Journal of Institute of Medicine Nepal
Institute of Medicine, Kathmandu, Nepal

OPEN ACCESS

Original Article

JIOM Nepal. 2025 Dec;47(3):91-95.

Factors associated With Hypertension among Adult Clients in Provincial Hospital: A Case-Control Study

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ABSTRACT

Introduction

Hypertension is one of the major public health problem and its prevalence is increasing across the countries globally. Most of the factors associated with high blood pressure are modifiable. If they are not addressed timely it would burden to health care system. This study aimed to determine the factors associated with hypertension among the adult clients in provincial hospital.

Methods

This study is a hospital-based case-control design conducted in Lumbini Provincial Hospital with a total 160 (80 cases and 80 controls) samples. The data was collected by face-to-face interview technique using World Health Organization STEP wise approach to Non-Communicable Disease Risk Surveillance instrument version 3.2 from 18 September 2023 to 13 October 2023. Data were entered in SPSS version-21 and analyzed. Chi-square, crude odds ratio and adjusted odds ratio was calculated.

Results

Clients having a family history of hypertension are 2.3 times more likely to get hypertension (COR= 2.38, 95% CI= 1.262-4.516, p=0.007). Second hand smoker had 2.4 times more chance of getting hypertension (COR= 2.362, 95% CI=1.262-4.516, p=0.007). Alcohol consumers were likely to have high blood pressure 3.0 times more. Other risk factors were inadequate consumption of fruits and vegetables, physically inactive, having a higher BMI, and having comorbidity.

Conclusion

Most of the risk factors associated with hypertension are behavioural and could be modified. So, policymakers and healthcare professionals need to conduct awareness programs focusing on lifestyle modifications for the prevention of hypertension and to reduce disability and death.

Keywords
Hypertension; risk factors.

DOI
10.59779/jiomnepal.1437

Submitted
Oct 13, 2025

Accepted
Dec 20, 2025

INTRODUCTION

Cardiovascular disease accounts for 17.8 million deaths worldwide.[1] It is estimated that by 2025, hypertension will increase by 30% and 1.56 billion adults will suffer from it.[2] The 80-80-80 blood pressure control target states that 80% of people with hypertension are identified and informed of their condition, 80% of those who are aware receive appropriate treatment, and 80% of those undergoing treatment successfully meet guideline-recommended blood pressure goals.[3]

Hypertension leads to higher frequency of morbidity and mortality related to cardiovascular and kidney disease.[4,5] Mortality due to hypertension is 7.5 million annually causing 57 million disability-adjusted life years.[6] It directly contributes to conditions like strokes, diabetes, heart diseases, and renal impairment.[7]

Age, smoking, alcohol consumption, obesity,sedentary lifestyle, physical inactivity, excessive salt intake, stress and caffeine intake are risk factors for increasing blood pressure.[8–12] Similarly, major comorbidity associated with hypertension are diabetes mellitus, high triglycerides level and arteriosclerosis.[5,13]

In the context of Nepal research related to hypertension are conducted but they mainly described demographic associations without exploring multivariate relationships between lifestyle factors. [14–16] So, this study was done to explore the actual depth of the problems related with modifiable and preventable risk factors associated with hypertension.

METHODS

This was a hospital-based pair-matched case-control design to determine the factors associated with hypertension among adult clients between the age group 20-60 years attending the Medicine and Orthopedic OPD.

Inclusion criteria for cases were both sex, age 20 to 60 years, diagnosed as hypertension by a physician. Control group was the patients who did not have hypertension. The total sample was 160 (80 cases and 80 controls), age and sex matching were done in the ratio of 1:1. The sample was calculated by using Fleiss's, Statistical Methods for Rates and Proportions because it is acceptable and widely used as a reasonable approximation. Non-probability convenience sampling technique was used to select cases and controls. Those who met the eligibility criteria for cases was selected from the medicine OPD as per the requirement of the study. Then, another age and sex matched client attending the orthopedic OPD and meting the eligibility criteria for the controls were selected as control. Respondents was chosen purposively until 80 cases and 80 controls had been interviewed.

A standard structured questionnaire developed by WHO for the measurement of non-communicable diseases was used as a data collection instrument. The WHO STEPS (STEP-wise approach to NCD risk Surveillance) Instrument version 3.2 is a valid tool, contextualized in Nepal by the Nepal Health Research Council (NHRC) which is freely available to use for research purposes. Part I included socio-demographic variables. Part II included factors associated with hypertension consisting of step 1: behavioral measurement and step 2: physical measurement. The behavioral measurement consists of a questionnaire related to tobacco consumption (11 questions) alcohol consumption (7 questions), dietary habit (9 questions), physical activity (15 questions), history of Diabetes Mellitus (7 questions), and history of raised cholesterol (6 questions). For tobacco use, alcohol consumption and dietary patterns showcards were used to find out the standard amount of consumption. For Step II: Physical measurement, height and weight was measured and BMI was calculated by measuring weight in kilograms divided by height in meters squared. Pretesting was done on 16 respondents. No any modification was needed.

