https://doi.org/10.22502/jlmc.v7i2.300

Original Research Article

Prevalence and Associated Risk Factors of Hypertension Among Adults in Palpa District, Nepal

Deelip Kumar Karki,[a,b] Samata Nepal,[a,b] Keshav Raj Bhandari[a,b]

ABSTRACT:

Introduction: Hypertension mostly remains asymptomatic when controlled, however there is always an increased risk of heart disease, stroke and renal failure. The higher the blood pressure, the higher the likelihood of harmful consequences to the heart, blood vessels, eyes, brain and kidneys. **Methods:** A community-based cross-sectional study was conducted in adult population. The blood pressure was measured on left arm, the respondents in sitting posture and arm support at the heart level. **Results:** The prevalence of hypertension was 22% and higher in people above 60 years of age. Prevalence of hypertension was more in people who had elevated waist to hip ratio (65%) and positive family history (40.8%). The prevalence of hypertension was observed high among diabetics (63.2%) and smokers (33.3%). **Conclusion:** The prevalence of hypertension was seen positively associated with increasing age, smoking, alcohol sedentary lifestyle, diabetes, stress, central obesity and >25 BMI.

Keywords: Hypertension, Prevalence, Risk factors

INTRODUCTION:

Globally cardiovascular diseases account for approximately 17 million deaths per year, nearly one-third of the total deaths.[1] Worldwide, nearly one billion people have hypertension; of these, two-thirds are in the middle- and low-income countries. Hypertension is one of the most important causes of premature deaths and the problem is growing. Approximately one-third of the adult population in South East Asia has high blood pressure.[2] Nepal Demographic and Health Survey (2016) showed that 17% of women and 23% of men aged 15 years and above had hypertension.[3]

There are a number of behavioral risk factors responsible for hypertension including consumption of food with excessive salt and fat, eating not enough fruits and vegetables, alcohol and tobacco use, physical inactivity, obesity, poor stress management, family history of hypertension, high cholesterol and dyslipidemia. Addressing behavioral risk factors, e.g. unhealthy diet, harmful use of alcohol, smoking and physical inactivity can prevent hypertension. This study aimed to evaluate the prevalence and associated risk factors of hypertension in Palpa district, Nepal.

METHODS:

This was an observational cross-sectional study conducted in Ribdikot Rural Municipality and Tansen Municipality of Palpa district over a period of two months from May to July, 2019. Ethical approval was taken from Institutional Review Committee of the institute (IRC-LMC 01-C/019) prior to commencement of data collection.

The sample size was calculated using the formula: $N>Zpq/e^2$; where, Z= 1.96; prevalence of hypertension (p)=41%[4]; q=1-p and margin of error (e)=5%.

The minimum sample size thus calculated was 371.71. A total of 372 participants were taken for the study. Interview schedule was developed and

Submitted: 5 September, 2019
Accepted: 7 December, 2019
Published: 19 January, 2020

a - Lecturer, Department of Community Medicine
b - Lumbini Medical College Teaching Hospital, Palpa, Nepal.

Corresponding Author:
Deelip Kumar Karki
e-mail: deelipkarki2039@gmail.com
ORCID: https://orcid.org/0000-0002-3838-9993

How to cite this article:
Karki DK, Nepal S, Bhandari KR. Prevalence and Associated Risk Factors of Hypertension Among Adults in Palpa District, Nepal. **Journal of Lumbini Medical College. 2019;7(2):107-112. DOI:** https://doi.org/10.22502/jlmc.v7i2.300. **Epub: 2019 January 19.**

informed consent was taken from the participants. Multi stage sampling method was adopted for the study. The blood pressure was measured on the left arm in sitting quietly on a chair with feet on the floor, legs uncrossed and the arm supported at the heart level. The first reading was taken at least after 15 minutes of rest. The second measurement was obtained after the participant had rest for at least three minutes of the first measurement. If the two readings were different, their mean wasnoted. The systolic blood pressure was recorded at phase I Korotkoff sounds, while the diastolic blood pressure was recorded at phase V Korotkoff sounds. Similarly, systolic blood pressure < 140 mm of Hg and diastolic blood pressure < 90 mm of Hg was considered normal blood pressure. Systolic blood pressure as of 140 mm of Hg or above and/or diastolic pressure 90 mm of Hg or above was considered Hypertension. [5,6] Participants currently on antihypertensive medication were also considered hypertensive.

