PREVALENCE AND RISK FACTORS OF HYPERTENSION AMONG SCHOOL CHILDREN AGED 9-12 YEARS IN KANNUR DISTRICT

Kuruvilla John[1], Prasanth Karakkad[2], Elizebeth Vissac[3]

[1]Assistant Professor, Department of Paediatrics, Mount Zion Medical College, Adoor, Kollam.
[2]Senior Consultant, Department of Paediatrics, Ashoka Hospital, Kannur.
[3]Assistant Professor, Department of Gynaecology, Azzezia Medical College, Meeyannoor P.O., Kollam.

ABSTRACT

BACKGROUND

Prevalence of hypertension seems to be in increasing trend in adolescents and young men. This study has been conducted to find the prevalence of hypertension among school children in the age group 9-12 years to identify the relation between blood pressure and body mass index, Socioeconomic status, Family history of hypertension, diabetes, ischaemic heart disease and renal disease.

MATERIALS AND METHODS

This is a cross-sectional study done in randomly selected schools in Kannur district. Study was conducted among 1024 school children (Both boys and girls) in the age group 9-12 years studying in various schools in Kannur during September 2008 to August 2009. All children from selected class who gave consent were included. Exclusion criteria were absentees those who have not given the consent. Height and weight were recorded in all children by standard techniques as described by Indian Council of Medical Research and BMI was calculated. Blood pressure was recorded using a standard mercury sphygmomanometer. Data about family history, income, etc. were collected using questionnaire.

RESULTS

In our study, we observed that there is gradual increase in mean systolic and diastolic blood pressure in children as age advances. Prevalence of hypertension is 2.53%. The prevalence of systolic hypertension in whole group is 1.5%, 2.21% among boys and 0.8% among girls. The prevalence of diastolic hypertension in whole group is 0.87%. Among boys, it is 0.47% and in girls it is 1.03%. Correlation is found to be statistically significant. The prevalence of stage 1 hypertension is 2.06% and stage 2 hypertension is 0.47%. Body mass index has got a positive correlation with blood pressure. The prevalence of obesity in our study was 3.32%, overweight was 5.46%. Obesity was more among those with better socioeconomic status. 29.41% of the obese children are hypertensive in our study. Statistically, significant association was found between childhood hypertension and family history of hypertension, cardiovascular risk factors in parents. Statistically, no significant correlation is obtained between childhood hypertension and family history of diabetes and renal disease.

CONCLUSION

Hypertension in children is associated with higher BMI, family history of hypertension and ischaemic heart disease.

KEYWORDS

Blood Pressure, Hypertension, BMI, Family History.

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INTRODUCTION: Prevalence of hypertension seems to be in increasing trend in adolescents and young men. Hypertension in adult population is associated with an increased incidence of stroke, coronary heart disease, congestive heart failure and renal insufficiency. Changing life style, increased consumption of cola products and junk foods, television viewing and absence of exercise are making children more prone for hypertension.

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Corresponding Author:
Dr. Kuruvilla John,
Amoolya, Kairali Nagar,
Kottarakkara-691506.
E-mail: kuruvillajhn@gmail.com
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Because, the origin of some cases of adult hypertension may lie in childhood or adolescence, preventive intervention beginning early in life may reduce the risk of cardiovascular disease and organ damage during later life. Children and young adolescents with blood pressure greater than 90th percentile have a threefold greater likelihood of becoming adults with hypertension than children with blood pressure at 50th centile. This study has been conducted to find out the prevalence and risk factors for hypertension in children.

AIMS AND OBJECTIVE OF STUDY ARE:

1. To identify the prevalence of hypertension among school children in the age group 9-12 years.
2. To identify the relation between blood pressure and body mass index.

3. To identify the relation between hypertension and
    - Socioeconomic status.
    - Family history of hypertension.
    - Family history of diabetes.
    - Family history of ischaemic heart disease.
    - Family history of renal disease.

