Research Article
AMERICAN JOURNAL OF PHARMACY AND HEALTH RESEARCH
www.ajphr.com
2015, Volume 3, Issue 5
ISSN: 2321–3647(online)

Correlation of Height with Blood Pressure in School Going Children of Meerut Region

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ABSTRACT

The reports of longitudinal study of blood pressure in childhood suggest an important role for early detection and enhancing a better understanding of the natural history of elevated blood pressure. Many of the risk factors associated with development of hypertension are preventable. Early identification of children at risk for hypertension is important to prevent serious complications in future adulthood. The present study was aimed to determine the percentile of systolic and diastolic blood pressures and to investigate distribution of blood pressure and its association with anthropometric parameters. A cross-sectional study among 300 school children (in the age group of 3-12 years), selected by stratified random sampling was conducted in Meerut. Personal data were collected through a pre-tested questionnaire. Blood pressure and height were measured through standardized techniques. The distributions of blood pressure by anthropometric characteristics were examined. Mean, standard deviation and correlation coefficient were used for statistical analysis using SPSS 16 software.

Keywords: Hypertension, Blood Pressure, Anthropometric Parameters, Height.

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Received 18 April 2015, Accepted 25 April 2015

Please cite this article as: Garg DK *et al*., Corelation of Height with Blood Pressure in School Going Children of Meerut Region. American Journal of Pharmacy & Health Research 2015.

INTRODUCTION

Systemic hypertension has been considered to be associated with adult population. But Nowadays a lot number of children are also being affected. Childhood hypertension is an established predictor of adult hypertension and organ damage, and it is underestimated problem in developing countries. An increasing number of healthy children and adolescents across the world are being diagnosed with hypertension[1]. Primary hypertension, once considered a rare occurrence in paediatric population, is seen more often particularly in obese children .Other factors responsible for increased prevalence of hypertension in children include life style changes such as decrease physical activity, increased intake of high calories, high sodium and low potassium foods, use of caffeinated and alcohol beverages, smoking, mental stress and sleep deprivation[2]**.** Several studies have estimated association between BP and weight, height and age. But very few workers worked out a quantitative analysis of association between them[3,4,5]. The incidence of hypertension in children has been claimed to be 1-11%[6] and 80-90% cases of these are known to be secondary to some underlying and often remediable cause[7]. The common cause are renal diseases, coarctation of aorta, tumours of adrenal glands, rheumatic heart disease, thyroid disorders etc. This low incidence of essential hypertension in childhood has not been definitely proved yet because the essential hypertension in children has not been fully investigated. It is probably due to lack of awareness that hypertension can and does occur in children.

MATERIALS AND METHOD

Study Area and Population:

This study was conducted in Department of Physiology LLRM Medical College, Meerut on 300 school children of age group 3-12 years from-

(a) Lala Ram Nath Memorial School, Sector-4 Shastri Nagar , meerut.

(b) Marry Gold School, Ram Bagh, Meerut.

(c) Arun Shiksha Niketan School, Jai Devi Nagar, Meerut.

Out of 300 school children, 173 children were male and 127 were female children.

Instrument for Data Collection:

The materials used for the study include: height meter, Mercury Column Sphygmomanometer, Appropriate size cuff as per recommendations for various age groups children and Paediatric Stethoscope.

Parameters in Data collection:

Prior to the data collection, the subjects gave their consent after an assurance of confidentiality was given. The following parameters were determined and recorded: age, sex, height, systolic blood pressure and diastolic blood pressure.

Method of Data Collection:

In the present study, height and blood pressure of 300 primary school children were measured using standard anthropometric instruments (height meter and sphygmomanometer).

Height:

The heights of the pupils subjects were measured with the children standing erect, heels together, chin up, and a horizontal rule was made to rest on the head and the heights were read off from an erect metre rule placed on a flat surface and against the wall.

Blood Pressure:

Blood pressure was measured on the left arm by auscultatory method using mercury column sphygmomanometer. The individual was made comfortable and seated at least for five minutes in their chair before measurement. Two readings were taken fifteen minutes apart and the average of two was taken.

Data Analysis:

The data obtained was analyzed using SPSS 16.0. Descriptive statistics of mean and standard deviation were used to examine the data. Pearson moment correlation was used to find correlation between anthropometric measurements and blood pressure.

RESULTS AND DISCUSSION

A significant positive correlation between height and systolic blood pressure in school going male children was observed in 3-4, 5-7 and 10-11 years age groups. However, this correlation was most significant in children between 5-6 years age groups. The other age groups showed insignificant relationship between height and systolic blood pressure. (Table-1).

Table 1: Correlation between Height (centimeter) and Systolic blood Pressure (mmHg) in school going male children (n=173)

Age Group	Number of Children	Height (Mean±SD)	Systolic Blood Pressure (Mean±SD)	Correlation Coefficient (r)	p Value
3-4	24	95.38±2.99	91.58±2.04	+0.483	S**
4-5	21	97.86±2.74	93.14±2.06	-0.271	NS
5-6	21	102.86±2.83	93.14±3.07	+0.561	S*
6-7	17	108.41±3.99	97.06±4.96	+0.431	S^{+}
7-8	17	111.41±3.37	103.29±2.73	-0.007	NS
8-9	20	116.00±3.01	105.80±3.49	+0.130	NS
9-10	20	120.45±2.86	106.20±2.59	+0.399	NS

10-11	18	121.11±4.84	107.78±1.93	+0.569	S**
11-12	15	125.47±2.92	110.00±2.93	+0.334	NS

S*= p<0.05 S**= p<0.01 S^{+}=<0.001

A significant positive correlation between height and systolic blood pressure in school going female children was observed in 6-7 and 10-12 years age groups. However, this correlation was most significant in children between 6-7 & 10-11 of years age groups. In other age group no such significant correlation was observed.

