were reviewed to fill the forms with the needed variables. Figure 1 shows a diagrammatic flow chart of the study design.

Statistical method

Using IBM SPSS Statistics descriptive analysis of the data and frequency tables were used and produced for all variables. Categorical data were summarized as numbers (n) and percentages (%) while continuous data would be as means \pm SD (standard deviation). For studying the difference between proportions and the categorical variables, a Chi-square (χ^2) test or Fisher's exact test was used for calculating P values while for continuous variables t -test was used instead. The value of the statistical level of significance was set at 0.05 and 95% confidence intervals (CI) was calculated for the relative frequencies of each group. Furthermore, to study the strength of association between the dependent and independent variables the binary logistic regression analysis yielding odds ratios (OR) were used and 95% CI were calculated as well to estimate the precision of the OR.

Results

We conducted a study on obesity and HTN among hypertensive patients on medication or the patients with (BP $> 140/90$) who

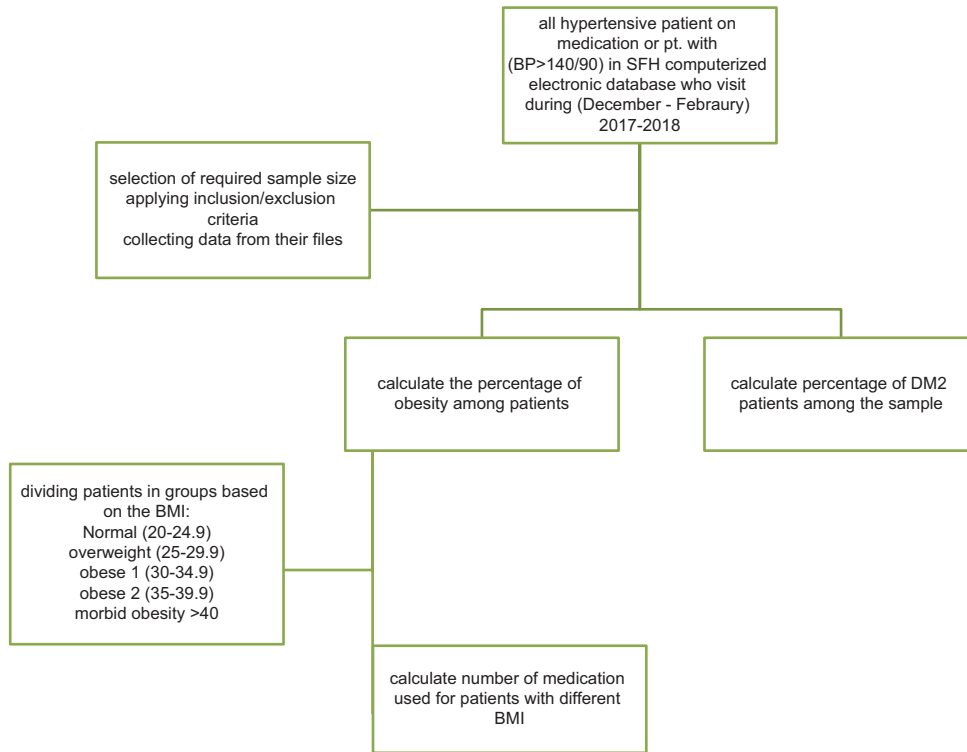


Figure 1: Flow chart summarizing the study design

attended the Primary Care Center in Security Forces Hospital (SFH), Riyadh, Saudi Arabia between (December-February) 2017–2018. Table 1 shows the sociodemographic characteristics- 56.1% of participants were females and 43.9% were males, the most prevalent age group of obese students (55.2%) was above 55 years, 38.9% were between 45–55 years and 5.8% were below 45 years with the mean age of 55.83 ± 6.211 . All of our participants were Saudi.

