Is Ethnicity an Important Determinant of High Blood Pressure in Nepalese Population? A community-Based Cross-Sectional Study in Duwakot, Nepal

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ABSTRACT

Background

Hypertension is a rising public health problem in Nepal. Most of the upsurge is attributed to the behavioural and lifestyle transitions. However, the hereditary component such as ethnicity, which may also be an important determinant, has not been studied.

Objective

This study aims to investigate if ethnicity is a key determinant of having a high blood pressure in the Nepalese population.

Methods

A population-based cross sectional study was conducted in the Duwakot village of Bhaktapur District, Nepal. Systematic random sampling of the adults was done in all the nine wards. A total of 641 adults of both sexes, of age 35 years or more were included in the analysis.

Results

Most of the life-style related risk factors were comparable in the broad two ethnic groups- Tibeto-Burmans and Indo-Aryans. The prevalence of hypertension was 25.3% in the Tibeto-Burmans compared to the 14.0% in the Indo-Aryans. Crude odds ratio (95% CI) of being hypertensive for the Tibeto-Burmans compared to the Indo-Aryans was 2.07 (1.36-3.15) (p=0.01). After adjusting for the different factors the adjusted odds ratio (95% CI) for the same was found to be 1.78 (1.12-2.81) (p=0.014).

Conclusion

There is an ethnic variation in the blood pressure distribution in the Nepalese population, which might be acting independent of the different life-style factors. More elaborate studies, including longitudinal and migration studies, and probably genetic analyses, can provide a more definite answer.

KEY WORDS

blood pressure, ethnicity, Nepal

INTRODUCTION

Hypertension, which is a rising health problem throughout the world, is now a common cause of morbidity in Nepal as well. Various population-based studies have documented a high prevalence of the disease in the general population.[1,2] The studies done in different time periods and geographical settings all indicate towards a rise in the prevalence of hypertension in the Nepalese population. [1-4]

Nepal is a small country with more than 70 ethnic groups having different cultures and spoken languages.[5] According to a broad based categorization; they come from two main ethno-origins: Tibeto-Burman and Indo-Aryan. The two groups have respectively originated from the large-scale migrations of Mongoloid groups from Tibet and Indo-Aryan people from northern India which accompanied the early settlement of Nepal. Nepalese of Indo-Aryan ancestry comprise of, for example, the Brahmins and the Chhetris, the people of the Tarai, and the Tharus. The Tibeto-Burman group comprises of the Tamang, Rai, Limbu, Sherpa and Newars to name a few.

Studies done in the western countries, particularly United Kingdom and Canada, have demonstrated the varying prevalence of hypertension in the people with various ethnic backgrounds. [6-8] There has been no study done to determine the ethnic variation in the blood pressure status of the Nepalese population. This study was therefore undertaken to assess the association between ethnicity and hypertension in the Nepalese population.

METHODS

This population-based cross sectional study was conducted in the Duwakot village of Bhaktapur District, Nepal in November 2009. Duwakot is one of the sixteen village development committees (VDCs) of Bhaktapur District in the Kathmandu Valley. [9] There are about 1400 households in its nine wards with approximately 7500 residents. Ethnic majorities such as Brahmins and Chhetries each constitute a third of the population followed by Newars (29%) and marginalized castes (5%). The majority (75%) of the villagers are in to agriculture and livestock. Apart from the state-run sub health post with limited manpower and services, the locality is largely served by the 70-bedded Community Hospital run by Kathmandu Medical College. The Tertiary Care Referral hospital of the college is situated centrally at Sinamangal, Kathmandu, about 15 km away from Duwakot.

One hundred medical students, trained in measuring blood pressure and survey methodology, visited the selected households for data collection. Verbal consent was taken from those willing to participate. Standard procedures, instruments and questionnaires such as WHO-STEPwise manual were used.[10] All the subjects were questioned about demographic and dietary profile, physical activity and stress history, tobacco and alcohol taking habits, etc. Participants were labelled either 'Tibeto-Burman' or 'Indo-Aryan' according to their caste. A standard mercury sphygmomanometer with an adequate cuff size was used. Systolic pressure (SBP) was taken by the first heard sound (Korotkoff phase I). Diastolic pressure (DBP) was recorded at the level when the sound just disappeared (Korotkoff phase V). Two readings were taken on the right arm at least five minutes apart. Subjects were resting for at least five minutes, and had not smoked for at least 30 minutes before this measurement. The subjects were classified according to the Joint National Committee VII classification; those with blood pressures of normal and pre-hypertensive level were grouped as 'normal' and those in the hypertensive stages 1 and 2 were categorized as 'hypertensive'.[11]

