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Prevalence and determinants of hypertension among adults: A cross-sectional survey of one tribal area in Bangladesh

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Abstract

Introduction: The prevalence of non-communicable diseases is not well known in tribal areas of Bangladesh. Lifestyle and food habits are quite different from most of the population living in plain lands (recognized as "Bengalee"). Though data are available regarding the latter, data on the tribal population is scanty.

Purpose: It was aimed to determine the prevalence and assess the risk factors of hypertension in a tribal area in Bangladesh.

Materials and Methods: We conducted a cross-sectional study of 637 men and women aged ≥18 years located in Rowangchhari THC of Bandarban, a hilly district of Bangladesh. Data on demographics, behavioral factors, physical measurements, and health history were collected, using a pretested questionnaire and clinical examination. A value of $P < 0.05$ was considered statistically significant.

Results: Among 637 participants, 52% were male and mean age 35.4±13.4 years. Almost 78% were from different tribal communities (e.g., Marma, Tonchonga, Bom, Tripura, Chakma etc.). Hypertension prevalence was 28.9% (95% CI 25.4 to 32.6) and was significantly higher among male than female (33.1% vs 24.3%; p-value= 0.014). The highest prevalence was observed among aged ≥60 years at 41.3%. Hypertension was higher among Bengali (33.6%) than tribal population (28.1%), but not statistically significant. Determinants of hypertension included male gender, older age, higher income, nature of job, increasing body mass index and waist circumference. >85% have knowledge of harmful effects of hypertension (86.9%) and smoking (91.2%).

Conclusion: Our study suggests that the prevalence of hypertension is significant among the population living in tribal areas.

Keywords: Hypertension; Prevalence; Risk factor; Tribal; Bangladesh

1. Introduction

Hypertension is a major risk factor for cardiovascular diseases (CVD), causing half of coronary heart disease and two thirds of the burden from cerebrovascular diseases worldwide [1]. Other diseases such as kidney failure, stroke, disability, and premature death are also linked to it [1]. According to research, worldwide high blood pressure is responsible for 13% of deaths each year [2]. Globally, hypertension prevalence is expected to rise from 26.2% in 2000

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to 29.2% by 2025. This will represent approximately 29% of the global population [3]. According to recent studies, non-communicable diseases such as hypertension are a problem in developed countries. However, most hypertensive people live in countries with low or low-middle-income, particularly in South Asia [4,5,6]. Recent studies have linked rapid urbanization and increased life expectancy to CVD and its risk factors, including hypertension [7].

Bangladesh, a low- and medium-income South Asian nation [8], is experiencing a transition in the epidemiology of communicable diseases to non-communicable ones [9,10]. The ongoing transition of the traditional diet from processed food to fast food, increased trends of sedentary life due to an improved socioeconomic standing, congested conditions of living, and lack of physical activity due to rapid urbanization could also contribute to the hypertension epidemic. Recent studies found that hypertension is prevalent in adults at a rate of 26.4%, with females bearing a disproportionately greater burden than males which is 25 times greater than it was in 1976 [1, 11]. The prevalence of hypertension in Bangladesh varies widely depending on study characteristics, study design, and target population. However, all previous studies confirm that the prevalence of hypertension among adults is increasing [12–14]. The lifestyle, economic, and social-demographic changes of rural and urban populations have all played a major role in the rise of NCDs such as hypertension [15]. Unfortunately, the prevalence of hypertension in Bangladesh and its risk factors, especially for tribal populations, are still not adequately studied.

Hypertension is caused by several factors that are both modifiable and non-modifiable. Risk factors such as race, gender, and age cannot be altered. Modifiable lifestyle-related risks include obesity, smoking, excessive alcohol consumption, food, and a lack of exercise. These factors may be pathogenic as well, for example in the cases of type 2 diabetes and dyslipidemia [16–17]. In different settings, there are many established associations between high blood pressure and certain risk factors [1, 3, 18, 19]. However, the extent to which these associations exist in tribal communities, particularly in Bangladesh, is still not well understood. This study was designed to assess the prevalence of high blood pressure and the risk factors in adult tribal communities in the Bandarban District in Bangladesh.

