



Assessment of the Association between Hypertention & Body Mass Index in Patients Visiting at Department of Medicine Pmch Nawabshah

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Authors' contributions

This work was carried out in collaboration among all authors. Author SAS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors JK, AA, AAJ, AHD, SA and AA managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i32B31745

Editor(s):

(1) Dr. Mohamed Fawzy Ramadan Hassanien, Zagazig University, Egypt.

Reviewers:

(1) Krishna Sujeethasai, University of Jaffna, Sri Lanka.

(2) Suvarna E Pawar Vishwakarma Institute of Information Technology, India.
Complete Peer review History: <http://www.sdiarticle4.com/review-history/70237>

Original Research Article

Received 16 April 2021

Accepted 18 June 2021

Published 21 June 2021

ABSTRACT

Background: Hypertension is a common health issue all over the world; increased Body Mass Index (BMI) is alone one strong risk factor for the HTN.

Objective: To assess the relationship between HTN & BMI in patients visited at department of

Medicine PMCH Nawabshah.

Methodology: This cross sectional study was conducted at PMC Hospital Nawabshah during March 2019 to February 2020. Sample size was 385. This study was conducted after ethical approval of institutional committee and willing male and female subjects with hypertension were included in present study after consent. Age ranges from 15 years and above. Those having other co morbidities like, DM, IHD, stroke and other metabolic and endocrine disorders were excluded from the study. Patients with history of drugs causing weight gain were also excluded.

Results: there were total 385 subjects included, 130 were females and 245 were males 1:2 ratio of female and male. Mean age of patients was 46.50 sd \pm 8.65 years, mean BMI was 26.18 sd \pm 4.73, mean systolic HTN was 158.35sd \pm 30.40 and mean diastolic blood pressure was 95.75 sd \pm 12.91 mmHg.

Conclusion: There is strong association between hypertension and BMI, as the BMI will increase the risk of HTN will increase.

Keywords: Body mass index; Hypertension; obesity; Medicine.

1. INTRODUCTION

There is rise in the frequency of obesity all over the globe, together with Europe [1,2].

The major risk factors of hypertension consist of age, sex, smoking, physical activity, familial history, nutritional behaviors, and BMI (body mass index) [3-5]. About 31.0% of global populace had cardiovascular ailment (CVD), and near 80.0% from this present with cardiac disease or stroke. Higher systolic and diastolic blood pressures are considered as a severe issue as well as the obesity is also considered as a chief risk agent to be addressed [6]. Ordinary blood pressure both systolic and diastolic increased significantly and linearly crossways BMI stages. Many of the researches have shown an inclining increase in blood pressure associated with increased levels of BMI. Current incline exists even in the entirely accustomed evaluations suggesting that BMI might have straight consequences on blood pressure as an autonomous of additional medical risk issues [7].

One of the most essential avoidable non-communicable disease (NCD) identified as risk issue for early death and ill health is recognized as hypertension [8-10]. Conferring to the current data near 1/3rd of the global population is suffering from hypertension [11-12]. This problem of hypertension is raising predominantly in the low and middle income nations [12].

A sound recognized relationship amongst hypertension and adiposity in established situations [12-15]. Studies from diverse cultural clusters had described the relationship among hypertension and BMI [13-19]. In earlier researches a much stronger relationship among BMI and blood pressure in Asian populace

[17,18]. South Asian adult populations had significantly less cut off points for overweight and obesity in comparison to white Europeans, these are related with increased risk of CVD and diabetes mellitus type 2 [20, 21].

Dissimilar researches had evaluated the relationship amongst BMI and hypertension. It is a significant community wellbeing consequence in South Asian nations, wherever the load of hypertension is excessive and increasing obesity are the chief problems at the local levels [22-24].

In our local area of Nawabshah, Sindh Pakistan there is no such study performed previously to observe the relationship between BMI and hypertension. Current study was aimed to observe the association between BMI and Hypertension. The relationship among overweight, obesity and hypertension were systematically assessed by means of different cut offs. The prevalence related among BMI and hypertension were analysed in our local set up.

To assess the association between HTN & BMI in patients visited at department of Medicine PMCH Nawabshah.

2. OPERATIONAL DEFINITIONS

Hypertension: When blood pressure measured on two different occasions showing the systolic blood pressure \geq 140 mmHg and/or diastolic blood pressure \geq 90 mmHg is diagnosed as Hypertension.

