

# Obesity and Non Communicable Risk Factors for Hypertension a Population-Based Cross-Sectional Study

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## ABSTRACT

**Background:** Hypertension is very common in both men and women in all over the world, according to several studies, obesity, smoking, and physical inactivity are causative factors for hypertensive men and women.

**Objective:** To assess whether overweight and Non Communicable risk factors have any association with Hypertension in male and female population.

**Study Design:** Present study was A Population-Based Cross-Sectional Study.

**Place and Duration:** Current study was conducted in medical healthcare units and Ghurki Hospital Lahore from January to May 2023.

**Methodology:** This is a Population-Based Cross-Sectional Study in which raw data were collected randomly from males and females of age from 30 to 65 years old. Total 250 individuals were divided into different groups regarding their demographics and Non Communicable risk factors. Relationship between systolic and diastolic blood pressure with obesity and inactive life style were measured.

**Results:** There were significant ( $P \leq 0.05$ ) changes seen in individuals of Group-C shown in table-5 and table-6, as compared with control and group-B regarding BMI, smoking, Unhealthy diet, Physical inactivity, Heavy alcohol use, systolic and diastolic blood pressure, ( $35.10 \pm 0.04$ ,  $45.01 \pm 0.01$ ,  $05.01 \pm 0.01$ ,  $05.01 \pm 0.02$ ,  $45.01 \pm 0.01$ ,  $05.01 \pm 0.01$ ,  $45.01 \pm 0.01$ ,  $15.01 \pm 0.01$ ,  $35.01 \pm 0.02$ ,  $170.01 \pm 0.01$ ,  $100.01 \pm 0.01$ ), ( $35.10 \pm 0.04$ ,  $05.01 \pm 0.01$ ,  $45.01 \pm 0.01$ ,  $10.01 \pm 0.03$ ,  $35.01 \pm 0.01$ ,  $05.01 \pm 0.01$ ,  $45.01 \pm 0.01$ ,  $00.01 \pm 0.00$ ,  $50.01 \pm 0.02$ ,  $180.01 \pm 0.01$ ,  $100.01 \pm 0.01$ ) of both male and female respectively.

**Conclusion:** The finding of the current study described that obesity and overweight and non-communicable factors such as smoking, inactive lifestyle, unbalanced diet, use of alcohol have direct correlation with systolic and diastolic blood pressure of individuals.

**Keywords:** obesity, overweight, non-communicable factors, smoking, inactive lifestyle, unbalanced diet, systolic and diastolic blood pressure of individuals.

## INTRODUCTION

Obesity and Overweight is accumulation of excessive or abnormal amount of fat in the biological system. A person with  $25 \text{ kg/m}^2$  BMI considered overweight while over than  $30 \text{ kg/m}^2$  is obese. Obesity is a significant global health concern. Obesity is linked to a higher risk of heart disease and an earlier development of cardiovascular morbidity. Because of hypertension, type 2 diabetes, dyslipidemia, certain malignancies, and serious cardiovascular diseases, the expanding obesity epidemic is a significant contributor to unaffordable health expenses as well as morbidity and mortality. Different researchers claimed that obesity is a major risk factor for hypertension and it is a global burden. The prevalence of overweight and obesity in both adults and children is rising. Overweight or obese children and adolescents aged 5 to 19 more than quadrupled in prevalence from 6% to 21% between 1990 and 2022.

In every continent, with the exception of sub-Saharan Africa and Asia, more people are obese than underweight today, which is one side of the double burden of malnutrition. Overweight and obesity, once thought to be a problem exclusively in high-income nations, are now sharply increasing in low- and middle-income nations, especially in metropolitan areas. Children who are overweight or obese make up the majority of the population in developing nations, where the pace of increase has been more than 30% higher than in industrialized nations. Obesity is a chronic, multifactorial condition that can result in excessive body fat and occasionally poor health. Whereas excess body fat itself is not an illness. However, an excessive amount of additional body fat might alter body function.

