Original Research Article

A cross sectional study on the prevalence of overweight and obesity in affluent school children of central Kerala

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ABSTRACT

Background: Childhood obesity is increasing in India in recent years. The recent economic development and nutritional transition has been attributed to the increase in childhood obesity. Obesity in childhood predisposes to many cardiovascular/endocrinal problems in later years of life. This problem is taking an epidemic lever in Kerala too. Objective was to assess the prevalence of obesity among affluent school children in Thrissur.
Methods: This cross sectional study was conducted among 1104 private school children in Thrissur, Kerala, South India between November 2019 to October 2020. Prior permission to conduct the study was obtained from the respective authorities. Parent assent was obtained. A semi-structured questionnaire was used. Anthropometric measurements-height and weight were measured using the standard methods prescribed in the World Health Organization STEPwise approach to surveillance (WHO-STEPS) field manual. Body mass index (BMI) was calculated and classified as per WHO guidelines for their respective ages.
Results: 13.9% were overweight and 7.3% were obese. The combined prevalence of overweight and obesity was 21.2%. Prevalence of obesity and overweight was 23.7% among boys and 18.2% among girls. The prevalence of overweight and obesity increases with age.
Conclusions: Appropriate preventive measures like change in food habits and life style practices, increasing physical activities, health education for parents and children, needs to be taken.

Keywords: Childhood obesity, Overweight, Prevalence

INTRODUCTION

Obesity was once considered as a problem of affluent nations in the world. But in recent times, obesity is emerging as a significant issue in developing countries also.[1] There is a marked rise in childhood and adolescent obesity rates in low and middle income countries, especially in Asia. It has recently accelerated in the post millennium developmental goal (MDG) era. It is a major public health concern in India especially among children from urban high socio-economical group.[2] The increased economic development and nutritional transition has led to a dramatic increase in the prevalence of obesity in children in the developing countries. Around 340 million children are considered to be obese in the age group of 5-19. The prevalence of overweight and obesity has emerged from 4% in 1975 to 18% in 2016 in India.[3] The prevalence of obesity is more in urban India. Recent studies report the prevalence of obesity in the range of 2.9-14.3% and overweight by 1.5-24%.[4] More than 60% of overweight children have at least one additional risk factor for cardiovascular disease, such as raised blood pressure, hyperlipidemia, or hyperinsulinemia, and more than 20% obese children have two or more risk factors. Obesity is harder to treat in adults than in children. Sedentary lifestyle, strange food habits, binge eating, and prolonged TV viewing have probably given rise to this health catastrophe.[5-9]

The extent of overweight and obesity in adolescents seem to be taking an epidemic lever in Kerala.[10] The prevalence of overweight in age group 15-19 years as per National Family Health Survey (NFHS)-4 in Kerala was 9.7% and 13.7% among girls and boys respectively.[11] The high prevalence of overweight and obesity have serious health consequences. Adolescent and childhood obesity are an important predictor of adult obesity. In addition to this, obesity in children is a major risk factor for diseases like cardiovascular disease, type 2 diabetes, hypertension, dyslipidemia and many cancers (including, colorectal cancer, kidney cancer and oesophageal cancer) in adulthood.[12-14] Thus obesity is an opportunity hidden in plain sight to achieve sustainable development goal (SDG) by 2030. Obesity is both an NCD in itself and is the fundamental risk factor of numerous non communicable diseases (NCDs). It had to be addressed for the achievement of SDG target 3.4- reduce the preventable death from NCDs. There is a dearth in data to assess the prevalence of obesity among affluent school children in Thrissur. Hence this study was planned to be conducted to assess the prevalence of obesity and overweight among private school students in Thrissur.

METHODS

This cross sectional study was conducted among 1104 private school children in Thrissur, Kerala, South India between November 2019 to October 2020. Among the total private schools in Thrissur district, one school was selected using the lottery method. The district educational authorities and the school authorities were contacted to get prior permission to conduct the study. Institutional ethical committee clearance was obtained before the start of the study. Universal sampling method was adopted in the school and all the children in the school were requested to participate in the study. Assent sheet was sent to their parents through the wards along with information sheet in both languages (local vernacular and English) and confidentiality statement. Only those children whose parents gave permission were included in the study.

The combined prevalence of overweight and obesity ranges between 5-17% in India.[4] Hence the sample size was calculated as 1034 considering the prevalence as 8.5% (50% of the maximum prevalence) using the below mentioned formula

$$n = z^2_{1-\alpha/2}(1 - P)/\varepsilon^2 P$$

A semi-structured questionnaire was used. Anthropometric measurements- height and weight were measured using the standard methods prescribed in the WHO-STEPS field manual.[15] Height was measured using a stadiometer (portable height-length measuring board) to the nearest centimeter. Weight was measured using a portable bathroom scale weighing machine to the nearest gram. BMI was calculated and classified as per WHO guidelines for their respective ages. Data was entered in excel sheet and analyzed using statistical package for the social

sciences (SPSS) software version 20. Qualitative data were expressed in proportions with 95% confidence interval and quantitative data were expressed in means and standard deviation. Bivariate analysis was done to find out the association between weight classification and other parameters measured. P value <0.05 was considered significant.

RESULTS

Of the 1104 private school students in the study, 54.3% were boys. Among the total study participants 33.3% were high school students and 27.2% were primary school students (Table 1). The age of study participants ranged between 4 and 18 years. Mean age of boys and girls were similar (11.4±3.4 and 11.5±3.4 respectively, t=-0.487, p=0.627). The distribution of boys and girls in each class was also comparable (p=0.39).
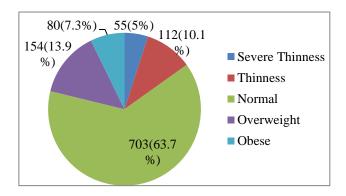

Figure 1: Distribution of study participants based on BMI.

