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Prevalence and Risk Factors of High Blood Pressure among Elderly People

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ABSTRACT

Background: High Blood Pressure, a prevalent condition exacerbated by population growth, disproportionately affects the elderly, with over two-thirds of individuals aged 65 and above affected. This study aimed to evaluate the prevalence and risk factors of high blood pressure among elderly residents of Chandragiri Municipality in Kathmandu.

Methodology: A cross-sectional was applied, and the respondents were selected from randomly chosen wards of Chandragiri Municipality. Elderly individuals aged over 60 years residing in the area, regardless of permanency, were included. Data analysis was conducted using SPSS software, with the Chi-square test employed to assess associations between high blood pressure and various risk factors at a significance level of 5%.

Results: The study included 418 individuals, of whom 48.8% were currently suffering from high blood pressure. The majority was male 55.5% and married 73.7%, with Chhetri 45.2% and Brahmin 40.7% being the most prevalent ethnic groups. Most respondents were illiterate 44.3% and resided in joint families 68.4%. Reported risk factors for high blood pressure included tobacco smoking 37.3%, alcohol consumption 36.1%, and non-vegetarian diets 85.9%.

Conclusion: Significant relationships were observed between blood pressure and age, sex, marital status, tobacco smoking, and alcohol consumption. Conversely, religion, ethnicity, education level, family type, BMI, diet type, and physical activity did not exhibit noteworthy associations with high blood pressure in this sample. These findings underscore the multifactorial nature of high blood pressure and its diverse risk factors.

Keywords: Elderly people; high blood pressure; prevalence; Risk factors.

INTRODUCTION

High blood pressure or Hypertension is a serious global public health challenge due to its widespread impact and severe health consequences. It accounts for approximately 7.5 million deaths per annum, representing 12.8% of worldwide fatalities, with an estimated 1.56 billion adults projected to be affected by 2025.[1] High blood pressure significantly increases the risk of heart disease, kidney failure, stroke, and vision impairment.[1] Currently, around 1.28 billion adults aged 30-79 live with high blood pressure, with a majority in low- and middle-income countries. Alarmingly, 46% are unaware of their situation, and only 21% manage it efficiently.[2]

In Nepal, the 2016 Demographic and Health Survey reported high blood pressure prevalence in 23% of men and 17% of women over 15 years.[3] Early studies in Nepal indicated a 6% prevalence in 1982, rising to 40% among individuals over 40 by 2007.[4] This study focuses on Chandragiri Municipality to assess high blood pressure prevalence and risk factors among the elderly.

METHODS

This study was cross-sectional using quantitative method. The respondents were elderly people of the age group ≥60 years residing at Chandragiri Municipality, Kathmandu. The total number of respondentsfor the study was 418. The sample size was determined using an unknown population formula, taking into account a 95% confidence level, a 5% margin of error, and an assumed High Blood Pressure prevalence of 44.9% among

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the elderly. Including a 10% allowance for non-response, the final sample size required was 418.[5]

Eight wards, representing over 50% of the total 15 wards of Chandragiri Municipality, were selected as the study area using a simple random sampling technique through a lottery method. Systematic random sampling was employed to select households within these wards. The total number of households in each ward was obtained from the 2011 Nepal Census conducted by the Central Bureau of Statistics (CBS). Proportionate sampling was applied to determine the required number of households in each ward based on their population size. The sampling interval for each ward was calculated by dividing the total number of households by the required sample size.

Data collection started from the central or market area of each ward. A pen was rotated to determine a random direction, and the first household along that direction was selected randomly. Subsequent households were chosen systematically based on the calculated sampling interval. From each selected household, one eligible respondent (an elderly person aged 60 years or older) was identified through a lottery method. In cases where no eligible participant was present, the next adjacent household was considered.

Data were collected using a structured interview schedule through face-to-face interviews. The tool was pretested on 50 respondents (10% of the total sample) at Kalanki, Kathmandu, to ensure its reliability and validity. Feedback from pretesting was used to refine the tool before conducting the final data collection. This systematic approach ensured representativeness and accuracy in capturing information from the targeted population.

