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Prevalence and Risk Factors of Obesity and Overweight in Urban School Children of Age 6 to 12 Years in Kerala

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ABSTRACT
Introduction: *Obesity in childhood is a multi-system disease with potentially devastating consequences. There has also been a trend towards increasing prevalence of overweight and obesity as well as metabolic complications in developing countries.*
Methods: *A cross sectional survey was done in school children of 6 to 12 years age group in Thiruvananthapuram city of Kerala to know the prevalence of obesity, overweight and associated risk factors.*
Results: *In the study population, the prevalence of obesity (>95th percentile of BMI) was 3.2% and prevalence of overweight (≥85th percentile of BMI) was 8.6%.Prevalence of hypertension and prehypertension were 3.9% and 6.4% respectively. There was an increased prevalence of obesity and overweight in children with daily exercise less than 1 hour, TV watching more than 1 hour daily, and family history of obesity. The association with family income was not significant.*
Conclusions: *Obesity and overweight is a problem in urban school children of 6 to 12 years and lifestyle modification may help in the control.*
Keywords: *childhood obesity, overweight, risk factors, Kerala.*

INTRODUCTION

Obesity represents a major health problem in both developed and developing countries. In the last 30 years the prevalence of obesity has increased markedly and it is estimated that there are now more than 500 million overweight and 250 million obese adults in the world[1]. Unfortunately, the problem of progressive overweight and obesity affects children as well. The calculated global prevalence of overweight in children aged 5-17 years is estimated by International Obesity task Force (IOTF) to be approximately 10 %. But this is unequally distributed with prevalence ranging from 30% in United States to < 2% in sub-Saharan Africa[2]. Obesity in childhood is a multi-system disease with potentially devastating consequences. In addition early onset obesity is associated with increased chance of being an obese adult and an increased risk of obesity related diseases.

There are national differences in the prevalence rates of obesity. There has also been a trend toward increasing prevalence of overweight and obesity as well as metabolic complications in developing countries. There are a few studies, reporting, prevalence of childhood and adolescent obesity and overweight from different parts of India that range from 3% to 29%, and also indicate that the prevalence is higher in urban than

in rural areas[3]. The crucial period for the persistence of obesity are gestational period, adiposity rebound age 5 to 7 years, and adolescence. In Kerala there are some studies done in adolescence age group; but a few studies were done in 6- 12 year old on the prevalence of obesity, hence the need for the study.

This study also tried to find out the association of known risk factors of obesity. There are many factors responsible for obesity in children. Obesity tends to run in families. Genetics plays a major role. A common explanation is, the family members share common attitude towards food, eating habits and exercise[4]. Modern environment may have unmasked previously silent obesogenic genes, thrifty genotypes[5]. The risk of obesity is low in children with neither parent being obese and greater when one parent is obese and greatest when both parents are obese[6]. A lifestyle characterised by lack of physical activity and excessive inactivity (particularly television viewing) might cause obesity in children[7].

AIM OF THE STUDY

To find out the prevalence and risk factors of obesity in school children 6 to 12 years from Thiruvananthapuram corporation, Kerala.

METHODS

A cross sectional survey was done by recruiting students in the age group 6 to 12 years from 3 randomly selected schools of Thiruvananthapuram Corporation after getting approval from IEC. School authorities and Parent Teachers Association were informed and consent were obtained from students and or their parents prior to data collection and examination. Those who have not given consent and children on steroid therapy were excluded. Data regarding socio demographic variables like age, sex, family income were collected. Anthropometric measurements like weight and height were taken as per the standard recommendations and BMI was calculated. Blood pressure was recorded using appropriate cuff size. In those children with initial BP suggestive of hypertension or prehypertension three BP recordings were taken in 30 minutes interval and mean value was taken and hypertensive status confirmed. Details regarding family history of obesity, environmental risk factors for obesity like exercise habit, food habit, time spend on television / computer in a day were collected using a questionnaire which was answered by parents. Operational definitions for obesity, overweight and underweight were as per CDC definition. Hypertension was defined when the mean blood pressure of 3 recordings above 95th centile for age, height and gender. Pre hypertension was defined when the mean blood pressure of 3 recordings were between 90thand 95th centile for age, height and gender. Data collected were coded properly and entered in excel spread sheet and appropriate data checking measures were used for ensuring quality of data.

RESULTS

A total of 1051 children were examined and data were collected. 54% were males and 46% were females. Distribution of study subjects according to BMI is presented in table1. Overall prevalence of obesity was 3.2% and overweight was 8.6%. The prevalence of underweight (less than 5% BMI) was 23.2%. Male female ratio of obesity was 59:41 and that of overweight was 51:49. The distribution of BMI based on gender is presented in table2.

Table 1. Distribution of BMI in the study population

BMI	Number	Percentage (%)
Obese	34	3.2%
Overweight	90	8.6%
Normal	683	65.0%
Under weight	244	23.2%
Total	1051	100%

Table 2. Distribution of BMI according to gender

BMI	Boys		Girls	
	Number	Percentage	Number	Percentage
Obese	20	3.5 %	14	3.1%
Overweight	46	8.0%	44	7.5%
Normal	382	66.4%	301	65.5%
Under weight	127	22.1%	117	24%
Total	575	100%	476	100%

Prevalence of hypertension and prehyper tension in the study subjects were 3.9% and 6.4% respect-ively. Family history of obesity (any one parent) was present in 32% children. 73% of children were spending only less than one hour in a day for exercise, whereas 54 % of children were spending more than one hour in watching television or computer. Prevalence of obesity and overweight was more in the 11-12 year age (3.8% and 12.0%) when compared to younger children (2.7% and 5.4%) Table 3. Shows prevalence of obesity and overweight in different age groups.

