



# Evaluation Of Hypertension And Its Risk Factors Among The Adult Population In Urban Area Ranjeet Nagar, West Delhi

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**Abstract:** Hypertension is a major global public health concern and primary cause of strokes, cardiovascular illnesses, and early mortality. This study uses a mixed-methods approach to provide a comprehensive understanding of the prevalence, determinants and socio-economic implications of hypertension in the urban area of Ranjeet Nagar, West Delhi. The methods included quantitative surveys, clinical examinations and qualitative interviews. Data was collected on socio-demographic characteristics and various risk factors increasing the prevalence of Hypertension. Standard operating protocols were followed for taking blood pressure and anthropometric measures. To discover chance variables connected to hypertension, numerous calculated relapses were utilized in the consideration and chances proportions with 95% certainty interims were computed. A total of 400 patients were surveyed within the age range of 30-60 years, among them 171 male patients 27.8% were hypertensive and out of 229 female patients 27.1% were hypertensive. The prevalence of the hypertension among current smoking (n=93) and alcohol consumption (n=280) was 32.3% and 29.9% respectively. Nearly half of the patients were overweight and obese (BMI  $\geq 25$  to  $\leq 29.9$  kg/m<sup>2</sup>) and 32-36% were found to be hypertensive. Occupation, marital status, education levels, BMI, weight, functional capacity, and diet were each associated with hypertension. When fit in a multivariable logistic regression model, occupation (AOR=0.5), marital status (AOR=3.12), education levels (AOR=1.43), functional capacity (AOR=1.13) and diet (AOR=0.6), all remained significantly associated with hypertension. Additionally, it was discovered that the statistical data's p value was statistically significant in the information gathered. At least one in three persons between the ages of 30 and 60 in metropolitan areas suffer from hypertension, a public health hazard. Patient's age, occupation, marital status, education, weight, BMI, food, alcohol use, smoking and functional ability are all significant risk factors for hypertension. To stop hypertension and its increasing effects, preventative strategies that target the modifiable risk factors linked with hypertension are necessary.

**Index Terms - Hypertension, Risk factors, Urbanization, Obesity, BMI.****I. INTRODUCTION**

Hypertension (HTN) commonly known as high blood pressure is recognized as one of the major non-communicable health disorders and is a significant public health challenge worldwide.[1] The global burden of hypertension is increasing and is estimated to affect one-third of the world's population by 2025. Hypertension significantly increases the risk of cardiovascular disease, stroke, other serious health conditions and death.[2] In Indian adults, the prevalence of hypertension has risen to similar and sometimes exceeding that in many high-income countries. The increasing prevalence of hypertension in low-income countries represents a substantial public health problem with associated economic and social impact.[3]

In Delhi, the rapid rate of urbanization has led to slums and slum dwellers. The residents of slums live below the poverty line and are referred to as 'urban poor'. [4] Poor people in cities frequently lead unhealthy lifestyles. They tend to eat more meals heavy in saturated fat, salt, and sugar, and they are more sedentary than people living in rural areas.[5] They are also more likely to experience problems from untreated hypertension since they have weak purchasing power and restricted access to healthcare.[6] Their susceptibility to and exposure to risk factors for hypertension are also influenced by underlying socioeconomic conditions.

Hypertension, in addition to being a significant risk factor for CVD, hypertension also has associated risk factors despite being an asymptomatic illness.[7] The present study aims to assess the prevalence of these risk factors and their association with hypertension among the adult population living in Ranjeet Nagar, West Delhi, India.

**II. METHODS****Study area**

The study was conducted in Ranjeet Nagar, an urban locality of Delhi characterized by a diverse population and a blend of residential and commercial spaces. The area has seen significant urbanization and population growth, contributing to lifestyle changes that may impact health outcomes. The area is approximately 2.5km<sup>2</sup> in size and located toward west side of Delhi.