Only after the turn of the century in Asia have chronic non-communicable diseases become the primary causes of mortality and morbidity. Cardiovascular diseases (CVDs) emerged as the primary cause of non-communicable diseases (NCDs), also known as chronic diseases and better known as socially transmitted diseases, which accounted for more than 50% of deaths in these years. The leading cause of death and disability worldwide is chronic non-communicable diseases (NCDs). The term "NCDs"

refers to a set of ailments that are not primarily brought on by an acute infection, have an impact on long-term health, and frequently necessitate ongoing care and therapy. Cancers, cardiovascular disease, diabetes, and chronic lung problems are some of these conditions. By lowering common risk factors like tobacco use, hazardous alcohol use, physical inactivity, and eating unhealthily, many NCDs can be avoided.

The term "NCDs" also refers to a wide range of other significant diseases, such as injuries and mental health issues. Non-communicable diseases (NCDs) account for 41 million annual deaths worldwide, or 71% of all fatalities. NCDs are responsible for 5.5 million deaths in the Asia region. 15 million individuals worldwide and 2.2 million in Asia, die from an NCD each year between the ages of 30 and 69; more than 85% of these "premature" deaths take place in low- and middle-income countries. Along with cancer, the main categories of NCDs are cardiovascular and chronic respiratory illnesses, because these are closely related to lifestyle decisions, NCDs include cardiovascular diseases (CVD), stroke, diabetes, and some cancers are frequently referred to as lifestyle diseases. Three main categories can be used to categorize the causes of NCDs: behavioral risk factors that can be changed, risk factors that cannot be changed, and metabolic risk factors.

## MATERIALS AND METHODS

**Background:** Hypertension is very common in both men and women in all over the world, according to several studies, obesity, smoking, and physical inactivity are causative factors for hypertensive men and women.

**Objective:** To assess whether overweight and Non Communicable risk factors have any association with Hypertension in male and female population.

**Study Design:** Present study was A Population-Based Cross-Sectional Study.

**Place and Duration:** Current study was conducted in medical healthcare units and Ghurki Hospital Lahore from January to May 2023.

**Inclusion criteria:** Local resident more than 30-65 years of age and all participants are independent with an early stage of hypertension i.e. 160 mm Hg systolic and 100 mm Hg Diastolic.

**Exclusion criteria:** If Patients are with secondary stage hypertension i.e. 200 mm Hg systolic and 120 mm Hg Diastolic and using high potency antihypertensive drugs . If participants are with sever kidney disease and liver disease. The Pregnant women with malignant tumors.

**Methodology:** This is a Population-Based Cross-Sectional Study in which raw data were collected randomly from males and females of age from 30 to 65 years old. Total 250 individuals were divided into different groups regarding their demographics and Non Communicable risk factors. Relationship between systolic and diastolic blood pressure with obesity and inactive life style were measured.

**Grouping of participants:** Total 250 participants male and female were divided into three different groups. In Group-A 50 individuals were normal i.e. control group. 100 over weight hypertensive individuals were in Group-B while 100 obese individuals were in group-C.

**Considering variables:** BMI, smoking, Unhealthy diet, Physical inactivity, Heavy alcohol use, systolic and diastolic blood pressure.

**Raw data collection:** Raw data of all participants were collected with the help of a well-defined questioner and clinical observations of individuals.

**Bio- Statistic:** Collected raw data was presented through ISSP version 2020 and significant level ( $P \leq 0.05$ ) was considered. The statistical comparison and descriptor analyses was performed through Mean Standard Deviation (Mean  $\pm$ SD) and for further description statistical data presented with the help of graphs.

## RESULTS

Non communicable risk factors can result in situations that make it challenging for the patients to lead normal lives. In case of chronic non communicable risk factors patients cannot be able to take participation in routine exercise, attend work, or eat normally.

