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

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Citation

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 12-18 years of age, 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.
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/m²), 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 obesity in the study group was 8.94%. 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)

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. Soundararajanan MB et al(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 if three measurements used to determine hypertension.

| Table 1: Age and sex wise distribution of hypertension in children |
| --- | --- | --- | --- |
| Females | Hypertension | No hypertension | Total |
| =14 years | 96 | 307 | 403 |
| >14 years | 61 (27.34) | 93 | 128 |
| Males | 41 | 238 | 279 |
| =15 years | 12 (8.95) | 122 | 134 |
| >15 years | 29 (20) | 116 | 145 |

Values in parenthesis denotes percentages

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| Table 2: Relationship of gender, obesity and positive family history of hypertension with childhood hypertension |
| --- | --- | --- | --- | --- |
| Variable | Total | Hypertension | No Hypertension | p value |
| 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 |  |
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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**References**