Body Mass Index (BMI): Normal weight (18.5–24.9 Kg/m²), Overweight (25.0–29.9 Kg/m²), Class I obesity (30.0–34.9 Kg/m²), Class II obesity (35.0–39.9 Kg/m²), Class III obesity (> 40 Kg/m²)

3. METHODOLOGY

This cross sectional study was conducted at PMC Hospital Nawabshah during March 2019 to February 2020. Sample size was 385. This study was conducted after ethical approval of institutional committee and willing male and female subjects with hypertension were included in present study after consent. Age ranges from 15 years and above. Those having other co morbidities like, DM, IHD, stroke and other metabolic and endocrine disorders were excluded from the study. Patients with history of drugs causing weight gain were also excluded.

3.1 Data Collection

After permission of ethical committee, the study will be conducted in different units of Medicine at PMC hospital Nawabshah, a tertiary care hospital. The population of district Nawabshah is approximately 1900000. Rao soft calculator for sample size was used to calculate the size of sample with a confidence level of 95% and margin of error 5%. A sample of 385 was estimated to be involved in the research.

After taking a detailed clinical history and examination patients will be subjected for relevant blood pressure was checked by mercury sphygmomanometer, and weight and height was checked to measure the BMI of the subjects. Routine laboratory investigations were sent to laboratory for analysis, Venous Blood samples will be drawn from the patients after strict aseptic measures. Parallel the available records of patients were checked for the comorbidities. Other routine tests like ultrasound abdomen were checked to assess the fatty liver. All the data will be gathered on the predesigned proforma.

3.2 Data Analysis

After data collection, SPSS version 22 was used to analyse the data. For quantitative

variables like age, blood pressure and BMI Mean and standard deviation was calculated. Categorical variables will be assessed in terms of frequencies and percentages. Statistical tests were applied to check the association of hypertension and BMI. Comparison in between the groups were analysed by using the t-test, one-way Anova. The relationships amongst different parameters were evaluated through Pearson correlation analyses. Importance of BMI was observed for age, with diverse parameters to observe the effect of them on consequences. The statistically significant P value was taken as $p < 0.05$. For the observation of alterations in ratios Chi-square test will be used. Relationship among HTN and BMI and other variables was explored through bivariate correlation analysis.

4. RESULTS

A total of 385 subjects were included in this study, mean age was 46.5065, Std. Deviation 8.65879, mean BMI was 26.1852 Std. Deviation 4.73066, mean Systolic Blood Pressure 158.5325 Std. Deviation 30.40293 and Diastolic Blood Pressure 95.7532 Std. Deviation 12.91817 as shown in Table 1.

The details of demographic values are shown in Fig. 1. with frequency and percentages of subjects those were included in current study.

Table 2. Shows the cross tabulation and frequency and percentages of hypertension associated with different levels of BMI, which was statistically significant $p < 0.000$

The Anova and coefficients were statistically significant between hypertension and BMI as shown in Table 3.

Table 4 shows the bivariate co relationship between HTN and BMI which was statistically significant $p < 0.000$.

The Fig. 2. shows the linear association between hypertension and BMI.

Table 1. Descriptive Statistics N=385

	N	Minimum	Maximum	Mean	Std. Deviation
Age In Years	385	30.00	65.00	46.5065	8.65879
BMI	385	20.20	43.00	26.1852	4.73066
Systolic Blood Pressure	385	100.00	240.00	158.5325	30.40293
Diastolic Blood Pressure	385	70.00	130.00	95.7532	12.91817