Table-1: Group-A i.e. Control male n= 25

Variables	Values	(Mean $\pm$ SD)	( $P \leq 0.05$ )
BMI	Kg/m <sup>2</sup>	21.13 $\pm$ 0.02	0.02
Smoking	Yes	01.04 $\pm$ 0.01	0.01
	No	24.61 $\pm$ 0.01	0.01
Diet	Balanced	24.01 $\pm$ 0.02	0.02
	Unbalanced	01.01 $\pm$ 0.01	0.01
Physical activity	Active	25.31 $\pm$ 0.01	0.01
	Inactive	0.01 $\pm$ 0.01	0.01
Alcohol use	Yes	0.01 $\pm$ 0.01	0.01
	No	25.11 $\pm$ 0.01	0.01
Systolic blood pressure.	mm Hg	120.01 $\pm$ 0.01	0.01
Diastolic blood pressure.	mm Hg	80.01 $\pm$ 0.01	0.01

In table-1 and table-2, the statistical data of Group-A normal male and female were presented the variables mean standard Deviation levels of BMI, smoking, Unhealthy diet, Physical inactivity, Heavy alcohol use, systolic and diastolic blood pressure,

Table-2: Group-A i.e. Control Female n= 25

Variables	Values	(Mean $\pm$ SD)	( $P \leq 0.05$ )
BMI	Kg/m <sup>2</sup>	20.13 $\pm$ 0.02	0.01
Smoking	Yes	01.04 $\pm$ 0.01	0.01
	No	24.61 $\pm$ 0.01	0.01
Diet	Balanced	24.01 $\pm$ 0.02	0.02
	Unbalanced	01.01 $\pm$ 0.01	0.01
Physical activity	Active	25.31 $\pm$ 0.01	0.01
	Inactive	0.01 $\pm$ 0.01	0.01
Alcohol use	Yes	0.01 $\pm$ 0.01	0.01
	No	25.11 $\pm$ 0.03	0.03
Systolic blood pressure.	mm Hg	120.01 $\pm$ 0.01	0.01
Diastolic blood pressure.	mm Hg	80.01 $\pm$ 0.01	0.01

(21.13 $\pm$ 0.02, 01.04 $\pm$ 0.01, 24.61 $\pm$ 0.01, 24.01 $\pm$ 0.02, 01.01 $\pm$ 0.01, 25.31 $\pm$ 0.01, 0.01 $\pm$ 0.01, 0.01 $\pm$ 0.01, 25.11 $\pm$ 0.01, 120.01 $\pm$ 0.01, 80.01 $\pm$ 0.01), (20.13 $\pm$ 0.02, 01.04 $\pm$ 0.01, 24.61 $\pm$ 0.01, 24.01 $\pm$ 0.02, 01.01 $\pm$ 0.01, 25.31 $\pm$ 0.01, 0.01 $\pm$ 0.01, 0.01 $\pm$ 0.01, 25.11 $\pm$ 0.03, 120.01 $\pm$ 0.01, 80.01 $\pm$ 0.01) were seen.

Table-3: Group-B male individuals n= 65

Variables	Values	(Mean $\pm$ SD)	( $P \leq 0.05$ )
BMI	Kg/m <sup>2</sup>	28.10 $\pm$ 0.02	0.02
Smoking	Yes	20.01 $\pm$ 0.01	0.01
	No	35.01 $\pm$ 0.01	0.01
Diet	Balanced	45.01 $\pm$ 0.03	0.03
	Unbalanced	20.01 $\pm$ 0.01	0.01
Physical activity	Active	55.01 $\pm$ 0.01	0.01
	Inactive	10.01 $\pm$ 0.01	0.01
Alcohol use	Yes	05.01 $\pm$ 0.01	0.01
	No	65.01 $\pm$ 0.04	0.04
Systolic blood pressure.	mm Hg	150.01 $\pm$ 0.01	0.01
Diastolic blood pressure.	mm Hg	90.01 $\pm$ 0.01	0.01