Weight of the participants was measured by weighing machine. To measure height, the participant was made to stand vertically against the wall and just over the head, height was marked on the wall and measured with a measuring tape.Body Mass Index (BMI) was calculated as weight in kilograms divided by square of height in meters (kg/m^2) and classified into four groups as underweight (BMI< 18.5 kg/m^2), normal weight (BMI 18.5-24.9 kg/m^2), overweight (BMI 25-29.9 kg/m^2) and obese (BMI≥30 kg/m^2).[7] Waist circumference was measured over light clothing while breathing out, relaxing and not contracting any abdominal muscles at a level midway between the lower rib margin and the iliac crest in centimeters rounded up to nearest 0.5 cm. Central obesity was defined as increased waist circumference > 88 cm in women and more than >102 cm in men. A waist-to-hip ratio >1.0 for men and >0.8 for women was also considered central obesity.[8]

Current smoker was defined as someone who has smoked greater than 100 cigarettes in his life time and smoking every day or some days over the past 6 months. Non-smoker was defined as someone who has not smoked greater than 100 cigarettes in his life time and does not currently smoke.[9]

Physical activity was classified as: [10]

High:

a. Vigorous-intensity activity on at least three days achieving a minimum total physical activity of at least 1500 min/week, or

b. seven or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum total physical activity of at least 3000 MET-min/week

Moderate:

a. Three or more days of vigorous-intensity activity of at least 20 min per day, or

b. five or more days of moderate-intensity activity and/or walking of at least 30 min per day, or

c. five or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET-min/week.

Low:

a. Low is the lowest level of physical activity. Those individuals who did not meet the criteria for moderate and high were considered low.

Total amount of alcohol intake was calculated in number of standard drinks (10 grams of pure ethanol). Any participant who drank alcohol within the last 30 days of data collection was defined as current alcohol user.

All the data were collected in a preformed proforma. They were entered to and analyzed using Statistical Package for Social Sciences (SPSS™) software version 16. Qualitative data were expressed in frequencies and percentages. Chi square test and odds ratio were used to analyze the data. A p-value <0.05 was considered statistically significant.

RESULTS:

There was a total of 372 participants in the study. Most of the participants were 40-59 years of age group and more than half (52.7%) were female. Most of them (61.6%) were Brahmin or Chhetri. More than one quarter (26.3%) were farmers and 15.3% were illiterate. Table 1 shows the age and gender distribution of normotensive and hypertensive participants.

Table 2 shows that 9.5% of the participants in the age group 20-39 years had hypertension whereas 34.8% of those of age 60 years and above had the condition. There was no statistically significant difference in the prevalence of hypertension in terms of sex (p=0.422) and ethnicity (p=0.145). Prevalence of hypertension was found more among illiterate than literate. Prevalence of hypertension was high in those with elevated waist/hip ratio as compared to normal waist/hip ratio (p<0.001, OR= 9). Similarly, 65.3% of those with BMI >25 kg/m^2 had hypertension and higher prevalence (40.8%) was found in those with positive family history

Table 1. Demographic characteristics of the study population (N=372).

Variables		Normal BP	Stage 1 HTN	Stage 2 HTN	Under medication
Age (years)	20-39	134 (36.0)	4 (1.1)	4 (1.1)	6 (1.6)
	40-59	111 (29.8)	18 (4.8)	14 (3.7)	12 (3.2)
	≥60	45 (12.2)	10 (2.8)	4 (1.1)	10 (2.6)
Gender	Male	134 (36.0)	17 (4.6)	10 (2.6)	15 (4.0)
	Female	156 (41.9)	15 (4.1)	12 (3.2)	13 (3.6)

Table 2. Relation between blood pressure, demographic profile and other variables