The World Health Organization defined overweight as $30 > \text{BMI} \geq 25$ (kg/m²) and obese as $\text{BMI} \geq 30$ (kg/m²).¹⁶ In this study, we observed that 21.2% i.e., about 80 patients out of 378 were overweight and 61 students (75.39%) were obese at different stages on the basis of BMI values where 31.7% of patients were in the obesity stage I, 25.7% of patients were in the obesity stage II, and 18.0% of students were in the obesity stage III. We also found that 2.1% of students were normal in weight whereas 1.3% of patients were underweight as shown in Table 2. Thus, we classified our patients based on obesity and found that 24.6% were nonobese and the remaining 75.4% were obese [Table 3].

Regarding the number of hypertensive medications that were taken by our patients, our results estimated that most of them (47.1%) took two types of medications, 32.3% took only one type, and the remaining 20.6% were subjected to more than one medication [Table 4].

Our results reported no significant correlation between study variables including age, gender, SBP (134.30 ± 17.664),

Table 1: Demographic characteristics of our participants

		n	Percentage
Sex	Male	166	43.9
	Female	212	56.1
Age	<45	22	5.8
	45-55	147	38.9
	>55	209	55.3
	Mean (SD)	378	100.0
Nationality	Saudi	378	100.0

Table 2: Distribution of participants according to BMI

	Frequency	Percent
Underweight	5	1.3
Normal	8	2.1
Overweight	80	21.2
Obese (30-35) (Stage I)	120	31.7
Obese (35-40) (Stage II)	97	25.7
Obese ≥ 40 (Stage III)	68	18.0
Total	378	100.0

DBP (70.36 ± 8.519), height (159.91 ± 17.008), and number of hypertensive medications related to obesity while it had a significant correlation with weight (89.02 ± 19.765) and BMI (34.742 ± 6.3818) (P value < 0.001) [Table 5].

Regarding the correlation between the number of hypertensive medications which administrated to our patients and studied variables including age, gender, SBP, and DBP (70.36 ± 8.519); however, our study reported no significant correlations [Table 6].

The multivariate logistic regression analysis of both studied groups (obese with HTN and nonobese with HTN) revealed that there was no statistically significant correlation between obesity and studied variables including age (P value = 0.796, OR 0.995 and 95.0% C.I. 0.958–1.034), gender (P value = 0.351, OR 0.796 and 95.0% C.I. 0.493–1.286), SPB (P value = 0.129, OR 1.010 and 95.0% C.I. 0.997–1.022), and (P value = 0.663, OR 0.994 and 95.0% C.I. 0.966–1.022) [Table 7].

Discussion

The current study included most of the diabetics and hypertensive patients attending SFH and showed that more than 75.4% of the patients suffered from overweight and obesity. Previous

studies from Saudi Arabia showed that overweight and obesity are common morbidities among hypertensive patients.

A study from Aseer region revealed that one-fourth of the hypertensive patients had overweight and 47% had obesity of different grades.^[18] Our results also matched with AL-Shahrani *et al.*, who reported that more than 80% of the patients suffered from overweight and obesity. A study carried out to determine the prevalence of obesity among Saudi males in the Riyadh region, showed that only 37% of subjects were their ideal weight (BMI <25 kg/m²) while 35% were overweight (BMI 25–29.9 kg/m²). Nearly 27% were moderately obese (BMI 30–40 kg/m²), and 2% were morbidly obese (BMI >40 kg/m²).^[19] A retrospective study to determine the prevalence of obesity in Saudi patients attending the PHCC of King Fahad University Hospital, Al- Khobar, in the Eastern Province of Saudi Arabia, showed that 51.5% of men were considered obese using the criterion the BMI (kg/m²) of greater than 25 (kg/m²).^[20] The high prevalence of overweight and obesity amongst hypertensive and diabetic adult patients might be explained because HTN is more prevalent in the older obese population than in normal-weight control.^[21] Moreover, there is a direct positive relationship between body weight or BMI and blood pressure.^[22]

Regarding drugs prescribed for hypertensive patients, it was found that about half of the patients were on two drugs (47.1%). In a study from Oman, it was reported that 70% of the patients were given one drug while 27% used two drugs.^[23] Al-Rukban *et al.* reported that one drug, two drugs, and three or more drugs were prescribed for 57%, 26.6%, and 10% of the patients, respectively,

