



Original Article:

Prevalence of Hypertension and Association of Obesity with Hypertension in School Going Children of Surat City, Western India.

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Abstract: Purpose: The association of obesity with hypertension has been recognized for the decades which are the important risk factors for the cardiovascular disease. So the purpose of the present study was to determine association of obesity with hypertension in school going children of Surat. **Methodology:** School going children aged between 12-18 years, of five schools in Surat were selected for the study. Height and weight were measured and BMI was calculated. Blood pressure measurements were taken as per recommendation of American heart society and family history of hypertension has also been assessed. Hypertension was considered if blood pressure is more than 95th percentile according to the update of task force report and Obesity was diagnosed by BMI for age. **Results:** Of 682 children, 8.94% were obese and 20.09% were hypertensive. **Conclusion:** Obesity is strongly associated with hypertension in children and both together may risk factors for later coronary disease. **Key Words:** Hypertension; Obesity; School children.

Introduction:

The prevalence of childhood obesity has been increasing at unsettling rates across the globe.(1) The association between hypertension, obesity and hyperlipidemia is well established. Systemic hypertension is an important condition in childhood, with estimated population prevalence of 1-2% in the developed countries. Nutritional surveys, in the USA show a significant secular increase in systolic and diastolic blood pressures.(2)

Children with elevated blood pressure (BP) can develop target organ damage; for example, increased carotid intima-media thickness(3) or ventricular hypertrophy (4), and they are also at increased risk of cardiovascular disease in adulthood. Moreover, BP tracks from childhood to adulthood.(5-8) Consequently, detection and management of elevated BP at an early age may be an important mean for

limiting the disease burden due to hypertension.(9) The causes for increase in blood pressure are attributed to obesity, change in dietary habits, decreased physical activity and increasing stress. Similar data is lacking from India; small surveys in school children suggest a prevalence ranging from 2-5 %.(10)

The association between obesity and hypertension in children has been reported in numerous studies among a variety of ethnic and racial groups with virtually all studies finding higher blood pressures and/or higher prevalence of hypertension in obese compared with lean children.(11,12) Given the importance of childhood hypertension in determining adult cardiovascular disease outcomes(13) our goal was to determine the prevalence of hypertension among school children in Surat and to determine whether obesity was associated with hypertension in this population.

Materials and Methodology

This was a cross-sectional study using a sample of total of 700 children aging 12 -18 years from five schools randomly selected in Surat, South Gujarat. Probability proportionate to size of the population (PPS) technique was used to decide the number of children to be studied from each school and then subsequently from each class and section. The required number of children from each section was selected by systematic random sampling.

Questionnaires sent to parents inquired regarding the child's age, gender, address, religion and health conditions, both previous and current. The questionnaire also asked whether there was a medical diagnosis of hypertension among blood-related family members and which family members were affected. The child was classified as having a positive family history only if disease was present in a first-degree relative. Children those who were having positive family history,

findings were reconfirmed by telephonic interview of parents asking about current medications and doctor visited. Informed consent was obtained from the school authorities as well as from parents/guardian to make anthropometric measurements. Data were collected from June 2011 to December 2011. Children who were absent from school because of sickness or other reasons were not followed-up. Measurements taken for each student were body weight, height, and blood pressure. Body weight was measured (to the nearest 0.5 kg) with the subject standing motionless on the weighing scale with feet 15 cm apart, and weight equally distributed on each leg. Height was measured (to the nearest 0.5 cm) with the subject standing in an erect position against a vertical scale of portable stadiometer and with the head positioned so that the top of the external auditory meatus was in level with the inferior margin of the bony orbit. Blood pressure (BP) measurements were taken using a mercury sphygmomanometer as per the recommendations of American Heart Association.(14) The measurements were taken in a quiet room in the sitting posture with the arm resting on the table. Efforts were made to eliminate the factors which may affect the blood pressure, e.g., anxiety, crying, exercise, etc. The average of three consecutive readings was taken as the blood pressure of the child. Body mass index (BMI), defined as body weight in kilograms divided by the square of height in meters (kg/m^2), and was used as the measure of obesity in this study. International Obesity Task Force (IOTF) classification was utilized for the estimation of overweight and obese subjects. Obesity (OB) was defined as children with a BMI value above 95th percentile for a specific age and sex.(15) Hypertension in children and adolescents was defined as systolic BP and or diastolic BP that is at or above the 95th percentile for age, sex, height and gender according to the "Task Force on Blood Pressure Control in Children".(16) All analyses were performed using SPSS software at 5% significance level.

