



## **Short Communication**

### **A Study on Prevalence of Hypertension and Major Associated Factors among School going Adolescents (13-16years) in two Schools in Santragachi Municipal area of Howrah, West Bengal**

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**Summary:** Adolescence is characterized by an exceptionally rapid rate of growth and is often variable in individuals due to its dependence on genetic, hormonal and nutritional factors. Today's adolescent are more engaged in indoor activities due to computer, internet, video games and due to high consumption of junk food and low level of physical activity, which make them prone towards many non communicable diseases like obesity, hypertension and diabetes mellitus at an earlier age.

The aim of the study was to find out the prevalence of hypertension among school children of 13 to 16 years of age & to observe some modifiable risk factors which may be associated with high blood pressure.

A cross sectional study was conducted in two schools which were selected randomly in Santragachi Howrah. Adolescent school children (n=94) of age ranging from 13 - 16 years were selected for the study. Blood pressure was measured by mercury sphygmomanometer.

Overall Hypertension was noted in 3.2% of adolescent study subjects in this study. Systolic pre-hypertension was noted among 29.8% of students and Diastolic pre-hypertension was

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noted among 39.4% students respectively. 38.29% of adolescents were found to be obese.

Looking at the high prevalence of fast food consumption & more indoor activities, target group intervention and large study are required.

**Keywords: Adolescence, Hypertension, Body Mass Index, Junk food**

**Introduction :** Hypertension (HTN) is an important public health problem in both economically developed and developing nations [1]. It is the commonest cardiovascular disorder affecting about 20% adult population worldwide & one of the major risk factor for cardiovascular mortality. Hypertension (HTN), known as high blood pressure, is a long term medical condition in which the blood pressure in the arteries is persistently elevated. Though hypertension is a problem of adults, but its etiologic process starts in childhood. Evidences across the globe have documented prevalence of childhood hypertension 1-2% in the developed countries and 5-10% in the developing countries [2]. The prevalence of hypertension in various Indian studies ranges from 0.96% to 11.4%, respectively [3]. High blood pressure is classified as either primary hypertension or secondary hypertension [4]. The National Health Blood Pressure Education Programme (NHBPEP) has published definitions of prehypertension & hypertension in children & adolescent. Stage I hypertension is defined as an average systolic & diastolic blood pressure level that is in the 95th to <99th percentile plus 5 mm Hg. Stage II hypertension is defined as an average systolic & diastolic blood pressure level that is in the >99th percentile plus 5 mm Hg. Pre-hypertension in children is defined as average systolic blood pressure (SBP) or diastolic blood pressure (DBP) levels of 90th percentile or higher but less than 95th percentile for gender, age and height on at least three separate occasions. Hypertension is defined as average SBP or DBP of 95th percentile or higher for gender, age and height on at least three separate occasions [5]. In view of the scanty evidence the present study was planned to find out:

- (1) The prevalence of hypertension among adolescent school children
- (2) To observe some modifiable factors which may be associated with high Blood Pressure.

**Materials & Methods:** A cross sectional study was carried out from February 16<sup>th</sup> to August 29<sup>th</sup>, 2017 in two selected higher secondary schools in Santragachi, West Bengal.

**Study Procedure:** Out of eleven schools in Santagati area, two schools one Boys' and one Girls' school had been selected conveniently (Purposive). As the target age group of the

children were between 13 to 16 years, the students of class eight to class eleven were chosen for the study.

The number children from class eight to eleven in two selected schools counted to be 400. Out of 400 students 25% or 100 students were selected for the study. Due to constraint of time, 25% of the adolescent students (13 to 16 years only) were selected for the study.

100 students were selected randomly from two schools, 50 students each from boys' and girls' school respectively using simple random number. The selected boys and girls were called for interview and examination. Permission from school authorities was sought. A consent was taken from their parent before Interview.

A questionnaire was prepared, and pretested before use. Last three months recall period was followed for asking risk factors in the study. Because of constraint of time and manpower and other limitation only Junk food and salty food were considered in the study. Study of other risk factors could have shown better results. After explaining the objectives as well as the study procedure, the questionnaires were distributed to the selected students in a class room and asked to deposit in a container on table after completion.

