Screening for Hypertension and Obesity in Rural Population of Nepal

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ABSTRACT

Background

Hypertension is a major non-communicable disease and obesity is a risk factor for non-communicable diseases around the globe. The prevalence of hypertension and obesity is gradually increasing in Nepal. Most cases in the rural population of Nepal remain undiagnosed due to lack of routine screening and awareness.

Objective

To screen the cases of hypertension and obesity in a rural population of Nepal and also to depict the association between them.

Method

A cross sectional study was used to collect data on age, sex, height, weight and blood pressure through a screening health camp. Only the respondents who were not already taking antihypertensive drugs were included in this study. The measurement of blood pressure and body mass index was done using standard instruments. Joint National Committee VII classification was used to classify hypertension and World Health Organization classification was used for Body Mass Index. Analysis was done in IBM SPSS version 20.

Result

Out of the total respondents, 69.8% were female and 30.2% were male, and mean age was 48.73 (±16.25) years. Among them, 375 (30.17%) respondents were found to be hypertensive and 137 (11.02%) were pre-hypertensive. Similarly, 27% male participants and 72 % female participants were obese. Almost three-fifths of the obese participants were hypertensive.

Conclusion

Pre-hypertension and hypertension were seen in 11.02% and 30.17% of the study population respectively. As routine screening of hypertension and obesity is not done in our country, most of them remain undiagnosed.

KEY WORDS

Health camp, Hypertension, Obesity, Rural population, Screening

INTRODUCTION

In developing countries the burden of disease has shifted from communicable to non-communicable diseases.[1] Hypertension is emerging as a public health problem.[2] Hypertension plays a major role in the causation of coronary heart disease, stroke and other vascular complications.[3] The STEPs survey reported a prevalence of hypertension in Nepal of 23.4% and the same study revealed that about 43% population never had their blood pressure measured and they remain unscreened.[4] Globally, about 13% of the adult population were obese and 39% of adults aged 18 years and over were overweight in 2014.[5] The relationship between BMI and blood pressure is nearly linear.[6]

There are limited epidemiological studies on hypertension and obesity screening in the rural population of Nepal and this article contributes to bridge that gap.

The objectives of this study were to find the cases of hypertension and obesity in a rural population, and to explore the association between them.

METHODS

A cross sectional study was conducted in four different parts of rural Nepal - Namtaar Village Development Committee(VDC) of Makwanpur District; Indrawatee VDC, Tipeni VDC and Thokarpa VDC of Sindupalchowk District during 2016. The four study areas were selected purposively as Kathmandu Medical College (KMC) was planning to conduct health camps for basic health checkups in those areas including screening for hypertension and obesity.

The sample size was calculated using the formula $Z^2 P(1-P)/d^2$, where Z is the statistic corresponding to level of confidence, P is expected prevalence and d is the precision or absolute error.

Considering the sample size of precision/absolute error of 5%, type I error of 5%(at confidence interval of 95%, Z=1.96), and the prevalence of hypertension to be 23.4% from the WHO STEPS surveillance Nepal 2013,[4] and non-response rate of 10%, the sample size calculated was 303. Considering the four study areas, the total sample size became 1212. Participants aged 18 years and above who were not already taking antihypertensive treatment and gave consent to participate in the study were included in this study. However, the health camps for basic health checkup were available for anyone of any age who visited the camp.

Information on age and sex of the participants were recorded and then they were rested for 10 minutes. Blood pressure was measured using standard sphygmomanometer (Doctor) by final year medical students from KMC.

Portable standard stature scale was used for measurement of height. After removing footwear such as shoes and slippers etc. and any hat or hair ties, Participants were asked to stand on a flat surface facing the interviewer with their feet together and heels against the backboard with knees straight. Then, they look straight ahead, ensuring that their eyes were at the same level as their ears. Height was recorded in centimeters. Weight was measured with a portable digital weighing scale (Equinox Model EB-EQ 33). Weight was recorded in kilograms. Body mass index (BMI) was calculated as BMI equals to weight in kilograms divided by height in meters square, and it was interpreted as per World Health Organization (WHO) guidelines.[7]

Blood pressure was measured by the auscultatory method with a random zero mercury sphygmomanometer (ALK) and standard cuff (12×34 cm). Before taking the measurements, participants were asked to sit quietly and rest for 10 minutes. Then, blood pressure measurement was taken in the seated position, in a chair with feet touching the floor and an arm support at the heart level. Only single episode of measurement of blood pressure (lowest of three readings) was taken.

