Prevalence and risk factors of overweight and obesity among upper primary and high school students

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Abstract

Background: The prevalence of childhood obesity is increasing worldwide. The objective of this study is to study the prevalence and risk factors of overweight and obesity among upper primary and high school students

Methodology: Descriptive cross sectional study conducted in randomly selected urban and rural schools of Kozhikode in the period April 2017 to September 2018.Sample size was 900.

Results: The prevalence of overweight and obesity was 17.9% and 7.2% respectively. Urban area, male gender, higher socioeconomic status, family history of obesity, diabetes, hypertension and dyslipidaemia ; habits like frequent intake of snacks, disordered eating, frequent intake of outside food and decreased sleep time had significant association with overweight or obesity.

Conclusion: One-fourth of the study population was obese/ overweight. Environmental and behavioral factors which facilitate increased food consumption are significant risk factors. Waist height ratio is a good indicator to screen for obesity and overweight in school health programmes

Keywords: childhood obesity, overweight, risk factors

Introduction

Obesity and overweight are defined by WHO as abnormal or excessive fat accumulation that may impair health. Childhood overweight and obesity is a part of global epidemic, and is one of the most serious public health problems in 21[st]century [1].

The global prevalence of overweight and obesity among children of 5-17 years as estimated by the International Obesity Task Force (IOTF) is approximately 10%, but this is distributed unequally[2].India is in the midst of an increasing epidemic of life style disorders associated with childhood obesity [3]

The basic cause for overweight and obesity is an energy imbalance between calories consumed and calories expended. Various faulty eating habits, decreased physical activity and increase in screen time had led to increase in the prevalence of overweight and obesity among children. Recent studies focusing on the prevalence and risk factors of overweight and obesity among children are scarce in northern Kerala. It is

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important to know the prevalence of childhood obesity and overweight in urban and rural areas to focus on preventive measures.

Materials and Methods

A descriptive cross sectional study was conducted in two randomly selected urban and rural government high schools in Kozhikode district from April 2017 to September 2018 . The study included all students of 5th to 10th standards who consented with a sample size of 900. Data was collected by school visits using a structured questionnaire. Weight and height was measured using electronic weighing machine and stadiometer respectively. Waist circumference and hip circumference were measured using a stretch resistant tape. Data was analysed using SPSS software. Chi square test was used to know the statistical significance

Body Mass Index was calculated using the formula BMI = weight(in kg) / height (in m2) and compared with age and gender specific Revised IAP 2015 growth charts. BMI above 23 adult equivalents is taken as overweight and above 27 adult equivalents is taken as obesity.

Waist–hip ratio values of 0.90 and 0.80 are taken as cut off for boys and girls respectively. The cut off values for Waist circumference was 75th percentile and waist height ratio was above 0.5 [4, 5].

Results

Study populations comprised of 900 students in the age group of 9 to 16 years, 457 boys and 443 girls. Out of this, 510 were from urban school and 390 from rural school. The overall prevalence of overweight and obesity was 25.1% (226 out of 900). The prevalence of overweight was 17.9% and the prevalence of obesity was 7.2% with a higher prevalence among children from urban school (20 &8.2% vs 15.1 & 5.8% in urban and rural children respectively). Prevalence of obesity was significantly high among boys (10.9 vs 3.3% with p value=0.013) There *is* a statistically significant relation between higher socioeconomic status and overweight/obesity with a p value of 0.003.

Prevalence of obesity and overweight among children with various risk factors is given in Table-1.Among the risk factors studied all were significant except intake of fried/grilled food, intake of junk food, intake of sweetened beverages/juices/soda and screen time. While considering anthropometric measurements, waist circumferences were above the cut off in 27.5% of the study population and among them 70.6% were obese/ overweight. It was above the cut off in 21.5% of rural school children and in 32.1% of urban school children. Waist hip ratio was above the cut off in total 52.7% of sample population of which 63.6% were overweight / obese. Waist hip ratio was above cut off in 66% of obese children and 64.5% of overweight children. It was above the cut off in 50% of the rural school children and 54.9% of urban school children. Waist height ratio was $\geq$ 0.5 in 19% of sample population and among them 95% were obese/ overweight. Waist height ratio was $\geq$ 0.5 in 45.3% of overweight children and 78.4% of obese children. Waist height ratio is a better indicator of overweight/obesity than waist hip ratio in children. Waist height ratio is above the cut off in 21.1% of urban school children and in 16.1% of rural school children

Table 1: Prevalence of obesity and overweight with various risk factors

Risk Factor		Prevalence of obesity	Prevalence of overweight	p value
Gender	Male	10.9%	17.7%	0.013
	female	3.3%	18%	
Location	Urban	8.2%	20%	0.013
	rural	5.8%	15.1%	
Intake of snacks	More than 3times/week	58.4%%	55.9%	<0.001
	less than 3times/week	9.6%	11.8%	
Intake of fruit juices/sweetened beverages/soda	More than 3times/week	6.3%	23.2%	0.411
	less than 3times/week	7.4%	16.1%	
Intake of fried/grilled food	More than 3times/week	8.1%	17.3%	0.974
	less than 3times/week	6.4%	18.2%	
Intake of junk food	More than 3 times / week	12%	18.5%	0.073
	less than 3times/week	6.4%	17.7%	
Intake of outside food	More than once weekly	11.3%	20.9%	0.009
	Less than once weekly	5.4%	16.5%	
Disordered eating	More than once weekly	14.2%	20%	<0.001
	Less than once weekly	5.3%	17.3%	
Screen time	<2hours	7.8%	17.8%	0.864
	>2 hours	6.3%	17.8%	
Sleep time	<6hours	5.1%	23%	0.010
	>6hours	7.3%	17.6%	
Family history of diabetes	Present	9.2	21.1	0.011
	Absent	6.2	16.3	
Family history of hypertension	Present	9.2	21.1	0.045
	Absent	6.2	16.3	
Family history of dyslipidemia	Present	9.6%	20.9%	0.003
	Absent	6.4%	17%	
Family history of obesity	Present	16.1	24.6	<0.001
	Absent	4.2	15.6	

