



HYPERTENSION; ASSOCIATION BETWEEN HYPERTENSION AND BMI IN FAISALABAD DISTRICT.

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ABSTRACT... Background: Hypertension is a leading cause of CVDs whereas BMI is a major risk factor for hypertension. **Objectives:** The objective of the study was to determine whether an association exists between overweight & obesity and suspected cases of hypertension. **Study Design:** Cross sectional study conducted in screening camps. **Duration:** From 19th till 24th February 2018. **Setting:** 45 Primary and Secondary healthcare facilities of Faisalabad District. **Material and Methods:** 43,943 people of Faisalabad district, age 25 and above were screened for hypertension. Height and weight of the study population was recorded for calculation of their BMI. People with BP Systolic >140mm Hg and BP Diastolic >90mm Hg were labelled screened positive for hypertension. People with BMI less than 23 were categorized as normal. People with BMI between 23 to 24.9kg/m² were categorized as overweight and 25 kg/m² or higher as obese. Data was entered in SPSS v.23 for analysis. Frequency distribution and percentage were calculated for age, gender, screening for hypertension and BMI. Chi square was used as a test for significance for association between Hypertension and BMI. **Results:** 43,943 people aged 25 years and above were screened for hypertension. 5,320 people were screened as hypertensive. 68.7% were females and 31.3% were males. Mean age was 43.9±12.6 years. 28.1% of the study population had normal BMI. 14.9% of the population was overweight while 57% of the population was obese. The association between BMI and Hypertension was statistically significant. **Conclusion:** Overweight and obesity are strongly associated risk factors to developing hypertension. Screening for early detection should be periodically considered for general population to ensure prevention of CVDs.

Key words: Hypertension, BMI, Obesity, Early Detection, Risk Factor.

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INTRODUCTION

Hypertension is one of the leading non-communicable diseases worldwide. It is defined as having a systolic pressure more than 140mm Hg and a diastolic pressure more than 90mm Hg. This aggravated blood pressure in the arterial walls leads to both microvascular and macrovascular complications in different organs of the body.¹ Hypertension can occur at any age however, it is more common in adults. Hypertension is one of the leading causes of mortality globally as it is a precursor to many of the cardiovascular diseases (CVDs) like heart attack and angina.² According to the World Health Organization, the prevalence of hypertension was nearly 40% globally.³ Hypertension is often labelled as a silent killer as a person may be hypertensive for many years

without knowing it until signs and symptoms of complications become apparent. Obesity, measured as Body Mass Index (BMI), is one of the major risk factors for hypertension.⁴ Obesity leads to adverse metabolic effects on blood pressure, due to elevated level of cholesterol, triglycerides and insulin resistance which may lead to risk of CVDs.⁵ Risks of coronary heart disease, ischemic stroke and type 2 diabetes mellitus increase steadily with increasing BMI. In a study conducted in Framingham, BMI was strongly associated with increased risk of hypertension in young adults.⁶ Even in early age, childhood obesity is a predictor to development of hypertension with time. It is estimated that obesity is a health issue for nearly 1.7 billion people and is a main factor in over 2.5 million deaths.⁷

BMI is one of the preferred medical standards used to measure over-weight and obesity indicating relationship of appropriateness of a person's weight to their height.⁸ BMI is calculated as

$$\text{BMI (kg/m}^2\text{)} = \frac{\text{Weight}}{(\text{Height in meters})^2}$$

WHO recommends a desirable BMI range between 18.9 to 22.9 kg/m² for Asian countries. A BMI of 23 to 24.9kg/m² is defined as overweight and 25 kg/m² or higher as obese. Pakistan is ranked 9th out of 188 countries in terms of obesity according to the Global Burden of Disease study.⁹ This is of grave concern as the trend of obesity in Pakistan is on the rise since the 1980s. The relationship between obesity as a risk factor for developing hypertension is now critical, as non-communicable diseases are a bigger global threat than infectious diseases. Faisalabad is one of the densely populated and a major industrial district of the Punjab province in Pakistan. The objective of this study was to assess the association of overweight/obesity with hypertension in population screened for non-communicable diseases in Primary and Secondary Healthcare hospitals in Faisalabad.

MATERIALS AND METHODS

Setting

5 Tehsil Head Quarter Hospitals, 10 Rural Health Centers and 30 Basic Health Units of district Faisalabad under Primary and Secondary Healthcare Department.

Study Subjects

All male and female population of age 25 years and above screened for hypertension and BMI.

Study Duration

Screening camps conducted from 19th till 24th February 2018.

Study Design

Cross Sectional Study.

Sampling Technique

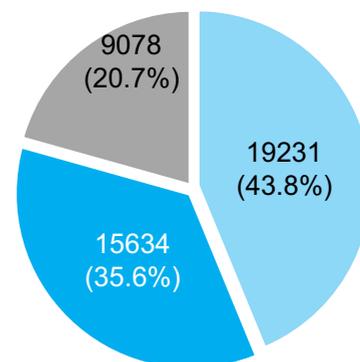
Non Probability Convenience Sampling.