All respondents who had been residing in the study area for more than six months, regardless of their permanency, were included in the study. Elderly individuals aged 60-85 years were the focus population. Exclusion criteria were carefully defined and included elderly individuals with mental disorders or cognitive impairments as confirmed through available medical reports, those with disabilities verified either through direct observation of medical documentation or based on self-reports substantiated by caregivers, and individuals with severe hearing difficulties. Additionally, respondents who were unavailable after three consecutive household visits were excluded. While medical reports were reviewed when provided, no on-site assessments by practitioners were conducted to confirm disabilities.

A structured questionnaire served as the primary tool for data collection, consisting of sections on socio-demographic characteristics, lifestyle behaviors, and health-related variables. The questionnaire was designed in the local language and pretested in a comparable setting to ensure its clarity and cultural appropriateness. The pretest feedback was incorporated to refine the tool. Trained enumerators conducted face-to-face interviews, allowing respondents sufficient time to answer questions in a neutral and supportive environment, minimizing bias. This process ensured the collection of reliable and comprehensive data.

Blood pressure was measured manually using a sphygmomanometer and stethoscope. Respondents were instructed to rest for at least 30 minutes before the measurement, avoiding smoking or caffeine during this period. Measurements were conducted with the respondent seated, legs uncrossed, and the left upper arm positioned at heart level. Three readings were taken at five-minute intervals, and the mean of the second and third readings was calculated to determine the respondent's blood pressure status. This standardized approach ensured accuracy and consistency in the measurements.[6]

The weight of elderly individuals was accurately determined using a digital balance, which was measured to the nearest 0.1 kg. This measurement was taken without any additional items being held. Similarly, their height was measured to the nearest 0.1 cm while standing upright, without wearing shoes or slippers. A portable height board was utilized for this purpose. The weight measuring scale was regularly calibrated to ensure accuracy, with zero level adjustments made between each measurement. The scale's repeatability was also tested to ensure consistency. To assess the respondents'body mass index (BMI) and determine their weight status (normal, overweight, or obese), the weight in kilograms was divided by the height in meters squared.[5]To ensure the reliability and validity questionnaire was constructed by consulting with the subject expert. The questionnaire was translated from English to Nepali for better understanding.

The collected data was entered into Epi-data software. Coding of data was done and errors were checked. Clean data was transferred to Statistical Package for Social Science Software (SPSS) for further statistical analyses. Data was presented in frequency and percentage in a table. The chi-square test was used to find out the association between hypertension and various risk factors likealcohol, smoking, additional salt intake, and

physical activities at the 5% level of significance.Ethical approval (Ref. No. 535-2 September 2022) was taken from the ethical board of the Nepal Health Research Council (NHRC). Written permission for the study was taken from the municipality. Informed written consent was taken from the respondents.The respondents were not forced to answer any questions they did not want to respond and could leave at any time. The respondents were assured that the answers given would remain private, anonymous, and confidential and only be used for study purposes.

High blood pressure or Hypertension was defined as a systolic blood pressure ≥140 mmHg and a diastolic blood pressure ≥90 mmHg, confirmed by the average of two accurate blood pressure measurements.

Elderly people were defined as those aged 60 years and above residing in Chandragiri Municipality, Kathmandu.

Risk factors incorporated variables such as age, sex, marital status, alcohol consumption, smoking, diet type, physical activity, and Body Mass Index (BMI), which were assessed for their association with high blood pressure prevalence.

BMI was calculated as weight in kilograms divided by the square of height in meters (kg/m^2) and categorized as underweight, normal weight, or overweight based on World Health Organization (WHO) criteria.

Smoking/Tobacco use was defined as the use of bidis, cigarettes, or smokeless tobacco products at least once/day.

Alcohol consumption was defined as the intake of alcoholic beverages (beer, wine, or hard drinks) at least once/day.

Diet type was assessed based on food consumption patterns. A diet was considered adequate if an individual consumed any type of non-vegetarian and vegetables daily if they consumed meat or fish at least once/day.

Physical activity was categorized as Yes if an individual engaged in ≥150 minutes of moderate or ≥75 minutes of vigorous activity/week and No if they engaged in less than these recommended levels.

RESULTS

Table 1 show that out of 418 participants 73.2% were age group from age group less than 70 years and remaining were from age group more than 70 years. Similarly, the majority of the respondents were male 55.5% with 45.2% identifying as Chhetri and 40.7% as Brahmin. Most participants were married 73.7%, and the majority practiced Hinduism 92.6%. Regarding education, 44.3% of participants were illiterate. In terms of family structure, 68.4% lived in a joint family setting.