2. Material and Method

A community-based cross-sectional study was conducted at the Rowangchhari Thana Health Complex in Bandarban, a hilly district located in south-east Bangladesh. The study involved 637 participants, and a simple random sampling method was used to collect data. Participants were adults over 18 years of age who gave their consent. Hypertensive individuals, whether or not they were taking medication, also participated in the study. The study excluded individuals who were pregnant, bedridden, mentally compromised, or incapable of consenting. The study used a semi-structured, pretested questionnaire to gather information on the participants' sociodemographic profiles, their salt consumption, alcohol and tobacco intakes, and the results of a physical exam, which included weight, height, waist circumference (WC), body mass index (BMI), and blood pressure measurements.

A trained doctor performed the physical examination. The height was measured with the heel, buttock, and back of the neck touching the wall (Frankfurt plan) in an upright position. Weight was also measured with minimal clothing in kilograms. The waist circumference is measured using a measuring tool in a standing posture when the participant's weight is evenly distributed between both feet. This measurement was taken in the horizontal plane between the inferior margin of the last rib and the crest of the ilium [20].

Blood pressure was measured in a seated position with a standard aneroid adult-size sphygmomanometer. No alcohol or tobacco were consumed within the last 30 minutes. The JNC VII [22] criteria were used to diagnose hypertension. The systolic and diastolic pressures were measured three times in three minutes, with the lowest reading being recorded [21]. Hypertension was diagnosed if the systolic blood pressure was $\geq$ 140 mmHg and/or the diastolic blood pressure was $\geq$ 90 mmHg, or if the participant had a history of being hypertensive. BMI was calculated as weight in kg divided by the square of height in meters. Overweight and obesity are considered BMI values of > 25 and >30 respectively. Abdominal obesity was diagnosed in men with a waist circumference > 102cm and in women with a waist circumference > 88cm [21]. Smokers were defined as those who smoked cigarettes, bidis, or any other form of tobacco for at least six months. Those who consumed gul, sadapata, smokeless tobacco, or another type at least once daily during the six-month study period were classified as smokeless tobacco consumers. Alcohol users are those who consumed 10 grams or more of alcohol per day for six months before the study [23]. The daily salt consumption and intake were calculated. The trained doctors educated the participants about the importance of taking regular medications and risk factors for hypertension after taking blood pressure, physical measurements, and an interview. The chi-square test was applied to find out the association between hypertension and various determinants. The prevalence and 95% confidence interval were estimated for hypertension. SPSS version 25.0 was used. A value of $P<0.05$ was considered statistically significant.

3. Results

There were 637 participants in total, with a mean age of 35.4 ± 13.4 years. Most of the participants in this study were from < 30 and 30 – 44 years age group. They make up 77.1% of all study participants. The majority (52.1%) of study participants are male. Almost 78% of participants were from various tribal communities, with the Marma community having the highest participation (38%), followed by the Tonchonga tribe (23%). We had 22% Bengali respondents in this study. Over one-third of respondents (35.1%) were farmers. Meanwhile, 21.8% of respondents were housewives. More than half of all participants (56.2%) had a monthly salary of less than 10,000 Bangladeshi taka. We found that 29.8% of respondents were smokers, and 10.1% consumed alcohol at least 10 grams per day during the six months prior to data collection. About one-fourth (24.5%) of the participants add salt to their meals. Over two-thirds of participants (67.9%) had a normal BMI. Table 1 gives detailed descriptions of the participants.

Table 1 Sociodemographic characteristics among adults in one tribal district of Bangladesh (n-637)

Variable	Frequency	Percent	SBP (Mean±SD)	DBP (Mean±SD)
Gender				
Female	305	47.9%	123.1±16.4	79.0±9.2
Male	332	52.1%	126.6±14.6	76.6±9.6
Age				
< 30 Years	241	38.4	123.8±15.1	76.5±9.1
30-44 Years	243	38.7	125.2±15.8	79.2±9.6
45-59 Years	98	15.6	125.1±15.9	78.1±10.3
> 60 Years	46	7.3	130.7±15.6	78.3±8.2
Race				
Marma	236	38	123.5±15.5	77.6±9.9
Tonchonga	142	23	124.7±13.9	77.1±8.5
Bengali	137	22	125.2±16.6	78±9.7
Bom	49	8	129.1±18.4	78.7±9.2
Tripura	29	5	126.2±17.8	79.7±10.1
Others	15	2	124.3±15.7	78.7±9
Chakma	11	2	135.9±12.8	79.1±10.2
Hajong	5	1	126±5.5	82±7.6
Chak	1	0	130±0	80±0
Job				
Farmer	211	35.1	123.1±15.9	76.9±9.3
Housewife	131	21.8	121.3±16.5	76.8±10.1
Service	77	12.8	129.8±15.7	82.3±9.9
Business	59	9.8	130.1±12.6	79.5±8.8
Student	49	8.2	123.3±15	76.4±8.5
Workers	22	3.7	121.8±13.2	76.1±7.7
Teacher	17	2.8	133.8±10.7	82.1±7.7
Police	2	0.3	135±7.1	87.5±10.6
Politician	1	0.2	130±0	90±0