Data Collection

43,943 people from general population, aged 25 and above were screened for hypertension in screening camps in 45 hospitals of Primary and Secondary Healthcare Department of district Faisalabad including THQH, RHCs and BHUs between 19th and 24th February. Age was further categorized into 3 groups, 25-40 years, 40-55 years and above 55 years age. Systolic and diastolic blood pressure were recorded for everyone. Of these, 5,320 people had systolic BP higher than 140mm Hg and diastolic BP higher than 90mm Hg. These were considered as high-risk hypertensive. Physical parameters of the study population were measured for height and weight. Height was measured in centimeters for accuracy and converted to meters. Weight of each patient was measured in Kilograms. BMI was calculated by using the standard formula and measured as kg/m². People with BMI less than 23 were categorized as normal. People with BMI between 23 to 24.9kg/m² were categorized as overweight and 25 kg/m² or higher as obese. Data was verified for missing or incomplete entries and entered in SPSS Version 23 for analysis.

RESULTS

43,943 people aged 25 years and above were screened for hypertension in Faisalabad district in various hospitals. 5,320 people were screened as hypertensive. Of these, 68.7% were females and 31.3% were males (Table-I). Minimum age of the study population was 25 years and their mean age was 43.9±12.6 years. (Figure-1)



■ 25-40 Years ■ 40-55 Years ■ 55+ years

Figure-1. Frequency distribution of sample population by age groups

Gender	Frequency	Percentage
Female	30210	68.7
Male	13733	31.3
Total	43943	100.0

Table-I. Frequency distribution of sample population by gender

Results of screening for hypertension showed that the mean systolic blood pressure of the study population was 121.93±15.9 mm Hg and the mean diastolic blood pressure was 79.9±10.04 mm Hg. The mean height of the study population was 159±9.43 cm, which was converted to meters (1.59±0.09). The mean weight of the study population was 67.28±14.39 Kg. People whose systolic BP was 140mm HG or higher as well as having diastolic BP 90mm Hg or higher were considered screened positive for hypertension. (Table-II)

Hypertension	Frequency	Percentage
Normal	38,623	87.9
Screened Positive	5,320	12.1
Total	43,943	100.0

Table-II. Frequency distribution of hypertension in sample population

After calculation for BMI, 28.1% of the study population was categorized as Normal with a BMI less than 23 kg/m². 14.9% of the population was overweight while 57% of the population was obese with BMI of 25kg/m² or higher. (Table-III)

BMI	Frequency	Percentage
Normal	12,308	28.1
Overweight	6,536	14.9
Obese	25,030	57.0
Total	43,874	100.0

Table-III. Frequency distribution of BMI categories in sample population

In the normotensive group, 29.3% were having normal BMI. 15.3% were overweight and 55.4% of the people were obese. Among the 5,320 people screened positive for hypertension, 19.2% were of normal BMI. 12.1% of the people were overweight and 68.7% were obese. The association between BMI and Hypertension was statistically significant with a Pearson`s chi square value of 0.000. (Table-IV)

Hyper tension	BMI Categories			Total	P- Value
	Normal	Over weight	Obese		
Normal	11,289 (29.3%)	5,892 (15.3%)	21,373 (55.4%)	38,554	0.000
Hyper tensive	1,019 (19.2%)	644 (12.1%)	3,657 (68.7%)	5,320	

Table-IV. Cross tabulation between Hypertension and BMI

DISCUSSION

Faisalabad is one of the largest cities of Punjab province and densely populated. Due to its significant geographic location and demographics, the study was conducted with a large sample size to identify the association between BMI and hypertension in the population. Hypertension is increasingly becoming a global health risk. It is the leading cause of stroke and other CVDs like angina and heart attack. It is also associated with kidney impairment as well as visual impairment leading to blindness. In a study conducted in northern Punjab, myocardial infarction due to chronic hypertension was common in males at the age of 41-60 years.¹⁰ CVDs are also associated with risk factors such as overweight and obesity, lack of physical activity and unhealthy diet. BMI is an easy to measure indicator for obesity.

In a study by Wang W. et al, hypertension was significantly and positively associated with age and obesity. The results of current study show similar results with a highly significant association between hypertension and overweight/obesity.¹¹ Jounala M. et al conducted analysis of 4 prospective studies in 6,328 persons and measured BMI with a follow-up of 23 years and discovered that overweight or obese children who were obese as adults increased the risk of hypertension 2.7 times.¹² In our study, overweight accounted for 14.9% of the study population while obesity was far more prevalent at 57% of the study population. In the screened positive for hypertension group, 12.1% were overweight while 68.7% were obese. This high percentage (80.8%) of people with BMI more than normal poses a serious threat to the health of the population as well as economic burden on the

healthcare system as hypertension and obesity are precursor to many CVDs.

CONCLUSION

Evidence from other researches show that overweight and obese people are more at risk of developing CVDs. The current study indicate that overweight and obesity are a risk factor to developing hypertension. The results provide health professionals an indication of the wide spread health issue of obesity and directives to monitor, support and care for obese people. A routine screening strategy at every visit for hypertension can improve the health status of population having early detection leading to better control of any problem, which may arise latter on in life. Further studies in other districts should be conducted to generate stronger evidence for association of BMI with risk of hypertension.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Farooq Manzoor	Study designing, Literature review, Data Collection, Data analysis, Preparation of Results, Editing manuscript, Proof Reading.	
2	Farhan Zaib	Corresponding Author, Study designing, Layout of manuscript, Literature Review, Data Collection, Data analysis, Authentication of References.	