Hypertension was defined as having systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg during the study as per guidelines of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure.[8]

All the data were recorded in register at the study site and were later entered in Statistical Package for Social Sciences (SPSS) Version 20 with cross-check done to ensure correct entry of data. Analysis was done using SPSS version 20. The relationship between BP and age, sex and BMI was calculated using chi-square. Ethical clearance was obtained from the Institutional Review Committee of KMC for granting permission to publish data to be collected during health camp. Permission was also taken from local leaders who were coordinating with KMC for organizing health camp who were told to inform about the study to the population before the day of health camp. Researcher ensured to maintain confidentiality of the participants by anonymizing data at the time they were collected by giving unique number to all the participants.

RESULTS

Out of the total participants who attended the health camps, 1243 fall under our inclusion criteria which were well above our required sample size. Nearly 70% of them (N=868) (69.8%) were female and remaining 375 were male; mean age of participants was 48.73 (±16.25) years (Table 1).

Out of 1243 respondents, two thirds of both male and female participants were of normal BMI, and 229 participants (18.4%) were pre-obese and 66 participants (5.3%) were obese (Table 2).

There was a statistically significant trend showing that with increasing age there was a reduction in prevalence of normal

Table 1. Age and sex distribution of the respondents

Age (Year)	Male N(%)	Female N(%)	Total N(%)
18-29	38(3.1)	174 (14.0)	212 (17.1)
30-39	36 (2.9)	122 (9.8)	158 (12.7)
40-49	46(3.7)	185 (14.9)	231 (18.6)
50-59	101 (8.1)	179 (14.4)	280 (22.5)
≥60	154 (12.4)	208 (16.7)	362 (29.1)
Total	**375 (30.2)**	**868 (69.8)**	**1243 (100.0)**

Table 2. Distribution of BMI

Body Mass Index	Male N(%)	Female N(%)	Total N(%)	P value
Underweight	56 (14.9)	92(19.6)	148 (11.9)	
Normal	247 (65.7)	553(63.7)	800 (64.4)	
Pre-obese	54 (14.4)	175(20.7)	229 (18.4)	0.026
Obese	18 (4.8)	48 (5.5)	66 (5.3)	
Total	**375(100)**	**868(100)**	**1243(100)**	

BMI Category: Underweight: <18.5; Normal: 18.5-24.9; Pre-obese: 25.0-29.9; Obese: >30

blood pressure, that a smaller proportion of men than women had a normal blood pressure and that increasing BMI was associated with a reduction in prevalence of normal blood pressure. Table 3 reveals that 137 (11.02%) were pre-hypertensive and 375 respondents (30.17%) were hypertensive. Out of hypertensive respondents, 233 (62.13%) were female. Similarly, 156 (41.6%) of them were of age more than 60 years. Fifty eight respondents (15.5%) with hypertension were of age less than 40 and 317 (84.5%) of more than 40 years of age (Table 3).

DISCUSSION

We studied prevalence of hypertension and obesity in rural population of age 18 years or above in Makwanpur and Sindhupalchok districts in Nepal. In our study, 69.8% were female and 30.2% were male, and mean age was 48.73 (±16.25) years. Among them, 375 (30.17%) respondents were found to be hypertensive and 137 (11.02%) were pre-hypertensive. Similarly, 27% male participants and 72 % female participants were obese. Almost three-fifths of the obese participants were hypertensive.