Others	32	5.3	128.1±16.6	77.5±9.3
Monthly Income				
<10000	350	56.2	122.4±15.7	76.2±8.9
10000-20000	156	25.0	124.3±15.1	78.9±10
20001-30000	64	10.3	130.1±13.7	80.2±8.9
30001-40000	32	5.1	134.5±12.8	82.7±8.6
40001-50000	9	1.4	133.9±12.9	80.6±9.5
>50000	12	1.9	138.3±9.4	82.9±10.1
BMI				
Underweight	25	3.9	118.2±13.5	75±7.1
Normal	430	67.9	123.6±15.3	76.9±9.5
Overweight	144	22.7	129.6±15.4	80.7±9.3
Obesity	34	5.4	128.4±16.8	80.9±8.8
Salt Intake				
Yes	152	24.5	125.6±15.4	77.5±9.6
No	469	75.5	124.9±15.7	77.8±9.4
Smoking				
Yes	189	29.8	125.1±15.6	78.3±9.6
No	445	70.2	124.9±15.6	77.7±9.4
Use of Alcohol				
Yes	64	10.1	126.6±17.8	79.1±10.7
No	572	89.9	124.8±15.3	77.7±9.3

The overall prevalence of hypertension in this study was 28.9% (95 % CI: 25.4%–32.6%) at the Rowangchhari Thana Health Complex of Bandarban. The prevalence of hypertension was higher in males (33.1%) than females (24.4%) (p-value=0.014) (Table 2). The prevalence of hypertension was found to be 22%, 31.7%, 35.7%, and 41.3%, respectively, among those under 30, between 30 and 44, between 45 and 59, and over 60 years old. As a result, Table 2 illustrates a tendency to increase hypertension with age.

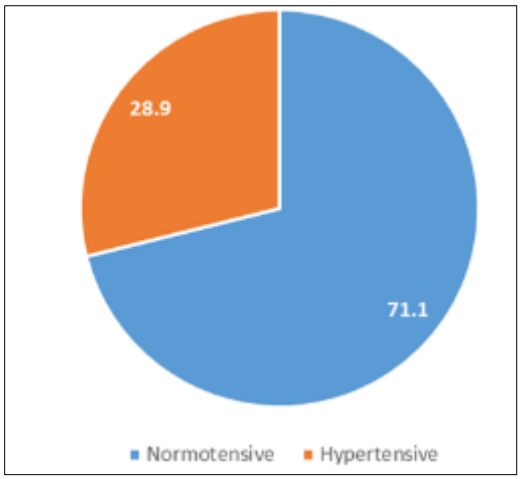

Figure 1 Overall prevalence of hypertension among study population (n-637)

