Research Article

A study of prevalence of overweight and obesity in adolescents

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ABSTRACT

Background: Obesity is a disorder of energy metabolism involving excessive adipose tissue stores which is associated with medical or psychosocial morbidity. The prevalence, as well as the severity of obesity in adolescents is increasing at an alarming rate, making it one of the most serious health problems affecting this age group.

Methods: This observational study was conducted in KIMSH, Tertiary hospital, Bangalore, Karnataka, to study the prevalence of overweight and obesity in adolescents. All adolescents attending outpatient in Department Of Pediatrics aged 12-18 years from 1st January 2014 to 30thJune2015 were included. Written consent was obtained from the adolescent and parent/guardian. Demographic data, History and examination were performed. An anthropometric measurement of weight, height was measured using same calibrated balance and stadiometer by standard technique. BMI calculated as BMI=weight (kg)/height (m). Centre for disease control and prevention percentile ranking was used. 85th to <95th percentile were categorized as overweight and >95th percentile as obese. Descriptive and inferential statistical analysis-Chi-square/ Fisher Exact test, softwares namely SAS 9.2, SPSS 20.0 were used.

Results: 500 adolescents were enrolled comprising 305girls and 195boys.Overall incidence of overweight and obesity was 11.2% of which 21 (4.2%) were obese and 35 (7%) were overweight. Among 305 girls, 18 (5.9%) were obese and 25 (8.2%) were overweight, while in boys, 3 (1.5%) were obese and 10 (5.1%) were overweight. During adolescence girls were found to be more obese and overweight (P=0.021).

Conclusions: Adolescent obesity has become rampant. Hence early screening and preventive strategies are necessary.

Keywords: Adolescent, Obesity, Overweight

INTRODUCTION

The term adolescence is derived from the latin word "adolescere" which means to "grow up".[1] Adolescents represent about one quarter of India's population.

Adolescence is divided into early (10- 13years), middle (14-16 years) and late adolescence (17-19 years). During this period, changes occur in thoughts, attitude, ideas, relationships and moral standard. During this period of transition, there is an earlier physical maturity and reproductive capability, than psychological and social maturity. It is the time for acquiring new skills, mastery over environment, learning to handle responsibilities and gaining control over one's emotions and thoughts.[2]

Obesity is a disorder of energy metabolism involving excessive adipose tissue stores, which is associated with medical or psychosocial morbidity. The prevalence, as well as the severity of obesity in adolescents is increasing at an alarming rate, making it one of the most serious health problems affecting this age group.

Childhood obesity is a matter of concern worldwide and WHO has designated obesity as global epidemic. The global prevalence of obesity in children of 5-17 years has been calculated to be 10% by The International Obesity Task Force (IOTF).[3]

The National Health and Nutrition Examination Surveys (NHANES cycle I, II and III) has been surveying the

prevalence of obesity in American children and youth since 1971. The 1966-80 NHANES II study identified up to 15% of adolescents aged 12 to 19 years as being overweight, which increased to 21% in 1988-91 NHANES cycle III Study (using BMI – criteria).[4]

Recent investigation has shown that this epidemic of obesity has started to percolate even to the underdeveloped and developing countries, including India. WHO has compiled the prevalence of childhood obesity as over 2% in many developing countries. Rapid transition countries are more vulnerable to childhood obesity.

Obese girls were more prone to develop persistent obesity during adolescence.[5] Despite efforts to curb the growing prevalence of childhood obesity, it is growing at an alarming rate and the stigmatization to which obese children are being exposed to is also growing.[6] Almost one-third of children and adolescents in the US are either overweight or obese now. Factors influencing the obesity epidemic mainly include changes in dietary patterns and food consumption, such as fast foods and large portion sizes and increase in physical inactivity.[7]

The objective of this study was to evaluate the prevalence of overweight and obesity in adolescents.

METHODS

An observational clinical study was carried out at Department of Paediatrics, KIMS Hospital, Bangalore during January 2014-June 2015 with total of 500 adolescents with purposive sampling method. The study sample was taken from a larger ongoing study to find the association between adolescent obesity and depression.