In this study, the prevalence of hypertension and pre-hypertension is much higher than the findings of the WHO STEPS 2 study which showed the prevalence of hypertension to be 23.4% under same criteria of definition of hypertension.[4] However, It is slightly lower than the finding of Sharma et al. using JNC VII criteria of hypertension, which stated the prevalence of hypertension to be 33.9%.[9] Similar camp based study conducted by Gupta et al. in urban population of Faridkot District, India found the raised systolic BP and diastolic BP among 25.3% and 25.5% of the study population respectively.[10]

Table 3. Association between background variables and hypertension

Variable		Normal N (%)	Pre-hyper-tension N (%)	Hyper-tension N (%)	Total N (%)	P-value
Age (Years)	<30	160 (75.47)	23 (10.85)	29 (13.68)	212 (100)	<0.001
	30-39	108 (68.36)	21 (13.29)	29 (18.35)	158 (100)	
	40-49	141 (61.03)	22 (9.53)	68 (29.44)	231 (100)	
	50-59	156 (55.71)	31 (11.07)	93 (33.21)	280 (100)	
	>60	166 (45.85)	40 (11.05)	156 (43.10)	362 (100)	
Sex	Male	182 (48.53)	51 (13.60)	142 (37.87)	375 (100)	<0.001
	Female	549 (63.24)	86 (9.91)	233 (26.84)	868 (100)	
BMI	Under weight	105 (70.95)	12 (8.11)	31 (20.95)	148 (100)	<0.001
	Normal	489 (61.12)	89 (11.12)	222 (27.75)	800 (100)	
	Pre-obese	115 (50.21)	29 (12.66)	85 (37.12)	229 (100)	
	Obese	22 (33.33)	7 (10.61)	37 (56.06)	66 (100)	
Total		**731 (58.81)**	**137(11.02)**	**375 (30.17)**	**1243 (100)**	

*Blood Pressure: Normal: <120/80 mm Hg; Pre-hypertension: 120-139/80-139 mm Hg; Hypertension: ≥140/90 mm Hg.

A report published by the WHO suggests that high BMI is one of the major risk factors for hypertension.[2] Population based studies indicate that at least two-thirds of the causes of hypertension can be directly attributed to obesity.[11] This study also revealed statistically significant association between hypertension and obesity (p<0.001). There is increasing trend of blood pressure with rising BMI. We were interested to find that almost 30% of the underweight adult population and one fifth of the participants having normal BMI were either pre-hypertensive or hypertensive. These findings, illustrate the need for blood pressure screening in populations with low or normal BMI as well as those with elevated BMI.

In this study, 11.02% of the respondents were in pre-hypertensive stage. The Framingham Heart Study, a cohort study, showed an increased risk of progression to hypertension from pre-hypertensive stage than from normotensive stage.[12] Screening of the population to detect pre-hypertension is equally important, so that interventions to be carried out in order to reverse the progression from pre-hypertensive to hypertensive state. The participants who were screened positive for hypertensive were given advice regarding diet, physical exercise, and need for medical interventions.

The limitation of this study is the sampling method, as people participating in screening health camp may not reflect the real picture of the Nepalese population. Only single episode of measurement of blood pressure (three readings) was taken, which may not be sufficient to diagnose hypertension in the population. There could be an error due to observer variation in hearing the Koratkoff sound in crowed places like screening health camps. However, in a developing country like Nepal, where routine screening and maintenance of data is not done on a regular basis, this sort of preliminary study can be vital for further studies. As reported in the results section, the male participants, especially young male in our sample is lesser than female participants. It is a common phenomenon for the male population in those study districts of Nepal to go for foreign employments.[13]

In this study though there were increased cases of hypertension in females however the proportions of hypertension were higher in males. This may be because sample size of females was higher than that of males (69.8% female versus 30.2% male) or this is a fact that male participants may be less likely to engage in health screening and that those remaining in the country may be less healthy than those who have left to work abroad. Probably, we do not know the answer to that question but we think we should acknowledge this possibility.

CONCLUSION

There were 11.02% and 30.17% cases of prehypertension and hypertension respectively. There was statistically significant association between hypertension and obesity ($p < 0.001$) in this study with blood pressure rising with increase in BMI. This study was conducted in the rural areas where most people were unaware of their blood pressure and BMI status. Due to lack of early screening and diagnosis, they are prone to developing complications leading to high morbidity and mortality. We can suggest from this study that regular opportunities for screening should be available for rural populations and there should be intensive public health awareness programs regarding risk factors for hypertension among them.

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