METHODS: This is a cross-sectional study conducted in randomly selected schools in Kannur district. Study was conducted among 1024 school children (Both Boys and Girls) in the age group 9-12 years studying in various schools in Kannur during September 2008 to August 2009. Study included all children from selected class who gave consent. Absentees, those who have not given the consent, age less than 9 completed years and 13 completed years or more were excluded. Height in centimetres and weight in kilogram was recorded in all children by standard techniques as described by Indian Council of Medical Research and BMI was calculated. Blood pressure was recorded using a standard mercury sphygmomanometer. Cuffs of two different sizes were used in the procedure. In children, above 9 years of age, standard adult size cuff (12.5 cm) was used except in a few children who required the 7.5 cm cuff. This was done according to the recommendations made by Moss that a cuff, which covers approximately two-third of upper arm with enough space left over the cubital fossa to place the diaphragm of stethoscope to be employed in the measurement of blood pressure in children.

Before recording the blood pressure, children in groups of 10 were taken to a separate room away from noise and they were explained in detail the procedure of pressure recording and were reassured that the procedure is not painful. All children were made to void urine before blood pressure recording as a full bladder is a source of strong sensory stimuli, which may increase blood pressure. All efforts were made to eliminate factors, which might affect the blood pressure such as anxiety, fear, crying, laughing, recent activities in order to facilitate the blood pressure recording under simulated "basal" or "near basal" condition. Blood pressure was recorded only when the child had become accustomed to the observer, instrument and surroundings. The pressure within the cuff was released at a rate of about 2 to 3 mmHg per second while the auscultation was done over brachial artery. The onset of sound was taken as systolic BP and absence of all sounds was taken as diastolic BP. Three readings were taken in succession with an interval of 1-½ to 2 minutes and the cuff was completely deflated between the readings. In those cases where the difference between first reading and third reading was more than 10 mmHg, the first reading was omitted and another recording was obtained. The average of the three reading was calculated and entered in the proforma. Data about family history, income, etc. were collected using questionnaire.

RESULTS:

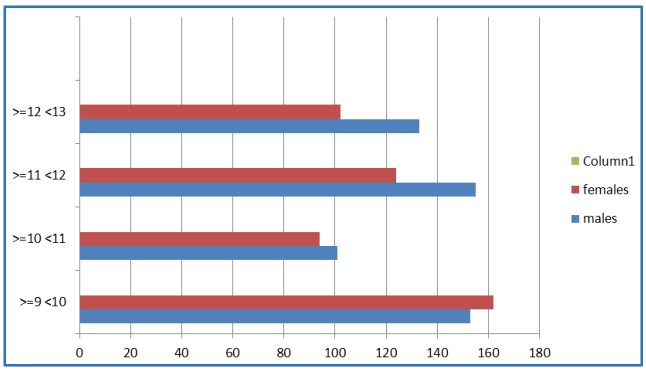

Fig. 1: Age Wise Distribution

Mean Systolic and Diastolic Blood Pressure: The mean systolic blood pressure is found to increase with age from 94.08 mmHg at 9 years to 107.28 mmHg at 12 years.

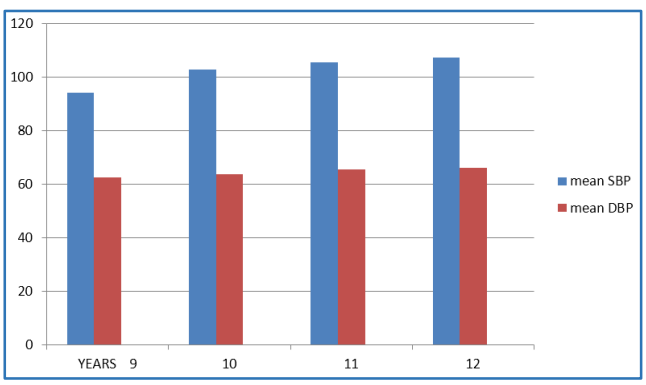

Fig. 2

Age Wise Prevalence of Hypertension among Boys: In this study, 2.06% boys has stage 1 HTN, 0.4% of boys have stage 2 HTN.