Inclusion criteria

All children attending outpatient and hospitalised at KIMS Hospital aged 12 to 18 years, who have given consent to participate in the study.

Exclusion criteria

- Children on long term steroids>4weeks/drugs acting on CNS
- Children with chronic illness
- Children with syndromic features
- Children with mental retardation/CNS disorders.

Methods of data collection

- Informed and written consent was obtained from the adolescent and parent/guardian.
- Demographic data, History was collected and brief examination of the child was performed.
- An anthropometric measurement of weight, height was measured using same calibrated balance and stadiometer by standard technique.

- BMI was calculated according to : BMI=weight (kg)/height (m).
- Body Mass Index (BMI) is an anthropometric index of weight and height (stature) that is defined as body weight in kilograms divided by height in meters squared. BMI is the commonly accepted index for classifying adiposity in adults and it is recommended for use with children and adolescents.

Tools used

CDC growth charts[8]

The revised growth charts consist of 16 charts (8 for boys and 8 for girls). These charts represent revisions to the 14 previous charts, as well as the introduction of two new body mass index-for-age (BMI-for-age) charts for boys and for girls, ages 2 to 20 years. The new BMI growth charts can be used clinically beginning at 2 years of age, when an accurate stature can be obtained.

Operational definitions

Obesity and overweight

Children are classified according to Centre for disease control and prevention as:

Percentile ranking Weight status

5th percentile to less than 85th percentile Healthy weight

85th to less than 95th percentile Overweight

Equal to or greater than the 95th percentile Obese

Statistical analysis

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance.

The Statistical software namely SAS 9.2, SPSS 20..0, Stata 10.1, MedCalc 9.0.1 ,Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS

Between 1st January 2014 and 31st June 2015, 500 adolescents attending pediatric OPD of our hospital were included in the study after applying inclusion and exclusion criteria.

In the present study, it was found that out of the 500 adolescents enrolled, overall the number of adolescents with BMI above the normal range was 56 constituting 11.2%, out of which the number of obese adolescents were 21 (4.2%) and overweight adolescents were 35 (7%).

Table 1: Distribution of BMI in early adolescents.

Age	Sex	Mean BMI	Std. Deviation	Range
12	F	16.9415	3.12124	9.71
	M	15.8176	2.57097	10.21
	Total	16.3047	2.82824	10.76
13	F	17.0886	2.67916	10.75
	M	15.2230	2.02246	9.80
	Total	16.2039	2.55591	11.55

Table 2: Distribution of BMI in mid adolescents.

Age	Sex	Mean BMI	Std. Deviation	Range
14	F	17.7355	2.89514	14.98
	M	15.6544	1.92701	9.23
	Total	17.1757	2.81943	15.90
15	F	17.9246	2.42351	14.75
	M	16.7011	2.08429	9.68
	Total	17.5041	2.37692	15.23

Table 3: Distribution of BMI of adolescents aged 16-17 years.

Age	Sex	Mean BMI	Std. Deviation	Range
16	F	17.7612	3.35734	17.86
	M	17.1218	3.29561	16.82
	Total	17.4533	3.32252	17.86
17	F	18.6078	2.17154	6.75
	M	17.3290	2.95291	8.91
	Total	17.9347	2.62412	9.17

When the study population was divided into three groups i.e. early, mid and late adolescents, it was found that the mean BMI in early adolescents was 16.25 kg/m^2 (Table 1), mid adolescents it was 17.34kg/m^2 (Table 2) and late adolescents it was 17.7kg/m^2 (Table 3). Hence it was found in our study, that there was an increasing trend in BMI with age.

In the present study, 4.2% were obese and 7% were overweight. It was found that proportion of girls was higher in the obese and overweight groups, i.e. 5.9% and 8.2% respectively as compared to boys i.e. 1.5% and 5.1% respectively and the differences were statistically significant (Table 4).

Table 4: Overweight and obese distribution of adolescents studied.

