

Hypertension in Primary School Children of Alvand City, Iran

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Abstract

Background- Currently little is known about the prevalence of high blood pressure among Iranian children. Early identification of children at risk for hypertension is a key approach to prevent serious complications. Our goal in this study is to determine the prevalence of hypertension in primary school children of Alvand city, Iran.

Methods- In this cross-sectional study, the levels of systolic and diastolic blood pressure were measured and the prevalence of hypertension among 840 primary school children (7-12 years) determined. The children were selected through a double-stage randomized sampling method while divided into six different age groups. The blood pressure was measured by means of standard equipment. Data were analyzed using statistical methods.

Results- Out of 840 children, 410 (48.8%) were male and 430 (51.2%) female. The average systolic and diastolic blood pressure among both sexes increased with increasing age. Except in one age group, there was no significant difference between the systolic blood pressure between the two genders; however, a significant difference was found when the diastolic pressure in 4 age groups was compared ($P < 0.05$). The prevalence of systolic and diastolic hypertension among boys and girls was 6.15% and 3.4%, respectively.

Conclusion- This study revealed that the prevalence of hypertension in primary school children in the city of Alvand is noticeable. Hence, it is necessary to measure the blood pressure on a regular basis for early detection of hypertension (*Iranian Heart Journal 2007; 8 (3): 44-47*).

Key words: blood pressure ■ hypertension ■ children

Arterial blood pressure measurement for children is one of the most important tools in diagnosing physical health. Through regular measurement and recording of blood pressure, children with hypertension can be identified and so, the serious complications of hypertension may be easily prevented.^{1,2}

Blood pressure is the result of cardiac output and peripheral vascular resistance.

Various factors including age, sex, weight, race, nutrition and environmental factors are influential on blood pressure.^{1,2}

To explain the blood pressure status in children, the standard curves such as STF

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scale should be employed, because the levels of blood pressure increases with increasing age.²⁻⁴ Unfortunately, studies in this regard are rare in Iran.

A study conducted in the central part of Iran revealed that 4.9% of boys and 3.5% of girls have systolic hypertension, and similarly, 10.1% of boys and 3.3% of girls have diastolic hypertension.⁴ Considering the importance of identification of hypertension among children, the present study was conducted on primary school children in the city of Alvand, Iran in an attempt to address the question.

Methods

The city of Alvand, with a population of 85,000, is among the cities of Qazvin province, located 150 kilometers west of Tehran. In this cross-sectional study, the blood pressures of 840 primary school children between 7 to 12 years old were measured. The children were selected through a double-staged randomized sampling method while divided into six different age groups. Blood pressure of selected children was measured by standard stethoscope and mercurial sphygmomanometer with standard cuff suitable for age, in a quiet environment observing all standard principles. Blood

pressure was calculated for 5th, 10th, 25th, 75th, 90th and 95th percentiles for the age group between 7 to 12 years old. The values greater than 95th percentile for each age and sex were considered as hypertension (according to STF standard: Report of Second Task Force on Blood Pressure of Children). The data were analyzed using SPSS software and t-test method.

Results

Out of 840 children, 410 (48.8%) were male and 430 (51.2%) female. The average systolic and diastolic blood pressure of both sexes increased with increasing age. Except in the 7-year old group, there was no significant difference between the systolic pressure among the two genders; however, a significant difference was found when the diastolic pressure in 4 age groups (7, 8, 9 and 12 years) was compared (Tables I, II, $P < 0.05$).

Systolic blood pressure greater than the 95th percentile (systolic hypertension) was seen in 6.4% of boys and 5.9% of girls. Also, diastolic blood pressure greater than the 95th percentile (diastolic hypertension) was seen in 4.3% of boys and 2.5% of girls. The prevalence of systolic and diastolic hypertension in children was 6.15% and 3.4%, respectively.

Table I. Comparison of mean systolic blood pressure of primary school children of Alvand city by gender.

Age (year)	Male (mmHg)	SD	Female (mmHg)	SD	P
7	94.14	16.55	83.9	18.33	< 0.05
8	96	18.01	92.57	15.87	< 0.05
9	96.86	13.57	94.28	13.1	< 0.05
10	100.14	15.79	98.14	12.54	< 0.05
11	105.14	15.9	104.4	9.5	< 0.05
12	108.5	18.16	105.42	17.29	< 0.05

Table II. Comparison of mean diastolic blood pressure of primary school children of Alvand city by gender.

Age (year)	Male (mmHg)	SD	Female (mmHg)	SD	P
7	55.14	13.62	48.07	13.17	< 0.05
8	57.21	11.64	50.78	9.77	< 0.05
9	58.07	10.01	53.86	9.09	< 0.05
10	58.36	13.43	56.64	10.96	< 0.05
11	62.29	13.29	60.86	15.92	< 0.05
12	69.7	11.36	64.1	12.07	< 0.05

Discussion

The data found in our study revealed that while the prevalences of systolic hypertension in boys and girls are 6.4% and 5.9% respectively, it was 4.3% and 2.5% for diastolic hypertension and the overall prevalences of systolic and diastolic hypertension among Alvand primary school children were 6.15% and 3.4%, respectively. Regarding the nature of the subject, little studies have been reported from Iran. The study conducted in the capital of Iran indicated that 4.9% of boys and 3.5% of girls had systolic hypertension, whereas diastolic hypertension was observed among 10.1% of boys and 3.3% of girls.⁴ Another study carried out in the central part of Iran (Isfahan) demonstrated that the prevalences of systolic and diastolic hypertension were 4.2% and 5.4%, respectively.⁵ The literature is indicative of local differences regarding the rate of prevalence of hypertension in children worldwide. Some reported a prevalence of 15.8% in boys and 8.7% in girls.⁶ In Penuela's study, the prevalences of systolic hypertension in boys and girls were reported as 1.6% and 1%, respectively.⁷ The study by Paradis showed that 12% of males and 14% of females among 9-year-old children had high-normal or elevated systolic hypertension, while diastolic hypertension was only found in 1% of

cases.⁸ In another study carried out on 6 to 11-year old primary school children, the prevalence of hypertension was recorded as 5.4% in girls and 3.1% in boys.⁹ In Barbara's study, 10% of boys and 14% of girls aged between 6-11 years old were found to have hypertension.¹⁰ In the study performed on 4 to 6 year old Iraqi children, the prevalence of systolic and diastolic hypertension were shown to be 1.1% and 0.6%, respectively.¹¹ The prevalence of hypertension in males and females among Tunisia's primary school children were 9.2% and 9.9%, respectively.¹² In our study, systolic and diastolic hypertension were higher in boys than in girls. Some studies have shown that the prevalence of hypertension is higher in the male gender^{4,5,7,8,13,14} and others reported that it is higher in females.^{10,12,15} However, Menghetti demonstrated that there was no distinction between the two sexes.¹⁶ Considering the data of different studies, it is obvious that the prevalence of hypertension in children varies from one area to another. Regarding the literature, the causes of this variation are multi-factorial and among those, age, sex, weight, height, race, obesity, nutrition and environmental factors are highlighted.^{1,2,17} Meanwhile, the average systolic and diastolic blood pressures of both sexes increase with increasing age. Similar findings are supported by other studies.^{1,2,4}

According to the literature and considering the importance of early detection of hypertension in children, routine measurement of blood pressure at any age should be mandatory.

Conclusion

This study revealed that the prevalence of hypertension in primary school children in the city of Alvand is noticeable. Hence, it is necessary to measure the blood pressure on a regular basis for early detection of hypertension.

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