Results

A total of 700 children participated in the study.18 students were absent on the day of anthropometric and blood pressure measurement. So they were not included in the study. So total of 682 children were included in the study .The age ranged from 12 -18 years. Of 682 children, 279(40.91%) were boys and 403(59.09%) were girls.

Overall, the prevalence of hypertension in the study group was 20.09%. Prevalence of hypertension among females was 23.82% and in males it was 14.70%. Prevalence of hypertension increases with age in males after 15 years (= 15 years 8.95%, >15 years 20%). (Table 1)

	Hypertension	No hypertension	Total
Females	96	307	403
=14 years	35(27.34)	93	128
>14 years	61(22.18)	214	275
Males	41	238	279
=15 years	12(8.95)	122	134
>15 years	29(20)	116	145

Values in parenthesis denotes percentages

The prevalence of obesity in the study group was 8.94%. Prevalence of obesity among females was 9.18% and in males it was 8.60%. Regarding association between obesity and hypertension, 34.43% of the obese children had hypertension while only 18.68% of the non obese children had hypertension.

A positive family history of hypertension was reported for 102 (14.96%) of the participants. Over all, including 90

(65.69 %) of children with positive family history of hypertension had hypertension.

In the present study risk factors like gender, obesity and positive family history of hypertension were associated with hypertension in children. (Table 2)

Variable	Total	Hypertension	No Hypertension	p value
Overall	682	137	545	
Gender				
Male	279	41	238	
Female	403	96	307	0.0034
Obesity				
Yes	61	21	40	0.0034
No	621	116	505	
Positive family history of hypertension				
Yes	102	90	12	<0.0001
No	580	47	533	

Discussion

As Surat is an important industrial centre and well known for diamond industry and textile industry. It has large population of affluent families who are exposed to modern life style. The unique feature about Surat is that it is cosmopolitan and fastest developing economic city in India. In the present study we found the very high prevalence of hypertension among school going children of Surat. Hypertension increases with age, among males it increases after 14 years. Gender, obesity and positive family history of hypertension found to be associated with hypertension in children.

The prevalence rates of hypertension have been so variable among different studies from different countries(17,18) and from India also (10,19-22) Overall, prevalence of hypertension among school going children of Surat was 20.09% which was very high as compare to the two previous studies done by HG Thakor et al(23)and Nirav Buch et al (24)in Surat. Difference may be due to only private schools had selected in the present study.

Soundarssanane MB etal(25)from India also gives opinion of increase in hypertension with increase in age. In their study on adolescent and young adults, they found a significant increasing trend of BP was seen only among males. In our study we found the same results.

In the present study we found that significant association of obesity with hypertension. 34.43% of the obese children had hypertension while only 18.68% of the non obese children had hypertension. This result was comparable to other previous from India. (10, 19, 23-25) Similar observations also reported in Sudan (26), Seychelles (27), Hungry(28)and France.(29)

Family history of hypertension was significant risk factor for hypertension as evident in many studies from India.(10,19,22,25) Lascaux-Lefebvre V et al(30)showed that parental history before age of 60 was related to offspring hypertension. In the present study also positive family history of hypertension was strongly associated with hypertension.

Findings of the our study also suggest a need for larger population based studies to accurately estimate the prevalence and other risk factors for hypertension among children in our country.

In common with two previous studies (26,31), we used the average of blood pressure measurements at a single time point for each subject, acknowledging that measuring blood pressure on separate occasions is necessary for the diagnosis of hypertension on a clinical basis.(32) It is possible that the prevalence of hypertension in our sample would be lower were three measurements used to determine hypertension.

Future research can be carried out to find out other factors like family history of diabetes mellitus, family history of ischemic heart disease, physical activity, diets and salt intake in children.

Conclusion

It can be concluded from the present study that school children in Surat exhibited a high prevalence of hypertension. Obesity and positive family history of hypertension are the risk factors for hypertension in children.

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