Blood Pressure Pattern in School Children, Abadir Elementary School Addis Ababa, Ethiopia

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Abstract

Elevation of the systemic arterial blood pressure represents one of the most common problems in clinical medicine. In contrast to the experience in adults, the incidence of hypertension in children is quite low.

The objective of this study was to see the pattern of BP in school aged children and its relation to age, sex, weight and height. All children, age 6 through 12 year in Abadir elementary school, Lideta sub city, A.A, formed the study population. Blood pressure measurements were made according to recommendations made by the second task force on Blood pressure control in children the mean systolic and mean diastolic BP for both sexes combined was 97.86 ± 9.73 and 70.51 ±8.60 mmHg, respectively. There was no significant difference between both the mean systolic (p =0.201) and diastolic (p=0.750) of boys and girls. The blood pressure of boys increased with age (p=0.001) while there was no significant increment or change of BP of girls with age (p >0.3). From this study it was observed the height -for -age did not show an effect on BP but the effect of weight for age was significant only on boys (p=0.001). Though the study had its own limitations the findings are worth to be taken up as a base line for future more conclusive studies.

Introduction

The development of national data base on normative blood pressure level throughout childhood has contributed to the recognition of elevated blood pressure in children and adolescents.(1)

The measurement of blood pressure is now firmly established as an important component of routine pediatric physical examination.(2) Therefore it become very important to have accurate blood pressure measurement on which to base a clinical decision when evaluating hypertension .Accurate measurement of blood pressure in children requires careful attention, choice of appropriate cuff size and position of the limb are very important components.(3) The second task force on blood pressure control in children has developed blood pressure chart similar to height and weight cure and recent revision contains modified recommendation and norms. This helps to define the values and classification of hypertension in children and adolescents. (4,5)

There is evidence that childhood hypertension can lead to adult hypertension. (6,7, 8) Reports show that early development of arthrosclerosis does exist in children and young adults.(9)Non invasive methods of assessment of vascular changes related to arteriosclerosis demonstrate an association of blood pressure with predictors of cardiovascular disease including arterial stiffness, calcification and carotid medial thickness evaluated by computer tomography and echocardiography.(9)

Thus accurate measurement of blood pressure and early detection and treatment of hypertension in children and adolescents may contribute for prevention of cardiovascular diseases in later adult life.(10)

Information on blood pressure pattern in Ethiopian children is generally scanty. The only study done in 1994 in rural community showed that the mean diastolic and mean systolic blood pressure combined was 106 (± 14.8) and 70.5 (±4.5mmHg respectively (11)

Thus the objective of this study is to determine the blood pressure pattern of school children in urban setting and to see the relation of blood pressure to age, sex, body weight and height.

Objectives of the study
General objective
To determine the BP distribution of school aged children.

Specific objectives
General pattern of BP in school aged children in urban setting.
Relation of BP to age, Sex, body weight and height in school children.

Materials and Methods
Population
The population consisted of all children, ages 6 through 12, in Abadir elementary school, Lideta sub city, Addis Ababa, Ethiopia. A total of 392 students were involved, among which 190 (48.5 %) and 202 (51.5%) were boys and girls respectively.

Measurements:
Blood Pressure:
Different sized sphygmomanometers were used for measurement of BP. The inflatable bladder within the cuff cover at least two-thirds of the length of the upper arm, allowing room for comfortable placement of the stethoscope. The length of the bladder was almost sufficient to completely encircle the arm. Selection of the proper cuff was made based on the size of the child's arm and not on the child's age.

The children were approached in a non threatening manner. They were allowed to sit in a comfortable position with their arm fully exposed at almost the level of the heart on a desk.

The cuff was inflated approximately 20 to 30 mmHg above the point at which the palpable pulse disappears, and was then released at a rate of 2 to 3 mmHg per second. Kortkoff 1 was marked by the onset of a clear tapping sound and was taken a systolic pressure. The onset of muffling of the sound was labeled as kotkoff 4, which represented a diastolic pressure.
The blood pressure was measured by final year nursing students after undergone a 2 days training. Any difficulty of recording BP by the nurses was communicated and rechecked by a final year medical student.

Other measurements
Weight and height of all study group was also taken. A standard age-sex curve was used to categorize the children weight – for-age and height-for-age (<5th percentile, between 5th and 50th percentile and greater than 50th percentile)

Analysis
Data was analyzed using Epi-Info. Statistical tests (Mann-Whitney and kruskal-Wallis) were used to see the significance of relation between BP and the other factors (age, sex, weight and height).