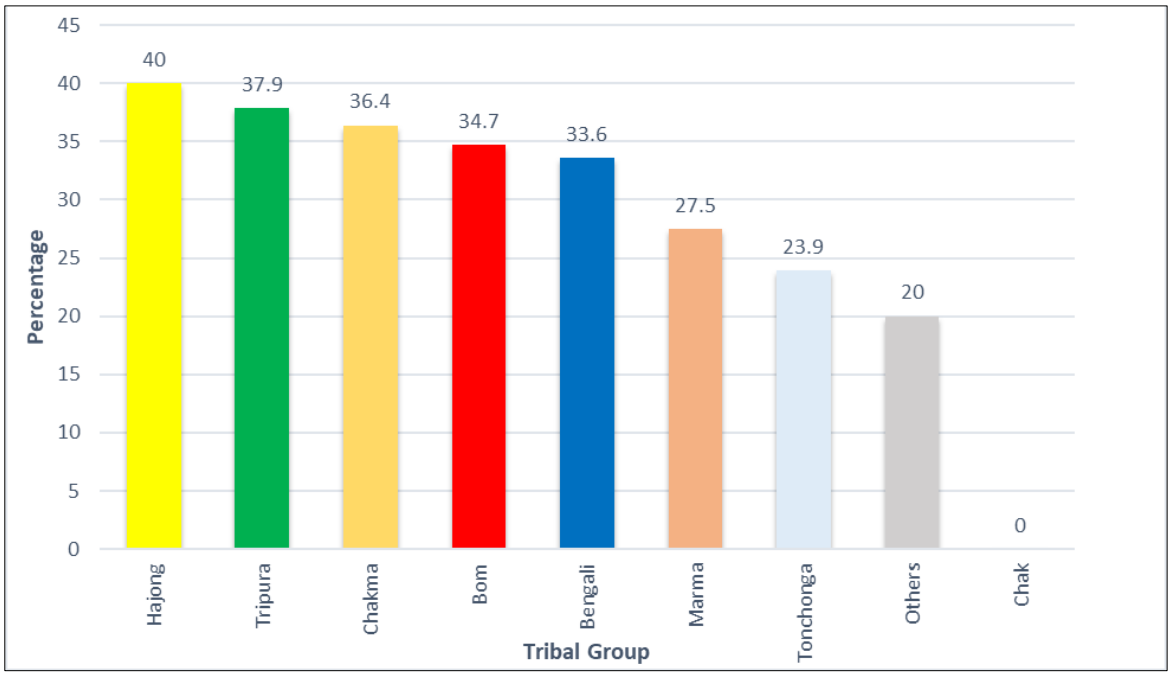

Figure 2 Prevalence of Hypertension in different tribal groups and Bengalees

Table 2 Prevalence of hypertension according to sociodemographic characteristics (n-637)

Variable	Normotensive	Hypertensive	P-value
	Frequency (%)	Frequency (%)	
Gender			
Male	222 (66.9%)	110 (33.1%)	0.014
Female	231 (75.7%)	74 (24.3%)	
Age			
<30 years	188 (78.0%)	53 (22.0%)	0.007
30-44 years	166 (68.3%)	77 (31.7%)	
45-59 years	63 (64.3%)	35 (35.7%)	
>60 years	27 (58.7%)	19 (41.3%)	
Race			
Bengali	91 (66.4%)	46 (33.6%)	0.552
Chakma	7 (63.6%)	4 (36.4%)	
Marma	171 (72.5%)	65 (27.5%)	
Chak	1 (100.0%)	0 (0.00%)	
Bom	32 (65.3%)	17 (34.7%)	
Tonchonga	108 (76.1%)	34 (23.9%)	
Tripura	18 (62.1%)	11 (37.9%)	
Hajong	3 (60.0%)	2 (40.0%)	

Others	12 (80.0%)	3 (20.0%)	
Job			
Service	46 (59.7%)	31 (40.3%)	0.015
Business	40 (67.8%)	19 (32.2%)	
Teacher	7 (41.2%)	10 (58.8%)	
Politician	0 (0.00%)	1 (100%)	
Student	38 (77.6%)	11 (22.4%)	
Housewife	98 (74.8%)	33 (25.2%)	
Farmer	158 (74.9%)	53 (25.1%)	
Workers	18 (81.8%)	4 (18.2%)	
Police	1 (50.0%)	1 (50.0%)	
Others	21 (65.6%)	11 (34.4%)	
Monthly Income			
<10000	271 (77.4%)	79 (22.6%)	< 0.001
10000-20000	107 (68.6%)	49 (31.4%)	
20001-30000	43 (67.2%)	21 (32.8%)	
30001-40000	15 (46.9%)	17 (53.1%)	
40001-50000	5 (55.6%)	4 (44.4%)	
>50000	4 (33.3%)	8 (66.7%)	
BMI			
Underweight	21 (84.0%)	4 (16.0%)	< 0.001
Normal	325 (75.6%)	105 (24.4%)	
Overweight	85 (59.0%)	59 (41.0%)	
Obesity	19 (55.9%)	15 (44.1%)	
Salt Intake			
YES	104 (68.4%)	48 (31.6%)	0.36
No	339 (72.3%)	130 (27.7%)	
Smoking			
Yes	133 (70.4%)	56 (29.6%)	0.826
No	317 (71.2%)	128 (28.8%)	
Alcohol			
Yes	41 (64.1%)	23 (35.9%)	0.182
No	412 (72.0%)	160 (28.0%)	

