RELATIONSHIP BETWEEN BODY MASS INDEX AND BLOOD PRESSURE LEVEL AMONG VISITORS OF SHAR TEACHING HOSPITAL IN SULAYMANIYAH CITY

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ABSTRACT

Background

Obesity and Hypertension are major public health problems of global significance. The Framingham Study, a population-based study initiated in the United States, demonstrated that men and women had increased blood pressure with increased overweight.

Objective

To determine the relationship between body mass index and blood pressure level in Sulaimani city.

Patients and Methods

This is a descriptive-analytic quantitative study conducted in Sulaimani city for those who visited Shar Hospital from December 2021 to March 2022. Three hundred people were recruited (150 cases, 150 control). The sociodemographic characteristics and information regarding (the BP) and (BMI) of each person were collected. The data was collected by using a predesigned questionnaire by direct interview.

Results

The mean age of the participants was 50.2±18.3 years. (53.7%) were female (46.3%) were male. Most of them were married (85.7%), illiterate (30%), Occupation as a housewife (41%), and urban residents (77.7%). Sixteen. Seven percent had HTN for 1-5 years (50.3%) and had a family history of HTN, most of them from their mother (16%), non-diabetic (72.7%), non-smoker (73%), and non-alcoholic (96.7).

Conclusions

According to the result of the study, there was a significant relationship between BP (systolic and diastolic) and BMI.

Keywords: *Blood Pressure (BP), Body Mass Index (BMI).*

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INTRODUCTION

The percentage of people with high Blood Pressure (BP) increases by a certain level among adults every year worldwide, especially in low-income countries. Blood pressure (BP) is the force of blood pushing against blood vessel walls, written as two numbers. The top systolic number is the pressure when the heart beats. The bottom, diastolic, number is the pressure when the heart rests between beats. The normal range is 120/80 mm Hg [1].

There are two types of blood pressure: Low Blood Pressure (LBP) [Hypotension], which is a decrease in systemic blood pressure below accepted low values [less than 90/60 mm Hg] [2] , and High Blood Pressure (HBP) [Hypertension] which are values higher than BP normal range [higher or equal to 140/90 mm Hg] [3]. Hypertension is a significant public health problem, and one of the leading risk factors for morbidity and mortality from cardiovascular diseases, and its complications account for 9.4 million annual deaths worldwide [4]. It also affects 30% of adults [3].

Hypertension has many causes, and one of the common causes is obesity or being overweight, which studies have proved. The consumption of ultra-processed foods plays a vital role in developing obesity and Hypertension [5].

One of the causes of obesity in Kurdistan is that the people tend to drink water early after meals; also, cultural Kurdish foods, in general, are primarily full of saturated fat and salt, which leads to obesity that the prevalence of high blood pressure and other diseases such as heart disease, diabetes mellitus type 2, stroke. The reasons mentioned above made the disease more common within the region [6].

Body mass index (BMI), formerly called the Quetelet index, is a simple weight-for-height index used to assess an individual's total amount of body fat and is commonly used to determine healthy-, overweight, and obesity. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2). It provides the most useful population-level measure of body fat as it is the same for both genders and all ages of adults and children. However, it should be considered a rough guide because it may not correspond to the same degree of fatness in different individuals [7] since it varies according to age, sex, and race. Therefore, one's BMI can only be compared to those of the same sex, age, and race; for example, The influence of large muscle mass on BMI in athletes and young adults may misclassify these individuals as overweight and obese [8].

The same goes for pregnant women and older adults. Pregnant women may have a higher BMI due to increased weight associated with pregnancy, but not necessarily due to increased fat [9], and older adults have lesser muscle mass and, therefore, will have a lower BMI, but this does not mean that their weight is normal or Underweight [10].