Table 2: Correlation between Height (centimeter) and Systolic blood Pressure (mmHg) in school going female children (n=127)

Age Group	Number of Children	Height (Mean±SD)	Systolic Blood Pressure (Mean±SD)	Correlation Coefficient (r)	p Value
3-4	15	95.73±2.12	91.47±1.41	-0.242	NS
4-5	13	98.77±2.20	93.85±2.51	+0.265	NS
5-6	18	103.56±2.94	95.11±4.61	+0.325	NS
6-7	14	105.71±3.75	97.86±2.77	+0.470	S^{+}
7-8	14	108.21±2.58	102.71±2.89	-0.001	NS
8-9	11	115.18±2.36	106.36±3.07	+0.294	NS
9-10	15	120.40±3.30	106.00±2.93	+0.310	NS
10-11	12	120.67±4.76	109.17±3.35	+0.699	S^{+}
11-12	15	128.00±2.65	111.07±2.92	+0.554	S**

S**= p<0.01 S^{+}=<0.001

Table 3: Correlation between Height (centimeter) and Diastolic blood Pressure (mmHg) in school going male children (n=173)

Age Group	Number of Children	Height (Mean±SD)	Diastolic Blood Pressure (Mean±SD)	Correlation Coefficient (r)	p Value
3-4	24	95.38±2.99	60.33±1.83	+0.183	NS
4-5	21	97.86±2.74	61.71±2.12	-0.403	NS
5-6	21	102.86±2.83	61.52±2.04	+0.225	NS
6-7	17	108.41±3.99	63.65±3.55	+0.496	S*
7-8	17	111.41±3.37	64.47±1.94	+0.236	NS
8-9	20	116.00±3.01	65.70±3.06	-0.236	NS
9-10	20	120.45±2.86	65.50±2.67	-0.134	NS
10-11	18	121.11±4.84	67.56±2.12	+0.659	S^{+}
11-12	15	125.47±2.92	68.53±1.77	+0.612	S^{+}

S*= p<0.05 S^{+}=<0.001

A significant positive correlation in 6-7 and 10-12 years of age group was observed between height and diastolic blood pressure in school going male children. However, this correlation was most significant in children between10-12 years of age groups. The other age groups showed insignificant correlation between height and diastolic blood pressure.

Table 4: Correlation between Height (centimeter) and Diastolic blood Pressure (mmHg) in school going female children (n=127)

Age Group	Number of Children	Height (Mean±SD)	Systolic Blood Pressure (Mean±SD)	Correlation Coefficient (r)	p Value
3-4	15	95.73±2.12	60.93±1.83	-0.032	NS
4-5	13	98.77±2.20	62.00±2.45	-0.155	NS
5-6	18	103.56±2.94	62.44±2.25	+0.334	NS
6-7	14	105.71±3.75	62.57±1.99	+0.374	NS
7-8	14	108.21±2.58	63.86±1.99	-0.366	NS
8-9	11	115.18±2.36	66.55±1.81	+0.677	S^+
9-10	15	120.40±3.30	65.33±2.35	+0.516	S**
10-11	12	120.67±4.76	68.17±2.48	+0.806	S^+
11-12	15	128.00±2.65	69.73±2.82	+0.183	NS

S**= p<0.01 S^+=<0.001

No significant correlation between height and diastolic blood pressure was observed in school going female children of all age group except between 8-11 years of age groups. This positive correlation was most significant in the age group 9-10 years and fairly significant in 8-9 and 10-11 years age group. In our study we found a positive correlation between height and systolic blood pressure in school going male children in the age group of 3-4, 5-7 and 10-11years and a positive non-significant was found in other age groups. With increasing age, there was increase in mean height as well as mean systolic blood pressure. Our results are in accordance with Gupta et al[8], Laroia et al[9], Sharma et al[10] and Rosner B. et al[11].

In the present study we found positive significant correlation of height with systolic blood pressure in female school children of age group 6-7 & 10-12 years. A study by Gupta et al[8], Laroia et al[9], Sharma et al[10] and Rosner B. et al[11] supported our results. A positive significant correlation was observed between height and diastolic blood pressure in male children between the age group of 6-7 and 10-12 years. The correlation of height with diastolic blood pressure was most significant in children between age group of 10-12 years. We also found an increase in mean diastolic blood pressure with increase in age and height but the pattern of increase was non-linear and cause of this variation could not be ascertained.

Gupta et al[8], Laroia et al[9], Sharma et al[10], Rosner B. et al[11] and Stephen R. Daniels[12] also supported our results. We found a positive significant correlation between height and diastolic blood pressure in girls between the age group of 8-11 years. This positive correlation was most significant in the age group of 9-10 years and fairly significant in 8-9 and 10-11 years. Study performed by Gupta et al[8], Laroia et al[9], Sharma et al[10] and Rosner B. et al[11] observed the same result.

CONCLUSION

Thus in the present study, we tried to correlate the systolic and diastolic blood pressures with height in Indian school going children of both the sexes. However, in some age groups, the correlation was found with height. There is a debate in the literature also, about the better correlate to be height than weight. We could not conclude the single best indicator which can be correlated with blood pressures in Indian children. Therefore, it is suggested to have a large scale study including children from different regions, different grades of nutrition and ethnic groups to establish the blood pressure norms in Indian children and its correlation with anthropometric parameters.

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