Variables	Categories	Number of Respondents	Normoten-sion	Hyperten-sion	Statistics
Age (years)	20-39	148 (39.8)	134 (90.5)	14 (9.5)	$\chi^2 = 23.7$, p<0.001
	40-59	155 (41.7)	111 (71.6)	44 (28.4)	
	≥60	69 (18.5)	45 (65.2)	24 (34.8)	
Gender	Male	176 (47.3)	134 (76.1)	42 (23.9)	$\chi^2 = 0.6$, p=0.422
	Female	196 (52.7)	156 (79.6)	40 (20.4)	
Ethnicity	Dalit	63 (16.9)	55 (87.3)	8 (12.7)	$\chi^2 = 3.8$, p=0.145
	Janajati	80 (21.5)	61 (76.2)	19 (23.8)	
	Brahmin/ Chhetri	229 (61.6)	174 (76.0)	55 (24.0)	
Education	Illiterate	57(15.3)	40 (70.2)	17 (29.8)	$\chi^2 = 42.2$, p<0.001
	Primary	107(28.8)	63 (58.9)	44 (41.1)	
	Secondary	103(27.7)	92 (89.3)	11 (10.7)	
	Intermediate	73 (19.6)	65 (89.0)	8 (11.0)	
	Bachelor and above	32 (8.6)	30 (93.8)	2 (6.2)	
Waist/ hip ratio	Normal	332 (89.2)	276(83.1)	56 (16.9)	$\chi^2 = 48.1$, p<0.001 OR= 9
	Elevated	40 (10.8)	14 (35.0)	26 (65.0)	
BMI	<25	323 (86.8)	273 (84.5)	50 (15.5)	$\chi^2 = 61.4$, p<0.001 OR= 10
	≥ 25	49 (13.2)	17 (34.7)	32 (65.3)	
Family history	Yes	98 (26.3)	58 (59.2)	40 (40.8)	$\chi^2 = 27.2$, p<0.001
	No	274 (73.7)	232 (84.7)	42 (15.3)	
Smoking	Yes	69 (18.6)	46 (66.7)	23 (33.3)	$\chi^2 = 6.2$, p=0.012
	No	303 (81.4)	244 (80.5)	59 (19.5)	
Alcohol consumption	Yes	64 (17.2)	35 (54.7)	29 (45.3)	$\chi^2 = 24.3$, p<0.001
	No	308 (82.8)	255 (82.8)	53 (17.2)	
Diabetes	Yes	19 (5.1)	7 (36.8)	12 (63.2)	$\chi^2 = 19.6$, p<0.001
	No	353 (94.9)	283 (80.2)	70 (19.8)	
Physical activity	Low	180 (48.4)	130 (72.2)	50 (27.8)	$\chi^2 = 6.7$, p=0.035
	Moderate	170 (45.7)	142 (83.5)	28 (16.5)	
	Heavy	22 (5.9)	18 (81.8)	4 (18.2)	
Stress	Yes	40 (10.8)	8 (20.0)	32 (80.0)	$\chi^2 = 87.6$, p<0.001
	No	332 (89.2)	282 (84.9)	50 (15.1)	

of hypertension. Other factors such as smoking (p=0.012), alcohol consumption (p<0.001), diabetes (p<0.001) and sedentary lifestyle (p=0.035) were found statistically significant with hypertension.

DISCUSSION:

The prevalence of hypertension in this study was 22% which is similar to that of other studies.[11,12,13] This study further showed that the prevalence of hypertension was low (9.5%) in 20-39 years of age group but high (34.8%) among 60 years and above. This signifies the risk of hypertension increases with age. Similar result was obtained in another study.[14] Similarly, NDHS (2016) shows that the prevalence of hypertension increases with age. The lowest prevalence was observed among 30–39 years of age (21.7%) and the highest prevalence was 59.3% among participants above 60 years of age.[3] Arterial and arteriolar stiffness and increased sodium retention are related to rise of blood pressure with age.[15] With increasing age, the aorta and arterial walls are stiffened and this contributes to the higher prevalence of hypertension in older age groups.[16] The prevalence was slightly higher in males (23.9%) than females (20.4%) but the difference observed between them was not statistically significant (p=0.422).