**Study design and procedures**

This research employed a cross-sectional study to evaluate the prevalence of hypertension in Ranjeet Nagar, located in West Delhi during the period of 4 months from January to April 2024. This design allows for the assessment of data, making it suitable for identifying relationships between hypertension and various demographic, lifestyle, and risk variables. The study targeted 400 adults aged 30 to 60 years, with weights ranging from 50 to 70 kg and a BMI of less than 30 kg/m<sup>2</sup>. Participants were selected from the local community, ensuring a representative sample of both genders, with 171 male and 229 female participants. A modified version of the World Health Organization's (WHO) stepwise surveillance questionnaire for risk variables associated with chronic diseases (STEPS) was used to gather survey data.[8] The WHO STEPS is a standardized and proven method that, depending on the resources available, can be used in any situation and makes it easier to compare risk variables within and between nations.[9]

Information on socio-demographic variables and behavioral risk factors such as smoking, consumption of alcohol, functional capacity (METs), and diet were collected using the questionnaire. Level of education, occupation, and marital status were used as independent measures of socio economic status.

**Measurements**

Patients were measured for weight with light clothing and no shoes, to the nearest 0.5 kg, using a calibrated scale. Using a portable stadiometer, height was measured to the nearest 0.1 centimeter.

An OMRON digital automatic sphygmomanometer that has been approved was used to take the left arm's blood pressure. Patients were asked to relax and sit comfortably for 5 minutes before measuring blood pressure. The blood pressure measurements were taken with at least 4 min intervals between each measurement as per WHO steps protocol. For analysis, the mean value of the second and third measurements was employed. Blood pressure was categorized using the sixth Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI).[10]

**Operational definitions**

Hypertension is defined as mean measured blood pressure of  $\geq 140$  mmHg systolic and/or  $\geq 90$  mmHg diastolic or self-reported current use of hypertensive medications.

Awareness of hypertension is based on the patient verbal report of a prior diagnosis by a healthcare professional.

Treatment is based upon verbal reports on present medications for lowering high blood pressure.

Control: Systolic blood pressure of <140 mmHg and diastolic blood pressure of <90 mmHg among the patients defined as having hypertension and treated.

Body Mass Index (BMI) was calculated as the ratio of weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ). BMI was classified as per Asia Pacific Classification of BMI. Underweight (<18.5  $\text{kg}/\text{m}^2$ ), Normal (18.5-22.9  $\text{kg}/\text{m}^2$ ), Overweight (23-24.9  $\text{kg}/\text{m}^2$ ), Obese (25-30  $\text{kg}/\text{m}^2$ ).

Smoking: Patients were characterized as non-smokers, current smokers, and reformed smokers depending upon the use of tobacco content at the time.

Alcohol consumption: was characterized as abstainer (never drinking alcohol at all), moderate drinker (once or less than once a month, never 6+ units in one day), occasional excessive drinker (once a week 2 or 3 times/month), and frequent excessive drinker (every day >2-3 times/week 2-3 times/week).

Functional capacity: converted into metabolic equivalents (METs). 4-10 METs as very active and rigorous exercise, 1-4 METs as moderate worker and light housework, and <1 METs as lazy and weak.

### Statistical analysis

Data management and analysis was done by SPSS IBM software (version 27.1 2022). Descriptive statistics were generated using cross-tabulations. Chi-square test was used to assess significant differences between categorical variables. Utilizing bi-variate logistic regression, the impact of each risk factor on hypertension was determined separately. The study employed a multivariate backward regression model to identify important risk factors linked to hypertension. The adjusted odds ratios (AOR) and their respective 95% confidence interval showed the measure of association.

### Ethical consideration

Ethical consideration was obtained from the ethical community at RLKC Hospital and Metro Heart Institute Ranjeet Nagar, Delhi. Informed written consent was obtained from all participants. Patients having hypertension defined by our measurements were admitted in the healthcare facility for further diagnosis and treatment.

## III. RESULTS AND DISCUSSION

Table 1 shows the socio-demographic variables of the study population. Out of the 400 patients eligible for the study, 171 (43%) were male patients and 229 (57%) were female patients. The age range for different groups was 30-40 years, 40-50 years, and 50-60 years. At least 74% had completed the basic level of education of graduation or more.

Table 2 shows the overall and gender prevalence of risk factors of hypertension.