According to the World Health Organization, the BMI ranges are divided into six categories [<18.5 as Underweight] [18.5 - 24.9 as Normal] [25 - 29.9 as Overweight] [30 - 34.9 as Obese] [35 - 39.9 as Severely Obese] [≥40 as Morbidly Obese]. These ranges are based on the effect excessive body fat has on disease and death. They are reasonably well related to adiposity. It was developed as a disease risk indicator; as BMI increases, so does the risk for some diseases. [11].

Some common conditions related to being overweight and obesity are premature death, cardiovascular diseases, high blood pressure, osteoarthritis, some cancers, and diabetes [11].

Obesity has already become a common health problem, and its prevalence continues to rise in both developed and developing countries. In 2017, high body mass index (BMI) was expected to cause 4.72 million deaths and 148 million disability-adjusted life years globally [12]. Just as being overweight and obese, being Underweight has its risk factors as well; for example, a study provides evidence that being underweight with a BMI below 18.5 kg/m^2 may be another risk factor for CVD, especially in the population below 40 years old [13]. Besides that, several studies in children and adults suggest that both being underweight and obese are associated with increased infection risk [14].

Both systolic and diastolic blood pressure (SBP, DBP)) are favorably linked with body mass index (BMI). Weight loss lowers blood pressure (BP), implying that BMI is not just a measure of things linked to high blood pressure but is causally linked. As BMI rises, this relationship implies that high blood pressure, a key cardiovascular disease risk factor, will become an even more pressing health issue [15].

PATIENTS AND METHODS

Study design

This is a descriptive-analytic quantitative study conducted for people visiting Shar Hospital in Sulaimani City from December 2021 to March 2022 to identify the relationship between (BMI) and Blood Pressure (BP) among those people who were visiting Shar Hospital during that period.

Sampling

A non-probability / purposive sample of (300) people, including 139 males and 161 females, was taken. We use control and case groups, which include 150 controls (not hypertensive patients) and 150 (hypertensive patients) cases that visited Shar Hospital.

The setting of the study

Shar Hospital is a general teaching hospital that opened in 2013. It is a 461-bed hospital with 12 operating rooms and 46 ICU units, providing service for the city community and its surroundings. It has six floors in total: the Basement floor, which consists of (a storage area for medicine, a library, a kitchen, and a hall for seminars); the ground floor, which has (OPD, physiotherapy, emergency, laboratory, cafeteria), then we have the first floor which has (pediatric surgery, GIT, ICU, ICCU, surgery), second floor (GIT and surgery), Third Floor (Surgery and orthopedics). The goal of this hospital is to improve the quality of care, increase the knowledge of the healthcare workers, planning, and research to provide optimum patient care.

Inclusion criteria

Patients visiting the hospital, over 18 years old, and their willingness to participate in the study

Exclusion criteria

Pregnant

Tools of Data Collection

Close-ended questions used to measure the variables were two-part constructed questionnaires; the first consists of sociodemographic data, and the second consists of (vital signs [SBP, DBP] and anthropometric measurements).

Rating Scales and Score

The items were rated and scored according to the following patterns:

The BMI ranges are divided into six categories: [<18.5 as Underweight] [18.5 - 24.9 as Normal] [25 - 29.9 as Overweight] [30 - 34.9 as Obese class I] [35 - 39.9 as Obese class II] [≥40 as Obese class III] [11].

Blood Pressure: Normal: 120/80 mm Hg. Elevated: 120-129/80 mm Hg. Hypertension Stage 1: 130-139/80-89 mm Hg. Hypertension Stage 2: 140/90 mm Hg or higher. Hypertensive crisis: 180/120 mm Hg or higher [3].

Statistical analysis

Statistical Package Social Sciences version (24) (SPSS) was used for the data analysis, which was performed through Descriptive statistics (frequency, percentage, mean, standard deviation, minimum, maximum, and range), inferential statistics (correlation test, chi-square, p-value, Fisher Exact).

