



Original article

Prevalence of Hypertension and Associated Factors among College Students in West Bengal, India: A Cross Sectional Study

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ABSTRACT

Background: Hypertension is the commonest non-communicable disease affecting both sexes in all races. Obesity increases risk for hypertension. **Objectives:** Prevalence of hypertension among college students in suburban area of West Bengal, Eastern India and also to estimate association of BMI and arterial hypertension. **Methods:** A cross-sectional study was conducted during the period from July 2013 to May 2014, setting participants comprised of 522 college students. After obtaining informed consent from the college principal, a pretested questionnaire regarding age, physical activity and family history of hypertension, myocardial infarction and/or stroke was administered. Anthropometric measurements were taken. Blood pressure was measured with a standard mercury sphygmomanometer. **Results:** Overall prevalence of hypertension was found to be 61% (30% pre-hypertensive and 30% hypertensive) for boys and 33% (19% pre-hypertensive and 14% hypertensive) for girls. 76% overweight and obese males and 49% overweight and obese females were hypertensive where as it was 58% and 29% respectively for healthy males and females. Significant association was noted between hypertension and BMI as well as hypertension and male sex. **Conclusion:** A high burden of hypertension was observed among male and female college students in suburban area of West Bengal, India. Male sex and overweight were identified as independent risk factors of the disease. Preventive measures, such as increasing awareness and early screening for the disease in young adults warranted.

KEYWORDS: Hypertension, pre-hypertension, BMI, male sex.

INTRODUCTION

The prevalence of communicable disease is increasing in both the developed and developing countries due to ecological imbalance and change in lifestyle of man. Heart disease has been identified as single largest killer of the world. Forty million persons of India are estimated to be suffering from cardio vascular diseases [1].

Hypertension is the commonest non-communicable disease affecting both sexes in all races [2]. It places the affected individuals at an increased risk of cardiovascular accident, ischemic heart disease, stroke and renal failure [3]. This disease is referred to as a 'silent killer' [4]. Around one billion adult world population was found to have HT in the year 2000 and this is expected to increase to 1.56 billion by 2025 [5, 6]. In India 6-15% of the adults in different survey have been reported to suffering in hypertension [7]. In most

of the countries at least 8% population is estimated to be hypertensive [8].

Many factors have been identified as risk factors, such as male gender, advance age, parental history of hypertension, diabetes mellitus, body mass index (BMI), smoking and alcohol consumption [9]. One of the most important elements in the control of hypertension is early diagnosis. The age group 18-30 years is most appropriate group to evolve measures to prevent the future complication arising from high blood pressure. A few studies have been under taken so far on assessment of blood pressure among general degree college students.

This study was designed to determine the prevalence of arterial hypertension among clinically asymptomatic college

students having age limit 18-24 years and also to estimate the association between nutritional status and blood pressure.

MATERIALS AND METHODS

The study was conducted in a general degree college under the University of Burdwan. 522 students (242 male and 279 female) were included in this study. The subjects of this study were chosen at random irrespective of socioeconomic status and religion so that it can reflect an overall picture of blood pressure status of study region. Each student filled up questionnaires recording his/her age, gender, history of illness, family history of illness etc.

Measurement of blood pressure: Blood pressure was measured with a standard mercury sphygmomanometer. Before recording the blood pressure students were allowed to wait in separate room for 10 minutes to relieve their restlessness and anxiety. Each student was then called one by one and pressure was measured in the sitting posture in the right upper arm. Three readings were taken at 5 minute intervals and their mean was taken as subject's blood pressure. Systolic blood pressure was recorded on hearing the first sound (phase I) while diastolic blood pressure was taken on complete disappearance of Korotkov sounds (phase V). Normotensive, pre hypertensive and hypertensive status of blood pressure were estimated by considering the sixth report of Joint National Committee [10] using following reference values (table-1).