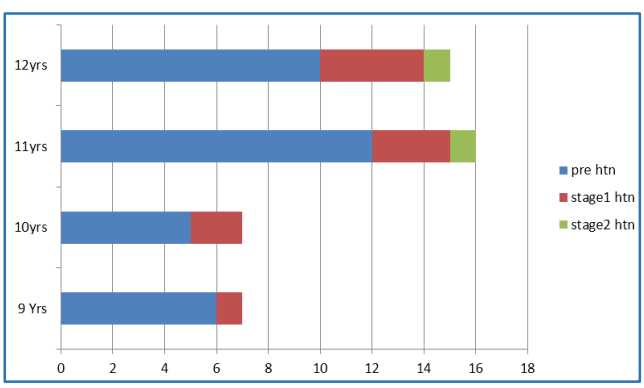

Fig. 3

Age Wise Prevalence of Hypertension among Girls: In this study, 0.6% of girls have stage 1 HTN and 0.25% of girls have stage 2 HTN.

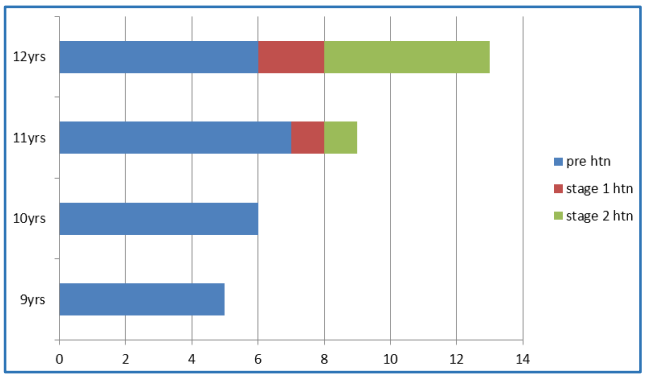

Fig. 4

Prevalence of Obesity in Study Population:

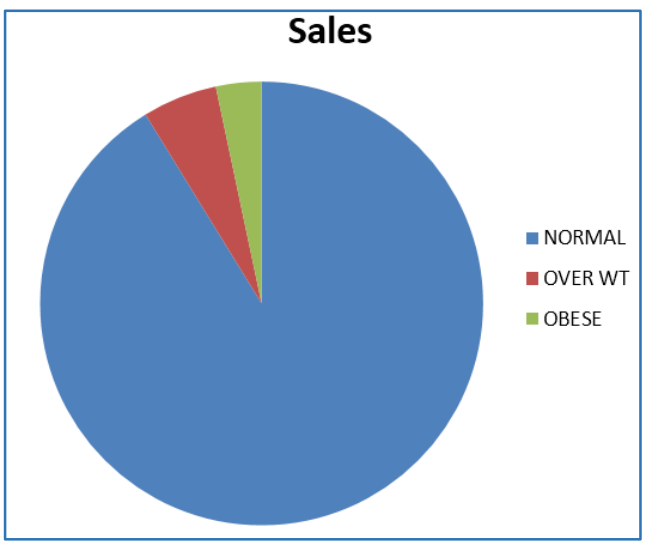

Fig. 5

3.32% of Students among Study Group have Obesity.

Distribution of Obesity and Overweight and Hypertension:

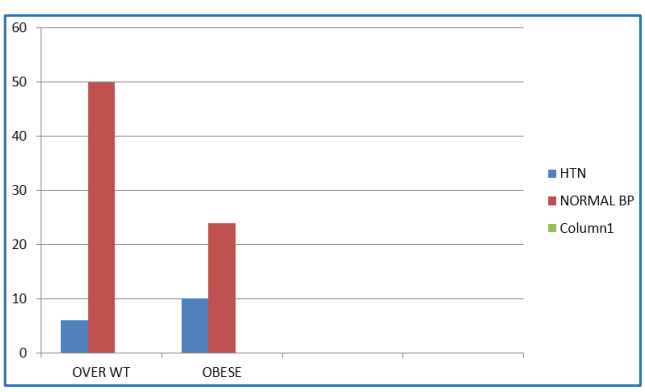

Fig. 6

X^2 test for obesity and hypertension shows that relation between obesity and hypertension in children is significant (p value=0.032). In our study, we observed that out of the 34 obese children 10 were found to have hypertension (29.41). Among 56 overweight children, 6 were hypertensive (10.71%).