### Dietary habits

A majority of the patients were vegetarians almost 60% of the study population (21% males and 39% females). 25% of male and female patients combined were non-vegetarians of which 20% were male and 5% were female patients. 12 male patients accounting for 3% and 48 female patients accounting for 12% of the total population had an intake of fast food.

### Smoking

The patients with active smoking were reported 93 (23.25%) of the total study population. Males reported a nearly 6 times higher prevalence of hypertension compared to female patients. Almost 71% of the study population were non-smokers, with male patients accounting for 23.75% and female patients accounting for 47.25%. The remaining 7% were reformed smokers.

### Alcohol consumption

Only 30% of the patients (10% male and 20% female) were not consuming alcohol at all. Almost 70% of the study population were consuming alcohol, out of which moderate drinkers (once or less than once a month, never 6+ units in one day) were 17% of which males were 12% and females were 5%. Occasional excessive drinkers (once a week 2 or 3 times/month) were 5.25% male patients and 1.75 female patients. Frequent excessive drinkers (every day >2-3 times/week 2-3 times/week) were 33.5% male and 12.5% female of the total study population.

### Functional capacity

The study population was physically active. More than 20% were physically active and performed rigorous exercises and were in the 4-10 METs group. Patients with moderate physical activity were 70% in total, out of which 41.25% were male patients and 28.75% were female patients. Patients in group <1 METs were lazy and had low physical activity; males contribute to 3.25% and females to 6.75%.

### Overweight and obesity

The prevalence of obese and overweight patients was 17% and 26% respectively. Male patients had lower mean BMI than female patients. The incidence of obesity ( $\text{BMI}=25\text{-}30\text{kg}/\text{m}^2$ ) was approx. Seven times



higher in female patients than in male patients. About 7% of the study population was underweight while male patients making up 4.75% of the population.

### **Blood pressure**

The classification of the blood pressure was done as per the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 6) classification.[11] as shown in Table 3. The distribution of blood pressure categories shows a higher percentage of females in the normal and pre-hypertensive categories compared to male patients. Male patients show a significant presence in the higher hypertension stages, particularly in Stage 1 and Stage 2. The p-value of 0.017 indicated a statistically significant difference in blood pressure categories between genders.

### **Prevalence of hypertension**

The incidence of hypertension in the overall study was found to be 27.1%. The age standardized prevalence was 29.4% among male patients 27.8% and female patients 27.1%. The incidence of hypertension increased with the increase in age being highest in the 50-60 years age group. Hypertension prevalence was higher in males than compared to females (17.1% to 21.5%) in the 30-40 years age group, while above 45 years the incidence of hypertension was higher in females than males (43.2% vs 27.8%).

### **Awareness of treatment and control of hypertension**

Overall 232 patients (58%) of the study population indicated that they have ever had their blood pressure measured. Compared to men, women were more likely to have ever had their blood pressure checked. 90 (39.0%) of the 232 individuals with hypertension knew they had the illness and awareness was higher in women than in men (29.2% vs. 9.8%). Of those receiving treatment, 51 (42.8 %) were in control. Compared to men, women were more likely to be aware of hypertension and to have it treated and managed.

### **Factors associated with hypertension**

Table 4 shows the risk factors associated with hypertension. There was an independent correlation between each of the following factors with hypertension: overweight, obesity, current smoking, low level of education, highest BMI, modest physical activity, older age and divorce.

The incidence of hypertension increased with advancing age. Individuals over 50 years had a five-fold [AOR = 4.9] increased risk of hypertension in comparison to those between the ages of 30 and 40. Divorced patients showed a 20% higher risk of hypertension (AOR = 2.0) in the logistic regression model adjusted for age and gender than married patients. Over 25 kg/m<sup>2</sup> of body mass was associated with hypertension. Compared to having a normal BMI, being overweight or obese raised the risks of hypertension by (AOR = 1.65) and (AOR = 1.93).