Results

All children, ages 6 through 12, in Abadir Elementary School, Lideta sub city, Addis Ababa were studied. They had a mean age of 9.24 years. The total number of children studied was 392 among which 190 (48.5%) were boys and 202 (51.5%) were girls making male to female ratio of 1:1.06. (Table 1)
The combined mean systolic and diastolic BP for both sexes were 97.86 ±) 9.73 and 70.51± 8.60mmHg respectively. The boys had a mean systolic BP of 97.42±10.35 and a mean diastolic BP of

70.26 ± 8.82 mmHg. The mean systolic and diastolic Bp of girls was 98.27 ± 9.11 and 70.74 ± 8.40 mmHg. There was no significant difference between both the mean systolic (p= 0.201) and diastolic (p= 0.750) of boys and girls. The mean systolic (p=0.044) and diastolic (p= 0.001) BP of boys increases with age while there was no significant difference observed in the mean Bp of girls as age increases (for systolic p= 0.372 and for diastolic p=0.330) [see table 2 and fig 1 & 2]

When we see the relationship between weight -for-age and height-for-age with blood pressure it was found that both the mean systolic (p= 0.007) and diastolic BP (p=0.001) of boys increases with increase of weight-for-age percentile. Weight-for-age percentile has no effect on neither mean systolic (p=0.247) nor mean diastolic (p= 0.266) BP of girls. The height-for-age percentile has no significant effect on the blood pressure pattern of both boys and girls (p> 0.814)

DISCUSSION

This is the first study done to see the BP pattern and few of its correlates in Ethiopian urban setting. The mean systolic BP observed in this study is lower than the one reported by k. oli etal (11) but the mean diastolic BP was similar. It is very difficult to substantiate this similarity or difference as the studies were under different setups with difference in age range and sample size.

There was no significant difference observed between the blood pressure of boys and girls (p >0.201). This finding is consistent with other studies which could not demonstrate a sex blood pressure difference in prepubertal children (12)

The BP of boys was observed to increase with age while the BP of girls had no significance difference with age. But as can be seen it in fig 1 & 2 there is a relative decrease of BP around the ages of 8 and 9 in both sexes. Though this is an interesting observation, with the limited information we had it was difficult to make a sensible conclusion. But it was reported in some studies that the relative drop of BP around the mentioned ages is probably because of decrement in arm circumference (triceps thickness). (12)

The other interesting observation in this study was that the effect of weight-for-age on blood pressure was reflected only in boys and height-for-age has no effect on BP of both boys and girls. In other studies (13) the influence of body height and ponderosity index (wt/ht^3) were both very strong and in most instances overrode the apparent influence of age on BP. The combined significance of the effects of ponderosity index and body height may well support the premise of Alexander that systolic BP increase is related to increase in blood & plasma volume (13)

It is worth to consider the study limitations; the fact that the study involved only children of one school may infact make study findings non generalisable. For logistical reasons Bp of children was measured only once which may have an implication on the study findings.

Although the study has tried to show relationship of some factors (age, sex, weight and height) with BP, unidentified factors might have affected our noted associations. Nevertheless the study findings need to be held as a baseline so that a similar study at a larger scale is recommended.