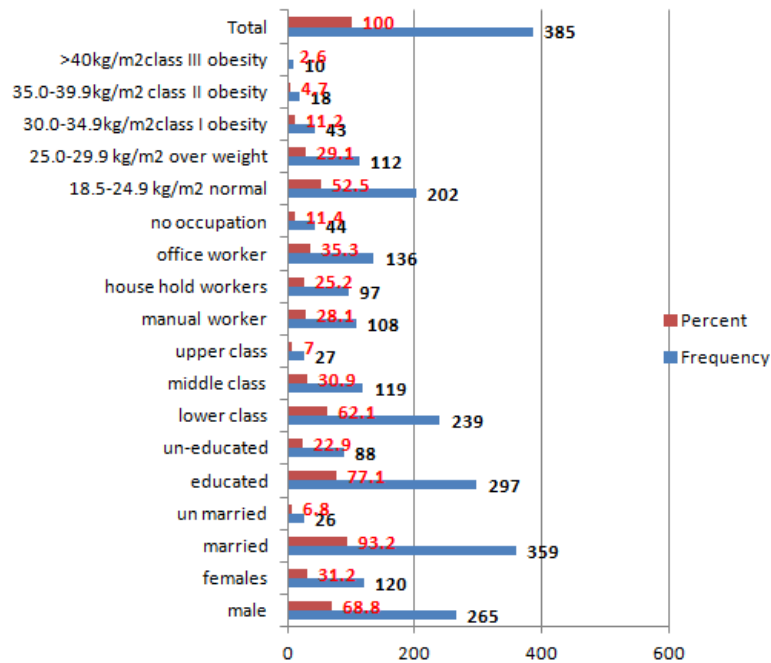


Fig. 1. Demographic variable N=385

Table 2. Body Mass Index * Hypertension cross tabulation n=385

		hypertension		Total	P value
		yes	no		
body mass index	18.5-24.9 kg/m2 normal	Count	53	149	.000
		% of Total	13.8%	38.7%	
	25.0-29.9 kg/m2 over weight	Count	30	82	
		% of Total	7.8%	21.3%	
	30.0-34.9kg/m2 class I obesity	Count	25	18	
		% of Total	6.5%	4.7%	
	35.0-39.9kg/m2 class II obesity	Count	11	7	
	% of Total	2.9%	1.8%		
	>40kg/m2 class III obesity	Count	10	0	
		% of Total	2.6%	.0%	
Total		Count	129	256	385
		% of Total	33.5%	66.5%	100.0%

Table 3. ANOVA and COEFFICIENTS

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Regression	755.162	1	755.162	36.899	.000
Residual	7838.443	383	20.466		
Total	8593.606	384			
The independent variable is hypertension.					
COEFFICIENTS					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
hypertension	-2.967	.488	-.296	-6.074	.000
(Constant)	31.125	.845		36.821	.000

Table 4. Bivariate Correlations

		hypertension	BMI
hypertension	Pearson Correlation	1	-.296**
	Sig. (2-tailed)		.000
BMI	Pearson Correlation	-.296**	1
	Sig. (2-tailed)	.000	

** . Correlation is significant at the 0.01 level (2-tailed)

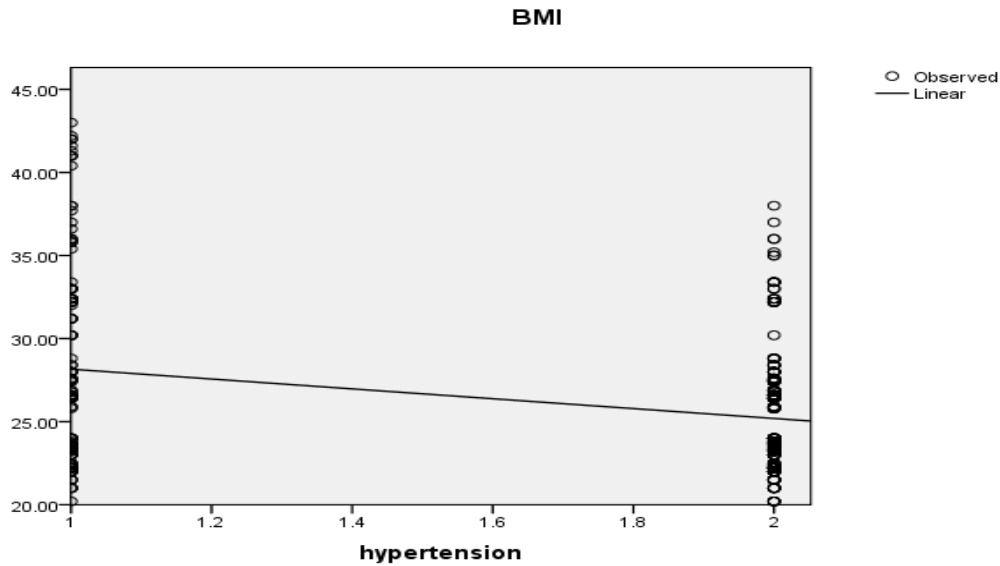


Fig. 2. Linear correlation of HTN and BMI

5. DISCUSSION

The hypertension and other cardio-vascular diseases are continuously the most important cause of mortality, morbidity and disability all over the globe inspite of increased availability of therapeutic opportunities and implementation of health policies from the last decade. There is well known relationship among overweight, obesity and hypertension. We also observed the association among BMI with hypertension in different socio-economical sub-groups.

Overweight is a Body Mass Index BMI ranging from 25.0 to 29.9 kg/m² is noted as overweight and BMI of 30 kg/m² or higher is regarded as Obesity [25]. Overweight and obesity are risk issues for HTN, DM and dyslipidemia [26].

In a study by Framingham it was observed that hypertension was around twofold predominant in both genders with obesity in comparison to men and women with a standard Metropolitan relation weight [27]. He also analysed an increase in blood pressures with increased over-weight in

both genders. In relation to inhabitants with low BMI quartile, the persons with increased BMI quartile had an increase in both systolic and diastolic blood pressures as 16 mmHg and 09 mmHg respectively. With each increase of 4.5 kg in weight was associated with a rise of 4 mmHg in systolic blood pressures [28]. An affirmative association among overweight, obesity and hypertension in a data from insurance company [29].