Distribution of Hypertension with Socioeconomic Status:

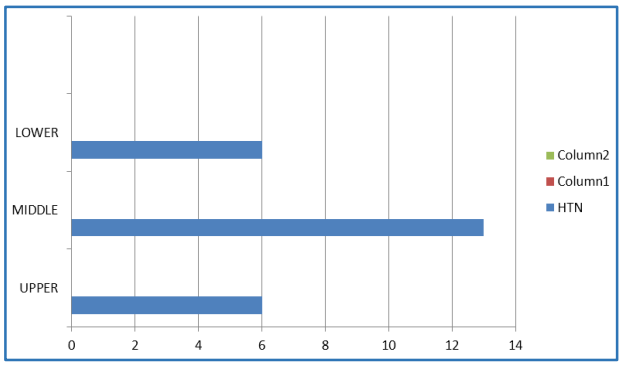

Fig. 7

X^2 test for hypertension and socioeconomic class shows that relation between hypertension and socioeconomic status is significant. (p value 0.012).

Correlation between Parental Hypertension and Presence of Hypertension in Children:

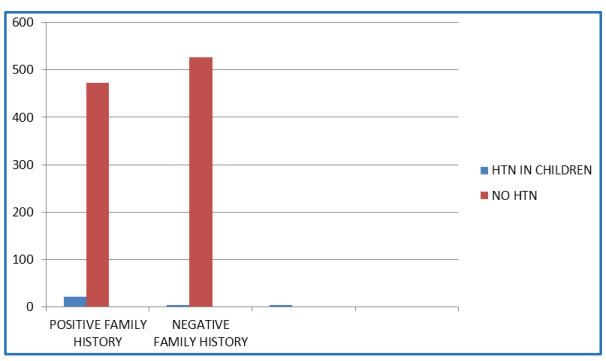

Fig. 8

P value = 0.002 (Significant),
Chi-Square Value=26.66.

Correlation between Parental Diabetes and Presence of Hypertension in Children:

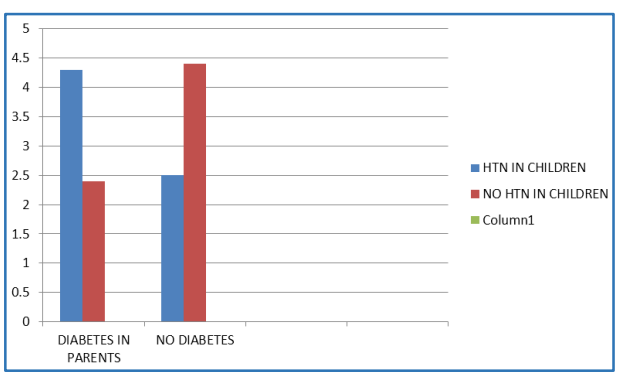

Fig. 9

Chi-Square Value = 0.648,
P value = 0.452 (not significant).

Correlation between Ischaemic Heart Disease in Family and Childhood Hypertension:

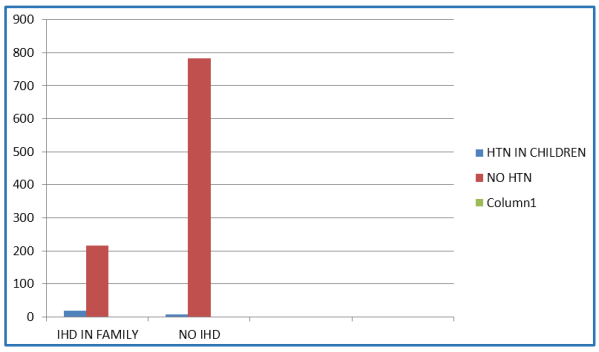

Fig. 10

Chi-square value = 5.932, P value=0.04 (Significant).