Compared to those who engaged in high physical activity (4-10 METs), those who engaged in low physical activity (<1 METs) had a 1.3 times higher risk of hypertension (AOR = 1.13). Patients who consumed alcohol and smoked had 1.13 and 1.27 times higher risk than non-alcoholics and non-smokers. (AOR=1.13 and AOR=1.27)

### **Discussion**

The data collected from the study indicated that older age groups exhibited a higher prevalence of hypertension, consistent with established medical knowledge that hypertension risk increases with age. Our study has demonstrated that approximately one in every three adults aged 30 years and above is hypertensive. Other studies [12], [13], and [14] show similar results as ours, documenting female patients had a higher prevalence of hypertension compared to their male counterparts and that with advanced age the incidence of hypertension increases.

In every ten-year age group, the prevalence of hypertension rose by about 20%: from 17.7% in the 30- to 40-year age group to 34.6% in the 40-50 year age group and 51.5% in the 50-60 year age group. If proper actions are not taken, a significant proportion of pre-hypertensive responses (48.3%) may acquire complete hypertension as the population matures.

The study found that the prevalence of hypertension increased by approximately 10% from housewives 25% to work from home 28% and to office-going patients by 40%. Occupational stress was a significant factor. Individuals in high-stress jobs exhibited higher rates of hypertension. The result was similar to other studies carried out by [15] and [16] which stated that the prevalence of hypertension increases with occupational stress and work environment.

The prevalence of hypertension in unmarried patients was approximately 10% more than in married ones and the prevalence of hypertension in divorced patients was 20% more than in married patients. The study also found the prevalence of hypertension was 2% more in under-graduate patients than graduate patients and prevalence was approximately 10% more in post-graduates than graduates.

Table 1: Comparison of the socio-demographic characteristics of the study population.

<b>Variable</b>	<b>Male (%)</b>	<b>Female (%)</b>
<b><u>p-value</u></b>		
<b>Age Group Years</b>		
30-40	83 (20.7)	141 (35.25)
40-50	56 (14.0)	64 (16.0)
50-60	32 (8.0)	24 (6.0)
<0.001		
<b>Occupation</b>		
Office-based Job	134 (33.5)	106 (26.5)
Work from Home	42 (10.5)	98 (24.5)
Housewife	0 (0)	20 (5.0)
<0.001		
<b>Marital Status</b>		
Unmarried	6 (1.5)	14 (3.5)
Married	153 (38.25)	159 (39.75)
Divorced/Widowed	7 (1.75)	61 (15.25)
<0.001		
<b>Level of Education</b>		
Under Graduate	27 (6.75)	69 (17.25)
Graduate	82 (20.5)	122 (30.5)
Post Graduate	59 (14.75)	41 (10.25)
<0.001		
<b>Body Mass Index</b>		
Underweight	19 (4.75)	9 (2.25)
Normal	110 (27.5)	90 (22.5)
Overweight	29 (7.25)	75 (18.75)
Obesity	10 (2.5)	58 (14.5)
<0.001		
<b>Weight</b>		
50-58 kg	19(4.75)	9(2.25)
58-68 kg	110(27.5)	90(22.5)
66-70 kg	39(9.75)	133(33.25)
<0.001		

A body mass index of less than 30 kg/m<sup>2</sup> was found to be independently linked to hypertension. A strong correlation was observed between increased BMI and hypertension prevalence. Compared to patients with a normal BMI, those who were overweight or obese had a 1.5-fold increased risk of hypertension.[17-20] found similar results in their study.

Smoking, alcohol consumption, diet, and functional capacity (METs) are lifestyle risk factors of hypertension. The study suggested that smokers and alcoholics are more vulnerable to hypertension as

compared to non-smokers and non-alcoholics. The smokers were approximately 8% more vulnerable than non-smokers to alcoholics. The study also suggested that alcoholics were 7% more hypertensive than non-alcoholics.

The study revealed a significantly higher prevalence of hypertension among patients with <1 METS group and 1-4 METS group as compared to 4-10 METS group. The incidence of hypertension increases approximately by 5% with decrease in the METS group. The study revealed that hypertension is more prevalent in non-vegetarians than vegetarians and patients with fast food intake.

Table 2 Prevalence of risk factors for hypertension by gender.