Table 1: Distribution of study participants based on gender and educational status.

Variables	Number (n=1104)	Percentage (%)
Gender		
Male	599	54.3
Female	505	45.7
School		
Pre-primary school	73	6.6
Primary school	300	27.2
Upper primary	273	24.7
High school	368	33.3
Higher secondary	90	8.2

Among the study participants 13.9% were overweight (11.9-16.2) and 7.3% were obese (5.8-9). The combined prevalence of overweight and obesity was 21.2% (Figure 1). Prevalence of obesity and overweight was 23.7% among boys and 18.2% among girls. Also the proportion of underweight was higher among boys 17% as compared to girls 12.9%. The results are statistically significant (Table 2). The prevalence of overweight and obesity increases with age and the results are statistically significant (Table 3).

Table 2: Association of body mass index with gender.

BMI classification	Boys (n=599)		Girls (n=505)		Chi square	P value
	N (%)	95% CI	N (%)	95% CI		
Obese	50 (8.3)	6.3 - 10.9	30 (5.9)	4.1 - 8.5	11.19	0.011
Overweight	92 (15.4)	12.6 -18.6	62 (12.3)	9.6 -15.5		
Normal	355 (59.3)	55.2 - 63.2	348 (68.9)	64.6 - 72.9		
Underweight	102 (17.0)	14.2 - 20.3	65 (12.9)	10.1 -16.1		

Table 3: Association of BMI with different levels of education in the school.

School category	Underweight (%)	Normal (%)	Overweight (%)	Obese (%)	Chi square and p value
Pre-primary (KG)	29 (39.7)	40 (54.8)	4 (5.5)	0	X^2 =60.58 p<0.001
Primary (1st to 5th)	38 (12.7)	198 (66.0)	37 (12.3)	27 (9.0)	
Upper primary (6th to 8th)	26 (9.5)	168 (61.5)	50 (18.3)	29 (10.6)	
High school (9th and 10th)	60 (16.3)	239 (64.9)	48 (13.0)	21 (5.7)	
Higher secondary (11th and 12th)	14 (15.6)	58 (64.4)	15 (16.7)	3 (3.3)	

DISCUSSION

This study was undertaken to estimate the prevalence of overweight and obesity in urban school children from affluent families. The overall prevalence of overweight and obesity was 21.2%. The prevalence of overweight was 13.9% and obese was 7.3%. Prevalence of obesity and overweight was 23.7% among boys and 18.2% among girls. The prevalence of overweight and obesity increases with age and the highest prevalence was in upper primary level.

Poonam et al in her study in Delhi observed that 22% of the children were overweight and 6% were obese.[16] The prevalence of obesity and overweight was 3.4% and 12.7% in a study done by Aggarwal et al at Punjab.[17] 6.8% of children were overweight and 15.3% of the children were obese in a study done by Kaur et al in Delhi.[18] Sidhu et al from Punjab reports a prevalence of 12.24% overweight and 5.92% obese.[19] Prevalence of obesity and overweight among children of private school was 8.83% and 12.13% respectively in a study done by Gonge et al in Maharashtra.[20] Danasekar and Ranganathan in their study in Chennai observed a prevalence of 8.8% obesity and 4.4% overweight children (13.28% overall) among affluent school children.[21] 24.6% were obese and 35.8% were overweight in a study done by Chandra et al in Telangana. Mahato et al and Kapil et al in their respective studies in Delhi observed the overall prevalence of overweight and obesity as 7.4% each.[8,22,23] Subramaniam et al[24] in their study in Chennai found out a prevalence of 6.3%. Similar results were obtained in the studies done by other authors in different parts of India – Bisoi et al from Odisha (7.13%), Poonam et al from Punjab (7.6%), Kumar et al from Punjab (5.74%), Eshwar et al from Gujarat.[1,4,25,26] Studies conducted in other developing countries showed variable prevalence of obesity in children e.g., in Egypt it was found to be 10.8% by Manir et al and in Malaysia, it was 11.3% by a study done by Moy et al while in Pakistan, Ramzan et al found 5.17% prevalence.[27-29]

Mozaffari et al found that BMI was directly and significantly correlated with increasing age and Thakre et al showed that the risk of overweight/obesity was significantly higher to the children of age group ≥10 years.[30,31] The results of the above mentioned studies were similar to results found in present study. Similar results were also obtained from other studies.[17,20,23] However, Bodhare et al found that increasing age was not significantly associated with obesity.[32] The prevalence of obesity was more in adolescent age group than the child group may be associated with increase in adipose tissue and overall weight gain during the pubertal growth spurt.[23,33] The decline in weight gain could occur because the children/adolescents become more conscious about their looks with increasing age and restrict their dietary intake.[34]

In our study, there was slight preponderance of males in prevalence of overweight/obesity showing no significant difference of gender in development of obesity. Similar results were found in study by Bodhare et al, Bharati et al, Kulkarni et al, Eshwar et al, Mahato et al and Poonam et al.[1,23,32,35-37]

Limitations

Since the study was taken from pre-primary children to higher secondary, fearing the validity of the information given by the school children, the contributing factors for obesity like diet practices, physical activity and TV/gadgets usage were not elicited.

CONCLUSION

Prevalence of obesity is increasing because of rapid economic and industrial growth, improvement in living

standards; overeating of energy dense foods, decreased physical activity, sedentary lifestyle, playing of computer games and television viewing for longer duration. Hence, appropriate steps like promotion of healthy life style practices, balanced nutritional diet, increasing physical activities by arranging outdoor games in schools, health education for parents and children need to be taken to address this problem to build up a strong and healthy nation. These may help halt overweight, beat NCDs and achieve SDG by 2030.

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