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ORIGINAL RESEARCH PAPER

Prevalence of hypertension among obese and overweight students in the schools of Silchar, Assam

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ABSTRACT

Introduction: *Hypertension, a silent killer disease, once thought to be a disease of adult population, now studies have shown that the process of development of it starts in adolescence perhaps in early childhood. There has also been increased prevalence of overweight and obesity in school children in developing countries including India. Obesity is one of the many risk factors of hypertension, metabolic and cardiovascular diseases.* ***Materials and methods:*** *1000 school children of aged 10-16 years were screened for hypertension, overweight and obesity. Using BMI and WC as per IAP chart, school children were categorized as overweight, obese; and blood pressure were measured by mercury sphygmomanometer. Definition and stages of hypertension were taken as per American Academy of Pediatrics guidelines for childhood hypertension 2007.* ***Results****: The prevalence of hypertension in the present study is 9.6%. The mean age of study population is 14.68 ± 1.02 years. The prevalence of hypertension in male and female was 11.5% and 8.08% respectively. 11.5% children were overweight and 6.3% were obese. Stages of hypertension were found, elevated BP 2.1%, stage 1 hypertension 6.1% and stage 2 hypertension 1.4% in the overweight and obese students together.* ***Conclusion****: Although hypertension is a well monitored and well versed disorder among the adult population yet it is the cheer expectancy of this disease among pediatric population which is threatening. A substantial number (9.6%) of overweight and obese school children had different categories of hypertension in our study. Time trends in childhood obesity, hypertension and their consequences should be monitored for primary prevention of adult hypertension.*

Keywords*: Obesity; overweight; hypertension; BMI.*

INTRODUCTION

The prevalence of overweight and obesity among children and adolescents has widely increased worldwide. Although once considered to be a major problem in affluent countries only, overweight and obesity are now rising all over the world even in developing nations like India and has been called a global epidemic.[1,2,3] This may be due to ongoing urbanization and economic transitions. Obesity and overweight are also major risk factors for non communicable diseases many of which have now been grouped under heading of metabolic syndrome as these diseases have been seen to occur together.

In concert with this increasing prevalence of overweight and obesity, anecdotal evidence suggests that pediatric hypertension may also have become more prevalent than previously reported. This increase reflects an epidemiologic shift from secondary hypertension (most often caused by renal disease) to primary (i.e. essential) hypertension as the main cause of hypertension in the pediatric age range.[4] Elevated blood pressure has been established as a major risk factor for the development of cardiovascular disease.[5] Obesity in infants and adolescents is acquiring epidemic dimensions and is a major risk factor for metabolic syndrome (MS). MS consists of a group of metabolic abnormalities and according to the International Diabetes Federation (IDF) characteristics

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of this syndrome include obesity with emphasis on excess abdominal fat, hypertension, dyslipidemia and hyperglycemia.[6] Primary hypertension as a part of metabolic syndrome has become rampant among obese and overweight children with their own set of complications. Ethnic differences in blood pressure are seen as among African Americans, Hispanics, Asians. Asians are more prone to these adverse effects of overweight and obesity like hypertension making these studies very important among these ethnic groups.

Keeping in mind that the young school children who are obese and overweight but apparently healthy may have hypertension, the present study was undertaken to find out the prevalence of hypertension in students of 10-16 years of age of schools of Silchar town, Assam.

MATERIALS AND METHODS

This school based study for screening of hypertension among overweight and obese school students of aged 10-16 years of class VII-X standards of schools of Silchar town, Assam was undertaken over a period of 4 months from August 2019 to November 2019. This period was chosen because the schools were free from examinations during this period. 1000 high school students from 2 government and 2 private schools were included in the study. Students with known chronic diseases like epilepsy, renal, endocrine diseases found on school records and physical examination and not willing to participate were excluded from the study population. As this is a short duration study lacking follow up, we did not consider determinants like, diabetes, IHD, ethnicity, food habit, substance abuse. Schools were notified the date of screening and for consent of the parents/students in advance with explanation that the procedures to be used are non invasive and the purpose of the screening. In the selected schools, by random sampling the enrolled students underwent for measurements for height, weight and blood pressure. Datas were recorded in a pre-structured proforma. BMI was calculated and matched as normal, overweight or obese according to the IAP Chart for BMI for age from 5 to 18 years.[7,8] The stages of hypertension and definitions were taken from the AAP Guidelines for Childhood Hypertension,2017.[9]

RESULTS

Out of 1ooo school students 493 (49.3 %) were male and 507 (50.7%) were females. School wise, 514 (51.4%) students were from private schools and 486 (48.6%) were from government schools. The mean age of students were 14.68± 1.02 years (Table 1). Out of the study population 115 were overweight (11.5%) and 63 were obese (6.3%) (Table 2). Out of 493 male students, 55 had hypertension (11.5%) and out of 507 female students, 41(8.08%) were hypertensive.