After excluding incompletely filled in questionnaires, 48 questionnaires from boys and 46 questionnaires from girls were taken for analysis. Actually the study questionnaire had 22 questions and one for frequency of consumption of junk food taking. The filled in questionnaire which had two or more unanswered questions or partial answer was considered as incomplete. Thus total 94 completed questionnaires were analysed. The age was determined to the nearest birth date from the school registration record. The blood pressure was measured using a standard mercury sphygmomanometer. The study subject was seated at rest prior to measurements. Readings were taken on the right arm. BP was measured three times, keeping minimum interval period of 10 minutes. The average of all three readings was used to represent the individual's BP. Pre-hypertension in children was defined as average systolic blood pressure (SBP) or diastolic blood pressure (DBP) levels of 90th percentile or higher but less than 95 th percentile for gender, age and height on at least three separate occasions. Hypertension was defined as average SBP or DBP of 95th percentile or higher for gender, age and height on at least three separate occasions <sup>[7]</sup>

#### **Anthropometric measurements:**

Anthropometric rod was used for height measurement & Digital weighing machine used for weight measurement. Height was measured with the subject standing in an erect position

against a wall and with the head fixed against head piece and the top of external auditory meatus was in level with the inferior margin of the bony orbit. Body weight was measured with the subject standing motionless & wearing minimum cloths.

Student who had BMI for age  $\geq$ median -2SD to  $+ < 1$ SD of reference population were classified as normal. Students who had BMI for age median  $\geq +1$ SD to  $< + 3$ SD of reference population were classified as overweight .Students who had BMI for age  $<$  median -3SD of reference population were classified as severe undernutrition. [8]

Because two Schools (one boys' and one girls') had been selected conveniently (purposive), statistical test ideally could not be applied in the study.

Data have not been analyzed to show association of modifiable risk factors with high blood pressure (i.e.,among the hypertensives how many were obese or how many had the history of frequency of taking junk food or family history of hypertension.) .

It has been analyzed to show among the total participants what proportion were obese or had history of frequency of taking junk food or family history of hypertension

**Results:** A total of 94 participants from 2 schools (boys' & Girls') between the ages of 13-16 years were included in the study and data were analyzed for the study. Most of the students (39.4%) belonged to the age of 14years. Over all prevalence of hypertension was 3.2%. Among the prehypertensive students more (39.4%) students found to suffer from high diastolic blood pressure than systolic high pressure (29.8%). [Table 1]

More than one third (38.29%) of study subjects were found obese in this study. Females were found to be more obese (45.65%) than males (31.25%). Only 3.19% students were under weight or thin. [Table 2]

58.51 % of the students belong to the group of normal BMI of which male were 64.58 % & female 52.17 %.Overall 38.29% of the study population were obese and 3% of the study subjects were underweight [Table no. 2].

Some relation was noted between obese person and use of junk food. Junk food was defined as food that is high in calories and low in nutritional content.

Most of the obese children (75%) reported to consume junk food in high frequency

(More than 3 times a day) in this study, whereas only one fourth (23.63%) among normal children found to consume Junk food in high frequency. [Table 3]

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More than two third (66.66%) of the Children with high systolic BP found to consume salty food in high frequency (3-7 times a day). However only three children had systolic hypertension and two out of three children had history of consuming salty food in high frequency.[Table 4]

Only 27.77% among normotensive children found to consume salty food in high frequency .[Table 5]

About half (48.9%) of all children had the history of high BP in their Family. Only 38.3% of the respondents had no definite history of Hypertension in their Family in this study. [Table 6]

**Table no. 1**

### **Distribution of study subjects according to their Blood Pressure**

Systolic blood pressure			Diastolic blood pressure	
Grade	Frequency	Percent	Frequency	Percent
Normal	63	67.0	54	57.4
Pre hypertension	28	29.8	37	39.4
Stage 1 Hypertension	3	3.2	3	3.2
Stage 2 Hypertension	0	0	0	0
Total	94	100	94	100

3.2% students were hypertensives and 39.4% were prehypertensives

**Table no. 2**

### **Distribution of study subjects according to BMI**

BMI	Male	Female	Total
Normal	31(64.58%)	24(52.17%)	55 (58.51%)
Obese	15(31.25%)	21 (45.65%)	36 (38.29%)
Thin	2 (4.16%)	1(2.17%)	3 (3.19%)
Total	48(100%)	46 (100%)	94 (100%)

Overall more than one third 36 (38.29%) students were obese. Proportionally Female (45.65%) were more obese than male (31.25%).