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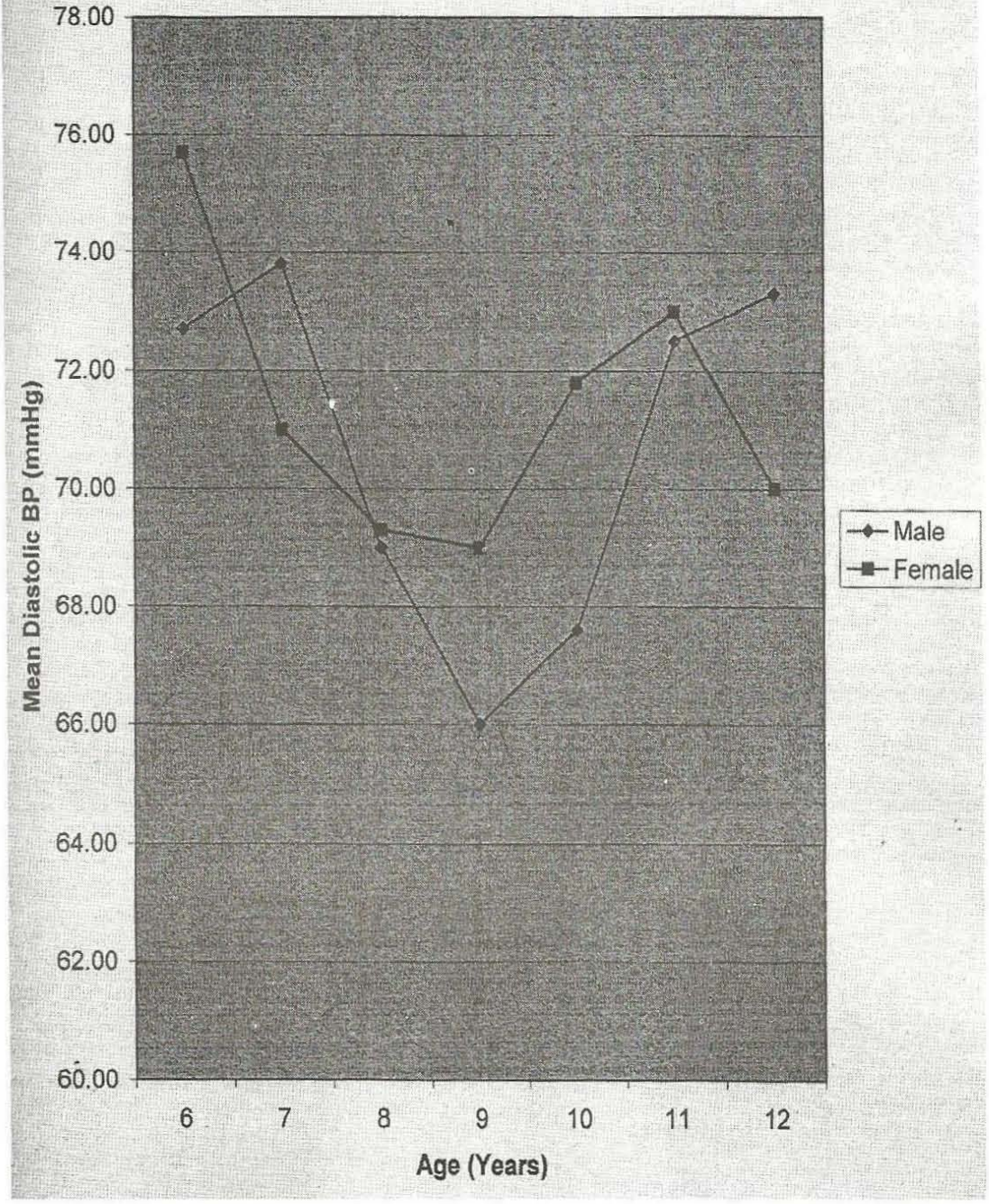
Table 1: Distribution of Study Population by age and sex, Abadir Elementary School, Lideta Sub city, Addis Ababa, Ethiopia, 2006

Age (Yrs)	Males		Females		Total	
	No	%	No	%	No	%
6	11	2.8	7	1.8	18	4.6
7	32	8.3	31	7.8	63	16.1
8	22	5.6	29	7.4	51	13
9	35	8.9	49	12.5	84	21.4
10	38	9.7	38	9.7	76	19.4
11	28	7.1	24	6.2	52	13.3
12	24	6.1	24	6.1	48	12.2
Total	190	48.5	202	51.5	392	100

Table 2: Mean Standard Deviation of Systolic and Diastolic BP in 392 School Children 6 to 12 years old, Abadir Elementary School, A.A, Ethiopia, 2006

Age (Year)	Mean Systolic BP±SD	Mean diastolic BP ±SD
6	97.78 ± 8.09	73.89 ± 5.02
7	97.62 :± 8.56	72.38 ± 6.15
8	95.88 ± 8.98	69.22 ± 9.35
9	96.79 ± 9.59	67.86 ± 9.32
10	97.11± 10.30	69.74 ± 8.94
11	100.96± 10.53	72.69 ± 8.66
12	100.00± 10.31	71.67 ± 8.34
Total	97.86 ± 9.73	70.51 ± 8.60
P - Va	P = 0.001	P > 0.05

Fig. 2 Pattern of Mean Diastolic BP of Boys & Girls in 392 School Children 6-12 years, Abadir Elementary School, Lideta Subcity, A.A, Ethiopia, 2006.



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