Ethical consideration

Permission and scientific agreement to carry out the study was obtained from the University of Sulaimani/ College of Nursing and the official agreement of the Directory of the Health of Sulaimani to get their help and cooperation in Shar Hospital. Besides, verbal consent was obtained from each participant.

RESULTS

Table 1 shows sociodemographic characteristics. The mean age of the participants was 50.2(±18.3) years. The majority (53.7%) of participants age was between 31-60 years, and nearly half of them were illiterate housewives (41%), married (85.7%), and urban residents (77.7%).

Table 2 shows the sum of the history of Hypertension and risk factors: risk factors and patient comorbidities. (50%) of the participants had established Hypertension (50) of the participants had not established Hypertension, (27%) had DM, (27%) were smokers, and (3.3%) were alcoholics.

Table 3 represents Blood pressure levels and BMI among the participants; regarding blood pressure, systolic blood pressure (SBP) of 37% of the participants was

<120, (34.7%) of the participants' SBP was> 140, and 130-139 (stage 1 - high blood pressure). Diastolic Blood Pressure (DBP) in the majority of the cases, 63.7% was <80 (normal), and in 20% of the cases, diastolic blood pressure was>90 (stage 2 - high blood pressure); in addition, 16.3% of the participant DBP were 80-89 (stage 1- elevated BP. According to BMI (Body et al.), 36.7% of the participants were overweight, and 34.7% were normal.

Table. 4 indicates the SBP and DBP of the participants and their relation to BMI levels in both control and case participants. In control, participants with average SBP (<120) that had normal BMI (18.5-24.9) had a higher percentage of 35(58.3); the difference was statistically highly significant (p<0.005). Regarding case participants, those with normal SBP (<120) and with normal BMI (18.5-24.9) had a higher percentage, which was 15(34.1) of the participants who had normal or healthy weight according to BMI level. The difference was statistically significant (p<0.005).

Table 1. Sociodemographic characteristics of the study sample.

Sociodemographic characteristic		Frequency	%
Age (year)	18-30	51	17
	31-60	161	53.7
	61-90	88	29.3
	Total	300	100
Mean± SD 50.2±18.3			
Gender	Male	139	46.3
	Female	161	53.7
	Total	300	100
Levels of education	Illiterate	90	30
	Primary school	77	25.7
	Secondary school	79	26.3
	Institution or university	54	18
	Total	300	100
Occupation	Employed Governmental	53	17.7
	Employed Non-governmental	62	20.7
	Student	13	4.3
	Housewife	123	41
	Unemployed	24	8
	Retired	25	8.3
	Total	300	100
Marital status	Single	39	13
	Married	257	85.7
	widowed	4	1.3
	Total	300	100
Residency	Urban	233	77.7
	Suburban	56	18.7
	Rural	11	3.7
	Total	300	100

Table 2. History of Hypertension and Risk Factors.

Variables	Frequency	%
Hypertension		
Yes	150	50.0
No	150	50.0
Family history of HTN		
Yes	151	50.3
No	149	49.7
Diabetes mellitus		
Yes	82	27.3
No	218	72.7
Smoker		
Yes	64	27.0
No	236	73.0
Alcohol		
Yes	10	3.3
No	290	96.7
Total	300	100.0

Table 3. Blood pressure levels and BMI.

Variables	No. :300	
	Frequency	%
Systolic Blood Pressure SBP (mmHg)		
<120 (Normal)	111	37.0
120-129 (Elevated BP)	39	13.0
130-139 (Stage 1 - hypertension)	46	15.3
> 140 (Stage 2 - Hypertension)	104	34.7
Diastolic Blood Pressure DBP (mmHg)		
<80 (Normal)	191	63.7
80-89 (Stage 1- elevated BP)	49	16.3
>90 (Stage 2 - high blood pressure)	60	20.0
BMI		
<18.5	16	5.3
18.5-24.9	104	34.7
25-29.9	110	36.7
30-34.9	56	18.7
35-39.9	11	3.7
>40	3	1.0
Total	**300**	**100.0**

Table 4. SBP and DBP of the participants with BMI levels in both control and case participants.