<b>Risk Factor</b>	<b>Male (%)</b>	<b>Female (%)</b>
<b><u>p value</u></b>		
<b>Smoking</b>		
Non-Smokers	95 (23.75)	189 (47.25)
Current Smokers	80 (20.0)	13 (3.25)
Reformed Smokers	24 (6.0)	4 (1.0)
<0.0001		
<b>Alcohol</b>		
Abstainer	40 (10.0)	80 (20.0)
Moderate Drinker	48 (12.0)	20 (5.0)
Occasional Excessive Drinker	21 (5.25)	7 (1.75)
Frequent Excessive Drinker	134 (33.5)	50 (12.5)
<0.001		
<b>Diet</b>		
Vegetarian	84(21.0)	156(39.0)
Non-vegetarian	80(20.0)	20(5.0)
Fast food	12(3.0)	48(12.0)
<0.0001		
<b>Functional Capacity (METs)</b>		
4-10	43(10.75)	37(9.25)
1-4	165(41.25)	115(28.75)
<1	13(3.25)	27(6.75)
0.007		

Table 3 shows the distribution of the study population among the five blood pressure groups.

Gender	Blood Pressure					<i>p</i> -Value
	Normal	Pre-hypertension	Hypertension Stage 1	Hypertension Stage 2	Hypertension Stage 3	
Male n (%)	42(10.5)	64 (16.0)	32 (8.0)	13 (3.25)	6 (1.5)	0.017
Female n (%)	78(19.5)	76 (19.0)	36 (9.0)	27 (6.75)	26 (6.5)	

Table 4 Risk factors associated with hypertension along with adjusted odds ratio.

Variable	Number	Percentage Hypertension	AOR
Male	171	27.8	
Female	229	27.1	1.05
<b>Age Group Years</b>			
30-40	224	17.7	
40-50	120	34.6	2.48
50-60	56	51.5	4.94
<b>Occupation</b>			
Office-based Job	240	40	
Work from Home	140	28	0.578
Housewife	20	25	
<b>Marital Status</b>			
Unmarried	20	25.8	
Married	212	17.2	1.58
Divorced	68	40	3.12
<b>Levels of Education</b>			
Under Graduate	96	26.2	0.925
Graduate	204	24.8	
Post Graduate	100	34.3	
<b>Body Mass Index</b>			
Under Weight	28	27.4	1.42
Normal	200	21.9	
Over Weight	104	32.2	1.65
Obesity	68	36	1.93
<b>Weight</b>			
50-58 kg	28	28	1.42
58-66 kg	200	22	
66-70 kg	172	38	2.16
<b>Current Smokers</b>			
No	312	26.9	
Yes	93	32.3	1.27
<b>Alcohol Consumption</b>			
No	120	27.1	
Yes	280	29.9	1.13
<b>Functional Capacity (METS)</b>			
4-10	80	21.1	0.713
1-4	280	27.4	
<1	40	29	
<b>Diet</b>			
Vegetarian	240	15	0.452



<b>Non-Vegetarian</b>	100	28.2	
<b>Fast Food</b>	60	20.8	0.642

### Limitations

The research is vulnerable to memory bias because the behavioral risk factors in this study (physical activity, alcohol consumption, and tobacco use) were self-reported. It's possible that the reported risk factor values were inflated or underestimated. Underreporting of some habits (such as alcohol and tobacco intake), particularly among females, may occur in areas where these activities are prohibited. The average of two blood pressure readings taken during a single visit was used for blood pressure measurements, as it is in many population-based studies. We are unable to demonstrate a causal association between any of the study's connected components because the data was collected for a cross-sectional study. When evaluating the prevalence of risk factors in various communities, regions, and countries, the standardized WHO STEPs risk factor questionnaire is a helpful tool.

### Conclusion

The study highlights significant findings regarding the hypertension prevalence and risk factors among the adult population in Ranjeet Nagar, West Delhi. The multifaceted nature of hypertension calls for comprehensive strategies to address its determinants effectively. The identified gender differences, along with the focus on individuals within a specific age and BMI range, provide a foundation for targeted health interventions. By addressing hypertension proactively, the community can significantly improve overall health and reduce the burden of cardiovascular diseases.

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