

## RESEARCH ARTICLE

## PREVALENCE OF OVERWEIGHT AND OBESITY IN AFFLUENT ADOLESCENT GIRLS IN SURAT CITY, WESTERN INDIA

Nagendra Kumar, Jagdish Goyal, Indira Parmar, Vijay Shah

Department of Pediatrics, Government Medical College, Surat (India)

Correspondence to: Jagdish Goyal (jpgoyal@rediffmail.com)

### ABSTRACT

**Background:** Incidence of obesity is increasing day by day because of various factors. It is important to assess the trend of obesity in particular geographical area.

**Objective:** To assess the prevalence of obesity and overweight in affluent schoolgirls aged 13 to 15 years in Surat, India.

**Methods:** This cross-sectional study was conducted from July 2009 to April 2010. From a list of all private schools in Surat, with tuition fees more than Rs. 2,000 per month, two schools were selected randomly using a random table. Height and weight was measured and BMI was calculated. Overweight and obesity was assessed by BMI for age. Student who had BMI for age >85th and < 95th percentile of reference population were classified as overweight and BMI for age >95th percentile of reference population were classified as obese (IAP Growth Monitoring Guidelines for Children from Birth to 18 Year).

**Results:** Prevalence of obesity and overweight amongst the study subjects was 6.6% and 13.5% respectively.

**Conclusion:** There is significant prevalence of obesity in affluent schoolgirls in Surat, India.

**Key Words:** Obesity; Prevalence; Adolescent Girl; Surat

### INTRODUCTION

Obesity is one of the most widespread and a major problem affecting children and adolescents is a global concern. An increased prevalence is found in many countries where the major nutritional disorder previously was malnutrition.<sup>[1]</sup> While this global epidemic is well described in the adult population, not much data is available regarding the prevalence of overweight/obesity in children or adolescents amongst developing countries. In India the problem of obesity has been scantily explored even in the affluent population groups.<sup>[2]</sup>

A few studies have been conducted in India on overweight and obesity among children and adolescent mostly in metropolitan cities. Gujarat is economically advanced state of country. Surat is an important industrial center and well known for diamond industry and textile

industry. It has large population of affluent families who are exposed to modern life style. The present study was undertaken to study the prevalence of overweight/obesity among affluent adolescent girls in Surat city, Western India. Overweight and obesity are marginally higher in the pubertal age groups of 13 to 15 years, perhaps because of increased adipose tissue and overall body weight in children during puberty. Hence we included adolescent girls in the age group of 13-15 yr only in the study.

### METHODS

This cross-sectional study was conducted from July 2009 to April 2010. From a list of eleven public schools in Surat, with tuition fees more than Rs. 2000 per month, two schools were selected randomly using a random table.

The sample size was arrived as per WHO recommendations on the use of anthropometric indicators for assessing nutritional status and for nutritional surveillance, which states that 200 individuals in each age and sex group must be selected.<sup>[3]</sup> Therefore, a total of about 600 girls, *i.e.* 200 girls each of 13, 14 and 15 yr, of two selected schools studying in class 8th, 9<sup>th</sup> and 10<sup>th</sup> were included in the study. The following subjects were eliminated from the study, those who (a) had been advised bed rest for more than 15 days during the last 6 months, due to any sickness (b) had any chronic systemic disease (c) had any physical deformities (d) were absent during the time of conduction of the study due to any reason and (e) unwilling for study.

The study protocol was approved by ethical committee of Govt. Medical College, Surat. A prior consent for the study was taken from school administration and from the parents. At the time of the initiating the study each participant was informed about the study protocol and assent was obtained.

All anthropometric measurements were taken by trained investigators. Height and weight were measured, using “Seca” stadiometer (UNICEF) with beam balance, with sensitivity of 0.1 cm and 0.1 kg, respectively. Zero error was set after every 10 measurements Height was measured without any footwear. The student stood straight with heels, buttocks, back touching the vertical limb of the instruments and stretching upwards to the fullest extent with arms hanging on the side. The head was aligned so that the lower rim of the orbit & the auditory canal were in the horizontal plane (Frankfurt plane). Mild upward pressure was exerted on the mastoid region bilaterally. Weight was measured without any footwear with minimal clothing (school uniform). BMI was calculated and children classified as overweight if BMI was more than 85<sup>th</sup> percentile and obese if BMI was more than 95<sup>th</sup> percentile (IAP Growth Monitoring Guidelines for Children from Birth to 18 Year).<sup>[4]</sup> The results were analyzed statistically using chi square and *P* value <0.05 was considered as significant.

## RESULTS

The study comprised of 801 affluent schoolgirls of 13 to 15 years from two randomly selected private schools of Surat. The number of girls in the three age groups was almost similar, 277(34.6%) were 13-yr-old, 271(33.8%) were 14 years old and 253(31.6%) were 15-yr-old.

**Table-1: Prevalence of Obesity in the Study Subjects (n=801)**

Age (Years)	Total Children	Obesity n (%)	Overweight n (%)
13	277	18 (6.5)	35 (12.6)
14	271	18 (6.6)	36 (13.3)
15	215	17 (6.7)	37 (14)

Values in parenthesis are percentages

Table 1 depicts the prevalence of obesity amongst the affluent school girls of 13 to 15 year age group in Surat city. Prevalence of obesity amongst the study subjects was 6.6% (*i.e.* 53 out of 801 were obese) and prevalence of overweight was 13.5% (*i.e.* 108 out of 801 were overweight). Thus, 161(20.1%) school girls in our study were either overweight or obese. The prevalence of obesity was estimated to be 6.5% in the 13-yr-old girls (n = 277), 6.6% in the 14-yr-old girls (n=271) and 6.7% in the 15-yr-old girls (n = 253), respectively in our study.