Table 3

**Subject with BMI and frequency of taking junk food**

BMI	Frequency of taking Junk food			
	High frequency number (%)	Optimum frequency number (%)	Never Number (%)	Total
Normal	13( 23.63)	31(56.36)	11( 20.00)	55(100%)
Obese	27( 75.00)	6 (16.66)	3( 8.33)	36 (100%)
Thin	1( 33.33)	1( 33.33)	1(33.33)	3 (100%)
<b>Total</b>	<b>41(43.61%)</b>	<b>38(40.42%)</b>	<b>15(15.95%)</b>	<b>94(100%)</b>

Most of the obese (75.00%) children consumed junk food in high frequency

Table 4

**Systolic blood pressure vs frequency of consuming salty food**

Systolic blood pressure	Frequency of taking salty food			
	High frequency	Optimum frequency	Never	Total
Normal	22(34.92%)	37 (58.73%)	4 (6.34%)	63 (100%)
Pre hypertension	25(89.28%)	2 (7.14%)	1 (3.57%)	28 (100%)
Stage 1 Hypertension	2(66.66%)	1(33.33%)	0	3(100%)
<b>Total</b>	<b>49(52.12%)</b>	<b>40(42.55%)</b>	<b>5(5.31%)</b>	<b>94(100%)</b>
<b>High frequency: 3-7 times a day, Optimum frequency: 1-3 times a day</b>				

Nearly 90% of the children among prehypertensive category and two third (66.66%) among hypertensive adolescents found to consume salty food in high frequency (3-7 times a day) than among normotensive (34.92%) category children.

Table 5

**Diastolic blood pressure vs salty food**

Diastolic Blood pressure	Frequency of Salty Food			
	High frequency	Optimum frequency	Never	Total
Normal	15 (27.77%)	35 (64.81%)	4(7.40%)	54(100%)
Pre hypertension	33 (89.18%)	3 (8.10%)	1(2.70%)	37(100%)
Stage 1 Hypertension	2(66.66%)	1(33.33%)	0	3(100%)

<b>Total</b>	<b>50(53.19%)</b>	<b>39(41.48%)</b>	<b>5(5.31%)</b>	<b>94(100%)</b>
<b>High frequency: 3-7 times a day,</b>		<b>Optimum frequency: 1-3 times a day</b>		

Two out of three children with hypertension ( 66.66%) had the history of consuming salty food in high frequency ( 3-7 times a day) and nearly 90% ( 89.18%) among prehypertensive adolescents had the history of consuming salty food in high frequency . Among normotensive adolescents only one fourth ( 27.77%) had the history of taking salty food in high frequency.

**Salty food= Snacks or foods that are high in salt and quick to consume.**

**Table 6**

**Family history of hypertension of adolescent school children**

<b>Family history of hypertension</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	<b>46</b>	<b>48.9</b>
<b>No</b>	<b>36</b>	<b>38.3</b>
<b>Do not know</b>	<b>12</b>	<b>12.8</b>
<b>Total</b>	<b>94</b>	<b>100</b>

About half (48.9%) of all children had the history of high BP in their Family. Only 38.3% of adolescents had no definite family history.

**Discussion:**

Early identification of hypertension and prehypertension translates into early interventions and possibly prevention of later morbidity and mortality. <sup>[10]</sup> In the present study, the prevalence of hypertension found to be 3.2% [table no.1]. No stage 2 Hypertension was found in this study. It was almost similar to other Indian studies from rural area. Mohan *et al* <sup>[11]</sup> in their study among children from rural area reported the prevalence of 2.56% . .

Similarly, Savitha *et al.* showed no such sex predilection for hypertension among males and females <sup>[12]</sup>. Adolescent Hypertension is an emerging epidemic in India and the complications of hypertension like stroke, retinopathy.