Table-4: Group-B Female individuals n= 35

Variables	Values	(Mean $\pm$ SD)	( $P \leq 0.05$ )
BMI	Kg/m <sup>2</sup>	29.10 $\pm$ 0.02	0.02
Smoking	Yes	02.01 $\pm$ 0.01	0.01
	No	33.01 $\pm$ 0.01	0.01
Diet	Balanced	25.01 $\pm$ 0.03	0.03
	Unbalanced	10.01 $\pm$ 0.01	0.01
Physical activity	Active	25.01 $\pm$ 0.01	0.01
	Inactive	10.01 $\pm$ 0.01	0.01
Alcohol use	Yes	35.01 $\pm$ 0.01	0.01
	No	00.01 $\pm$ 0.01	0.01
Systolic blood pressure.	mm Hg	145.01 $\pm$ 0.01	0.01
Diastolic blood pressure.	mm Hg	90.01 $\pm$ 0.01	0.01

A significant ( $P \leq 0.05$ ) changes were seen In table-3 and table-4, as compared with control regarding BMI, smoking, Unhealthy diet, Physical inactivity, Heavy alcohol use, systolic and diastolic blood pressure, (28.10 $\pm$ 0.02, 20.01 $\pm$ 0.01, 35.01 $\pm$ 0.01, 45.01 $\pm$ 0.03, 20.01 $\pm$ 0.01, 55.01 $\pm$ 0.01, 10.01 $\pm$ 0.01, 05.01 $\pm$ 0.01, 65.01 $\pm$ 0.04, 150.01 $\pm$ 0.01, 90.01 $\pm$ 0.01), (29.10 $\pm$ 0.02, 02.01 $\pm$ 0.01, 33.01 $\pm$ 0.01, 25.01 $\pm$ 0.03, 10.01 $\pm$ 0.01, 35.01 $\pm$ 0.01, 00.01 $\pm$ 0.01, 145.01 $\pm$ 0.01, 90.01 $\pm$ 0.01) of both male and female individuals.

Table-5: Group-C male individuals n= 50

Variables	Values	(Mean $\pm$ SD)	( $P \leq 0.05$ )
BMI	Kg/m <sup>2</sup>	35.10 $\pm$ 0.04	0.04
Smoking	Yes	45.01 $\pm$ 0.01	0.01
	No	05.01 $\pm$ 0.01	0.01
Diet	Balanced	05.01 $\pm$ 0.02	0.02
	Unbalanced	45.01 $\pm$ 0.01	0.01
Physical activity	Active	05.01 $\pm$ 0.01	0.01
	Inactive	45.01 $\pm$ 0.01	0.01
Alcohol use	Yes	15.01 $\pm$ 0.01	0.01
	No	35.01 $\pm$ 0.02	0.02
Systolic blood pressure.	mm Hg	170.01 $\pm$ 0.01	0.01
Diastolic blood pressure.	mm Hg	100.01 $\pm$ 0.01	0.01

Table-6: Group-C Female individuals n= 50

Variables	Values	(Mean $\pm$ SD)	( $P \leq 0.05$ )
BMI	Kg/m <sup>2</sup>	35.10 $\pm$ 0.04	0.04
Smoking	Yes	05.01 $\pm$ 0.01	0.01
	No	45.01 $\pm$ 0.01	0.01
Diet	Balanced	10.01 $\pm$ 0.03	0.03
	Unbalanced	35.01 $\pm$ 0.01	0.01
Physical activity	Active	05.01 $\pm$ 0.01	0.01
	Inactive	45.01 $\pm$ 0.01	0.01
Alcohol use	Yes	00.01 $\pm$ 0.00	0.00
	No	50.01 $\pm$ 0.02	0.02
Systolic blood pressure.	mm Hg	180.01 $\pm$ 0.01	0.01
Diastolic blood pressure.	mm Hg	100.01 $\pm$ 0.01	0.01