Table 3: Classification of participants according to obesity

	Frequency	Percent
Non-obese	93	24.6
Obese	285	75.4
Total	378	100.0

Table 4: Distribution of participants according to hypertensive medication

	Frequency	Percent
One	122	32.3
Two	178	47.1
3 or more	78	20.6
Total	378	100.0

Table 5: Comparison of studied variables between obese and nonobese patients

Characteristic	Hypertensive with obesity; (n),%, or mean±SD	Hypertensive with no obesity; (n),%, or mean±SD	P *
Age	55.79±5.89	55.97±7.15	0.807
Gender			
Male	129 (45.3)	37 (39.8)	0.355
Female	156 (54.7)	56 (60.2)	
Weight	93.39±19.54	75.63±13.49	<0.001*
Height	159.5±19.02	161.18±8.2	0.408
Body Mass Index (BMI)	37.2±5.15	27.17±2.87	<0.001*
Systolic blood pressure	135.1±12.55	131.86±28.01	0.126
Diastolic blood pressure	70.32±8.96	70.49±7.03	0.861
Hypertensive medication			0.592
One	94 (33.0)	28 (30.1)	
Two	130 (45.6)	48 (51.6)	
Three	61 (21.40)	17 (18.3)	

*Student's t -test for quantitative variables. χ^2 for qualitative variables

Table 6: Distribution of studied variables according to hypertension medication

Characteristic	Not on medication; (n),%, or mean±SD	One medication; (n),%, or mean±SD	Two medications or more; (n),%, or mean±SD	P
Age	55.27±6.38	55.98±6.4	56.36±5.46	0.436
Gender				0.904
Male	53 (43.4)	77 (43.3)	36 (46.2)	
Female	69 (56.6)	101 (56.7)	42 (53.8)	
SBP	134.83±12.48	133.72±19.88	134.77±19.3	0.839
DBP	70.43±8.5	70.75±8.36	69.35±8.85	0.574

Table 7: Predictor of obesity multiple logistic regression analysis

Factors	P	Odds ratio	95.0% C.I. for odds	
			Lower	Upper
Age	0.796	0.995	0.958	1.034
Gender (female vs male)	0.351	0.796	0.493	1.286
SBP	0.129	1.010	0.997	1.022
DBP	0.663	0.994	0.966	1.022
Medication	0.975	1.005	0.723	1.397
Constant	0.617	2.458		

in the Riyadh region of Saudi Arabia.^[24] Al-Khaldi *et al.*, found that more than one-third of the patients were on two drugs or more (35.6%). Combined ACE inhibitors and beta-blockers were prescribed for 28% of the patients.^[18]

Concerning the relationship between the degree of overweight/obesity which was expressed as BMI and HTN, it was found that there is a strong association between high BMI and incidence of HTN (P value < 0.001). Such an association should be taken into consideration during the management of HTN through concentrating on health education about lifestyles and weight reduction programs for those high-risk groups of HTN patients. This results complemented with AL-Shahrani *et al.*,^[18] who reported that there is a strong association between poor control of HTN and high BMI (P value less than 0.05). Al-Turki *et al.*, also concluded that overweight and obesity are coexisting risk factors amongst hypertensive and diabetic adult patients, and are an important focus factor for treatment and prevention of HBP and diabetes.^[16]

Conclusion

This study revealed that most of the HTN patients in the SFH, Riyadh, Saudi Arabia, suffer from overweight and obesity that could contribute significantly to the incidence of HTN. Obesity and overweight should be given more attention during the management of HTN patients. Intensive health education regarding lifestyles and behavioral therapy are mandatory to reduce weight and to improve metabolic control.

Limitation of the study

Variables like age and gender are the most frequently reported determinants. This probably does not mean that these are the most important variables but rather reveal that sociodemographic variables are always assessed as part of the research routine and therefore, they turn out to be significant in some studies.

Since a small number of the population was considered for the present study, future studies on higher populations are recommended.

Ethical considerations

The approval of the study for ethical clearance was sought from the Research Review Board and Research Ethics Committee in

Riyadh Security Forces Hospital prior to its start. All information obtained was confidential.

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Conflicts of interest

There are no conflicts of interest.

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