Regarding monthly incomes, hypertension prevalence was positively correlated with higher monthly incomes, reaching a maximum prevalence at 66.7% for those who earn more than 50,000 Taka each month ($p<0.001$). There was a statistically significant correlation between hypertension and sedentary work ($p=0.015$). This study found that higher BMI is positively related to a greater frequency of hypertension. The highest rate was observed in obese participants (44.1%), followed by those who were overweight (41.0%). Bengalis had higher blood pressure (33.6%) compared to the tribal population (28.1%), but this difference was not statistically significant. We also found that there was no

statistically significant association between salt consumption, alcohol intake and hypertension. More than 85% of the participants were aware of the harmful effects of hypertension (86.9%) and smoking (91.2%).

4. Discussion

This community-based, cross-sectional survey conducted at the Rowangchhari Thana Health Complex in Bandarban revealed that tribal people make up more than two-thirds of the population. In this region, we found a prevalence of hypertension of 28.9%. In a cross-sectional study conducted in two nationally representative waves of the Bangladesh Demographic and Health Survey, 2011 and 2017, with a sample size of 23539 respondents, the prevalence of hypertension among adults >35 increased from 25.84% to 39% (1). This study shows that hypertension increases in both urban and rural areas. However, there are few studies that have been conducted exclusively with the tribal community. Some myths claim that lifestyle-related diseases only affect the urban and wealthy, while those with a tribal lifestyle do not experience such illnesses as hypertension. Our study revealed that hypertension is also a problem for tribal people. In a study with Santhal tribal people in Bangladesh, a similar prevalence (24.4%) of hypertension was found [24]. The NNMB Tribal Survey, conducted by the National Institute of Nutrition at the ICMR in Hyderabad, found that the prevalence of hypertension was 24% among Indian tribal adults which is similar to our results [25].

Our study found that the prevalence of hypertension was higher in men than women (33.1% vs. 24.3%). In a similar way, many studies have shown that men are more likely to suffer from hypertension than women [26]. In Varanasi, a study found that the prevalence was 40.9% males and 26.0% females [27]. This could be because women are less likely to smoke and more inclined to use health services and report poor health, which may explain why they are healthier [27].

The highest prevalence rate was observed in those over 60 (41%) while the lowest was in younger age groups (22%). The positive association between age and hypertension is consistent with other studies [3, 28] from Bangladesh. The risk of developing hypertension increased as age increased [28].

This study found that a higher BMI is positively related to a greater prevalence of hypertension. The highest rates were observed in obese participants (44.1%), followed by those who are overweight (41.0%). The findings were similar to those of other studies [3, 25, 26, 27]. Physical activity, occupation, and other factors are also related to a higher BMI. Our study found that hypertension prevalence was associated with participants' job status. Participants with occupations such as service, business, or politics were more likely to have hypertension, while those with other jobs like worker, farmer, student, etc. had a lower prevalence. Hypertension was also more prevalent in those with higher incomes. Participants with incomes greater than 50000 Taka per month had hypertension more than 50%. Only 22% of participants had hypertension if their monthly income was below 10,000 Taka.

Like other populations, tribals also share many of the same risk factors as those in other populations. These include smoking, chewing tobacco, and drinking, which are likely to contribute to the high rate of hypertension. The majority of tribals, however, are workers and perform manual labor. In our study, we also discovered that hypertension is associated with smoking, drinking alcohol, and high sodium intake. However, it wasn't statistically significant.

The smaller sample size is one of the study's limitations. But we covered all the major tribal groups in the area, and our participants' professions and socioeconomic levels were also diverse. Our results, even though they are a small sample, will still represent the entire tribal community of the area. Data on medical conditions and drug histories, dietary habits or physical activities, hormonal treatment, dietary patterns, knowledge of the tribe, their attitude, or practice could not be collected.

5. Conclusion

In conclusion, our results indicate a high rate of hypertension in the tribal population the first time it has been unearthed. The main risk factors for hypertension were male gender, an older age group, a high body mass index, and a more sedentary work profile. By analyzing the results of this study, we recommend that specific interventions be designed to educate tribal populations about the need for lifestyle changes, the importance of early detection, and the need for campaigns to encourage early health seeking and improved health access. A study covering wider geographical areas with greater number of populations will substantiate our observation further.

Compliance with ethical standards

Disclosure of conflict of interest

No potential conflict of interest was reported by the authors.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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