Variables	Body Mass Index (BMI)						N=150	P. Value
	<18.5	18.5-24.9	25-29.9	30-34.9	35-39.9	>40	Total	
	F. (%)	F. (%)	F. (%)	F. (%)	F. (%)	F. (%)	F. (%)	
(Control)								
SBP								
<120	6(75.0)	35(58.3)	25(42.4)	9(56.3)	0(0.0)	0(0.0)	75(50.0)	.001
120-129	1(12.5)	11(18.3)	10(16.9)	1(6.3)	0(0.0)	1(50.0)	24(16.0)	
130-139	0(0.0)	6(10.1)	13(22.0)	3(18.8)	2(40.0)	0(0.0)	24(16.0)	
>140	1(12.5)	8(13.3)	11(18.6)	3(18.8)	3(60.0)	1(50.0)	27(18.0)	
DBP								
<80	5 (62.5)	49(81.7)	39(66.1)	14(87.5)	2(40.0)	2(100.0)	111(74.0)	.149
80-89	3(37.5)	8(13.3)	12(20.3)	2(12.5)	3(60.0)	0(0.0)	28(18.7)	
>90	0(0.0)	3(5.0)	8(13.6)	0(0.0)	0(0.0)	0(0.0)	11(7.3)	
(Case)								
SBP								
<120	4(50.0)	15(34.1)	8(16.3)	9(22.5)	0(0.0)	0(0.0)	36(24.5)	.014
120-129	0(0.0)	6(13.6)	4(8.2)	5(12.5)	0(0.0)	0(0.0)	15(10.2)	
130-139	1(12.5)	8(18.2)	6(12.2)	5(12.5)	2(40.0)	0(0.0)	22(15.0)	
>140	3(37.5)	15(34.1)	31(63.3)	21(52.5)	3(60.0)	1(100.0)	74(50.3)	
DBP								
<80	6(75.0)	33(75.0)	20(40.8)	18(45.0)	3(60.0)	0(0.0)	80(54.5)	
80-89	0(0.0)	6(13.6)	7(14.3)	7(17.5)	1(20.0)	0(0.0)	21(14.3)	.012
>90	2(25.0)	5(11.4)	22(44.9)	15(37.5)	1(20.0)	1(100.0)	46(31.3)	

DISCUSSION

Our Sociodemographic characteristic of the study sample shows that the mean age is 50.2, nearly similar to the study [16], in which they found the mean age is 46. Our study result shows that most cases are from urban areas, which are going with [17] also concluded that Hypertension is more common among urban residencies. The highest rate of hypertension cases was married, according to our study, but it is contrary to [18] results found that most hypertension cases were previously married.

Offspring parents with Hypertension have a three times higher risk of developing Hypertension [19]. In our study, we discovered that more than half of the participants have a family history of HTN, almost 50% of hypertensive patients had maternal familiarity [20], and in our study, we found that almost 16% of the participants had mothers diagnosed with HTN.

In the nationwide Community Hypertension Evaluation Clinic screening, more than 1 million men and women, the prevalence of Hypertension in overweight persons aged 20 to 39 years was twice that of people with an average weight and three times higher than that of underweight people. In overweight people aged 40 to 64 years, the prevalence of Hypertension was 50% higher than that of people with an average weight and 100% higher than that of underweight people [21]. Our analysis indicates that there is a relation between blood pressure levels and BMI; also, in the study of Canadians aged 18 to 74 years, the prevalence of Hypertension in men and women increased with increasing body mass index [21].

In another study, given these results, China and countries in a similar position should not only focus on preventing the increase of BMI but also improve Hypertension diagnosis and treatment rates to mitigate this emerging health threat [15].

In conclusion, there is a relationship between body mass index and blood pressure level in both control and case groups; the difference was statistically highly significant ($p<0.005$).

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