Original Article

Variation of blood pressure among the adolescent students

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Abstract

The increase in the burden of chronic disease associated with dietary and life style changes is of growing concern in Bangladesh and the adolescents are at the forefront of these changes. A very few studies have been carried out on the dietary intake, nutritional status and lifestyle pattern of adolescent in Bangladesh. This cross sectional study was carried out to determine the variation of blood pressure among adolescents and its association with socio-demographic factors, personal habits, dietary habits and body mass index. The study was conducted among one hundred and thirty students of adolescent age from selected school and college in Dhaka city during January to June 2012. Among 130 adolescents majority (50.8%) were male and 49.2% were female but no association was found between blood pressure and sex of the adolescent. Among the adolescents, 69.2% perform physical exercise but no association was found between the blood pressure and the exercise habit of the adolescent students. Among all the adolescents, 12.3% were smoker. The study assessed the association between blood pressure and smoking habit of the adolescent students & it was significant. Majority (70.80%) of the adolescents had history of taking extra salt but no association was found between the blood pressure and extra salt intake habit. Majority of the adolescent (86.2%) used to take fast food regularly but no association was found between the blood pressure and fast food intake habit. Majority of the adolescent 58.5% had positive family history of hypertension but no association was found between the blood pressure and family history of hypertensio. Among the adolescents, 40.0% had mental stress but no association was found between the blood pressure and mental stress. The study assessed the association between blood pressure and BMI of the adolescent students. But no association was found between the blood pressure and BMI. These findings might not have revealed the true picture regarding variation of blood pressure among adolescents and identify the risk factors responsible for this variation because the time was limited and sample size was small.

Kew Words : Blood Pressure, adolescent, variation in blood pressure

Introduction

Adolescent is defined by World Health Organization (WHO) includes person aged 10-19 years. The period of gradual transition from childhood to adulthood that normally begins with the onset of signs of puberty is characterized by important psychological and social changes. The normal range of onset is ages 8 to14 in females and ages 9 to 15 in males, with girls generally experiencing physiological growth characteristic of the onset of puberty two years before boys.[1]

It may be said that adolescents are a nutritionally vulnerable group for a number of specific reasons, including their requirements for growth, their eating patterns and lifestyles, their risk taking behavior and their susceptibility to environmental influences. Certain lifestyle habits including unhealthy dietary habits, smoking, physical inactivity is risk factors for cardiovascular diseases.

Blood pressure is the pressure exerted by circulating blood upon the walls of blood vessels. Various factors, such as age and gender influence average values, influence a person's average BP and variations occur. An individual's BP varies with exercise, salt intake, emotional reactions, sleep, digestion, stress, drugs, disease, standing or sitting position and time of the day. In case of adults we can say hypertension if blood pressure level is above 140/90 mmHg but the definition of hypertension is different in adolescents. In the adolescent the definition of hypertension is BP values that fall above the 95th percentile for age, gender and stature on at least three occasions[2]

The national high blood pressure education program has more recently staged hypertension, for adolescents, in

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this way :

- Normal Blood pressure- both systolic and diastolic blood pressure <90th percentile.
- Pre hypertension - systolic and/or diastolic blood pressure ≥90th percentile but <95th percentile or blood pressure ≥120/80 mmHg.
- Hypertension - either systolic and /or diastolic blood pressure ≥95th percentile for gender, age, height and measured upon three or more separate occasions.[3]

Teenagers can have secondary or essential hypertension. Secondary hypertension is caused by kidney or heart dysfunction. Thus the purpose of this study was to assess the association between variations of blood pressure among adolescents and factors responsible for this variation.

Methods

This cross sectional study was carried out to assess the variation of blood pressure among adolescent students during January to June 2012 at some selected school and college in Dhaka city. One hundred and thirty students were selected by systematic random sampling method and data were collected by face-to-face interview with the help of semi structured questionnaire and check list.

Data were analyzed by SPSS software (Version 19). Descriptive statistics included mean, median, SD and ranges for numerical data while frequency and proportion for categorical data. Data were presented in frequency table, bar diagram and pie chart as needed.

Ethical permission was obtained from the ethical committee of NIPSOM. Informed written consent was taken from each student prior to participate in the study. Privacy was maintained during data collection and confidentiality of data was maintained strictly.

Results

The study found that 75.8% male adolescents had normal blood pressure, 15.2% had pre-hypertension and 9.1% had hypertension. On the other hand 79.7% female adolescents had normal blood pressure, 10.9% had pre-hypertension and 9.4% had hypertension. This difference of blood pressure among male and female was not statistically significant (2, p>0.05). (Table-I)

Table-I: Distribution of blood pressure by sex of the students

Sex	Blood Pressure			Total
	Normal	Pre - Hypertension	Hypertension	
Male	50	10	06	66
	75.8%	15.2%	9.1%	100.0%
Female	51	07	06	64
	79.7%	10.9%	09.4%	100.0%
Total	101	17	12	130
	77.7%	13.1%	09.2%	100.0%
Significance	^{2} = 0.51, df=2, p=0.77			

Among the students who used to perform physical exercise, 7.5% had pre-hypertension and 7.5% had hypertension while among the students didn't perform physical exercise, 15.6% had pre-hypertension and 10.0% had hypertension. But the difference was not statistically significant (2, p>0.05). (Table-II)