Discussion

The prevalence of overweight was 17.9% and prevalence of obesity was 7.2%. The overall prevalence of overweight and obesity was 25.1%. The prevalence was higher when compared to worldwide prevalence, which is 18% according to WHO [6]. The prevalence was higher in the present study when compared to similar studies in South Kerala, in which the prevalence of obesity was 6.3% and overweight was 12 % [7]. This increase in prevalence might be because of the change in lifestyle and dietary habits, evolved over years.

There was higher prevalence of obesity (8.2%) and overweight (20%) in urban schoolchildren than in rural school children (5.8% obese and 15.1% overweight). This might be because of the varying socioeconomic status and life style in the urban and rural area. This finding was comparable to a study conducted in affluent children in Delhi where the prevalence was 31% of which 7.5% were obese [8]. Hodgkin E et al also observed that urban children have more risk of overweight and obesity [9].

There was an increased prevalence of overweight/ obesity among boys (28.6%) when compared to girls (21.38%). Kapil et al also observed that overall prevalence of obesity was higher in male than in female children [7].The present study showed statistically significant association between higher socioeconomic status and obesity. Similar association was also reported by the Ten State National Survey in USA [10]. This may be because of the habit of more hotel visits, frequent intake of junk foods, increased screen time and sedentary life style among high socioeconomic status families.There was a significantly higher risk of overweight and obesity among those who take snacks more frequently.similar findings were reported by Mc Donald CM et al [11].

In a review article by Rafeela Liberali et al, a positive association between sugary drinks and fast food with obesity was reported [12]. In our study the prevalence of obesity/overweight among those who took sweetened beverages, soda or fruit juices more than 3 times/week was 33.5% when compared to 23.3% among those who took less frequently. Among those who had junk food frequently, 32.7% were obese or overweight compared to 24.5% among those who took junk food less frequently. Taveras et al reported increased intake of fried food was associated with increased BMI [13]. In the present study 65.9% of obese/overweight children took fried/grilled food once weekly or more frequently.

Disordered eating behaviour like skipping of meals was significantly associated with overweight/ obesity. It was observed that, 36.3% of those who had the habit of disordered eating once weekly or more frequently, were obese or overweight. This was consistent with the finding of Szajewska H et al [14]. It was found that frequent intake of outside food was a significant risk factor for obesity/ overweight. These findings were similar to the findings of J Kumar et al [15]. Present study showed that, 59.2% of obese/overweight children had screen time of more than 2 hours. Emily Banks et al also reported positive association between increased screen time and obesity [16]. Decreased sleep time had significant association with overweight/obesity in this study. A meta analysis by Cappuccio et al reported increased risk of overweight and obesity among short sleepers both in children and adults [17].

There was significantly increased risk of obesity/ overweight among children who had family history of obesity,hypertension,dyslipidemia, diabetes or heart attack. Avon longitudinal study also reported increased risk of obesity in children whose parents are obese[18].

A study by Corica D et al also reported family history of obesity, diabetes, heart disease, dyslipidemia as a risk factor for early onset and severe obesity in children [19].

Out of 226 obese/overweight children, only 70.6% had an abnormal waist circumference and only 63.6% had waist hip ratio above cut off. But 95% of obese/overweight children, had waist height ratio above cut off suggesting this measurement is a better tool to screen such children. In a study by Sanam Anwar et al also largest proportion of overweight was picked up by waist height ratio than waist circumference [20].Klinc A also reported waist to height ratio as a better screening tool for identifying childhood obesity[21]. Waist hip ratio was reported not to a good indicator of intra-abdominal fat deposition in children and adolescents by Semiz S et al[22]. In our study also had similar finding as least proportion of overweight/ obesity was picked up by waist hip ratio

Based on the findings of our study it is recommended that unhealthy eating habits like frequent intake of snacks, disordered eating and frequent hotel visits should be avoided by children. Children should have adequate hours of sleep. An efficient school health checkups and health education programs have a major role to prevent the epidemic of childhood and in turn the adult obesity.

Conclusion

In the present study there is a high prevalence of childhood obesity and overweight. Children from the urban area and those from affluent families are at a higher risk of these morbidities. Those with family history of obesity, diabetes, hypertension and dyslipidemia are more prone to became obese and overweight during their school going age. Environmental and behavioral factors which facilitate increased food consumption, like frequent intake of snacks, frequent hotel visits, disordered eating and decreased sleep are significant risk factors. These factors have to be addressed to prevent this life style disorder. Inclusion of chapters on healthy diets and heating habits in school curriculum will be useful to generate awareness. Waist height ratio is a good indicator to screen for obesity and overweight in school health programmes and in community settings as it requires a simple measuring tape only

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