Ethical approval was obtained from Institutional Review Committee of Institute of Medicine. Data collection permission was taken from the hospital administration and informed written consent was obtained from clients. Participants were assured there is no foreseeable harm to them and they have full right of autonomy to participate in the study and respect their dignity by allowing them to withdraw from the study if they wanted. Confidentiality of the participants was maintained by assigning code, keeping the questionnaire in a locked cupboard and not disclosing their information to anyone. Privacy was maintained by collecting data in a separate place. All the demographic related questions, alcohol consumption, smoking, physical activity and dietary habit related questions was asked to the participants. The number of cigarettes, amount of alcohol, fruits and vegetables serving was calculated by using showcards given by STEPS survey manual of WHO. The data was collected by in-person interview technique for approximately 20-25 minutes for each participant. Data was collected from 18th September 2023 to 13th October 2023. Each day, data was collected from 6-7 participants and checked for completeness.

For data analysis, IBM SPSS version 21 was used. For descriptive statistics, categorical variables were expressed in numbers and percent, whereas continuous variables were presented in the mean and standard deviation.For Inferential Statistics: Chi-square test, risk estimation Crude Odd Ratio (COR) was calculated first, level of significance was set

at ≤0.05. After ensuring the significant difference between cases and controls, those variables were further tested using binary logistic regression model (Multivariate analysis) and Adjusted Odds Ratio (AOR) was calculated. Model fit was assessed using the Hosmer-Lemeshow test.

RESULTS

Table 1 shows, more than half of the cases (52.5%) and less than half of the controls (48.8%) belong to the upper caste groups. Almost all the cases (90%) and most of the controls (88.8%) were married. More than half cases had family history of high blood pressure.

Table 2 depicts the multivariate analysis in which second hand smoking, drinking alcohol and inadequate vegetable consumption is significantly associated with hypertension.

Table 1. Respondents' socio-demographic characteristics

Characteristics	Case (n=80)	Control (n=80)
	No. (%)	No. (%)
Age in years		
20-40	14 (17.5%)	14 (17.5%)
41-60	66 (82.5%)	66 (82.5%)
Mean age	49.38 (+7.58)	49.01 (+ 7.77)
Sex		
Female	43 (53.8%)	43 (53.8%)
Male	37 (46.3%)	37 (46.3%)
Ethnic background		
Upper caste group	42 (52.5%)	39 (48.8%)
Others group**	38 (47.5%)	41 (51.2%)
Marital status		
Married	72 (90%)	71 (88.8%)
Single	8 (10%)	9 (11.3%)
Residence		
Within Rupandehi district	60 (75%)	62 (77.5%)
Beyond Rupandehi district	20 (25%)	18 (22.5%)
Literacy		
Can read and write	79 (98.8%)	75 (93.8%)
Cannot read and write	1 (1.3%)	5 (6.3%)
Family history		
Yes	45 (56.3%)	28 (35%)
No	40 (43.8%)	52 (65%)

DISCUSSION

In this study, multivariate logistic regression analysis was conducted to identify the independent predictors of the outcome among the study population. Three variables emerged as significant independent predictors: exposure to second-hand smoke, alcohol consumption, and low vegetable intake.

Exposure to second-hand smoke was found to significantly increase the odds of the outcome, with exposed individuals being more than twice as likely to develop the condition compared to those not exposed. This finding is consistent with the previous study done in Korea [17](AOR=1.16, 95% CI=1.08-1.24, p=0.001). Another study of China also supports this findings (AOR=1.09, 95% CI=0.22-0.74, p=0.004).[18]

In this study, alcohol consumption was found to be significantly associated with hypertension (p=0.019),. Individuals who consumed alcohol had 2.6 times higher odds of developing hypertension (AOR=2.682, p=0.019 ,95% CI=1.177-6.110,). This findings is consistent with previous research conducted in Nepal. A study from Kathmandu reported that alcohol counsumers had a significantly higher likelihood of hypertension (AOR=1.605, 95% CI=1.047-2.460, p=0.03).[19] Similarly, the study in Surkhet found alcholol intake to be a significant predictor of hypertension (AOR=1.75, p=0.03, 95% CI=1.047-2.460).[20]

According to the finding of the present study those individual who consumed vegetables ≤ 5 servings/ week had a significant association with hypertension (AOR=2.168, 95% CI=0.927-4.836), p=0.049). This result is supported by a study conducted in China[21] which reports a positive association between low vegetable intake and elevated blood pressure. However, it is contradictory to the findings of the study conducted in Kathmandu (p=0.542).[19] This discrepancy may be due to the difference in the sample size and setting.

