

# Prevalence and Associated Factors of Hypertension among Adults in Rural Nepal: A Community Based Study

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## ABSTRACT

### Background

Hypertension is a major health problem throughout the world and is one of the major risk factors for cardiovascular mortality. It is important to detect and manage prehypertension and hypertension to reduce the risk of correlated complications especially cardiovascular diseases.

### Objective

The objective of the study was to find the prevalence and risk factors of hypertension among the adults in rural Nepal.

### Method

A community based cross-sectional study was conducted among 648 respondents. The information was obtained using pre-tested questionnaire which included demographic information of individuals and other risk factors like alcohol and tobacco use, physical activity and diet preference. Height, weight and blood pressure were recorded and hypertension was defined as per Joint National Committee (JNC) VII guidelines.

### Result

The overall prevalence of hypertension was 20.5 % and pre-hypertension was 46.6%. The males had higher prevalence of hypertension (30.6%) compared to females (13.8%). Bivariate analysis showed male gender, smoking and non vegetarian diet have association with hypertension. Male gender [OR 2.50 (1.68 – 3.74)] and non vegetarian diet [OR 0.11 (0.01 – 0.85)] were found to be significantly associated with hypertension in multivariate analysis.

### Conclusion

The prevalence of hypertension and prehypertension was high in the study population. In absence of life style modification and risk reduction the individuals categorized as prehypertension have great risk of developing hypertension in the future which may pose a great challenge in the future. Hence, there is a big scope for screening and primary prevention strategies to curb the epidemic of hypertension.

## KEY WORDS

*Cross-sectional study, epidemic, hypertension, JNC VII, prehypertension prevalence, screening*

## INTRODUCTION

Hypertension is a major health problem throughout the world because of its high prevalence and its association with increased risk of cardiovascular disease. It is one of the major risk factors for cardiovascular mortality, which accounts for 20-50 percent of all deaths.<sup>1</sup> The World Health Organization (WHO) attributes hypertension to be the leading cause of cardiovascular mortality. Half of the current health burden in developing nations is attributable to non-communicable diseases.<sup>2</sup> By 2020 it is projected that non-communicable diseases (NCD) including, hypertension, will outstrip communicable diseases as the leading cause of death. Demographic changes, increasing urbanization and lifestyle changes are some of the factors contributing to the increasing burden of NCD.<sup>3</sup>

Although hypertension is common, readily detectable and easily treatable, it is usually asymptomatic and often leads to lethal complications if left untreated.<sup>4</sup> The relationship between blood pressure and risk of cardiovascular disease events is continuous, consistent and independent of other risk factors. Higher the blood pressure, the greater the chance of myocardial infarction, heart failure, stroke and kidney disease.<sup>5</sup> Even a mild increase in blood pressure is considered a threat, leading to cardiovascular diseases (CVD).<sup>6</sup> This mild rise may lead to prehypertension stage and often is ignored as it is asymptomatic. Individuals with prehypertension hold more than threefold risk for developing hypertension and CVD in the future when compared to individuals with normal/optimal BP.<sup>7</sup>

Prevalence of hypertension has been increasing in the South Asian region including Nepal.<sup>8</sup> In high-income countries, the prevalence of hypertension has declined due to strong public health policies and widely available diagnosis and treatment. However, in low and middle-income countries, the disease burden of hypertension has increased over the past decade.<sup>9</sup> The importance of detection and management of prehypertension and hypertension to reduce the risk of correlated complications especially CVD prompted us to initiate this study to assess the prevalence of hypertension and its correlates among adult rural population of Nepal.

## METHODS

This is a community based cross sectional study which was conducted among the people of rural community of Ramechhap district. The study was conducted among the permanent residents of the area who were 18 years or more of age. The study protocol was approved by the Institutional Review Committee, Kathmandu University School of Medical Sciences. Sample size was calculated using formula  $4pq/d^2$ , where (p) was taken 34% and d was taken 12% of p.<sup>10</sup> Door to door visit was done and eligible subjects who were willing to take part in the study were included in our study. Pregnant women, acutely ill

individuals were excluded from the study. Purpose of visit was explained and informed verbal consent was obtained from all the participants. The interview of the participants was taken using the pretested structured questionnaire which included the information about socio demographic characteristics, medical and family history, behavioral characteristics and anthropometric measurements.

After the interview height and weight were measured using standardized techniques and calibrated equipments. Body mass index (BMI) was calculated using the formula weight in kilograms divided by the square of the height in meters (weight (kg)/height (m<sup>2</sup>). Obesity was defined as BMI>25 for males and females.

