

Determinants of hypertension among middle-aged and elderly populations of Kavrepalanchowk district

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ABSTRACT

Introduction: Hypertension is a significant contributing factor for the morbidity and mortality in the world. The global prevalence of hypertension is in the increasing trend and reached 1.4 billion in 2024. The objective of the study is to find the prevalence of hypertension and the determinants of hypertension.

Methodology: The study was conducted using cross-sectional study design in Panauti Municipality. The data was collected during Aug/Sept, 2025 and 352 samples were selected using the systematic random sampling. Data for anthropometric measurements and perceived stress level were collected and analysed using SPSS. Chi square test was used to find association between categorical variables with hypertension.

Results: The prevalence of hypertension was found to be 57.7%. Among the total hypertensive participants, 164(80.8%) were known hypertensive and 104(51.2%) had family history of hypertension. Among the total respondents, 76(21.6%) were known diabetes. The variables age group, education status, smoking, BMI, waist circumference, diabetes were found to be significant association with the hypertension.

Conclusions: The prevalence of hypertension is high in the study area. It also revealed that higher age group, low level of education, smoking, BMI, waist circumference, and known diabetes are significant factors for the hypertension.

Key words: body mass index, hypertension, smoking, stress level, waist circumference

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INTRODUCTION

Hypertension is a critical global health issue contributing significantly to morbidity and mortality.¹ The prevalence of hypertension has globally increased to 1.4 billion in 2024, rapid increases are more predominant in low and middle-income countries (LMICs).² This growth is driven by demographic changes, urbanization and lifestyle shifts.³ In 2015, 88% of deaths attributed to high systolic blood pressure in LMICs underscoring the unequal burden in these regions.⁴ Hypertension is a modifiable risk factor for stroke, chronic kidney disease and hypertensive retinopathy.⁵⁻⁷ These conditions not only reduce quality of life but also impose heavy economic and productivity losses.⁸ In LMICs, the cost of managing hypertension related complications drives many families into poverty, disproportionately affecting women due to healthcare inequities.⁹⁻¹¹ Among urban populations, the prevalence reaches 33.82% and is influenced by gender, ethnicity, socioeconomic status and lifestyle behaviours.¹² The aim of this study is to determine the prevalence and risk factors of hypertension.

METHODOLOGY

This cross-sectional study was conducted in the middle-aged and elderly populations of Panauti Municipality and data was collected from 17th August to 16th September, 2025. The sample size was determined using the formula $n = Z^2 pq / e^2$, where prevalence of hypertension (p) = 35.5%¹³, $Z = 1.96$ at 95% confidence interval and margin of error was 5%. The estimated sample size was 352. Five wards (1, 2, 3, 5 and 10 wards) of Panauti Municipality were randomly selected and the number of households in the selected wards were obtained from the Panauti Municipality office. Seventy-one houses were selected from each selected ward by systematic random sampling. Sample interval was calculated by dividing the number of households in each ward by 71 households and based on sample interval, the houses were selected. The data were collected by face-to-face interview with the respondents. The questionnaire consists of socio-demographic details, physical health information blood pressure measurements and the validated Perceived Stress Score 10 (PSS -10). Height, waist circumference and weight were measured using measuring tape and weighing machines respectively from which body mass index (BMI) was calculated. BMI was categorized according to WHO Asian classification. The blood pressure was measured by the trained enumerators using aneroid sphygmomanometer. Before taking the measurements, the respondents were requested to sit quietly and rest for 15 minutes with leg uncrossed. Three readings of the systolic and diastolic blood pressure were measured with 10 minutes interval between each reading and the mean of the second and third reading was used as the final blood pressure of the respondents.