Other variables including smoking, family history, BMI, low physical activity, diabetes, and high cholesterol showed elevated crude odds ratios but did not retain statistical significance after adjustment.

CONCLUSION

The present study identified several modifiable risk factors associated with hypertension. Alcohol consumption, exposure to second hand smoke, and low vegetable intake were found to increase the likelihood of developing hypertension. Other factors such as family history, smoking, low fruit

Table 2. Multivariate Analysis of Risk Factors

Variables	Case (n=80)	Control (n=80)	COR	AOR	p-value	95% CI for AOR
	No. (%)	No. (%)				
Family history						
Yes	45 (56.3%)	28 (35%)	2.388	1.927	0.100	.882-4.208
No	35 (43.8%)	52 (65%)				
Smoking						
Yes	52 (65%)	34 (42.5%)	2.510	1.853	0.122	.848-4.048
No	28 (35%)	46 (57.5%)				
Second hand smoker						
Yes	43 (53.8%)	26 (32.5%)	2.410	2.362	0.032*	1.078-5.176
No	37 (46.3%)	54 (67.5%)				
Ever drink alcohol						
Yes	39 (48.8%)	19 (23.8%)	3.054	2.682	0.019*	1.177-6.110
No	41 (51.2%)	61 (76.3%)				
Fruits consumption servings/week						
≤ 5	57 (71.3%)	43 (53.8%)	2.132	1.622	0.260	.699-3.764
> 5	23 (28.7%)	37 (46.3%)				
Vegetables consumption servings/week						
≤ 5	51 (63.7%)	32 (40%)	2.638	2.168	0.049*	.927-4.836
> 5	29 (36.3%)	48 (60%)				
Intake of processed food						
Yes	48 (60%)	33 (41.3%)	2.136	2.164	0.053	.992-4.724
No	32 (40%)	47 (58.8%)				
Walking and cycling as a means of transportation						
Yes	39 (48.8%)	55 (68.8%)	.432	.587	0.211	.255-1.353
No	41 (51.2%)	25 (31.3%)				
WHO recommended physical activity per week						
<600 MET	42 (52.5%)	24 (30%)	2.579	2.155	0.085	.898-5.172
≥ 600 MET	38 (47.5%)	56 (70%)				
BMI (kg/m$^{2)}$						
≥ 25	43 (53.8%)	56 (70%)	2.268	1.805	0.162	.790-4.124
18.5-24.9	37 (46.3%)	24 (30%)				
Diabetes mellitus						
Yes	30 (37.5%)	17 (21.3%)	2.224	1.452	0.411	.597-3.533
No	50 (62.5%)	63 (78.8%)				
High cholesterol						
Yes	25 (31.3%)	12 (15%)	2.576	1.723	0.287	.634-4.683
No	55 (68.8%)	68 (85%)				

intake, processed food consumption, physical inactivity, high BMI, diabetes, and high cholesterol also showed a tendency to increase risk, although these were not statistically significant. These findings underscore the importance of lifestyle and dietary modifications. Based on the study findings, hospitals can help prevent and control hypertension by promoting healthy lifestyle behaviors. This includes educating patients about the risks of alcohol consumption and exposure to secondhand smoke, encouraging increased vegetable intake, and providing support for smoking cessation and

alcohol reduction. It can also implement routine screening for high-risk individuals, offer dietary counseling, and create a smoke-free environment.

ACKNOWLEDGEMENT

We would like to acknowledge all the clients for their participation in the study.

FINANCIAL SUPPORT

We would like to acknowledge the University Grants Commission, Sanothimi, Bhaktapur, Nepal for financial support for the study.

CONFLICT OF INTEREST

The author(s) declare that they do not have any conflicts of interest with respect to the research, authorship, and/or publication of this article.

AUTHOR CONTRIBUTIONS

Sarada Bhandari : Conceived the study, prepared the study design, prepared the proposal, collected and analyzed the data and prepared the research report and manuscript.

Devaka Kumari Acharya : Conceived the study, supervised in proposal development, critically supervised in data analysis and preparation of research report and manuscript feedback.

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