Table-II: Association between blood pressure and exercise

Exercise	Blood Pressure			Total
	Normal	Pre- Hypertension	Hypertension	
Yes	34	03	03	40
	85.0%	7.5%	7.5%	100.0%
No	67	14	09	90
	74.4%	15.6%	10.0%	100.0%
Total	101	17	12	130
	77.7%	13.1%	9.2%	100.0%

Among the non-smoker students, 31.3% had pre-hypertension and 6.3% had hypertension whereas among the smoker students, 10.5% had pre-hypertension and 9.6% had hypertension and this difference was statistically significant (2, p<0.05). (Table-III)

Table-III: Association between blood pressure and smoking

Smoking	Blood Pressure			Total
	Normal	Pre -Hypertension	Hypertension	
Yes	10	05	01	16
	62.5%	31.3%	6.3%	100.0%
No	91	12	11	114
	79.8%	10.5%	9.6%	100.0%
Total	101	17	12	130
	77.7%	13.1%	9.2%	100.0%

Among the students with the habit of extra salt intake, 13.0% had pre-hypertension and 9.8% had hypertension while among the students with habit of normal salt intake, 13.1% had pre-hypertension and 9.2% had hypertension but the difference was not statistically significant (p > 0.05), (Table-IV)

Table- IV: Association between blood pressure and extra salt intake

Extra Salt Intake	Blood Pressure			Total
	Normal	Pre-Hypertension	Hypertension	
Yes	71	12	09	92
	77.2%	13.0%	9.8%	100.0%
No	30	05	03	38
	78.9%	13.2%	7.9%	100.0%
Total	101	17	12	130
	77.7%	13.1%	9.2%	100.0%

Among the underweight students, 10% had hypertension while among the adolescent with normal BMI, 7.5% had hypertension. Among overweight students, 8.7% had hypertension while among the obese students, 50.0% had hypertension but the difference was not statistically significant (p> 0.05). (Table-V)

Table-V: Association between blood pressure and obesity (based on BMI)

Obesity	Blood Pressure			Total
	Normal	Pre -Hypertension	Hypertension	
Underweight	09	00	01	10
	90.0%	.0%	10.0%	100.0%
Normal Range	72	14	07	93
	77.4%	15.1%	7.5%	100.0%
Overweight	18	03	02	23
	78.3%	13.0%	8.7%	100.0%
Obese	02	00	02	04
	50.0%	0.0%	50.0%	100.0%
Total	101	17	12	130
	77.7%	13.1%	9.2%	100.0%

Discussion

Among the adolescents, majority (50.8%) was male and the rest (49.2%) was female. The study revealed that among the male adolescents, 75.8% had normal blood pressure, 15.2% had pre-hypertension and 9.1% had hypertension. Among the female adolescents, 10.9% had pre-hypertension and 9.4% had hypertension, but this difference was not statistically significant [p=0.77]. These findings were different from the findings of a study conducted by Nirav Buch et al[4] in India where prevalence of hypertension in males was 6.74% and females were 6.13%. Significant increasing trend of BP was found among the males. Another study conducted by Katona E et al[5] found that BP for boys was higher than for girls (BP systolic=11mmHg; BP diastolic=2 mmHg, P< 0.001).

The study found that majority (58.5%) of the adolescents had family history of hypertension and majority (32.9%) and in majority cases affected parent was mother followed by father (25.0%), both parent (17.1%), paternal grandparent (9.2%), mother and siblings (5.3%) & mother and maternal grandparents (3.9%).

The study found that among the adolescents with family history of hypertension, 14.5% had pre-hypertension and 6.6% had hypertension and among the adolescents without family history of hypertension, 11.1% had pre-hypertension and 13.0% had hypertension.

This findings differed with the findings of the study conducted by Nivraz Buch et al[4] where the prevalence of hypertension was 18.6% among the participants with family history. Family history of hypertension was significant risk factor for hypertension as evident in many studies like Zambian study[6] which showed that parental history before age of 60 was related to offspring hypertension. Studies from India like Verma et al,[7] Soundarssanance et al[8] and Gupta et al[9] also reported similar observation. This association also demonstrated in many studies like Norwegin study[10] and Taiwan study.[11] Many studies from India[7,8,12] had similar observations. Similar observations were also reported among adolescents population in Hungary[13] and France.[14] But in this present study such relationship could not observed which might due to inadequate screening of parents and smaller sample size.

According to BMI, maximum (71.5%) adolescents was within normal range while 17.7% were overweight, 17.7% were underweight and 3.1% were obese and mean (±SD) BMI was 22.58±2.96. Among the underweightadolescents, 10% had hypertension while

among the adolescents with normal BMI, 15.1% had pre-hypertension and 7.5% had hypertension. On the contrary, among the overweight adolescents, 13.0% had pre-hypertension and 8.7% had hypertension while among the obese adolescents, 50.0% had hypertension but the difference was not statistically significant.

These findings were different from the study done by Nirab Buch [4] et al where they found significant rise of hypertension with obesity in both sex group, around 30% obese children in their study had hypertension. This association also demonstrated in many studies like Norwegian study[10] and Taiwan study.[11] In this present study this association could not be observed due to small sample size.

This cross sectional study was conducted among adolescent students to assess the variation of blood pressure and the related risk factors responsible. Variation of blood pressure was revealed with regard to socio-demographic feature, personal and dietary habits, and body mass index of the adolescents. The study findings will contribute to device affective measures for prevention of hypertension among the adolescents. It will also draw attention of the researchers, health care providers to put due attention to the adolescent health care especially for early detection and prevention of high blood pressure.

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