Table 1: Blood pressure status According to JNC-VI [10]

Status	Blood pressure level (mm Hg)
Normal	SBP <120 mm Hg and DBP <80 mm Hg
Pre Hypertensive	SBP 120 to 129 mm Hg and DBP 80 to 84 mm Hg
Stage I hypertensive	SBP 130 to 139 mm Hg and DBP 85 to 89 mm Hg
Stage II hypertensive	SBP 140 to 149 mm Hg and DBP 90 to 99 mm Hg
Hypotensive	SBP <90 mm Hg and DBP <60 mm Hg

Measurement of body weight: Body weight was measured using bathroom scale accurate to 0.5kg. The scale was kept on a flat surface and adjusted with '0' mark. Then the subject was requested to step on it in bare feet. Weights were taken in light cloth. Weight was recorded to the nearest 0.5kg.

Measurement of body height: Height was measured using anthropometric rod. Height of the subject was recorded

without footwear and expressed to the nearest 0.1cm. *Estimation of body mass index (BMI):* BMI was calculated from the height and weight using following equation: $BMI (kg/m^2) = \text{weight (kg)} / \text{height}^2 (m)$. Nutritional status was considered on the basis of BMI using following reference values (table-2) recommended by WHO [11].

Table 2: Nutritional status according to BMI [11]

BMI (kg/m ²)	Category
<18.5	Under weight
18.5-24.99	Normal
25.0-29.99	Over weight
>30.00	Obese

Statistical analysis: Data obtained from the study were given as mean \pm SD. The statistical significance was determined by student's t test. Two tail p values were used throughout and p value less than 0.05 were judged as statistically significant. Pearson correlation was used to find the significant relationship between blood pressure and BMI. Test was done to find out association between hypertension and BMI and in between hypertension and gender.

RESULTS

Particulars of the study subjects were given in table-3. There was no significant difference in age and BMI between male and female students. But height and weight differed significantly between male and females. 13% male and 24% females are under weight. 15% male and 19% female are under overweight. 3% subjects of both sexes are obese.

Mean blood pressure on the basis of nutritional status was represented in table-4. Both SBP and DBP were lower in underweight group than normal or overweight group of male and female students. Both the pressures were significantly higher in male than their female counterpart for overweight and obese group. In male and female students both SBP and DBP are significantly correlated with BMI (Table-5). Percentage of hypertensive and pre-hypertensive male was higher (30.58% each) than a female (14% and 19%) counterpart. 4% female was hypotensive but no male was hypotensive.

Percentage of pre-hypertensive and stage-I hypertensive were more in female than male counterpart. Percentage of subject with stage-II hypertensive was more in male than female subjects. Significant association was noted between nutritional status and hypertension of both sexes (table-6) and in between gender and hypertension (table-7).

Table 3: Demographic profile of the study subjects

	Male	female	P value
Number of subjects	242	279	----
Age (years)	20.50 ± 1.84	20.01 ± 2.02	>0.05
Height (cm)	168.81 ± 6.78	154.66 ± 5.46	<0.05
Weight (kg)	63.81 ± 11.38	52.37 ± 11.01	<0.05
BMI (kg/m ²)	22.33 ± 3.40	21.85 ± 4.14	>0.05
Physical activity : No	31 (13%)	45 (16%)	---
30min/day	126 (52%)	117 (42%)	----
60min/day	63 (26%)	67 (24%)	----
≤ 120min/day	22 (9%)	50 (18%)	----
Smoking: Nonsmokers	186 (77%)	279 (100%)	----
smokers	56 (23%)	nil	----

Table 4: Systolic and Diastolic blood pressure in relation to the nutritional status