Hypertension was defined as having systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg during the study as recommended by Joint National Committee 7. The participants who were taking anti-hypertensive medicines were also considered as hypertensive.¹⁴ The waist circumference of 90cm and higher for male and 80 cm and above for female were considered higher. The waist circumference less than 90cm for male and less than 80 cm for female was considered normal. The Perceived Stress Scale (PSS) tool was used to measure the degree to which situations in one's life are appraised as stressful. The PSS-10, consisted of 10-item tool, provides a score that can be interpreted as low, moderate, or high stress. Scores between 0-13 indicate low stress, 14-26 indicate moderate stress, and 27-40 indicate high stress.¹⁵

The inclusion criteria were the person living in study area for at least one year and aged 40 years and above. If there are more than one eligible respondent in the family, the youngest was included in the study. Exclusions were those with serious chronic health conditions, mental health conditions and pregnant women. The collected data were entered into excel sheet and then exported to statistical package for social sciences, IBM SPSS Statistics for Windows version 22 (IBM Corp., Armonk, N.Y., USA). The frequencies and percentages were used for the categorical variables and means, standard deviations, medians and inter quartile ranges were used for the continuous variables. The Chi-square test was used to assess the association between categorical variables and the hypertension. The p value less than 0.05 was considered significant difference. The ethical approval was taken from the Institutional Review Committee of Nepalese Army Institute of Health Sciences (Ref. no. 1356 / Aug5, 2025). Before data collection, written informed consent was taken from all the participants. The confidentiality was maintained and the information of respondents was used only for the research purpose.

RESULTS

The mean and standard deviation age of the respondents was 58.96 ± 12.73 years. The age of the respondents ranged from 40 years to 84 years. Majority 201 (57%) of respondents were below 60 years of age. Males 183 (52%) were higher than female 169 (48%) and 245 (69.6%) of the respondents belonged to Brahmin and Chhetri. The majority of respondents 301 (85.5%) were married. One quarter of respondents were having alcohol drinking habit and the half of the respondents were smokers (Table 1).

Regarding obesity 26 (61.9%) of females were found obese and 112 (54.1%) of females were having high waist circumference (Table 2). The research found that 203 (57.7%) participants were hypertensive. Among the total hypertensive participants, 164 (80.8%) were known hypertensive and 104 (51.2%) had family history of hypertension. Among the total respondents, 93 (26.4%) had chronic illness and 76 (21.6%) were known diabetes patients (Fig 1). Age group and education were found to be statistically significant with the hypertension (Table 3). The variables smoking, known diabetes, body mass index and waist circumference were found to be statistically significant with the hypertension (Table 4).

Table 1: Demographic information of the participants

Variable	Number of Respondents (%)
Age Group (in years)	
40-59	201 (57.1)
60 and above	151 (42.9)
Sex	
Male	183 (52.0)
Female	169 (48.0)
Ethnicity	
Brahmin	155 (44.0)
Chhetri	90 (25.6)
Janjati	82 (23.3)
Dalit	18 (5.1)
Muslim	2 (0.6)
Others	5 (1.4)
Marital Status	
Married	301 (85.5)
Unmarried	5 (1.4)
Widow	29 (8.2)
Widower	17 (4.8)
Education	
Illiterate	107 (30.4)
Primary	130 (36.9)
Secondary	69 (19.6)
Higher secondary	29 (8.2)
Bachelor	12 (3.4)
Master and above	5 (1.4)
Alcohol consumption	
No	267 (75.9)
Yes	85 (24.1)
Smoking	
Yes	178 (50.6)
No	174 (49.4)

Table 2: Sex wise distribution of participants by BMI and Waist circumference

Variable	Male	Female
BMI (Kg/m²)		
Underweight	6 (46.2)	7 (53.8)
Normal	49 (47.6)	54 (52.4)
Overweight	42 (55.3)	34 (44.7)
Obese I	70 (59.3)	48 (40.7)
Obese II	16 (38.1)	26 (61.9)
Waist circumference (cm)		
Low	88 (60.7)	57 (39.3)
High	95 (45.9)	112 (54.1)

Table 3: Association of demographic variables with hypertension (n=352)