The pervasiveness of hypertension in both genders was augmented with increased BMI, particularly in subjects with age between 18 to 34 years. A 05 fold increase in occurrence of HTN was noted in persons with BMI more than 30 kg/m² in comparison to persons with BMI less than 20 kg/m² [30]. In a follow up of female nurses in USA, it was analysed that BMI was related with increase in blood pressure. With loss of body weight from 05 to 09.9 kg risk of HTN was 15.0% decreased, in females who lost body weight 10.0 or more kg the risk was reduced by 26.0%. Females who gained weight from 05 to 9.9 kg the risk of HTN was raised to 74.0%. In

females who gained weight 25 kg or more there was 05.21 folds increase in risk of HTN [31]. In obese females the significant risk issue leading to HTN was noted as the raised BMI. In comparison of females with BMI less than 23 kg/m² the females with raised BMI and obesity had 04.7% folds increased prevalence of HTN. About 40.0% of the newly diagnosed hypertensive cases were indorsed with over-weight and obesity, in 50.0% of newly diagnosed HTN the BMI was 23.0 kg/m² or higher [32]. In adults who were over-weight or obese during childhood had 02.7 folds increased risk of developing HTN. Subjects Over-weight or obese when become normal weight there is reduction in risk of developing HTN to a level similar to subjects without over weight or obesity [33]. In another study the risk of HTN was 01.65 times more in subjects with childhood overweight or obesity [34].

Waist to hip ratio and computed tomographic measurements of central fat dissemination are stronger associations among being overweight or obesity with HTN than the BMI. The weight loss resulting in decreasing blood pressure maybe consequence in insulin sensitivity improvement and may also be due to decrease in sympathetic activity [35]. In subjects with chronic HTN the impaired renal pressure natriuresis is related with over-weight and obesity.

Renal sodium reabsorption is increased in obese subjects, resulting in alteration of internal physical forces, activation of renin angiotensin and sympathetic system thus impairing the renal pressure natriuresis. Anatomical changes in the kidneys lead to loss of functioning of nephron, auxiliary raising the arterial pressures in subjects with chronic obesity [36]. Blood pressure and weight reduction in overweight HTN subjects with hypocaloric diet without decrease in sodium intake decreases the sympathetic activity. This reduction in sympathetic activity results by reduction in the activation of renin angiotensin aldosterone system, natriuresis, constricted volume of plasma, and reverse in increased state of cardiac output. Blood pressure is decreased in overweight subjects with loss of weight [37]. A decrease in body weight from 03.0% to 09.0% resulted in a decrease of 03 mmHg in systolic and diastolic blood pressures [38]. In older hypertensive subjects a weight reduction by 03.5 kg with a diet resulted in decrease by 04.0/01.1 mmHg [39].

The occurrence of HTN was analysed as 18.9% in subjects with weight loss and 40.5% in

controls, and in subjects with sodium restriction 22.4% and 32.9% in control group [40].

In a study conducted on hypertensive subjects with age ranging between 37 to 66 years, a weight reduction by 05.1 kg in body weight was related with a decrease of 04.44/03.57 mmHg in systolic and diastolic blood pressures. In subjects with weight loss of higher than 05.0 kg, a 06.63/05.12 mmHg reduction in systolic and diastolic blood pressures were noted [41]. The recognized management of obesity is Bariatric surgery, a 38.2% long term decrease in HTN was noted after gastric bypass surgery and reduction of 17.4% after s gastric band [42]. In a study done on black subjects, aging 42 years with morbid obesity out of them 74.0% subjects were with hypertension undergone bariatric surgery. The results showed a mean decrease in BMI from 57.1 kg/m² to 39.2 kg/m², and decrease in HTN was noted in 45.0% of hypertensive subjects at one year [43].

6. CONCLUSION

In conclusion, HTN is very raised amongst male and female patients having high BMI. The relationship of BMI and hypertension is very common in our population.

7. RECOMMENDATION

There is strong relationship between BMI and HTN in inhabitants with lower cut off point for overweight and obesity. Public health measures should be taken to decrease in BMI in populations thus lower decreasing the burden of hypertension. In Pakistan interventions targeted by public health to decrease the BMI in inhabitants might have increased benefits in reducing the hypertension.

CONSENT

Written and verbal consent was taken from subjects and next of kin.

ETHICS APPROVAL

The ERC of PUMHSW gave ethical approval.

ACKNOWLEDGEMENTS

We would like to thank the all contributors and staff and other persons for providing useful information.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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