

Prevalence of childhood overweight and obesity in rural Pune

Utkrant Kurlekar¹, Gauri Oka², Arundhatee Khare³

From ¹Department of Obesity Surgery, Deenanath Mangeshkar Hospital and Research Centre, Pune, Maharashtra, India, ²Department of Research, Deenanath Mangeshkar Hospital and Research Centre, Pune, Maharashtra, India, ³Department of Pediatric Endocrinology, Deenanath Mangeshkar Hospital and Research Centre, Pune, Maharashtra, India

Correspondence to: Gauri Oka, Deenanath Mangeshkar Hospital and Research Centre, Pune, Maharashtra, India.

E-mail: gaurioak@yahoo.com

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ABSTRACT

Background: Urbanization and mechanization of lifestyle is leading to increase in childhood overweight and obesity in developing countries. Urban Indian studies report a prevalence of 5.5-24% of childhood obesity. The studies representing childhood obesity in rural areas, specifically, rural Pune are lacking. **Objective:** To determine the prevalence of overweight and obesity in children 10-15 years in rural Pune. **Methods:** Sociodemographic and anthropometric data were recorded of students from standards V to IX from a rural Pune school. Most recent and revised Indian Academy of Paediatrics (2015) body mass index criteria were applied. **Results:** Out of 449 children, 239 (53.2%) were boys and 210 (46.7%) were girls (mean age 12.8±1.3 years). The prevalence of overweight was 7.1% (12.5% boys and 8.5% girls) and of obesity was 3.6% (5% in boys and 1.9% in girls). Both overweight and obesity were more prevalent in boys as compared to girls. The proportion of overweight and obese children increased with higher parental educational status, being statistically significant in the case of mother's educational status ($p < 0.005$). **Conclusion:** Rural childhood overweight and obesity certainly warrant attention. Strategies for curtailing adult obesity should begin with the prevention and management of childhood obesity.

Key words: *Childhood, Obesity, Overweight, Prevalence, Rural*

The World Health Organization (WHO) and International Obesity Task Force (IOTF) have calculated the global prevalence of childhood overweight including obesity as of 2010 for ages 5-17 years to be approximately 10%. Various studies conducted in India have determined that the incidence of childhood overweight and obesity is increasing dramatically. In the past, obesity was considered to be a problematic issue concerning affluent countries only. However, now, it is fast growing in many developing countries as well. Obesity, an important indicator of non-communicable diseases like cardiovascular diseases, amounts to a huge socioeconomic and public health burden in developing countries [1,2].

It is estimated that globally, about 42 million school children <5 years of age are overweight and out of these almost 35 million are from developing countries [2]. The rising trend in childhood obesity and overweight in developing countries is largely due to rapid urbanization and mechanization leading to greatly reduced energy expenditure along with increased energy intake in the form of high-calorie snack and junk food [3]. Concurrent with this rising trend in childhood obesity, there has been an increase in other cardiovascular risk factors aggravated by over-nutrition in children such as hypertension, dyslipidemia, and Type II diabetes [4,5]. In a population-based study of 5-17-year-old children, it was found that 70% of obese children had at least one risk factor for cardiovascular disease [6].

A healthy child's body mass index (BMI) ranges from 5th to 85th percentiles. Children whose BMI is more than 85th to less than the 95th percentile are considered as overweight, whereas obese children are those who have a BMI equal to or more than the 95th percentile (WHO 2000). There is limited data from India on the prevalence of childhood obesity, in general, but it has been reported to be between 5.5% and 24% and is showing a rising trend [7]. A large number of studies determining the prevalence of childhood overweight and obesity have been carried out in urban areas across the country with not too many studies addressing the same in rural areas.

Risk factors for childhood obesity, such as genetic and epigenetic factors, are non-modifiable, but the modifiable risk factors being largely environmental are amenable to intervention. Important among these are calorie excess, decreased physical activity and an increase in sedentary habits. When compared to India as a whole, Pune district is rapidly urbanizing with a comparatively lesser proportion of rural population (68.8% for India vs. 39% for Pune district) as per Census 2011 [8,9]. There are no studies on childhood overweight and obesity published so far which represent rural Pune, where it would be interesting to note what influence rapid urbanization and mechanization has had on the weight-gain patterns of rural children. Thus, we conducted a study in a school in rural Pune to determine the prevalence of overweight and obesity in children aged 10-15 years of age.

MATERIALS AND METHODS

A cross-sectional study was conducted on students from standards V to IX from a school in rural Pune using universal sampling method. Students 10-15 years of age were included after obtaining consent from the school authorities. Exact ages of the students were verified from birth date records obtained from the school. Students beyond this age range were excluded. Students' identities were kept confidential. The study received approval of Institutional Ethics Committee of Deenanath Mangeshkar Hospital and Research Centre, Pune.