Table 1.Demographic Characteristics of Respondent.

Variables	Frequency	Percentage (%)
< 70 years	306	73.2
> 70 years	112	26.8
Sex		
Male	232	55.5
Female	186	44.5
Ethnicity		
Chhetri	189	45.2
Brahmin	170	40.7
Other	59	14.1
Married	308	73.7
Single	110	26.3
Hindu	387	92.6
Non Hindu	31	7.4
Illiterate	185	44.3
Literate	233	55.7
Nuclear	132	31.6
Joint	286	68.4

Out of 418 participants, 62.7% were smoking tobacco whereas 37.3% were not smoking. Among them, 36.1% had consumed alcohol while 63.9% had not consumed alcohol. Among the participants, 85.9% were non-vegetarian while 14.1% were pure vegetarian, among them 39.7% had been involved in physical activity while 60.3% had no physical activity. Accordingly, out of 418 participants, 63.4% were normal weight followed by 31.8% were overweight and 4.8% were underweight.

Table 2. Risk Factors of the Respondents.

Variables	Frequency	Percentage (%)
Smoking/tobacco		
No	262	62.7
Yes	156	37.3
Alcohol consumption		
No	267	63.9
Yes	151	36.1
Diet Type		
Vegetarian	59	14.1
Non-vegetarian	359	85.9
Physical activity		
No	252	60.3
Yes	166	39.7
BMI		
Under Weight	20	4.8
Normal Weight	265	63.4
Over Weight	133	31.8

Figure 1 show that among the 418 respondents, 48.8% were currently suffering from high blood pressure while 51.2 were not suffering from blood pressure.

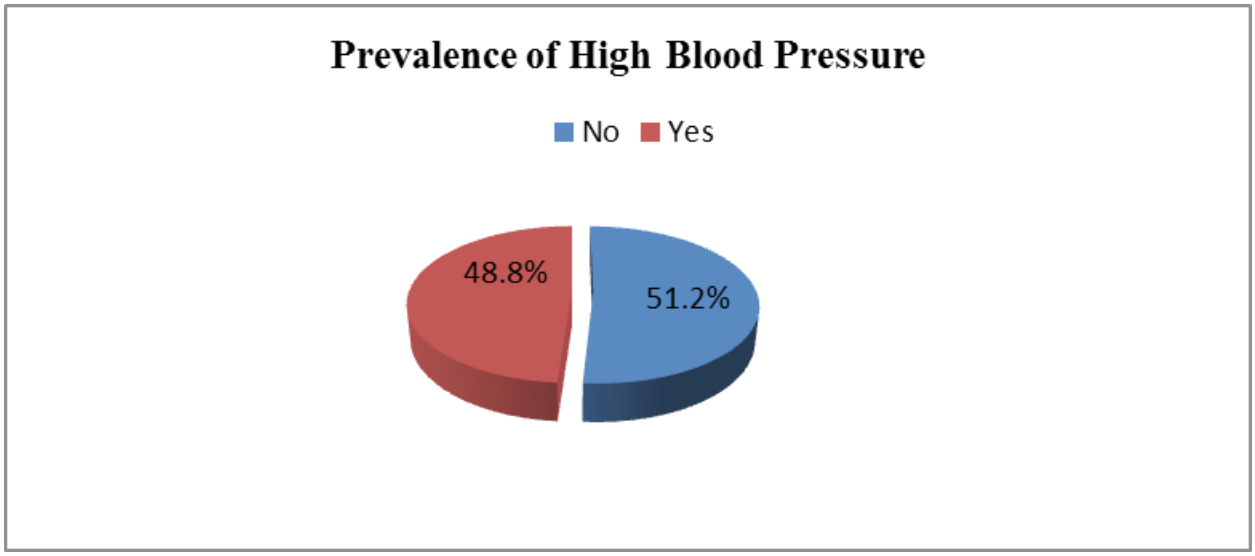

Figure 1. Prevalence of Blood Pressure Respondent.