Table 3. Prevalence of obesity and overweight in different age groups

Age (years)	Obese		Overweight (%)	
	n=34	%	N=90	%
6	2	1.6	6	4.8
7	5	3.5	7	4.9
8	4	3.4	6	5.1
9	4	2.4	10	6.1
10	5	3.1	9	5.6
11	7	4.4	20	12.5
12	7	3.9	32	17.7

When patients with obesity and overweight were compared with systolic blood pressure, there was a significant association between hypertension and high BMI in the study subjects (OR 69.4, 95% CI 22.9, 235.7). The details of comparison of systolic blood pressure against BMI is presented in table 4.

Table 4. Comparison of BMI and systolic BP

Systolic blood pressure	Obese N=34	Over weight N=90	Normal N=683	Under weight n=244	Total N= 1051
Normal BP	6	35	661	241	943
Prehypertension	13	34	18	2	67
Hypertension	15	21	4	1	41

Higher prevalence of obesity and overweight were seen in children with exercise less than one hour a day (OR 2.36; 95% CI 1.34, 4.19) and watching television/computer for more than one hour a day (OR 1.66 95% CI 1.09, 2.53) (Tables 5, 6). The prevalence of obesity and overweight were found to be more in non-vegetarians when compared with vegetarian but the difference was not statistically significant.

Table 5. Comparison of BMI and exercise habit

Exercise habit	Obee N=34	Over weigt N=90	Normal N= 683	Underweight N= 244	Total N=1051
Less than 1 hour a day	32	75	497	161	765
More than 1 hour a day	2	15	186	83	286

Table 6. Comparison of BMI and duration of TV/Computer watching

Exercise habit	Obese N=34	Over weight N=90	Normal N=683	Under weight N=244	Total N= 1051
More than 1 hour a day	28	54	369	115	566
Less than 1 hour a day	6	36	314	129	485

Prevalence of childhood obesity was found to be significantly associated with family history of obesity (OR 3.08 95% CI 1.44, 6.64) but not with overweight. Table 7. Shows the comparison of BMI and family history of obesity.

Table 7. Comparison of BMI and family history of obesity

Family history of obesity	Obese N=34	Over weight N=90	Normal N=683	Under weight n=244	Total N=1051
Yes	13	59	448	190	710
No	21	31	235	54	341

Prevalence of obesity was slightly more in children with high family income (more than 20000 per month), but not statistically significant. Prevalence of obesity and overweight was found to be more in unaided (affluent) schools (4.0%, 9.6%) when compared with the aided schools (2.4%, 7.4%).

DISCUSSION

During the past two decades, the prevalence of obesity and overweight have risen greatly worldwide. The calculated age prevalence of overweight in children aged 5-17 years estimated by International Obesity Task Force (IOTF) to be approximately 10%. In the present study conducted among school children of age 6 to 12 years of Thiruvananthapuram Corporation, the overall prevalence of obesity was 3.2% and

overweight was 8.6%. The prevalence was higher in children of age group 10 to 12 years when compared to younger children (6 to 10 years). In a similar study the prevalence of obesity and overweight in school children of 10 -15 years age group in Thiruvananthapuram Corporation[8] were 4.99 and 17.73 respectively. This shows that the prevalence of obesity and overweight is increasing steadily from 6 years to adolescence.

A study done in puduchery[10]the overall prevalence of obesity was 2.12% and prevalence of over-weight was 4.41%. Even thoughthe prevalence in Puducherry was less than our state, Mahe region in Puducherry, surrounded by Kerala reported the highest prevalence of obesity (4.69%) and overweight (8.66%). This might be due to their food habits or decreased physical activity. Another interesting observation was that, in spite of the high prevalence of obesity and overweight, 23.2% of our children were underweight. This shows that transitional economic countries like India, obesity and malnutrition co-exist.

The prevalence of hypertension was 4% and hypertension and prehyper tension together 10.5% in our study population and showed a positive correlation for obesity and hypertension. This is comparable to a study done in Surat city, India[11] where the prevalence was 6.8% in children of 6 to 18 years. The slightly increased prevalence may be due to inclusion of adolescents.

The prevalence of obesity and overweight was found to be more in children who were watching television for more than 1 hour. This observation is comparable to a meta-analysis[12] in which the multivariable-adjusted overall OR of the childhood obesity for the highest vs. the lowest time of TV watching was 1.47 95% CI): 1.33-1.62]. A linear dose-response relationship was also found for TV watching and childhood obesity ($P < 0.001$), and the risk increased by 13% for each 1 h/day increment in TV watching. Television watching is thought to promote weight gain not only by displacing physical activity but also by increasing energy intake. A significant association with exercise and prevalence of obesity was seen in our study which is comparable to other studies[13].

CONCLUSION

This survey conducted in school children of 6 to 12 years in Thiruvananthapuram city, a cross section of urban school children of Kerala state, showed a prevalence of obesity and overweight of 3.2% and 8.6% respectively which were increasing with age. The problem of underweight also existed in the same population. Obesity and overweight were associated with poor exercise, duration of TV watching, and family history of obesity. The prevalence of hypertension was 4% in the study population and there was a positive correlation with overweight and obesity.

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