There was a statistically significant association between obesity (p<0.001), central obesity (p<0.001) and hypertension. The result was consistent with the findings from other studies conducted in Nepal.[17,18] Similar findings showed that having BMI ≥ 25 (Adjusted OR 2.0) was significantly associated with hypertension.[12] Another study found that obesity is a principal risk factor for development of hypertension.[19] The abdominal adipose tissue results in release of free fatty acids directly in the portal veins and altered lipid levels in the blood.[20] The free fatty acid release also results in endothelial dysfunction that develops hypertension. Obesity and central obesity mean greater fat stores, insulin resistance, increased salt retention, and decreased physical activity all these contribute to rise in blood pressure level.[21] This study found that 40.8% of participants with positive family history had hypertension. There was a significant relation between hypertension and positive family history (OR=3). Similar finding showed that those who had family history of hypertension were nearly six times more likely to be hypertensive when compared to those who did not have (OR 5.7).[12]

There is statistically significant relationship between smoking and hypertension (p=0.012). Many studies have proved that cigarette smoking increases the risk of hypertension.[22,23] Alcohol consumption was also associated with hypertension (p<0.001). Different studies in Nepal have observed an association of alcohol consumption to hypertension.[17,18] Another study demonstrated that alcohol intake was positively and significantly associated with risk of hypertension.[24] This study showed association between alcohol, tobacco use and hypertension because it is more prevalent in tobacco users and alcohol users as compared to non-users. Our study depicted that around two-third diabetic patients had hypertension. Another study revealed that the participants who were diabetic were 16 times more likely to be hypertensive than those who were not (AOR=16.322, CI: 2.321-114.771).[25]

CONCLUSION:

This study evaluated the prevalence and associated risk factors of hypertension. Hypertension was found to be statistically significant with increasing age, smoking, alcohol consumption, sedentary lifestyle, diabetes, central obesity and BMI >25. Screening programs for early detection of hypertension and health education program for prevention and control of hypertension are glaring necessities in the studied region.

Conflict of interest:
The authors declare that no competing interests exist.

Source of funds:
No funds were available.

REFERENCES

1. World Health Organization. A global brief on Hypertension. World Health Organization. WHO/DCO/WHD/2013.2, 2013. Available from: https://www.who.int/cardiovascular_diseases/publications/global_brief_hypertension/en/

2. World Health Organization. Sustainable Development and Healthy Environments. Hypertension fact sheet. 2017.

3. Ministry of Health and Population. Department of Health Services, Government of Nepal. Nepal Demographic and Health Survey (NDHS), report. 2016. http://www.mohp.gov.np/english/publication

4. Pan American Health Organization / WHO. World Hypertension Day 2017: Know your numbers. Available from: https://www.paho.org/hq/index.php?option=com_content&view=article&id=13257:diamundial-de-la-hipertension-2017-conoce-tus-numeros&Itemid=42345&lang=en

5. World Health Organization. WHO STEPS Surveillance Manual: the WHO STEPwise approach to chronic disease risk factor surveillance / Noncommunicable Diseases and Mental Health, World Health Organization. WHO. ISBN: 9241593830, 2005. Available from: https://apps.who.int/iris/handle/10665/43376

6. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. Journal of the American Medical Association. 2003;289(19):2560–72. PMID: 12748199. DOI: https://doi.org/10.1001/jama.289.19.2560

7. World Health Organization. Obesity: preventing and managing the global epidemic: report of the WHO consultation of obesity, Geneva, 3-5 June 1997. WHO. WHO/NUT/NCD/98.1, 1998. Available from: https://extranet.who.int/iris/restricted/handle/10665/63854

8. World Health Organization. Waist circumference and waist–hip ratio. WHO. ISBN: 9789241501491, 2008. Available from: https://apps.who.int/iris/bitstream/handle/10665/44583/9789241501491_eng.pdf?ua=1

9. Mahid SS, Minor KS, Stromberg AJ, Galandiuk S. Active and Passive Smoking in Childhood Is Related to the Development of Inflammatory Bowel Disease. Inflammatory Bowel Diseases. 2007;13(4):431-38. DOI: https://doi.org/10.1002/ibd.20070

10. World Health Organization. WHO STEPS Instrument (Core and Expanded). WHO. 2008. Available from: https://www.who.int/ncds/surveillance/steps/STEPS_Instrument_v2.1.pdf

11. Esteghamati A, Abbasi M, Alikhani S, Gouya MM, Delavari A, Shishehbor MH, et al. Prevalence, awareness, treatment, and risk factors associated with hypertension in the Iranian population: The national survey of risk factors for noncommunicable diseases of Iran. American Journal of Hypertension. 2008;21(6):620–26. DOI: https://doi.org/10.1038/ajh.2008.154