Table 3 presents the association between various demographic variables and blood pressure status. Age, sex, and marital status show significant relationship with blood pressure, with p-values of 0.024, 0.001, and 0.045, respectively. Individuals aged below 70 and males have a higher prevalence of high blood pressure. Religion, ethnicity, education, and family type do not show significant relationship with blood pressure levels. The group of Hindu and non-Hindu, as well as different ethnicities, has similar blood pressure distributions. Similarly, literacy status and family type (nuclear or joint) do not significantly impact high blood pressure prevalence, as indicated by their higher p-values.

Table3. Association of Blood Pressure status and Socio-demographic Information of study Respondent.

Variables	Blood Pressure status		Total	P-Value
	Normal	High		
Age				
<70 Years	145 (47.4%)	161 (52.6%)	306	0.024
> 70Years	67 (59.8%)	45 (40.2%)	112	
Sex				
Male	91(39.2%)	141(60.8%)	232	
Female	124(66.7%)	62(33.3%)	186	0.001
Religion				
Hindu	197(50.9%)	190(49.1%)	387	
Non Hindu	18(58.1%)	13(41.9%)	31	0.443
Ethnicity				
Chhetri	98(51.9%)	91(48.1%)	189	
Brahmin	85(50.0%)	85(50.0%)	170	0.844
Other	32(54.2%)	27(45.8%)	59	
Marital Status				
Married	149(48.4%)	159(51.6%)	308	0.045
Other	66(60.0%)	44(40.0%)	110	
Education				
Illiterate	103(55.7%)	82(44.3%)	185	
Literate	112(48.1%)	121(51.9%)	233	0.122
Family type				
Nuclear	68(51.5%)	64(48.5%)	132	
Joint	147(51.4%)	139(48.6%)	286	0.982

The table 4 examines the relationship between various lifestyle factors and blood pressure status. Smoking tobacco, alcohol consumption, and additional salt intake show significant relationship with blood pressure, with p-values of 0.001, 0.001, and 0.002, respectively. Individuals who consume alcohol or smoke have a higher prevalence of blood pressure. Similarly, those with additional salt intake show a significantly higher risk. Body Mass Index and diet type do not show significant relationship with blood pressure, as indicated by their higher p-values. Normal-weight and overweight individuals have similar high blood pressure rates, and dietary preferences (vegetarian vs. non-vegetarian) do not significantly impact blood pressure status.

Table4. Association between Independent variables and High Blood Pressure status.

Variables	High Blood Pressure status		Total	P-Value
	Normal	High		
BMI				
Under Weight	13(65.0%)	7(35.0%)	20	
Normal Weight	135(50.9%)	130(49.1%)	265	0.490
Over Weight	67(50.3%)	66(49.7%)	133	
Smoke tobacco				
No	174(66.4%)	88(33.6%)	262	
Yes	41(26.3%)	115(73.7%)	156	0.001
Alcohol consumption				
No	176(65.9%)	91(34.1%)	267	0.001
Yes	39(25.8%)	112(74.2%)	151	
Diet type				
Pure Vegetarian	34(57.6%)	25(42.4%)	59	
Non vegetarian	181(50.4%)	178(49.6%)	359	0.328
Additional salt intake				
No	209(53.5%)	182(46.5%)	391	0.002
Yes	6(22.2%)	21(77.8%)	27	

DISCUSSION

The prevalence of high blood pressure in our study stood at 48.8%. That, males displayed a notably higher prevalence of high blood pressure compared to females. Factors such as marital status, tobacco smoking, and alcohol consumption correlated with high blood pressure. Conversely, variables like religion, ethnicity, education level, family structure, BMI categories, dietary habits, and salt intake did not demonstrate significant associations with high blood pressure.

The prevalence of high blood pressure tends to be underestimated, especially in low- and middle-income countries. High blood pressure detection often occurs during routine check-ups or after complications arise.[7] Our study employed bivariate analysis to examine the relationship between high blood pressure status and selected independent variables. Given the categorical nature of the variables, we utilized the chi-squared test with a 95% confidence interval and a 5% margin of error. Results were interpreted based on a p-value of < 0.05. Present study identified links between high blood pressure and factors such as smoking, body mass index (BMI), alcohol consumption, lack of physical activity, and diabetes. This study represents an initial community-based effort to assess high blood pressure prevalence and its associated factors within the specific region.