The blood pressure was measured by auscultory method using standard mercury sphygmomanometer. The method of blood pressure measurement and criteria for diagnosis of hypertension were according to JNC VII guidelines, that is, SBP  $\geq 140$  mmHg and/or DBP  $\geq 90$  mmHg and/ or use of anti hypertensive medicines.<sup>5</sup> Based on the physical activity participants were broadly classified into three groups: sedentary (no regular physical exercise, desk jobs), moderate (gardening or others household activities) and heavy (farmers, heavy manual work like carrying heavy loads). Smokers were defined as current smokers or no and alcohol consumption as yes or no.

The data collected was tabulated and analyzed by using the SPSS (Statistical Package for Social Sciences) version 20 for windows. Findings were described in terms of proportions and their 95% confidence intervals. Chi-square test was carried out to test the differences between proportions. The probability level of less than 0.05 was considered as significant. Multiple logistic regression analysis was performed hypertension as dependent variable and gender, age, BMI, physical activity, alcohol intake, smoking, diet and added salt as independent variables.

## RESULTS

### Characteristics of the study population

A total of 648 respondent adults from rural population were included in the present study of which 258 (39.8%) were males and 390 (60.2%) were females. Of the total study population, majority 229 (35.3%) were in the age group 40-49. The main occupation of the study population was farming and majority of them (93.8%) were non-vegetarian. Among the total study population 154 (23.8%) were overweight (BMI>25). A total of 27.9% study subjects were current smokers and 25.2% were alcohol consumers. (Table 3)

### Prevalence of hypertension and pre hypertension

The sex-wise prevalence of hypertension is shown in table 1. The prevalence of hypertension in this study was found to be 20.5% (known cases 13.6% and new cases 6.9%). Prevalence was high (30.6%) in males compared to females

(13.9%). The majority of the individuals (46.6%) were in the prehypertension category as shown in table 2.

**Table 1. Prevalence of hypertension (n=648)**

HTN status	Males (258)	Females (390)	Total (648)
	No. (%)	No. (%)	No. (%)
Hypertension	79 (30.6)	54 (13.9)	133 (20.5)
No hypertension	179 (69.4)	336 (86.1)	515 (79.5)

**Association between variables and hypertension**

The distribution of hypertension according to demographic characteristics of the study population, their health related behaviors and life style factors are shown in Table 3. Our finding reveals that high percentage (27.1%) of individuals with high blood pressure are in the young age group. However it did not show any significant association with hypertension. Bivariate analysis found male gender, non vegetarian diet and current smoking have significant association with hypertension.

**Table 3. Prevalence of hypertension according to demographic characteristics and life style factors of the study population.**

Variables	Number (%)	HTN (%)	$\chi^2$	p-value
<b>Gender</b>				
Male	258 (39.8)	79 (30.6)	26.784	0.000
Female	390 (60.2)	54 (13.8)		
<b>Age Group</b>				
18-29	129 (19.9)	35 (27.1)	5.419	0.247
30-39	127 (19.6)	25 (19.7)		
40-49	229 (35.5)	44 (19.2)		
50-59	70 (10.8)	10 (14.3)		
≥60	93 (14.4)	19 (20.4)		
<b>BMI</b>				
Normal (<25)	494 (76.2)	101 (20.4)	0.008	0.929
Overweight(≥25)	154 (23.8)	32 (20.7)		
<b>Physical activity</b>				
Heavy	306 (47.2)	72 (23.5)	5.310	0.070
Moderate	209 (32.3)	32 (15.3)		
Sedentary	133 (20.5)	29 (21.8)		
<b>Alcohol consumption</b>				
Yes	163 (25.2)	42 (25.8)	3.669	0.055
No	485 (74.8)	91 (18.8)		
<b>Smoking</b>				
Yes	181 (27.9)	48 (26.5)	5.533	0.019
No	467 (72.1)	85 (18.2)		
<b>Diet</b>				
Vegetarian	40 (6.2)	1 (2.5)	8.491	0.004
Non-vegetarian	608 (93.8)	132 (21.7)		
<b>Added salt intake</b>				
Yes	528 (81.5)	110 (20.8)	0.167	0.683
No	120 (18.5)	23 (19.2)		

**Table 2. Classification of HTN according to JNC VII**

Category	Sex		Total
	Male	Female	No. (%)
Normal	64 (24.9)	149 (38.2)	213 (32.9)
Pre-hypertension	115 (44.5)	187 (47.9)	302 (46.6)
HTN Stage I	65 (25.2)	46 (11.8)	111 (17.1)
HTN Stage II	14 (5.4)	8 (2.1)	22 (3.4)
Total	258 (100)	390 (100)	648 (100)

Male gender and non vegetarian diet were found to have significant association with hypertension in multivariate logistic regression analysis as shown in table 4.