12. Asresahegn H, Tadesse F, Beyene E. Prevalence and associated factors of hypertension among adults in Ethiopia: a community based cross-sectional study. BMC Research Notes. 2017;10:629. DOI: https://doi.org/10.1186/s13104-017-2966-1

13. Chataut J, Adhikari RK, Sinha NP. Prevalence and risk factors for hypertension in adults living in central development region of Nepal. Kathmandu University Medical Journal. 2011;9(33):13-18. Available from: http://kumj.com.np/issue/33/13-18.pdf

14. Ministry of Health and Population. Department of Health Services, Government of Nepal. Non communicable diseases risk factors: STEPS survey Nepal, 2013.

15. Weber MA, Neutel JM, Cheung DG. Hypertension in the aged: a pathophysiologic basis for treatment. The American Journal of Cardiology. 1989;63(16):25H–32H. PMID: 2650521. DOI: https://doi.org/10.1016/0002-9149(89)90112-4

16. Abebe SM, Berhane Y, Worku A, Getachew A. Prevalence and associated factors of hypertension: a cross sectional community based study in Northwest Ethiopia. PLoS ONE. 2015;10(4):e0125210. PMID: 25909382.

DOI: http://dx.doi.org/10.1371%2Fjournal.pone.0125210

17. Dhungana RR, Devkota S, Khanal MK, Gurung Y, Giri RK, Parajuli RK, et al. Prevalence of cardiovascular health risk behaviours in a remote rural community of Sindhuli district, Nepal. BMC Cardiovasc Disorder. 2014;14:92. PMID: 25066117. DOI: https://doi.org/10.1186/1471-2261-14-92

18. Dhungana RR, Pandey AR, Bista B, Joshi S, Devkota S. Prevalence and associated factors of hypertension: A community-Based cross-sectional study in municipalities of Kathmandu, Nepal. International Journal of Hypertension. 2016:2016:1656938. PMID: 27293880. DOI: https://doi.org/10.1155/2016/1656938

19. Onal AE, Erbil S, Ozel S, Aciksari K, Tumerdem Y. The prevalence of and risk factors for hypertension in adults living in Istanbul. Blood Pressure. 2004;13(1):31–6. DOI: http://dx.doi.org/10.1080/08037050410025762

20. Larsson B, Svardsudd K, Welin L, Wilhelmsen L, Bjorntorp P, Tibblin G. Abdominal adipose tissue distribution, obesity, and risk of cardiovascular disease and death: 13 year follow up of participants in the study of men born in 1913. British Medical Journal (Clinical research ed.). 1984;288(6428):1401-4. PMID: 6426576. DOI: https://doi.org/10.1136/bmj.288.6428.1401

21. Rocchini AP, Key J, Bondie D, Chico R, Moorehead C, Katch V, et al. The effect of weight loss on the sensitivity of blood pressure to sodium in obese adolescents. The New England Journal of Medicine. 1989;321(9):580–5. PMID: 2668763. DOI: https://doi.org/10.1056/NEJM198908313210905

22. Bowman TS, Gaziano JM, Buring JE, Sesso HD. A prospective study of cigarette smoking and risk of incident hypertension in women. Journal of the American College of Cardiology. 2007;50(21):2085–92. PMID: 18021879. DOI: https://doi.org/10.1016/j.jacc.2007.08.017

23. Primatesta P, Falaschetti E, Gupta S, Marmot MG, Poulter NR. Association Between Smoking and Blood Pressure. Evidence From the Health Survey for England. Hypertension. 2001;37(2):187–93. DOI: https://doi.org/10.1161/01.HYP.37.2.187

24. Manandhar K, Koju R, Sinha NP, Humagain S. Prevalence and associated risk factors of hypertension among people aged 50 years and more in Banepa municipality Nepal. Kathmandu University Medical Journal. 2012;10(39):35-8. PMID: 23434959. DOI: https://doi.org/10.3126/kumj.v10i3.8015

25. Dhakal S, Singh R, Yadav UN, Gurung LB. Prevalence and factors associated with hypertension among elderly population in Dhapasi VDC of Kathmandu district. Journal of Hypertension: Open Access. 2017;6(3):242. DOI: https://doi.org/10.4172/2167-1095.1000242