Adolescent overweight has been linked to comorbidities such as dyslipidemia, hypertension etc.. The strong relationship between hypertension and diet habits has been well proved through various studies. Junk food intake was high among children and adolescents who were hypertensive <sup>[12]</sup>. Saha et al. in West Bengal found similar picture (2.9%) among adolescent

children. Another interesting finding of the current study was the influence of junk food on BMI [Table no. 3]. Most of the children in obese group (75.00%) consumed junk food in high frequency in this study compared to less in normal group (23.63%). In one International study Irene Brathwaste et al. found similar findings<sup>[13]</sup> Children in the frequent and very frequent groups had a BMI that was 0.15 and 0.22 kg/m<sup>2</sup> higher than those in the infrequent group (p<0.001). In the current study, both SBP and DBP were found to be more among those children who consumed salty food in high frequency (3-7 times a day) than among the children who consumed salty food in optimum frequency or below. [Table no. 4 & 5]. In Kumar Amritanshu study significant association was found between hypertension and additional salt intake. Over all out of 94 students, 46 children (table 6) had positive family history (48.9%) of hypertension in this study. However among hypertensive children how many had positive family history was not studied.

### **Conclusion:**

Children with family history of hypertension should be targeted for primary prevention in vigorous manner along with dietary and lifestyle modification. Knowledge about prevalence, early and appropriate diagnosis is important since even a small decrease in blood pressure can have substantial effect on hypertension related morbidity and mortality, greater attention on blood pressure in early life ultimately lead to considerable improvements in cardiovascular health.

### **References**

1. Kearney P. M. Whelton M, K. Reynolds, Whelton P. K, and J. He, "Worldwide prevalence of hypertension: a systematic review," *Journal of Hypertension*, vol. 22, no. 1, pp. 11–19, 2004.
2. GB Luma, RT Spiotta. Hypertension in children and adolescents. *Am Fam Physician* 2006;73:1558-68.
3. De Onis M, M Blössner. Prevalence and trends of overweight among preschool children in developing countries. *Am J Clin. Nutr.* 2000; 72:1032-9 .



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4. Poulter, NR; Prabhakaran, D; Caulfield, M (22 August 2015). "Hypertension". *Lancet*. **386** (9995): 801–12. doi:10.1016/s0140-6736(14)61468-9. PMID 25832858. Hypertension-Wikipedia, date of last access 11<sup>th</sup> April 2019.
5. Riley Margaret, Arbor Arbor, bluhm brian, University of Michigan Medical School, Integrated Health Associates, Ann Arbor, Michigan. High blood pressure in Children and adolescents; *Am Fam Physician*. 2012 Apr 1;85(7):693-700 last accessed on 12.04.2019
6. . Saha Indranil, paul Bobby, Dasgupta A, Prevalence of hypertension & variation of blood pressure with age among adolescents in Chetla, India, Tanzania Journal Of Health Research(2008), vol.10,No.2,DOI:10.43.14/thrb.v10i2.14349,pubmed
7. National high pressure education programme working group on high blood pressure in children & adolescents. *pediatric*.2004;114(2suppl 4<sup>th</sup> report):555-576[PubMed]
8. World Health Organization.(REF) WHO Growth Reference for School Aged Children and Adolescents (5-19 years). Geneva: WHO; 2007].
9. National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics* 2004;114:555-76.
10. Mohan B, Kumar N, Aslam N, Rangbulla A, Kumbkarni S, Sood NK, et al. Prevalence of sustained hypertension and obesity in urban and rural school going children in Ludhiana. *Indian Heart J* 2004;56:310-4.
11. Savitha MR, Krishnamurthy B, Fatthapur SS, Yashwanth Kumar AM, Khan MA. Essential hypertension in early and mid-adolescence. *Indian J Pediatr* 2007; 74:1007-11
12. **Kumar Amritanshu, Kumar Atul, Pathak Apeksha, Garg Neha, Banerjee Deba Prasad,** Prevalence & risk factors associated with hypertension in children & adolescents. April-June 2015, volume 12, Issue: 2, DOI-10.7199/Ped.oncall.2015.34
13. Braithwaite Irene, Stewart Alistair W, Hancox Robert Beasley J, Richard, Murphy Rinki, Mitchell Edwin A. Fast-food consumption and body mass index in children and adolescents: an international cross-sectional study. *bmj open* December 2014. *bmj.com*; *BMJ Open* 2014 Dec 8; 4(12)I accessed on 23.07.2018