The prevalence of high blood pressure in our study stood at near of fifty percents. This figure aligns closely with the 44.9% reported in Banepa municipality,[5] possibly due to similar cultural and dietary patterns among the elderly population. In Uttarkhanda, India, a study reported a higher prevalence of 54.5%.[8] A study in Dhaka, Bangladesh, reported 49% prevalence,[9] a figure consistent with our findings, possibly due to similar study settings. In Ghana, high blood pressure prevalence was notably higher at 53.72%, surpassing the WHO African Region's reported rate of 27%. This discrepancy may be attributed to the adoption of new high blood pressure guidelines (≥ 130/80 mm/Hg) in the study,[10] a factor potentially applicable to Nepal.A 2019 study in Dubai revealed an overall high blood pressure prevalence of 32.5% among adults (38.37% in males and 16.66% in females).[11] This difference could be due to varying age groups, lifestyles, cultural contexts, and dietary patterns. Age consistently correlates with high blood pressure; as age increases, so does high blood pressure prevalence.[11] Our study echoed this trend, with nearly 50% prevalence among the elderly.

A study in Surkhet, Nepal, found associations between current and past smoking and high blood pressure.[12] Similarly, in Pokhara, a significant link was found between current smoking and high blood pressure.[13] Among our 418 participants, 37.3% smoked tobacco, 36.1% consumed alcohol, 85.9% were non-vegetarians, and 39.7% engaged in physical activity. A Pokhara study indicated that current alcohol consumers had a 2.6 times higher risk of high blood pressure than non-users, a finding consistent with our results.[13] Another study in Urban Varanasi, India, highlighted the positive associations between alcohol and tobacco use and high blood pressure, with high blood pressure being more prevalent in tobacco users (OR: 1.86) and alcohol users (OR: 1.55) compared to non-users.[14] In Ghana, most respondents were of normal weight, but 97% reported inadequate fruit and vegetable consumption, and only 1.8% engaged in daily physical activity. High rates of smoking (25.97%) and heavy alcohol consumption (58.62%) were also reported. Factors such as dietary changes, lifestyle shifts, and rising obesity rates may contribute to the higher high blood pressure prevalence in this study.[10] These findings contrast with ours, possibly due to socio-cultural, environmental, and behavioral differences.

Our study found no association between diet patterns and high blood pressure, but light exercises like walking or gardening were linked to high blood pressure. A study in Uttarkhand, India, reported a significant association between irregular physical activity and high blood pressure ($P < 0.05$).[8] Our findings highlighted that respondents' sex, marital status, smoking, alcohol consumption, and additional salt intake were associated with high blood pressure risk. A systematic review and meta-analysis indicated increased high blood pressure risk with smoking, alcohol consumption, and obesity, while higher education and exercise were associated with reduced risk.[15] A Chinese study corroborated these findings, linking habitual alcohol use and less physical activity with increased high blood pressure risk.[16] Similarly, a 2019 Dubai study revealed a significant association between physical activity and high blood pressure risk factors, supporting the benefits of exercise and physical activity in BP control and high blood pressure prevention.[11] Thorough protocols for measuring blood pressure and weight enhance the accuracy of data. Consistent procedures, including standardized rest conditions and participant positioning, reduce variability. Regular calibration and testing for repeatability of equipment ensure measurement reliability. However, the study's findings may not be broadly applicable to the entire nation. Additionally, as a cross-sectional study, recall bias could influence results. There's also potential for bias if participants don't fully adhere to pre-measurement requirements.

CONCLUSIONS

Our study highlighted a substantial prevalence of high blood pressure, at 48.8%, within the surveyed population. Through investigating various demographic and lifestyle factors, we uncovered significant associations with high blood pressure. Specifically, males exhibited a higher prevalence compared to females. Tobacco smoking, alcohol consumption, and excessive salt intake emerged as notable risk factors, underlining the importance of addressing modifiable lifestyle habits to mitigate high blood pressure prevalence.

To address this public health concern in Nepal, tailored interventions are essential. We recommend implementing targeted health education programs focusing on tobacco and alcohol cessation, promoting physical activity, and advocating for reduced salt intake. Effective interventions should employ culturally sensitive approaches, considering factors such as marital status and family structure, to maximize effectiveness and uptake across diverse populations. By addressing these modifiable risk factors, we can significantly contribute to reducing the burden of high blood pressure and improving overall health outcomes.

CONFLICT OF INTEREST

Non declared

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