**Table 4. Multivariate analysis of variables and hypertension.**

Variables	OR (95% CI)
<b>Gender</b>	
Female	Reference
Male	2.508 (1.680 – 3.745)
<b>Age Group</b>	
18-29	Reference
30-39	1.492 (0.769 – 2.895)
40-49	1.029 (0.515 – 2.055)
50-59	0.940 (0.504 – 1.754)
≥60	0.663 (0.279 – 1.577)
<b>BMI</b>	
Normal (<25)	Reference
Overweight(≥25)	1.169 (0.732 – 1.868)
<b>Physical activity</b>	
Heavy	Reference
Moderate	0.902 (0.538 – 1.512)
Sedentary	1.160 (0.659 – 2.041)
<b>Alcohol consumption</b>	
Yes	Reference
No	1.006 (0.614 – 1.649)
<b>Smoking</b>	
Yes	Reference
No	0.797 (0.522 – 1.215)
<b>Diet</b>	
Vegetarian	Reference
Non-vegetarian	0.116 (0.016 – 0.858)
<b>Added salt intake</b>	
Yes	Reference
No	0.915 (0.539 – 1.553)

**DISCUSSION**

The World Health Statistics 2012 report puts the spotlight on the growing problem of the non-communicable diseases burden. One in three adults worldwide, according to the report, has raised blood pressure – a condition that causes around half of all deaths from stroke and heart disease. The prevalence of non-communicable diseases (NCD’s) is

increasing in South East Asian Region In 2008 nearly 55% of total deaths in the region were estimated due to NCD,s. Hypertension, one of the major risk factors for CVD was estimated to be present in 38.6% of Nepalese adults 25 years and above.<sup>11</sup> Prevalence of hypertension has not only increased among urban population over the years also in the rural population.<sup>10,12,13</sup> This study shows the prevalence and factors associated to hypertension in rural population of Nepal. The prevalence in this study was found to be 20.5%, the finding consistent with other studies done over the years in other parts of the country.<sup>14,15</sup> There are other studies which reveal the higher prevalence of hypertension compared to our findings. A repeat cross-sectional study in rural population of Nepal reported the prevalence to be 33.8% and similarly other study in eastern Nepal found the prevalence of hypertension to be 33.9%.<sup>10,16</sup> Studies from other parts of the world report prevalence of hypertension to be lower than our findings.<sup>17-19</sup> Our study found the prevalence of hypertension was significantly higher among the males compared to females ( $p < 0.001$ ) which is consistent with other findings,<sup>15,20,21</sup> whereas others report higher prevalence of hypertension in females and difference was significant.<sup>17</sup>

Our findings reveal that 46.6% of the study subjects were pre-hypertensive. Although pre-hypertension is not a disease category but a designation chosen to identify individuals at high risk of developing hypertension and should be advised to practice lifestyle modification in order to reduce their risk of developing hypertension in the future.<sup>5</sup>

Our study reports that smoking is not a significant risk factor of hypertension which is consistent with other finding.<sup>22</sup> On the other hand there are studies which found smoking as significant correlate of hypertension.<sup>23,24</sup> Like the study done in India, our study also reveals that alcohol has no significant association with hypertension whereas other studies have reported that alcohol has significant association with hypertension.<sup>24-26</sup> There are studies demonstrating the positive relationship between alcohol use and hypertension. They also report that relationship though depends on dose, frequency and pattern of alcohol intake. Hypertension was more common among heavy and more frequent drinkers.<sup>27-29</sup> In our study we could not

asses dose or frequency which might be the reason for our study not showing positive relationship between alcohol intake and hypertension. Our study found the significant association between non vegetarian diet and hypertension whereas others found non vegetarian diet as a protective factor with respect to hypertension.<sup>30</sup> However they have explained the protective role of non vegetarian diet might have been related to the fish eating behavior and usage of mustard oil as cooking medium and both of which have significant level of essential polyunsaturated fatty acids. In present study although mustard oil is used as cooking medium but the study population is not predominantly fish eater. One of the interesting findings of this study is, though not significant, high percentage of hypertensive are in young age group. This could may be because of the fact that young people are more likely to adopt western lifestyle in the form of diet and other personal behavior.

#### Limitations of the study

This is the cross-sectional study and there was no follow up, this could have overestimated the prevalence of hypertension in the population. Prospective longitudinal study would be more appropriate to estimate the risk factors of hypertension. The possible bias in self reporting of life style behaviors cannot be denied.

#### CONCLUSION

Our study reports that the prevalence of hypertension was 20.5% and male gender and non vegetarian diet were found to be significantly associated with hypertension. There were sizable numbers of pre-hypertensive subjects. In absence of life style modification and risk reduction the individuals categorized as prehypertension have great risk of developing hypertension in the future which may pose a great challenge in the future. Hence there is a big scope for screening and primary prevention strategies to curb the epidemic of hypertension.

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