

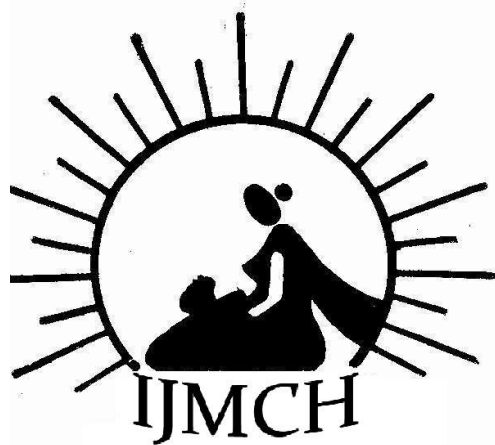
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To determine the prevalence of hypertension among apparently healthy school children, and correlate high blood pressures with sex, BMI, food habits, physical activity and family history of hypertension.

## Hypertension in School Children: Prevalence and Risk Factors

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### Abstract

**Research Question:** To determine the prevalence of hypertension among apparently healthy school children, and correlate high blood pressures with sex, BMI, food habits, physical activity and family history of hypertension.

**Settings:** School in Mumbai urban slum

**Study Design:** Cross-sectional study

**Participants:** Students of 8<sup>th</sup> standard

**Methodology:** 104 students (59 boys, 45 girls) between the ages of 12 to 15 years were interviewed using a standardised, structured questionnaire. Height, weight and BP were recorded. Cut off values proposed by Centre for Disease Control and Prevention (CDC) were used for defining the weight class. Children with systolic or diastolic blood pressure or both, equal to or more than the 95th percentile were considered to be hypertensive.

**Results:** The overall prevalence of hypertension was 4.8%. There was no significant difference in the blood pressure of the two sexes. Of the 104 students, 44 (42.3%) were underweight, 6 (5.8%) were overweight and 1(0.96%) obese. Prevalence of hypertension in children with high BMI (overweight and obese) and family history of hypertension was 57% and 13.7% respectively, as compared to other children in whom the prevalence was only 1.03% and 1.9% respectively.

**Keywords:** *Hypertension, School children*

### Introduction

Hypertension is a major public health problem worldwide and is one of the important risk factors for coronary artery disease and cerebrovascular diseases. Childhood hypertension is an established predictor of adult hypertension and organ damage, an underestimated problem in developing countries. As the symptoms of childhood hypertension are largely non-specific, most children with hypertension are likely to be asymptomatic.<sup>(1)</sup> Thus early detection of hypertension and its precipitating factors in children is important in order to evolve measures so that future hypertension morbidity and mortality can be prevented.

The aim of this study was to assess the prevalence of hypertension among apparently healthy school children in Mumbai, India and correlate high blood pressures with sex, BMI, food habits, physical activity and family history of hypertension.

## Materials and Methods

**Study area:** A school in Pratikshanagar, urban slum of Mumbai

**Study Design:** Cross-sectional study

**Sample Size:** 104

**Sampling Methodology:** Convenience sampling.

**Selection Criteria:** All students of 8<sup>th</sup> standard, whose parents/guardians gave written consent.

**Data Collection:** Written informed consent was obtained from the school authorities and from the parents/guardians of the children studying in the 8<sup>th</sup> standard. The children were interviewed using a standardised, structured questionnaire. Information on age, family history of hypertension, dietary habits, and physical activity was collected.

Blood pressure was determined using a digital automatic blood pressure monitor. For each student blood pressure was measured thrice in the same visit with a minimum of 3 minutes rest between each measurement. The mean reading of the second and third measurement was calculated to categorise the child as hypertensive or non-hypertensive. The children were considered hypertensive if the systolic or diastolic blood pressure or both were equal to or more than the 95th percentile for height, age and sex.<sup>(2)</sup>

Height was recorded in meters using height measuring equipment and weight was measured in kilograms using a mechanical weighing scale. Body Mass Index was calculated and cut-off values proposed by CDC were used for defining overweight and obesity.<sup>(3)</sup>

**Data Analysis:** Data was tabulated, analysed and described using percentage, average and appropriate statistical tests.

## Observations

A total of 104 students between the ages of 12 to 15 years from a municipal school were studied. Of the 104 students, 59 (56.7%) were boys and 45 (43.3%) were girls. Most of the students 51 (49%) were 13 years old, 22 (21.2%) were 12 and 14 years each and 9 (8.7%) were 15 years old. All the students were Hindu by religion.

Majority of the student's parents (51%) were educated up to secondary school. 53% of the children's fathers were non-government employees while most of the mothers (76%) were home makers.

54.8% of the students were unaware of their family income. The socioeconomic distribution of the study participants who were aware of their family income, as per B.G.Prasad's classification is as follows: Majority of the students, i.e. 63.8% were poor, 31.9% were lower middle class and 4.25% were upper middle class.

### Diet

**Fruits:** 20.2% of the students did not consume fruits at all. Most of the students 39.4% consumed fruits at least once a week. While only 2.9% had a daily intake of fruits. Of the students who consumed fruits, 87% consumed 1-2 servings/day. There was no statistically significant correlation between fruit consumption and socioeconomic class ( $p= 0.548$ ); and sex ( $p= 0.445$ ).

**Vegetables:** Only 61.5% of the students had a daily intake of vegetables. 30.8% consumed vegetables at least once a week. While 7.7% did not eat vegetables at all. Of the students who consumed vegetables, 80.2% had one fourth to half servings/day. Only 19.9% had 1 serving/day.

There was no statistically significant correlation between vegetable consumption and socioeconomic class ( $p= 0.661$ ) and sex ( $p= 0.512$ ).