Characteristics	Hypertensive	Non hypertensive	Odds Ratio	P Value
Age Group (in years)				
40- 59	102 (50.7)	99 (49.3)	0.51	0.002*
60 and above	101 (66.9)	50 (33.1)	Ref.	
Sex				
Male	110 (60.1)	73 (39.9)	1.23	0.335
Female	93 (55.0)	76 (45.0)	Ref.	
Ethnicity				
Brahmin	86 (55.5)	69 (44.5)	Ref.	0.395
Chhetri	53 (58.9)	37 (41.1)	0.87	
Janjati	45 (54.9)	37 (45.1)	1.02	
Dalit	14 (77.8)	4 (22.2)	0.35	
Others	5 (71.4)	2 (28.6)	0.49	
Marital Status				
Married	170 (56.5)	131 (43.5)	Ref.	0.162
Unmarried	3 (60.0)	2 (40.0)	0.86	
Widow	22 (75.9)	7 (24.1)	0.41	
Widower	8 (47.0)	9 (53.0)	1.45	
Occupation				
Agriculture	118 (57.0)	89 (43.0)	Ref.	0.398
Service	14 (60.9)	9 (39.1)	1.17	
Business	15 (51.7)	14 (48.3)	0.80	
Skill worker	2 (25.0)	6 (75.0)	0.25	
Lobour	5 (62.5)	3 (37.5)	1.25	
Retired	10 (52.6)	9 (47.4)	0.83	
Unemployment	11 (78.6)	3 (21.4)	2.76	
Home maker	28 (63.6)	16 (36.4)	1.31	
Education				
Illiterate	60 (56.0)	47 (44.0)	1.91	0.014*
Primary	89 (68.5)	41 (31.5)	3.25	
Secondary	36 (52.2)	33 (47.8)	1.63	
Higher secondary	11 (37.9)	18 (62.1)	0.91	
Bachelor	5 (41.7)	7 (58.3)	1.07	
Master and above	2 (40.0)	3 (60.0)	Ref.	

p value significant at <0.05, *= logistic regression.

Table 4: Association of smoking, alcohol consumption and anthropometric with hypertension, n=352

Characteristics	Hypertensive	Non hypertensive	Odds Ratio	p value
Smoking				
Present	121 (68.0)	57 (32.0)	2.38	<0.001*
Absent	82 (47.1)	92 (52.9)	Ref.	
Alcohol consumption				
Present	49 (57.6)	36 (42.4)	0.99	
Absent	154 (57.7)	113 (42.3)	Ref.	
Known Diabetes				
Present	62 (81.6)	14 (18.4)	4.24	<0.001*
Absent	141 (51.1)	135 (48.9)	Ref.	

BMI Classification				
Underweight	7 (53.8)	6 (46.2)	1.56	<0.001*
Normal	44 (42.7)	59 (57.3)	Ref.	
Overweight	47 (61.8)	29 (38.2)	2.17	
Obese I	70 (59.3)	48 (40.7)	1.17	
Obese II	35 (83.3)	7 (16.7)	6.70	
Waist circumference				
High	137 (66.2)	70 (33.8)	2.34	<0.001*
Normal	66 (45.5)	79 (54.5)	Ref.	
Stress Level				
High Stress	8 (80.0)	2 (20.0)	2.98	0.348
Moderate Stress	112 (57.9)	85 (42.1)	0.98	
Low Stress	83 (58.6)	62 (41.4)	Ref.	

p value significant at <0.05, *= logistic regression.

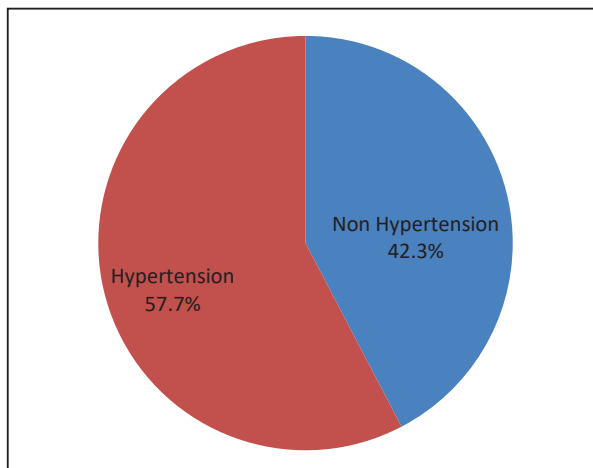


Figure 1: Distribution of respondents by hypertension

DISCUSSION

In this study of 352 adults aged 40 to 84 years, the prevalence of hypertension was found to be 57.7%. Studies conducted by Manandhar et al., Kafle et al. and Shreshtha et al found that the prevalence of hypertension were 44.9%, 41.5% and 40.67% respectively.¹⁶⁻¹⁸ The prevalence of hypertension in elderly population were 41.7% and 43.5% shown by Huang et al. and Hasan et al. respectively.^{19,20} These findings were consistent with the present study findings.

