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Original Research Article

A study of prevalence of obesity among adolescent students and its correlation with risk factors in Udaipur city, Rajasthan, India

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ABSTRACT

Background: The present study was aimed to determine the prevalence of obesity among adolescent students (11-17 years) and to study the correlation between the behaviors related eating, sedentary activities, dietary pattern and physical activities and obesity.
Methods: The study was conducted among1007 students as a case control study. Prevalence of obesity was calculated using centres for disease control and prevention (CDC) growth chart. Risk factors for obesity were assessed by using questionnaires which include 18 questions in four broad categories. And association of risk factors and obesity has been analysed by using multivariate logistic regression model.
Results: A total of 1007 school going adolescents were included in present study, out of this 50.94% were boys and 49.06% were girls. The prevalence of obesity in present study population was 4.27%. Prevalence of obesity was more among boys than girls. (53.49% vs 46.51%). On multivariate logistic regression factors V5, V6, V8, V10, V12, V13, and V14 are associated with obesity and risk factors V3, V4, V7, V11 are not associated with obesity, factors V15, V16, V17, V18 are associated with onset of adolescent obesity.
Conclusions: Adolescent obesity is a major health problem in Udaipur, Rajasthan and it requires timely intervention to prevent the complication and co morbidities.

Keywords: Adolescent, Obesity, Prevalence

INTRODUCTION

Obesity is defined as abnormal/excessive accumulation of fat. Adolescents are considered to be obese if their body mass index for age and sex is more than 95% percentile according to CDC growth chart.

Energy imbalances between consumed and expanded constitute the primary etiology behind overweight and obesity. Obesity is a major health problem worldwide at present including India. The prevalence has increased over last decade in both developing and developed countries.[1] Developing countries are undergoing nutrition transition due to globalization and economic development leading to rapid changes in life style and dietary habits.[2] The rising prevalence of obesity in India has direct correlation with increasing prevalence of obesity related co-morbidites like hypertension,dyslipidemia,type-2 diabetes mellitus (DM-T2), cardiovascular disease, metabolic syndrome.[3,4]

In India school-based data demonstrates an obesity ranges of 5.6% to 24% for children and adolescents.[5-7]

The purpose of the study is to evaluate the relationship between the determinants and adolescent's obesity and prevent the complications and comorbidities caused by obesity.

METHODS

A total of 1007 school children aged 11 to 17 years constituting boys and girls were sampled from different schools in and around Udaipur, Rajasthan during year 2016 to 2017 after taking prior permission from the teacher.

Exclusion criteria

- Adolescents in the age group of 11-17 years, who were suspected to have endogenous obesity and those heights less than the expected for their age and gender.

For measuring weight adolescents are made to stand in a platform scale, outer clothing and shoes removed. The scale is placed in the zero position before the child steps on the scale. The child is made to stand still will both feet in the centre of the platform. Measurement recorded to the nearest 100grams. For measuring height, a standing height board is used. This device has a flat vertical surface on which a measuring scale is attached. It also has a moveable headpiece and a permanent surface to stand. Shoes or slippers were removed, child made to stand erect with shoulders at level, hands at sides, thighs together and weight evenly distributed between both the feet. Childs feet placed flat on the floor with heels comfortably together and touching the base of the vertical board. Four contact points between body and the stadiometer. Lower the headpiece until it touches firmly over the crown of the head and at right angle to the measurement surface. Record height to the nearest 0. 1cm.The child BMI is plotted in the body mass index for age and sex percentile chart developed by the centres for disease control and prevention 2000 (CDC growth chart 2002).

Based on the above definition children were classified as obese. Obese children are taken as cases and age and sex standardised. A questionnaire to assess the dietary pattern, behaviours related to eating physical activity and TV viewing was distributed to both the cases and controls. Children were given necessary help to complete the questionnaire.

The questionnaire contains 18 questions grouped into 4 broad categories namely:

- Dietary pattern
- Behaviors related to eating
- Physical activity
- Sedentary lifestyle

Dietary pattern includes 2 questions one regarding the adolescent's fat intake and the other regarding vegetables and fruits intake. The behaviors related to eating included in the study are seeking food in the absence of hunger, losing control over eating, to seek food in response to sadness, boredom and restlessness, to seek food as a reward, to sneak or hide food, inappropriate behaviors like purging, excessive exercise after binging, evening hyperphagia, visiting fast food restaurants often, consume lunch or dinner in groups and to skip or delay breakfast. Physical activity studied under two groups:

- Community activities
- Leisure time activities.

Further physical activity studied under the nature of physical activity into mild, moderate and vigorous physical activity. Mild physical activity includes walking slowly, slow treading swimming, light stretching, sweeping. Moderate physical activity: Walking, briskly Cycling for pleasure or Swimming. Vigorous physical activity: Walking briskly uphill or with load, cycling fast or racing, swimming fast, vigorous athletic activities. Sedentary life style includes questions regarding hours of television viewing having television in bedroom, to seek food advertised in the television and to eat while watching television.