The study procedures were explained to the students in detail before beginning measurements. Anthropometric measurements, namely, height and weight were taken by trained data collectors. Height was measured with a calibrated stadiometer accurate up to 0.1 cm. Each student was made to stand on the stadiometer without footwear with the head aligned in Frankfurt plane. Weight was measured without footwear and without extra clothing (allowing only school uniform) using a digital weighing scale with an accuracy of up to 0.1 kg.

Criteria Used to Define Overweight and Obesity

Indian Academy of Pediatrics (IAP) 2015 criteria: Adult equivalents of the 23 and 27 cut-off lines in BMI charts were used [10].

Data were entered in MS Excel and analyzed using SPSS 19. Chi-square test was used to determine associations. $p < 0.05$ were considered statistically significant.

RESULTS

Out of 536 children from classes V to IX, those beyond the age limits of 10-15 years were excluded. Thus, data of 449 children were analyzed. Out of 449 children, 239 (53.2%) were boys and 210 (46.7%) were girls. The mean age of school children was 12.8 ± 1.3 years.

Table 1 shows socio-economic background of these children. Most parents (61%) were educated between IV and VII standard. Illiteracy was found to be higher in mothers (18.4%) as compared to fathers (8.9%), and more number of fathers were found to have received higher education (20.9%) as compared to mothers (9.1%). Hence, there was a male preponderance as regards higher literacy levels among parents of students in our study. The proportion of overweight and obese children increased with higher parental educational status. However, it was statistically significant only in case of mother's educational status. It was found that 15% mothers and 23% fathers were engaged in farming. Almost 50% students had more than one sibling indicating large family sizes. Based on economic assets, about 90% families either belonged to lower or middle economic class.

The prevalence of overweight and obesity was found to be 7.1% and 3.6%, respectively, according to IAP 2015 criteria (Fig. 1). When students were categorized into various grades of nutritional status based on BMI using IAP criteria (Table 2),

around 75% boys and 81% girls had a normal BMI. Among boys, 7.5% were found to be overweight and 5% were obese, whereas, among girls, the corresponding numbers were 6.7% and 1.9%, respectively (Table 2).

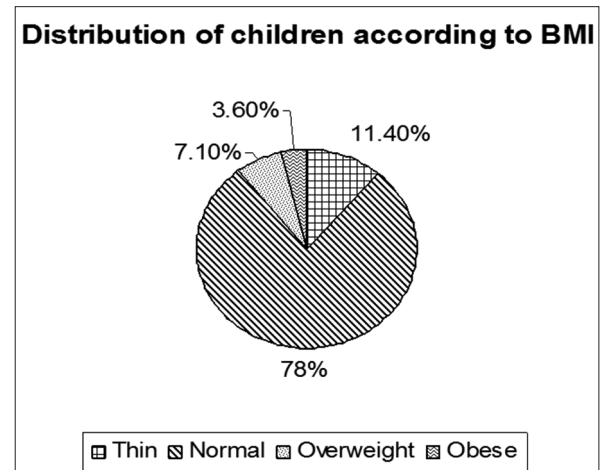


Figure 1: Prevalence of overweight and obesity in the study sample

Table 1: Socioeconomic characteristics of the sample

Characteristics	Details	n (%)
Mother's education (n=418) [#]	Illiterate	77 (18.4)
	Up to primary	48 (10.8)
	Up to secondary	255 (61.0)
	Secondary and above	38 (9.1)
Father's education (n=412) [#]	Illiterate	37 (8.9)
	Up to primary	33 (8.0)
	Up to secondary	256 (61.2)
	Secondary and above	86 (20.9)
Mother's occupation (n=436) [#]	Housewife	237 (54.4)
	Farming	66 (15.1)
	Service	98 (22.5)
	Business	35 (8.0)
Father's occupation (n=419) [#]	No job	10 (2.4)
	Farming	99 (23.6)
	Service	196 (46.8)
	Business	114 (27.2)
Siblings (n=449)	Nil	13 (2.9)
	One	212 (47.2)
	>1	224 (49.9)
Assets (n=449)	Lower class (up to 6)	287 (63.9)
	Middle class (7-8)	121 (26.9)
	Higher class (9-10)	41 (9.1)

[#]Information not available for remaining children

Table 2: Distribution of children by sex according to BMI

Sex of the child	n (%)				Total
	Thin	Normal	Overweight	Obese	
Boys	29 (12.1)	180 (75.3)	18 (7.5)	12 (5)	239 (100)
Girls	22 (10.5)	170 (81)	14 (6.7)	4 (1.9)	210 (100)
Total	51 (11.4)	350 (78)	32 (7.1)	16 (3.6)	449 (100)

BMI: Body mass index

Boys were heavier than girls in the age groups of 10-11 years and 14-15 years while weights of boys and girls were comparable between 11.5 and 13.5 years of age. As regards height, boys were taller than girls except in the 11-12-year age group. Girls below 12 years of age had a lower BMI as compared to boys. However, after 12 years of age, their BMI surpassed that of the boys. At 15 years, BMI of boys and girls was found to be similar (Fig. 2).