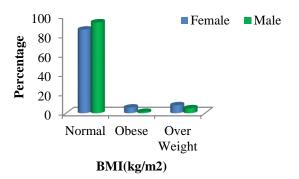| BMI (kg/m^2) (Percentile)	Gender		Total	P value
	Female	Male		
Normal (< 85th Percentile)	262(85.9%)	182(93.3%)	444(88.8%)	P=0.021*, Significant, Chi-Square test
Obese (>/= 95th Percentile)	18(5.9%)	3(1.5%)	21(4.2%)	
Over Weight (85th - <95th Percentile)	25(8.2%)	10(5.1%)	35(7%)	
Total	305(100%)	195(100%)	500(100%)	

Figure 1: Overweight and obese distribution of adolescents studied.

DISCUSSION

The definition of obesity - "that individuals whose body mass index (BMI) (weight in kilograms divided by the square of the height in meters; kg/m^2) exceeds the age-gender-specific 95th percentile are obese". "Those whose BMI is between the 85th and 95th percentiles are overweight" and are at increased risk for obesity related co- morbidities.[9]

According to data from the National Health and Nutrition Examination Survey (NHANES 19992000), approximately 30% of adolescents are at risk for overweight, and 14% of these are severely overweight or obese. Although all racial and socioeconomic groups are affected, higher rates were noted in African American

females and American Indian and Hispanic youth of both genders.[9]

Childhood obesity affects both developed and developing countries of all socio-economic groups, irrespective of age, sex or ethnicity. Worldwide over 22 million children under the age of 5 are obese, and 1 in 10 children is overweight.[10] Wide range of prevalence levels exist, with the prevalence of overweight in Africa and Asia on an average well below 10 per cent and in the Americas and Europe above 20 per cent.

Obesity prevalence varies across socio-economic strata. In developed countries, children of low socio-economic status are more affected than their affluent counterparts.[11] The opposite is seen in developing countries: children of the upper socio-economic strata are more likely than poor children to be obese.[12,13] Indian data regarding current trends in childhood obesity are emerging. A recent study conducted among 24,000 school children in south India showed that the proportion of overweight children increased from 4.94% of the total students in 2003 to 6.57 per cent in 2005 demonstrating the time trend of this rapidly growing epidemic.[14] A study from northern India reported a childhood obesity prevalence of 5.59% in the higher socio-economic strata when compared to 0.42 per cent in the lower socio-economic strata.[15]

In the present study, it was found that out of the 500 adolescents enrolled, overall the number of adolescents with BMI above the normal range was 56 constituting 11.2%, out of which the number of obese adolescents were 21 (4.2%) and overweight adolescents were 35 (7%). A study by Kapil U et al showed that among children aged between 10-15 years obesity and overweight was 7.4% and 24.7% respectively in children of both sexes.[16]

This study shows an overall increasing age wise trend of the mean BMI in both sexes, which is similar to the study done by Agarwal KN et al among children aged between 5-18 years from different cities of India and also to the study done by Raman KM et al in Delhi school children aged between 5- 18 years.[17,18]

In the present study it was found that among boys, 1.5% was obese and 51% were overweight. A study by Khadilkar VV et al showed a prevalence of obesity and overweight as 8.1% and 25.1% respectively in the age group between 10-15 years among boys.[19] The higher percentage of obese and overweight of the other study could be because it was done in affluent school children.

In the present study, obesity and overweight constituted 5.9% and 8.2% among girls. This is comparable to study by Subramanyam et al showed a prevalence of 9.67% of overweight and 6.23% of obesity in school girls aged between 10-15 years in Chennai.[20] In the present study it was found that obesity and overweight was higher in girls as compared to boys. This is in comparison to studies

done by Raman KM et al, by Ramachandran A, et al in Chennai and Kapil U et al in Delhi.[16,18,21]

CONCLUSION

Incidence of overweight and obesity in increasing at an alarming rate in children and adolescents. Information, education and communication about healthy lifestyle need to be promoted among children and adolescents.

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