The 18 factors mentioned in the questionnaire were given a code each (V1 toV18) V1- Consumption of high fat food V2- Consumption of food rich in vegetables, fruits and fibres less than 5 servings/day V3- To seek food in absence of hunger V4- Do not have a sence of control over eating V5- To seek food in response to sadness, Boredon and restlessness V6- To seek food as a reward V7- To sneek or hide food V8- In appropriate behaviours like purging ,fasting or exercises after binging V9 – Do moderate/vigorous activity less than 60 min per day for most of the day in a week, V10-To eat more than half of the daily food after evening, V11- To wake at night frequently and eat, V12- To visit fast food restaurants very often (5 or more times in a week), V13- To consume lunch and dinner in a group, V14- To skip or delay breakfast, V15- To watch television /videogames more than 2 hours/day, V16- To have TV in the bedroom, V17- To eat food items after seeing it in the TV advertisements, V18- To eat while watching TV.

RESULTS

In present study out of the 1007 school going adolescents, 513 (50.94%) are boys and 494 (49.06%) are girls. Of the sample 14.20% were of 11 years, 13.80% were of 12 years, 15.89% were of 13 years, 13.80% were of 14 years, 15.29% were of 15 years, 14.40% were of 16 years and 12.61% were of 17 years.

A total of 43 adolescents detected during this survey were Obese. Prevalence of obesity among adolescents in the age group of 11-17 years was (4.27%). Prevalence of obesity was more among boys than girls (53.49% vs 46.51%).

28 (65.12%) obese adolescents consumed food with more fat content when compared to 347(36.2%) non-obese adolescents. 713 (73.96%) non-obese adolescents are

consuming food rich in vegetables, fruits and fibre diet 5 servings/day when compared to 13 (30.24%) obese adolescents.

Obese adolescents consume 3.2 times more fat content diet than non-obese adolescents which is statistically significant (p<0.05). Obese adolescents are 6.4times more likely to have obesity as they are consuming less than 5 servings/day of vegetables, fruits and fibers diet. Which is statistically significant (P<0.05).

21(48.83%) obese adolescents consume food in absence of hunger when compared to 443(46.52%) non-obese adolescents. This is statistically not significant (p>0.05). 24(55.82%) obese adolescents do not have sense of control over eating when compared to 559(58.2%) non-obese adolescents. This is statistically not significant (p >0.05). 20(46.52%) obese adolescents seek food in response to boredom and restlessness when compare to 308(32.16%) non- obese adolescents which is statistically significant (p<0.05).18(58.8%) obese adolescents seek food as reward when compared to 289(30%) non-obese adolescents. Which is significant (p<0.05).

22(51.16%) obese adolescents sneak/hide food when compared to 385(40.13%) non-obese adolescents which is statistically not significant (p>0.05). 20(46.52%) obese adolescents have inappropriate behaviors like purging when compared to 308(32%) adolescents in non-obese group. This is statistically significant (p<0.05). 23(53.48%) adolescents in obese group consume half of the daily food after evening when compared to 366(37.97%) non-obese adolescents which is statistically significant (p<0.05).18 (41.86%) obese adolescent wake up frequently at night and consume food when compared to 327(33.84%) non-obese adolescents which is statistically not significant (p>0.05%).

22(51.16%) obese adolescents often visit fast food restaurants when compared to 357(37%) non-obese adolescents. This is statistically significant (p<0.05).22(52.16%) obese adolescents consume lunch/dinner in groups when compared to 347(36%) non-obese adolescents which is statistically significant (p<0.05).11(25.58%) obese adolescents skip or delay breakfast in compared to 357(37.20%) non-obese adolescents, which is statistically significant (p<0.05).

Based on multivariate logistic regression model the risk factors V5, V6, V8, V10, V12, V13, and V14 are associated with obesity. The risk factors V3, V4, V7, V11 are not associated with obesity in multivariate model may be due to confounding factors (Table 1).

18(41.8%) obese adolescents do moderate physical activity when compared to 492(51.16%) non-obese adolescents which is significant (p<0.05).

23(53.48%) obese adolescents watch TV/videogames >2hours/day when compared to 357 (37.2%) non-obese adolescents. This is statistically significant p<0.05). 20(46.51%) obese adolescents have TV in their bedroom when compared to 424(44.18%) non-obese adolescents, which is statistically significant (p<0.05). 22(51.17%) obese adolescents consume food items after seeing it in TV advertisement when compared to 405(42%) non-obese adolescents. This is statistically significant (p<0.05). 24(55.82%) obese adolescents eat while watching TV when compared to 443(46.51%) non-obese adolescents, which is statistically significant (p<0.05).

Table 1: Multivariate logistic regression model for risk factors.

Risk factor	ODD Ratio	95% CI		P value
		Lower	Upper	
V1	3.2092	1.6444	6.3228	0.05
V2	6.2092	3.2441	12.8962	0.001
V3	1.0288	0.5082	2.1124	0.51
V4	0.8912	0.3946	1.7262	0.56
V5	1.7599	1.0006	3.3233	0.04
V6	1.5612	0.8099	3.0102	0.05
V7	1.4795	0.7546	2.9945	0.06
V8	1.7521	1.0006	3.5989	0.041
V9	1.5989	0.2612	2.3996	0.05
V10	1.7796	1.0069	3.5692	0.046
V11	1.3026	0.6542	2.7999	0.058
V12	1.6899	0.8696	3.3825	0.04
V13	1.7626	1.0016	3.5326	0.045
V14	1.3246	0.5596	2.3753	0.05

Based on multivariate regression model risk factors V15, V16, V17, V18 are associated with onset of adolescent obesity (Table 1).