Sample size for the study was calculated with the standard formula (4pq/L2) with the value of 'p' taken as 0.2 taking in to account previous studies from Nepal.[1-4] Systematic random sampling of the adults was done in all the nine wards of the village. Data analysis was done with SPSS version 16.0 software. Means (with standard deviations) and proportions were calculated and compared between the two groups using t-test and chi-square test respectively. Odds ratios (with 95% confidence interval) were estimated.

A separate ethical clearance letter was not obtained from the institute as the work was a part of the students' Community Diagnosis Programme. Informed verbal consent was obtained from the respondents.

RESULTS

A total of 641 adults of both sexes, of age 35 years or more and were included in the analysis. Altogether there were 443 Indo-Aryans and 198 Tibeto-Burmans with a similar male to female ratio in the two ethnic groups. Demographic, lifestyle and biological factors considered and their distribution in the two groups are presented in the Table 1. The odds ratio of the factors for the Tibeto-Burmans compared to the Indo-Aryans (table 1) show comparable characteristics such as age, literacy status, present job status, physical activity, stress level and tobacco use.

Table 1. Distribution of the biological and lifestyle factors in the study population, with Odds ratios (95% Confidence Interval) of the hypertensives being Tibeto-Burmans

Factor	Tibeto-Burmans (n=198) (%)	Indo-Aryans (n=443) (%)	Odds ratio* (95% CI) Tibeto-Burman vs. Indo-Aryans	p-value
Age >50 years	51.1	47.6	1.34 (0.96-1.88)	0.083
Illiterate	24.7	25.7	0.95(0.64-1.39)	0.845
Retired	36.9	30.2	1.34 (0.94-1.91)	0.098
Non-labour profession	55.8	44.2	1.57 (1.12-2.20)	0.010
High socio-economic status	58.6	46.5	1.62 (1.16-2.28)	0.005
Non-vegetarian	96.58	85.8	4.52 (2.03-10.06)	<0.001
Extra salt	21.7	26.0	1.26 (0.84- 1.88)	0.276
Irregular fruits consumption	87.4	80.4	1.69 (1.04-2.73)	0.019
Inadequate physical activity	41.9	42.2	0.98 (0.70-1.38)	0.945
High stress	22.7	22.1	0.96 (0.64-1.44)	0.865
Tobacco use	75.8	71.6	1.24 (0.84-1.84)	0.270
Alcohol use	83.3	58.0	3.75 (2.46-5.73)	<0.001
High Body Mass index (BMI)	48.0	33.2	1.85 (1.32-2.61)	<0.001
Increased Waist Hip Ratio (WHR)	71.7	37.5	4.23 (2.94-6.09)	<0.001

* reference category: age <50 years, literate, employed, labour profession, low socio-economic status, vegetarian, normal salt intake, regular fruit consumption, adequate physical activity, low stress, no tobacco use, no alcohol use, normal BMI, normal WHR, respectively.

The Tibeto-Burmans had more of alcohol drinkers and obesity than the Indo-Aryans. The systolic and diastolic blood pressure distribution of the Tibeto-Burmans and Indo-Aryans, as presented in figures 1 (a) and (b), show more Tibeto-Burmans in the range above the systolic and diastolic cut offs of 140 and 90 mm Hg respectively. The mean blood pressures with their standard deviations in the two ethnic groups are presented in the table 2. The measurements are slightly higher in the Tibeto-Burmans with statistical significance (p-values: 0.003 and 0.001 respectively for systolic and diastolic blood pressures).]