Nutritional status	Male			Female		
	BMI(kg/m ²)	SBP (mm Hg)	DBP (mm Hg)	BMI(kg/m ²)	SBP (mm Hg)	DBP (mm Hg)
Under weight	17.69 ± 0.62	111.68 ± 10.80	69.42 ± 9.60	16.87 ± 1.30	105.48 ± 10.09	66.88 ± 8.52
Normal	21.76 ± 1.76	124.21 ± 13.82	75.54 ± 8.33	21.56 ± 1.83	114.64 ± 11.66	73.97 ± 8.62
Over weight and obese	28.08 ± 1.99	133.38 ± 11.12	81.29 ± 7.41	27.69 ± 2.25	118.63 ± 12.91	75.17 ± 9.72

Table 5: Correlation between blood pressure and BMI

Subject	SBP		DBP	
	r	p	r	p
Male	0.441	<0.001	0.327	<0.001
Female	0.366	<0.001	0.344	<0.001

Table 6: Blood pressure status in relation to BMI of the study subjects

BMI (kg/m ²)	Male		Female	
	Normotensive	Hypertensive	Normotensive	Hypertensive
≤24.99	84 (42.00%)	116 (58.00%)	146 (70.19%)	62 (29.81%)
>25.0	10 (23.80%)	32 (76.20%)	31 (50.82%)	30 (49.18%)
Chi square	4.83		7.87	
P value	<0.05		<0.01	

Table 7: Blood pressure status in relation to gender of the study subjects

Gender	Blood pressure status	
	Normotensive	Hypertensive
Male	94	148
Female	177	92
Chi square	37.16	
P value	<0.0001	

DISCUSSION

13% male and 24% females are under weight. 15% male and 19% female are under overweight. 3% subjects of both sexes are obese. Poor physical activity may be a cause of overweight and obesity as physical inactivity contributes to the weight gain and obesity in college aged young adults [10]. Both SBP and DBP was directly associated with BMI. Significant positive correlation was noted between BMI and blood pressure levels in both sexes.

This institution based cross-sectional study identified hypertension as a significant health problem among college students aged 18-24 years. Prevalence of hypertension according to the JNC-VI criteria was observed to be 22% without consideration of gender. The findings are consistent with that of a study done in Nigeria [12]. The prevalence of hypertension in this study was higher than the study conducted in Kuwait (7.0%) [13], Ethiopia (7.4%) [14] and India (10.5%) [15] But lower than study in Tunisia (35.1%) [16] and Gambia (38.0%) [17]. The differences may be due to differences in data collection method, population age group studied, socio economic status, ethnicity and time.

More than 30% males and 14% females were hypertensive. Remarkable percentage (24%) of study subjects was pre-hypertensive. Percentage of pre-hypertensive was more in male (30.58%) than female (17%). None of the students were aware of their hypertension status. A few studies that have been conducted in our country it was observed that the prevalence of hypertension was below 10% [12,13]. In a study conducted in Dehradun upon medical college students it was found that prevalence of hypertension was above 10% [15]. On observing the breakup of male hypertensive, it was observed that 50% in the category of pre-hypertension, 29% was stage-I hypertensive and 21% was stage-II hypertensive. Similarly, on breakup of female hypertensive it was observed that 56% in the category was pre-hypertension, 35% was stage-I hypertensive and 9% was stage-II hypertensive.

Higher BMI (>25 kg/m²) was one of the contributory factors for high blood pressure. 76% hypertensive males and 49% hypertensive females had BMI of >25 kg/m² and it were found to be statistically significant (table-6). Reddy et al [18] and Srivastava et al [15] also observed that BMI of >25 kg/m² contributed to high blood pressure in their population. Our study showed a positive association between sex and hypertension in which risk of hypertension increases with being men which is in the line with several studies [13, 16]

CONCLUSION

This study revealed that the prevalence of hypertension was soaring. Male sex and overweight were identified as independent risk factors for hypertension. Increase in body mass index is the most important predictor of elevated blood pressure. Sedentary life style is one of the contributors of high BMI. Preventive measures, such as increasing physical activity, awareness and early screening for the disease in young adults are warranted.

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