DISCUSSION

This study has been carried out in different schools in and around Udaipur, Rajasthan during the period 2016 to 2017, comprising of 1007 students among them 513 were males and 494 were females. In present study the prevalence of obesity is found to be 4.27%. The prevalence of obesity is more between 15-16 years age group, it is observed more in boys. In present study high fat content diet shows a strong correlation with obesity among the adolescents. (OR 3.3191, 95% CI: 1.7488-1.2995). Diet composition independent of total energy intake, resting energy expenditure and physical activity has been shown to be important in contributing to childhood and adolescent obesity. In diets of the same energy content, high fat diets promoted more weight gain than low-fat diets.8 Similar conclusion were arrived by Jennifer A Batch and Louise A Baur et al in their article which states that the increased prevalence of obesity in recent decades may have resulted from an increased consumption of high fat foods.[9] Low intake of vegetables and fruits though emerged as a possible risk factor in univariate and multivariate model. In our present study

reduced physical activity (moderate/vigorous) less than 30-60 minutes per day for most of the days in a week was strongly associated with the onset of obesity in adolescents. (OR: 1.6907 95% CI: 0.3720-2.2826). C S Berkey in his Longitudinal study of skipping breakfast and Fast food consumption and weight change in adolescents has stated that skipping breakfast and Fast food consumption increased during the transition to adulthood, and both dietary behaviors are associated with increased weight gain from adolescence to adulthood.[10]

In our present study Skipping or delaying breakfast showed a positive correlation with onset of obesity in adolescents. Adolescents who ate more than half of their daily food intake after evening hours noted to have a risk to become obese. (OR:1.3246 95%CI: 0.5596-2.3753).

Fast-food consumption may contribute to the growing level of obesity, through energy-dense foods, high fat content and large portion sizes. Fast food is known to be high in energy density, and fast-food outlets have an average menu of more than twice the energy density of recommended healthy diets. In our present study Eating in Fast food restaurants five or more times per week emerged as a key risk factor in both univariate and multiple logistic regression model (OR: 1.6899 95% CI: 0.8696-3.3825).

Television viewing is a major activity and influence on children and adolescents. On average, children aged 11-17 spend 4.5 hours a day watching some kind of screen with 2.7 hours of that spent watching television. In the present study, sedentary activity in the form of watching TV/Video games more than 2 hours per day emerged as one of the key risk factors for obesity in adolescents. (OR:1.8358, 95% CI : 1.0478-3.7206). Luis F Gomez et al in the study on Television viewing and its association with obesity, children classified as excessive TV viewers (2 to 3. 9 hours/day or 4 or more hours/day) were more likely to be obesity than those who watched less than 2 hours/day.[11]

Most experts agree that eating while watching TV encourages mindless eating. Eating while watching TV would contribute to obesity by tempting them to overeat even though they were not hungry. In our present study eating while watching TV emerged as a risk factor for obesity in adolescents. (OR:1.3745, 95% CI:0.7026-2.8562). It is obtained in the present study where TV in bedroom showed a strong positive correlation with the onset of obesity in adolescents. These results suggest the importance of keeping TV out of an adolescent's bedroom from an obesity prevention perspective.

CONCLUSION

Prevalence of obesity in adolescents in the age group of 11to 17 in and around Udaipur, Rajasthan is 4.8%. Prevalence of obesity is more in the age group of 15-16 Years. Prevalence of obesity is more in boys than girls. Dietary pattern: High intake of fatty foods is a risk factor for adolescent obesity Behaviours related to eating: Evening hyperphagia and Eating in fast food restaurants very often are associated with the onset of adolescent obesity Physical activity: Moderate or vigorous physical activities less than 30-60 minutes per day for most of the days in a week are associated with onset of adolescent obesity. Sedentary lifestyle: Watching television more than 2 hours per day, having Television in the bedroom and eating while watching Television are strongly associated with onset of adolescent obesity.

Recommendations

Interventions suggested to prevent the onset of obesity in adolescents based on this study: Balanced eating plan—to reduce the intake of corn chips, potatochips, cake, cookies, fried potatoes, ice-cream, pizza, soft drinks, tined foods, fried chicken and mutton and avoid vanaspathi and butter in cooking. To increase the intake of vegetables (beans, peas, corn, green leaves) and fruits to at least five servings per day.

Behavioral approach to treat evening hyperphagia Frequent visit to fast food restaurants should be avoided. To build up slowly 30 minutes of moderate physical activity in day. The 30 minutes can be accumulated throughout the day in 10 to 15 minutes bouts. Increase the amount of daily routine activities such as gardening, shopping, housework, walking, etc. To reduce TV viewing less than 2 hours per day, to avoid eating while watching TV and to avoid having TV in bedroom.

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