CONCLUSION:

- In our study, we observed that there is gradual increase in mean systolic and diastolic blood pressure in children as age advances.
- In the study, prevalence of hypertension is 2.53%.
- The prevalence of systolic hypertension in whole group is 1.5%, 2.21% among boys and 0.8% among girls.
- Correlation between systolic hypertension with age and gender was found to be statistically significant.
- The prevalence of diastolic hypertension in whole group is 0.87%. Among boys, it is 0.47% and in girls it is 1.03%. Correlation is found to be statistically significant.
- The prevalence of stage 1 hypertension is 2.06% and stage 2 hypertension is 0.47%.
- In our study, we found that body mass index has got a positive correlation with blood pressure.
- The prevalence of obesity in our study was 3.32%, overweight was 5.46%.
- Obesity was more among those with better socioeconomic status.
- 29.41% of the obese children are hypertensive in our study.
- There is a definite positive correlation between hypertension and higher socioeconomic status.
- In our study, statistically significant association was found between childhood hypertension and family history of hypertension.
- There was significant correlation between hypertension in children and cardiovascular risk factors in parents.
- Statistically, no significant correlation is obtained between childhood hypertension and family history of diabetes.
- Statistically, no significant correlation is obtained between childhood hypertension and family history of renal disease.

DISCUSSION: Many studies have been conducted worldwide to detect the normal distribution of blood pressure in children and to find out prevalence of hypertension.

Systemic hypertension is an important condition in childhood with estimated population prevalence of 1-2% in the developed countries. Similar studies are lacking from India. Small school surveys in school children suggest a prevalence ranging from 2-5%. In our study, we observed that there is gradual increase in mean systolic and diastolic blood pressure in children as age advances (Fig. 2). This is an agreement with national task force committee. Indian studies by Mangal et al,[1] Loria D et al,[2] Verma M et al,[3] Agarwal et al[4] also noted same findings. Dube et al[5] and Rames et al[6] also noted the same findings. It was noted that the age, height and weight are important determinants of blood pressure. The prevalence of hypertension in our study is 2.53%. This is comparable to studies by Pileggi et al[7] (3-5%). A wide range in the prevalence rate of hypertension has been recorded in different studies. This diversity is due to the varying age group taken for these studies. Different criteria's adopted for defining hypertension and basic difference between racial subgroup in terms of geographic, cultural and dietary factors. The prevalence of systolic hypertension in whole group is 1.5%, 2.21% among boys and 0.8% among girls. Correlation between systolic hypertension with age and gender was found to be statistically significant. The prevalence of diastolic hypertension in whole group is 0.87%. Among boys, it is 0.47% and in girls it is 1.03%. Correlation is found to be statistically significant. The prevalence of stage 1 hypertension and stage 2 hypertension among boys and girls is as shown in Fig. 3, 4.

Children in the group of prehypertension need close followup and primarily managed by lifestyle modification. They are being planned to reevaluate after 6 months. The positive correlation between the body mass index and blood pressure is obtained in many studies worldwide. In Aligrah North India,[8] among subjects in the age group 5 to 15 years found that the mean systolic and diastolic pressure were consistently and significantly higher among children who had higher body mass index. In our study, we found that body mass index has got a positive correlation with blood pressure. The prevalence of obesity in our study was 3.32%. The prevalence of overweight in our study was 3.32% and prevalence of overweight in our study was 5.46% (Fig. 5, 6). Obesity is more in school children with better socioeconomic status. Obesity compared to other studies is much lower, i.e. Graf et al,[9] a study by Subramanyan V.[10] from Chennai reported prevalence of obesity in affluent adolescent girls. While comparing prevalence of obesity in 6 different countries, as assessed by international obesity task force, the data showed that South East Asian countries had a higher prevalence of obesity. Although, the reason for this is not studied, some geographical, racial or cultural differences maybe the contributing factors. There is definite positive correlation between hypertension and higher socioeconomic status (Fig. 7). In our study, statistically

significant association was found between childhood hypertension and family history of hypertension.

There are significant correlation in blood pressure and cardiovascular risk factors in parents and their children as reviewed by Lauer et al and reported by Burns et al following the analysis of data from the Muscatine ponderosity family study.[11] Statistically, no significant correlation is obtained between childhood hypertension and family history of renal disease and diabetes. Positive correlation is obtained between childhood hypertension and family history of ischaemic heart disease.

Those children who were having prehypertension and hypertension were followed up and investigated. They were advised therapeutic life style modification including dietary modification and regular follow up.

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