Table 2. Blood pressure parameters in the Tibeto-Burman and Indo-Aryan ethnic groups

	Tibeto-Burman	Indo-Aryans	p-value
Systolic Blood Pressure			
Mean [SD]	129.84 (19.55)	124.91 (19.33)	0.003
Range	80-205	80-230	
Diastolic Blood Pressure			
Mean [SD]	83.48 (12.76)	79.97 (11.93)	0.001
Range	50-120	50-130	

Table 3. Odds ratios (with 95% Confidence Interval), crude and adjusted* in the hypertensive population compared to the normotensive population

Tibeto-Burman vs. Indo-Aryans	Odds ratios (with 95% CI)	p-value
Crude odds ratio (95% CI)	2.07 (1.36-3.15)	0.010
Adjusted odds ratio (95% CI)	1.78 (1.12-2.81)	0.014

*adjusted for age, literacy status, profession, socioeconomic status, diet, salt intake, fruit consumption, physical activity, stress, Tobacco use, Alcohol use, BMI and WHR

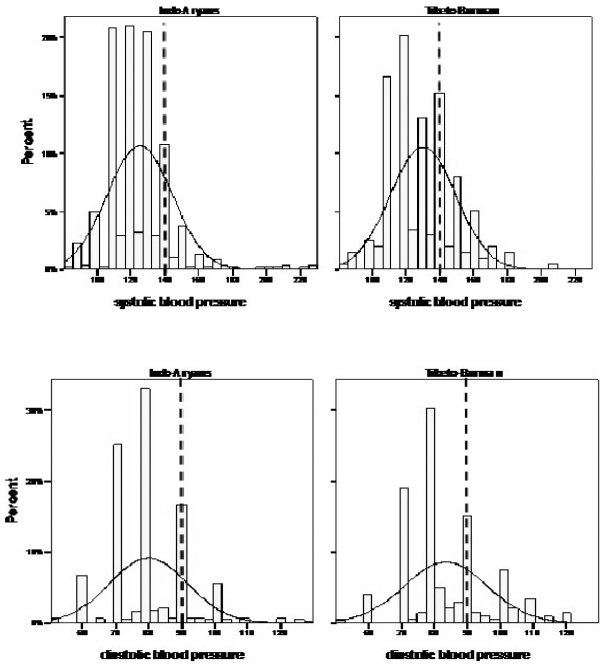

Figure 1. (a) Systolic and (b) Diastolic blood pressure distribution in the Indo-Aryans and Tibeto-Burmans. The interrupted lines indicate the cut-offs for hypertension (140 mmHg and 90 mm Hg) respectively.

Out of the 641 individuals, 112 (17.5%) were found to have high blood pressure at the time of the study. The prevalence of hypertension was higher in the Tibeto-Burmans (25.3%) than the Indo-Aryans (14.0) (p-value: 0.01). The crude odd of the hypertensives being Tibeto-Burmans was twice than the normotensive (table 3). When adjusted for the potential demographic and lifestyle confounders, the odds ratio was 1.78, signifying that the higher prevalence of hypertension in the Tibeto-Burmans is not fully explained by the demographic or lifestyle factors alone.

DISCUSSION

The prevalence of hypertension (17.5%) in this study population is comparable to the other recent studies from Nepal. [1,2] A study of urban males in the eastern town of Dharan showed a prevalence of 22.7%.[1] One of the pioneering studies in hypertension in Nepal which was done 25 years back had given prevalence rates ranging from 5-10% in the various geographical regions of Nepal. [3,4] The higher prevalence rates in the current studies compared to this study hints towards a mounting epidemic of high blood pressure in the country. There are only a few population-based studies on blood pressure in Nepal. Even more limited are the studies that compare the blood pressures across the subgroups of the population. For example, the Dharan study which compared the blood pressure across the different occupations, found the retired army-men had a higher prevalence than the males of other occupations.[2]

Studies in the developed countries also have shown ethnic variation in the blood pressure level across different races and ethnic groups. [5-7, 12-16] Most of them have found a greater cardiovascular risk for people of South Asian origin or the Blacks than the native Whites. More importantly, variations in the levels of detection and treatment as well as response to the treatment in the different races have also been demonstrated.[9] None of the studies involving South Asians mention Nepalese being included as well. As it would have been relevant to the present study in terms of the ethnic background of the two groups, there were not many studies comparing Chinese and Indian population. However, a study in Singapore had shown similar blood pressure levels in Chinese and Indian population.[17] However, difference in hypertension in the black and white people suggests the pathogenesis is likely to differ fundamentally in them and that even trivial ethnic differences in its optimal management can have large health resource implications.[18] One potential implementation of in-depth knowledge of the ethnic difference of hypertension in Nepalese population can be something similar to this.

CONCLUSION

Hence, the study indicates that there is possibly an ethnic variation in the blood pressure distribution in the Nepalese population, which might be acting independent of the different life-style factors. More elaborate studies, including longitudinal and migration studies, and probably genetic analyses, can provide a more definite answer.

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