Table 1 Age, gender and school type wise distribution

1.	Gender n (%)	Male 493 (49.3)	P value >0.05
2.	Age (mean) in years	Female 507 (50.7) 14.68±1.02	
3.	School type Government Private	 486 (48.6) 514 (51.4)	

Table 2 Gender and school type wise distribution of obesity and overweight

	Gender, *n*		**Total *n*(%)**	**Type of school, *n*(%)**	
	Male	**Female**		**Private**	**Government**
Overweight	52	63	115(11.5)	74(7.4)	41(4.1)
Obese	32	31	63(6.3)	33(3.3)	30(3.0)

Table 3 Prevalence of overweight and obesity according to type of school

School type	***n***	**Over wt, *n*(%)**		**Obese,*n*(%)**		
		BMI	WC	BMI	WC	Wt/Ht
Govt.	486	41(8.4)	54(11.1)	30(6.1)	25(5.1)	45(9.2)
Private	514	74(14.3)	62(12.0)	33(6.47)	50(9.7)	72(14)
CHI SQUARETEST		P<0.05 (0.003)	p>0.05 (0.63)	p>0.05 (0.87)	p<0.0 5(0.005)	p<0.05 (0.01)
ODD´S RATIO		1.7	—		1.9	1.6

Table 4 Overweight and hypertension.

Stage of hypertension	Number of overweight students (*n*=115), *n*
Elevated blood pressure	13 (11.3)
Stage 1 hypertension	34 (29.5)
Stage 2 hypertension	10 (8.69)

Values in parenthesis denotes percentage.

Table 5 Obesity and hypertension

Stage of hypertension	*n*(number of obese students=63)	Neither overweight nor obese (*n*=822)
Elevated blood pressure	8 (12.69)	20 (2.4)
Stage 1 hypertension	27 (42.8)	12 (1.4)
Stage 2 hypertension	4 (6.34)	2 (0.2)

Values in parenthesis denotes percentage.

DISCUSSION

The overall prevalence of hypertension in the present study is 9.6%. The prevalence of elevated blood pressure were 21 (2.1%), stage 1 hypertension were 61 (6.1%) and stage 2 hypertension were 14 (1.4%). The prevalence of hypertension was more in male than female students (11.5 vs 8.08%) and obese and overweight students than normal build students (Table 4 and 5). Studies done by Mahanta TG et al.[10] found significant higher mean blood pressure values among overweight and obese school children as compared to non overweight and non obese children. Nirav Busch et al.[11] in a study done in Surat, India found a prevalence of hypertension of 6.48% and the prevalence of obesity among the hypertensives to be 8.7%. Our prevalence of hypertension is slightly higher than this study because the number of students included in the study was more from private schools than the government schools. The private school goers the odds of becoming overweight are 1.7 times more than the government school goers (Table 3). There is no denying of the fact that the private school going students have more access to higher eat outs and a sedentary lifestyle. In another study in Shimla by Avinash Sharma et al.[12] revealed rates of elevated blood pressure significantly higher (46.5% *vs* 17%, $p < 0.001$) among those with high BMI (overweight and obese) compared to those with normal BMI with a total hypertension prevalence of 20% which is comparable to the present study. Other studies compared the prevalence of metabolic syndromes among children with increased BMI and have found the prevalence of hypertension to be more among obese and overweight.[13,14,15] Hypertension is also a part of metabolic syndrome.

CONCLUSION

Although hypertension is a well monitored and well versed disorder among the adult population yet it is the cheer unexpectancy of the disease among pediatric population which is threatening. A substantial number (9.6%) of overweight and obese school children had different categories of hypertension in our study. Time trends in childhood obesity and hypertension and their consequences should be monitored for primary prevention of adult hypertension. The limitation of our study is that we could not follow up the children included in this study for serial monitoring of blood pressure and the duration of the study is also short.

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Abbreviation: BMI (body mass index); WC (waist circumference); Ht (height); AAP (American Academy of Pediatrics); IAP (Indian Academy of Pediatrics).

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