## DISCUSSION

To our knowledge, this are very few studies in India attempting to document the prevalence of overweight and obesity that covered an adequate sample of urban affluent adolescent girls (13 to 15 years old) using latest IAP BMI percentile charts.<sup>[4]</sup>

The prevalence of obesity and overweight in our study was found to be 6.6% and 13.5% respectively. Agrawal *et al*<sup>[5]</sup> found the prevalence of obesity and overweight 3.4% and 12.7%, respectively in affluent adolescents from Ludhiana, Punjab; while Khadilkar *et al*<sup>[6]</sup> reported a prevalence of obesity to be 5.7% and overweight 19.9% among affluent school boys in Pune. The prevalence of obesity and overweight amongst affluent schoolgirls of 16 and 17 yr age groups was found to be 5.3% and 15.2% (n =

414) in a study from Delhi using the International Obesity Task Force (IOTF) criterion for defining obesity (*i.e.* BMI  $\geq$  30).<sup>[7]</sup>

The large range in the reported prevalence of overweight and obesity could be due to regional differences, non-uniformity in the criteria used to classify socio economic status and, the different age and sex of the children studies.

Kapil *et al*<sup>[8]</sup> observed prevalence of obesity among affluent schoolgirls from Delhi, aged 13 years (n=41) 7.3 %, 14 years (n=38) 5.3% and 15 years (n=46) 4.3% respectively. This difference could probably be due to the much smaller sample size covered in the study by Kapil *et al* as compared to our study where more than 200 girls in each age group were studied. Ramachandran *et al*<sup>[9]</sup> found the prevalence of obesity (as per IOTF definition of obesity) to be 2.7% in Indian adolescent girls aged 13-18 yr belonging to low-, middle- as well as high-income groups. Mysore obesity study observed prevalence of overweight and obesity in school aged children aged 5 to 16 years (as per IAP BMI percentile chart) to be 3.4% and 8.5%<sup>[10]</sup> which is low as compared to that found in our study. This is understandable as we have studied only the affluent schoolgirls in which the prevalence of obesity is naturally expected to be higher. Pediatric obesity is an emerging problem in developing countries, especially among higher socio-economic status groups. The increasing prevalence of obesity in a population is an early indicator of an emerging health burden due to the increasing mortality and morbidity from non-communicable diseases.<sup>[11]</sup>

There were certain limitations to study. It was cross sectional design. We did not look at how many of these children will continue to have high BMI for age in future. We have not studied or adjusted for factors such physical activity and diets.

## CONCLUSION

The result of our study confirms that there is significant high prevalence of overweight and

obesity in affluent adolescent girls. Findings of the our study suggest a need for larger population based studies to accurately estimate the prevalence and risk factors for overweight and obesity among affluent adolescent girls in our country

## REFERENCES

1. Styne DM. Childhood and adolescent obesity prevalence and significance. *Pediatr Clin North Am* 2001; 48:823-54.
2. Asthana S, Gupta VM, Mishra RN. Screening for obesity in affluent females: Body mass index and its comparison with skin fold thickness. *Indian J Public Health* 1998; 42: 37-41.
3. World Health Organization. Measuring change in nutritional status. World Health Organization, Geneva.1983.
4. Khadilkar VV, Khadilkar AV, Choudhury P, Agrawal KN, Ugra D, Shah NK. IAP Growth Monitoring Guidelines for Children from Birth to 18 Years. *Indian Pediatr* 2007; 44:187-97.
5. Aggarwal T, Bhatia RC, Singh D, Sobti PC. Prevalence of obesity and overweight in affluent adolescent from Ludhiana, Punjab. *Indian Pediatr* 2008; 45:500-502.
6. Khadilkar VV, Khadilkar AV. Prevalence of obesity in affluent school boys in Pune. *Indian Pediatr* 2004; 41: 857-858.
7. Mehta M, Bhasin SK, Agrawal K and Dwivedi S. Obesity amongst affluent adolescent girls. *Indian J Pediatr* 2007; 74:619-22.
8. Kapil U, Singh P, Pathak P, Dwivedi SN, Bhasin S. Prevalence of obesity among affluent school children in Delhi. *Indian Pediatr* 2002; 41: 449-452.
9. Ramachandran A, Snehalatha C, Vinitha R, Thayyil M, Kumar CK, Sheeba L, et al. Prevalence of overweight in urban Indian adolescent school children. *Diabetes Res Clin Pract* 2002; 57: 185-190.
10. Premanath M, Basavanagowdappa H, Shekar MA, Vikram SB, Narayanappa D. Mysore childhood obesity study. *Indian Pediatr* 2010;47: 171-73.
11. Shetty PS. Obesity in children in developing societies: Indicator of economic progress or a prelude to a health disaster? *Indian Pediatr* 1999; 36:11-15.

**Source of Support: Nil**  
**Conflict of interest: None declared**