

**A PROFILE OF BLOOD PRESSURE PATTERN IN SCHOOL GOING CHILDREN AGED 6 TO 12 YEARS IN SUBURBAN CHENNAI**Suresh P<sup>1</sup>, Antony J<sup>2</sup>, Ambujavalli B. T<sup>3</sup>, Thirunavukarasu H<sup>4</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT: AIM:** To study Blood Pressure (B.P.) Pattern in normal school children in the age group of 6–12 years. **OBJECTIVES:** To determine Blood pressure pattern in school going children so that the prevalence of Hypertension in young adults can be predicted and mortality due to the disease can be prevented. **MATERIALS AND METHODS:** It is a Prospective cross sectional study with Sample Size 1,400 children (Minimum 100 in each group). Children of both sexes between the age group of 6 – 12 years were selected were included. Children with Renal diseases and Family history of hypertension were excluded. Study Period: 1 Year (from January 2013 to December 2013). **RESULTS:** The results were analyzed with suitable statistical package with student 't' test, paired 't' test. Analysis of variance (ANOVA), Chi square tests. **CONCLUSION:** There is presently a lack of longitudinal data relating BP measurement in childhood to the risk of further cardiovascular disease. it would be logical to advice families with obese children to change their lifestyles with respect to diet, exercise and reduced salt intake to get their children accustomed to lifestyles which are favorable for the maintains of normal blood pressure.

**KEYWORDS:** Blood pressure, School going children.

**INTRODUCTION:** Blood pressure is an important physical sign as the body temperature, pulse rate and respiratory rate in childhood. But recording of blood pressure is often neglected in pediatric practice.

Recent emphasis on hypertension<sup>1</sup> and its possible origin during childhood has served as an impetus for pediatrician. In the hospitalized patient, it is considered as an important and routine test like documentation of body temperature, pulse rate and respiratory rate. In the office, it is now common practice to measure and record the blood pressure in all the children including new born. Primary prevention of one of the leading health problems like hypertension and ischemic heart disease in adults necessitates a scientific evaluation of the predictors in children. Blood pressure studies in children provide important epidemiological information which may help in controlling or modifying the risk factors.

The underlying process of growth and maturation is closely linked to the blood pressure in children. India<sup>1</sup> is a vast country with divergent customs, dietary habits and socio-economic background. The data on blood pressure profile in Indian children is inadequate with few studies showing different patterns of normal blood pressure.

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**OBJECTIVES:** To determine Blood pressure pattern inschool going children so that the prevalence of Hypertension in young adults can be predicted and mortality due to the disease can be prevented.

**MATERIALS AND METHODS:** It is a Prospective cross sectional study with Sample Size 1,400 children (Minimum 100 in each group). Children of both sexes between the age group of 6–12 years were selected were included. Children with Renal diseases and Family history of hypertension were excluded. Study Period: 1 Year (from January 2013 to December 2013). Before taking the BP the children were familiarized with the procedure and the efforts made to eliminate the factors which affect BP such as Anxiety, Fear, Stress, Crying, Laughing, recent activity abnormalbody temperature etc. Every child in the class was given a precoded proforma which he/ she was advised to bring the next day after getting it filled by his/her parents. This proforma was designed to obtain information with reference to history of Hypertension, Renal Diseases and any drug intakein the parents and children and socioeconomic status.

The following day 25 children at a time are called to the room where physical examination to be performed. The age of the child was recorded in complete years and verified with their birth records. Every effort including interview with the teacher’s evaluation of the school records as well as inspection of other documents if any were used for confirmation of the exact age of the child. Height and weight was measured in every child using standard techniques. Random checking of height and weight measurements was cross checked by another examiner. Auscultatory method was used to measure blood pressure with a standard mercury sphygmomanometer. Same blood pressure instrument was used throughout the study and was standardized periodically.

**RESULTS:** The study sample consists of 1400 with each of 100 in each group of Boys and Girls. The results were analyzed with suitable statistical package with student ‘t’ test, paired ‘t’ test. Analysis of variance (ANOVA), Chi square tests. The following are the observations such as:

1. Normogram of B.P.
2. B.P. in relations to age and sex.

The statistically significant are as follows:

1. The SBP in 6 year old boys being greater than the girls P value < 0.05
2. The SBP in 9 year old girls being greater than the boys. P value < 0.01
3. SBP of 10 year old girls being greater than boys. P value < 0.001.
4. SBP of 11 year old girls being greater than the boys P value < 0.001.
5. The DBP of 12 year old boys being greater than girls. P value < 0.001.