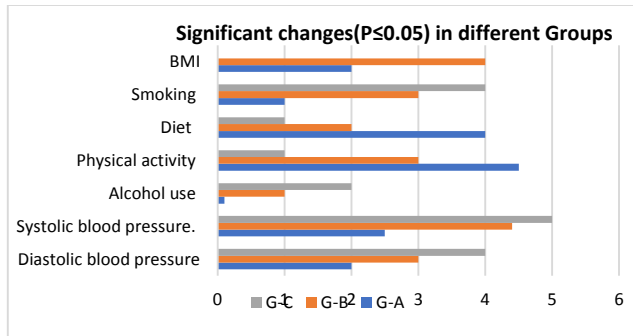


Fig-1: Significant changes (P<0.05) in different Groups

There were significant (P<0.05) changes seen in individuals of Group-C shown in table-5 and table-6, as compared with control and group-B regarding BMI, smoking, Unhealthy diet, Physical inactivity, Heavy alcohol use, systolic and diastolic blood pressure, (35.10±0.04, 45.01±0.01, 05.01±0.01, 05.01±0.02, 45.01±0.01, 05.01±0.01, 45.01±0.01, 15.01±0.01, 35.01±0.02, 170.01±0.01, 100.01±0.01), (35.10±0.04, 05.01±0.01, 45.01±0.01, 10.01±0.03, 35.01±0.01, 05.01±0.01, 45.01±0.01, 00.01±0.00, 50.01±0.02, 180.01±0.01, 100.01±0.01) of both male and female respectively.

**DISCUSSION**

The current population-based cross-sectional study sought to better understand the connection between non-communicable risk factors for hypertension and obesity. The results of this study shed critical light on the relationship between these two crucial health markers.

Our investigation found a statistically significant positive connection between obesity and hypertension, which is in line with other studies (1, 2). A significant risk factor for hypertension has been identified as obesity, which is characterized by an excessive buildup of adipose tissue (3). Blood vessels are subjected to increased pressure as a result of high body weight and obesity (4). Additionally, obesity frequently coexists with other metabolic disorders such as dyslipidemia and insulin resistance, which advance the onset of hypertension (5, 6).

Our study examined additional non-communicable risk factors for hypertension in addition to fat. Hypertension has been reported to be strongly connected with sedentary lifestyles, which include inactivity and extended sitting (7, 8). It has been established that sedentary behavior compromises metabolic and cardiovascular health and raises blood pressure (9). To prevent and treat hypertension, it is essential to encourage frequent physical exercise and discourage sedentary behavior (10). Dietary habits were another significant non-communicable risk factor that was investigated in our study. Hypertension was substantially correlated with poor dietary practices, which were characterized by excessive intakes of salt, saturated fats, and processed foods (11, 12). Increased blood pressure results from an excess of dietary salt, which upsets the body's electrolyte and fluid balance (13). Additionally, diets high in saturated fats and processed foods raise the risk of hypertension by causing obesity and other cardio-metabolic illnesses (14).

Additionally, a substantial correlation between smoking and hypertension was discovered in our study. Smoking has been established as a hypertension risk factor that is modifiable (15). The damaging substances in cigarette smoke damage blood vessel health and encourage the growth of atherosclerosis, which in turn causes hypertension (16). Interventions to stop smoking are therefore essential for managing and preventing hypertension (17). It is significant to mention that there are certain restrictions on our study. First off, because the study was cross-sectional, we are unable to demonstrate a causal link between obesity and non-communicable risk factors for hypertension. To investigate the temporal link between these factors, longitudinal studies are

required. Second, the study used self-reported data, which might lead to recall bias and compromise the validity of the results. Future research should think about evaluating obesity and other risk factors using objective metrics.

Furthermore, the study was limited to a particular geographic area, thus extra care should be taken when extrapolating the results to other groups. This population-based cross-sectional study concludes by showing a strong correlation between non-communicable risk factors for hypertension and obesity. Our research shows how crucial it is to address obesity, sedentary behavior, poor eating habits, and smoking as modifiable variables in the prevention and treatment of hypertension. To address the rising prevalence of hypertension, public health programs that emphasize the promotion of healthy lifestyles and behavioral changes are necessary.

**CONCLUSION**

The finding of the current study described that obesity and overweight and non-communicable factors such as smoking, inactive lifestyle, unbalanced diet, use of alcohol have direct correlation with systolic and diastolic blood pressure of individuals.

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**Conflict of interest:** No conflict of interest was faced during present study.

**Authors Contribution:** Every author devoted his time and knowledge sincerely in conducting the present study.

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