The overall prevalence of hypertension, in the community based study conducted in 2020 at Kavrepalanchowk district of Nepal, was found to be 27.7% and prevalence was high in males (32.7%) as compared to females (19.8%).²¹ The Nepal demographic health survey (NDHS) 2022 found to be national prevalence of hypertension to be 20.0% in Nepal and among them, 50.2% of the

participants were aware of their diagnosis, 31.7% of the participants received the treatment, and 18.0% of the participants had controlled blood pressure.²² The prevalence of hypertension was reported to be 35.5% in 2022 in Pokhara.¹³

Studies conducted by Chataut et al., Karmacharya et al., Koju et al. and Aryal et al., in Nepalese population found the prevalence of hypertension were be 25.7%, .27.7%, 27.8% and 28.9% respectively,^{21,23-25} which is very lower than the present study findings. This difference may be due to the study population. In present study, population of 40 years and above were included where as in other studies, youth population were included and change in time period. Although the prevalence of hypertension in males was higher than females, but the difference was not significant and this finding was similar with other studies. There are studies which revealed that male gender is significantly associated with hypertension. The present study revealed that the prevalence of hypertension increased with increased age. Age is significant factor for hypertension and is consistent with findings from other studies from Nepal and the different part of the world.^{21,23-25}

The study conducted by Fuentes et al revealed that the prevalence and associated factors of hypertension among rural population as hypertension is recognized as one of the major public health problem globally as well as in the developing countries.²⁶ It is now evident that it has a potential contribution for heart attacks, strokes and kidney failure.²⁷

Present study revealed that the participants who had education level of bachelor or higher have significantly

lesser odds of hypertension compared to people with secondary, primary and no formal education. This finding is consistent with other studies which proved that low level of education is significantly associated with hypertension.^{17,28,29} This may be due to educated people will aware about their health and may go for health check up at regular interval.

Current study found ethnicity was not significantly associated with hypertension. In contrast, the past, studies have shown that the association of ethnicity with hypertension and mostly it was found high in Janajati population as they are more exposed to risk factors of hypertension like alcohol and smoking.¹² This study showed that there was significant association between smoking and hypertension. This finding was consistent with the finding of Chataut et al.³⁰

Present study showed that alcohol consumption was not significant risk factor for hypertension and this result is similar to other findings.²⁵ However there are studies that found alcohol as significant contributor to hypertension.^{17,22} These differences may be due to the consumption of amount and concentration of the alcohol the different findings in the different studies.

This study revealed that there is significant association between BMI with hypertension there are several studies which suggested that high BMI is a significant factor of the hypertension.^{14,28,29} But there is no significant association between BMI with hypertension found in the other studies.³⁰ The study found that the higher waist circumference was significant factor for the hypertension. Similar result was found in the study conducted by Shrestha et al in Nepal.¹⁸

The study revealed that the known diabetes was statistically significant with hypertension. Similar result was found in the study conducted in the Tanahu district

of Nepal.¹⁷ The chance of developing the hypertension was almost three times higher in the person having the higher perceived stress level but the level of stress was not statistically significant with the hypertension.³¹ This finding was in contrast to other study findings. Persons with the high perceived stress were more likely to have hypertension compared to those with the low levels of perceived stress.^{32,33}

Despite these alarming figures in the increasing the prevalence rate of hypertension, awareness, treatment and control programs remain suboptimal across the countries.

The limitation of the study was conducted in only one municipality of Kavrepanchowk district. The findings of study may not be generalized for the all population.

CONCLUSION

The hypertension is in the increasing trend in the low- and middle-income countries. The present study concludes that prevalence of hypertension is high in the study area. It also revealed that higher age group, low level of education, smoking, BMI, waist circumference, and known diabetes are significant risk factors for the hypertension. Measures for early detection of hypertension are necessary and programs regarding increasing the awareness, the control of blood pressure and reduction in smoking are recommended.

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