**The other statistically non-significant results are:** In 8 years group, the SBP of girls is greater than that of boys; DBP of boys is greater than that of the girls. In these two age groups BP is increased in severely malnourished compared to normal BP, contrary to other age groups. The percentage distribution of BP in boys and girls in different age groups is presented in Table 2.

Hence as per this study, SBP & DBP of 6 and 7 year old boys and girls are almost the same.

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Age	V.K.Agarwal				Sol.Londe M.D.				N.K. Anand&LalitTandon				D.Laroia			
	Male		Female		Male		Female		Male		Female		Male		Female	
	SP	DP	SP	DP	SP	DP	SP	DP	SP	DP	SP	DP	SP	DP	SP	DP
6	106.65	70.92	107.79	70.04	105	60	105	64	96.3	64.4	95.0	64.3	106.85	70.22	106.06	70.19
7	108.25	69.39	107.91	71.94	106	63	107	63	98.5	66.5	98.4	65.2	107.71	69.73	107.13	70.55
8	108.35	70.51	110.39	72.52	108	61	108	65	100.4	68.0	100.4	68.1	108.3	70.45	107.22	71.10
9	108.17	72.16	109.20	72.89	111	65	112	67	101.5	69.1	101.0	68.3	108.6	70.87	108.51	72.06
10	107.38	71.92	109.97	75.14	114	66	114	64	103.2	75.0	102.6	70.2	107.74	70.95	108.34	73.27
11	107.53	70.74	109.16	72.48	114	65	121	69	106.3	72.2	105.7	72.1	108.89	70.07	108.59	71.01
12	110.49	70.74	110.68	75.74	116	67	117	65	110.7	73.3	110.1	73.0	111.90	70.41	110.20	75.50

**TABLE 1: Mean systolic and diastolic blood pressure according to age, sex from various studies**

Age	Percentiles	Boys		Girls	
		SBP	DBP	SBP	DBP
6 Yrs	5	100.00	62.00	100.00	62.00
	10	100.20	64.00	106.00	64.00
	25	106.00	66.00	108.00	66.00
	50	110.00	70.00	110.00	70.00
	75	120.00	72.00	111.50	72.00
	90	120.00	80.00	117.80	74.00
	95	124.00	81.90	120.00	80.00
7 Yrs	5	100.00	62.00	102.00	64.00
	10	104.00	64.00	106.00	66.00
	25	108.00	66.00	108.00	68.00
	50	110.00	70.00	110.00	70.00
	75	114.00	70.00	118.00	72.00
	90	120.00	79.60	120.00	80.00
	95	120.00	80.00	121.90	80.00
8 Yrs	5	94.00	58.10	100.00	60.10
	10	96.00	60.00	100.00	64.00
	25	106.00	64.00	106.00	66.00
	50	110.00	70.00	110.00	70.00
	75	110.00	70.00	112.00	70.00
	90	119.60	78.00	120.00	80.00
	95	120.00	80.00	120.00	80.00
9 Yrs	5	90.10	60.00	100.00	60.00
	10	96.00	60.00	102.00	64.00
	25	104.50	64.00	108.00	70.00
	50	110.00	70.00	110.00	70.00
	75	112.00	72.00	114.00	72.00
	90	120.00	80.00	120.00	80.00
	95	120.00	80.00	121.90	80.00

**TABLE 2: PERCENTAGE DISTRIBUTION OF BP IN BOYS AND GIRLS**

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Age	Percentiles	Boys		Girls	
		SBP	DBP	SBP	DBP
10 Yrs	5	94.30	50.20	100.00	60.00
	10	100.00	60.00	106.00	60.00
	25	104.50	64.50	108.00	66.00
	50	110.00	70.00	110.00	70.00
	75	110.00	72.00	117.50	72.00
	90	119.80	80.00	120.00	80.00
	95	120.00	80.00	121.90	80.00
11 Yrs	5	90.00	54.20	100.00	60.00
	10	96.00	60.00	106.00	64.00
	25	100.00	64.00	108.00	68.00
	50	108.00	70.00	110.00	70.00
	75	110.00	71.50	110.00	70.00
	90	120.00	80.00	117.60	72.00
	95	120.00	80.00	123.90	79.80
12 Yrs	5	108.00	68.00	100.00	60.00
	10	110.00	70.00	100.00	60.00
	25	110.00	70.00	106.50	66.50
	50	112.00	72.00	110.00	70.00
	75	120.00	80.00	120.00	72.00
	90	120.00	80.00	125.80	80.00
	95	121.90	82.00	130.00	81.90

**TABLE: 2 (CONT) PERCENTAGE DISTRIBUTION OF BP IN BOYS AND GIRLS**

**DISCUSSION:** Obesity is increasing world-wide because developing countries are adapting Western high fat foods and sedentary lifestyles. The Association of Hypertension and obesity in adults is well recognized, but this relationship has been studied less extensively in children.