### Physical Activity

The study participants were asked, if they played any outdoor games that causes an increase in the breathing or heart rate for at least 10 minutes continuously. 74% of the students were playing outdoor games at least once a week. All the students performed physical exercise in school for 30 minutes, four times a week.

Of the 77 students playing outdoor games, 53(68.8%) were boys and 24(31.16%) were girls. The difference was found to be statistically significant ( $p=0.000$ ). (Table I)

**Table I : Sex distribution of the students playing outdoor games**

	Sex		Total(n=104)
	Male (n=59)	Female(n=45)	
Play	53(68.8%)	24(31.2%)	77
Don't play	6(22.2%)	21(77.78%)	27
$\chi^2=17.691$ ; $df = 1$ ; $p=0.000$ ; Significant			

### Family History of Hypertension

Most of the students (50%) did not give a positive family history of hypertension. 26.9% had a positive family history, while 23.1% of the students didn't know.

Of the students giving a positive family history of hypertension, the family member suffering from hypertension was as follows: 41.3% were fathers, 34.4% were mothers, 17.2% were grandmothers and 6.8% were grandfathers.

### Body Mass Index

A total of 44 students (42.3%) were underweight, i.e. < 5<sup>th</sup> percentile. Of the underweight students, 27 (61.3%) were boys and 17 (38.6%) were girls. The difference between the girls and boys was not statistically significant ( $p=0.664$ ).

Six (5.8%) students were overweight, i.e. 85<sup>th</sup> to less than the 95<sup>th</sup> percentile. Of these three (50%) were boys & three (50%) were girls.

Only one student (a boy) was obese, i.e. Equal to or greater than the 95<sup>th</sup> percentile.

### Blood Pressure

Of the 104 students, five (4.8%) of the students were found to be hypertensive, i.e. B.P. values equal to or greater than the 95<sup>th</sup> percentile.

Of the students that were found to be hypertensive, the age distribution is as follows, one student was 12 years, three were 13 years old and one student was 15 years old. Prevalence was found to be slightly higher among boys, about 5.08% in boys and 4.44% in girls. The difference was not found to be statistically significant. ( $p=0.880$ )

**Table II: Distribution of Hypertensive students based on family history of hypertension**

	Family history of hypertension		Total (n=82)
	Yes(n=29)	No(n=53)	
Hypertensive	4(13.8%)	1(1.9%)	5(6.1%)
Non-hypertensive	25(86.2%)	52(98.1%)	77(93.9%)
$\chi^2=4.641$ ; $df = 1$ ; $p=0.031$ ; Significant			

Distribution of hypertensive students based on family history of hypertension is shown in Table II. The prevalence of hypertension was found to be higher among students with a positive family history of hypertension ( $p=0.021$ ).

Table III shows the distribution of hypertensive students based on weight class. The prevalence of hypertension was found to be higher among students with high BMI (overweight and obese)  $p=0.000$

**Table III: Distribution of Hypertensive students based on weight class**

	Weight class		Total(n=104)
	Normal & Underweight(n=97)	High BMI(n=7)	
Hypertensive	1(1%)	4(57.1%)	5(4.8%)
Non-hypertensive	96(99%)	3(42.9%)	99(95.2%)
$\chi^2=44.917$ ; $df = 1$ ; $p<0.001$ ; Significant			

### Discussion

It is important to determine the prevalence of hypertension in children, not only because it varies from one community to the other<sup>(4)</sup>, but also because it is essential to identify the population at risk. Early identification translates into early interventions and possibly prevention of later morbidity and mortality.<sup>(5)</sup>

In the studied school children, 4.8% had hypertension. A variety of studies conducted in different parts of the world have revealed a vast range in the prevalence of hypertension in children showing values as high as 22% to as low as 0.6%.<sup>(6)</sup> Chadha et al<sup>(7)</sup> reported about 11.7% prevalence on school children of Delhi while Anand and Tandon et al<sup>(8)</sup> reported

0.4% prevalence of hypertension in age group of 5-17 years. However it has been observed that low hypertension in these populations may be mainly due to the use of an arbitrary criterion of hypertension assessment and not the recognised criterion of 95<sup>th</sup> percentile of blood pressure values.

The association between elevated blood pressure and high BMI observed by us has been noted by various workers including few from this part of the world. <sup>(8,9)</sup> The Muscatine study reported 56.1% out of 41 hypertensive subjects to be obese (10). In our study we found that prevalence of hypertension among children with high BMI (overweight and obese) was 57% as compared to other children in whom prevalence was only 1.03%.

A positive family history of hypertension was found to be another influencing factor in the development of hypertension in children. This association has also been found by various other workers. <sup>(11,12)</sup>

In a study by N.K. Anand et al, <sup>(8)</sup> there was no significant difference between BP level of the two sexes in most age groups. In our study also, the difference between male and female BP level was minimal, with males having a prevalence of 5.08% and females having a prevalence of 4.44%.

Dietary habits and the level of physical activity did not have any significant effect on the BP levels. However it was noted that boys had higher levels of physical activity, with 68.8 % of the boys playing outdoor games vs. 31.16% of the girls. (p=0.000). (Table I)

### Conclusion

We found that the prevalence of hypertension in apparently healthy school children was 4.8%. Significant risk factors were high BMI (overweight and obese) and a family history of hypertension. The results suggest the need for screening of children to detect asymptomatic hypertension. The high risk children need to be considered for close follow-ups for modification of risk factors by advising lifestyle changes by means of proper diet, regular exercise and weight reduction. Appropriate health education needs to be imparted at home and school so that these risk factors can be eliminated in the early stages itself.

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