The mean systolic pressure at the age of 6 years for boys in this study is 111.52 mmHg and that of western standard is 105mm Hg which was also found by some Indian authors<sup>2</sup>.

This upward trend with age correlates with the studies by other authors. The mean systolic and diastolic blood pressure was higher for all ages when compared to other studies.<sup>3,4</sup> This study shows that the mean Blood pressure of both systolic and diastolic shows an upward trend with increase in age<sup>5</sup>.

The findings of present study revealed that a spurt of about 8mmHg in systolic Blood pressure and no spurt in diastolic blood pressure is observed from 6 – 7 years in boys and a spurt of about 2 mm Hg in SBP and 2mm Hg in DBP is observed from 6 – 7 years in girls. And spurt of about 0.45 (mean) of BMI is observed in both boys and girls.

A spurt of 2mm Hg is observed for DBP and SBP for boys and girls between 8 and 9 years and BMI also increases by 0.50 (mean) similar observations have been made by other investigators <sup>who</sup> found a spurt of SBP, between 13-15 years age group. The task forcecommittee report found this spurt between 5-6 years in both the sexes. The spurt may possibly be due to certain hormonal and physical changes occurring in the body.

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The mean diastolic BP for boys rises from 69.90 mmHg at the age of 6 years to 73.70 mmHg at 12 years of age. The mean diastolic blood pressure for girls rises from 69.06 mmHg at 6 years of age to 69.98 mmHg at 12 years of age.

Hahn<sup>6</sup> studying boys from 11 through 15 years of age, reported significant correlation of blood pressure with weight and height in each year.

This is in correlation with the observation of Y. Sachdev<sup>7</sup> in which the mean DBP was 62. But when compared to the study of diastolic BP at 12 years of age by Agarwal. R<sup>8</sup>our readings are little lower.

The average increment of SBP and DBP from 6 years to 12 years is 3-4 mm Hg. This is in correlation with Agarwal R<sup>8</sup> and others. The mean systolic and diastolic blood pressure were higher for all ages when compared to other studies.<sup>8</sup>

Londe S<sup>9</sup> noted significant difference between the two sexes, 10mmHg higher in boys at the age of 15 years and DBP of 2-3mm and BMI of 1.5-2.0 noted in girls with age group of 10-12 years.

Haggerty<sup>10</sup> did not observe any significant variation between two sexes both for systolic and diastolic blood pressure which is similar to our study.

Yadav et al<sup>11</sup> in a school based study among 9-12 years old reported a prevalence of obesity as 5.6%. In two other schools based studies among 8-16 years old children done in India by Desai et al<sup>12</sup> and Gupta et al<sup>13</sup> 10% were found obese.

We found that both systolic and diastolic blood pressure increased with increase of weight. Similar findings were observed by Feber et al.<sup>14</sup>

Pela et al<sup>15</sup> reported that the alterations on B.P. of the obese children were detected by ambulatory. 24 hour monitoring and that higher SBP levels were observed 6 to 11 year old obese children both during the day and the night.

Figuer OA et al<sup>16</sup> also reported that higher SBPs and DBPs were found with the usual B.P. check in a study of 5 to 11 year old obese children.

**CONCLUSION AND RECOMMENDATIONS:** The relationship of high BP to serious medical problems has been established by measuring BP in an adult population, and following the same individuals until the consequences are observed to occur.

There is presently a lack of longitudinal data relating BP measurement in childhood to the risk of further cardiovascular disease; until this information is obtained the significance of casual elevation of BP in childhood will remain in doubt.

The long term followup of the children with BP levels in upper percentiles is mandatory and may throw some light on the natural history of essential hypertension.

Hence, it would be logical to advice families with obese children to change their lifestyles with respect to diet, exercise and reduced salt intake to get their children accustomed to lifestyles which are favorable for the maintains of normal blood pressure.

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