DISCUSSION

This is among the first Indian studies that we know of which has been conducted using the most recent and revised IAP (2015) criteria for childhood overweight and obesity, and that too in a rural area of Pune. In this study, it was seen that the combined prevalence of overweight and obesity in the sampled rural Pune children was 10.7% (7.1% were overweight and 3.6% were obese). A study conducted in urban Pune in 2015 showed that prevalence of overweight and obesity in the age group of 10-15 years was 9.99% and 5.62%, respectively, using IOTF criteria [11]. Another study conducted in urban Pune (2004) showed the prevalence of overweight and obesity in young boys as 19.9% and 5.7% using IOTF criteria [12]. The prevalence of overweight and obesity in affluent adolescent school girls in Bengaluru was found to be 13.1% and 4.3%, respectively, using CDC BMI criteria [13]. A cross-sectional study conducted in Mysore city in 2009 showed prevalence of overweight and obesity in children between 5 and 16 years to be 8.5% and 3.4%, respectively, using BMI calculation according to WHO growth charts [14].

Among studies conducted in rural India, a study from Loni, Maharashtra (2013) documents the combined prevalence of overweight and obesity among rural children as 12.87% (according to the criteria of waist circumference >90th percentile) [15].

A study conducted in Nagpur reported a prevalence of 8.51% of overweight and obesity among rural school children using WHO 2007 BMI cut offs [16]. A Hyderabad study, interestingly, found no significant difference between the combined prevalence of overweight and obesity among urban (15.03%) and rural (13.17%) children [17].

The relatively high prevalence of overweight (16%) and obesity (7%) reported by a study on rural adolescents from Kerala (2012) is certainly alarming. This study documents a higher prevalence of obesity among rural girls (8%) compared to rural boys (6%). Among the influencing factors, consumption of fast food was found to be significant [18]. Our study revealed that overweight and obesity were more prevalent in boys as compared to girls. The possible social reasons for this observation in a rural setting could be the favoring of boys over girls for access to calorie-dense food, acceptance of more sedentary habits on their part and lesser physical exertion. This finding is similar to that seen in an urban study in India where the age-adjusted prevalence of overweight and obesity was found to be more among boys as compared to girls (14.3% and 9.2% overweight among boys and girls respectively and 2.9% and 1.5% obesity among boys and girls, respectively) [19].

The proportion of overweight and obese children in our study increased with higher maternal education. This is in contrast to some studies which have shown that the prevalence of childhood obesity is higher in children of parents with lower educational levels, and more specifically, in the case of low maternal education [20-23]. Our results prompt us to question whether higher education in parents equates with a better knowledge about health-promoting choices. We feel that it may not necessarily be so, thus bringing to light the need for specific education of parents regarding healthy nutrition and lifestyle.

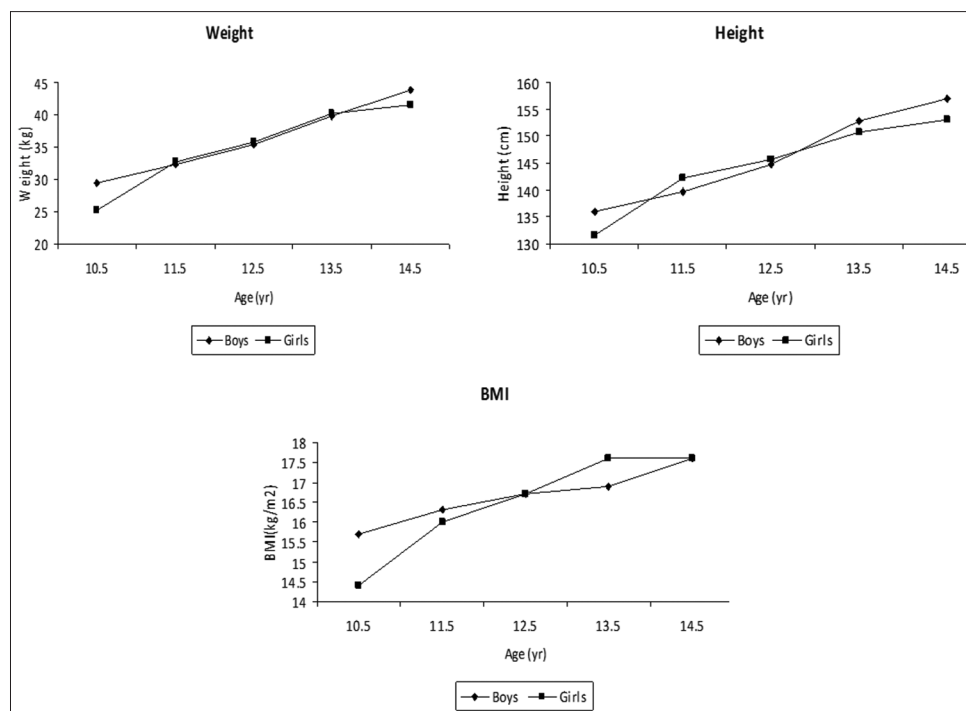


Figure 2: Comparison of weight, height and body mass index between boys and girls according to age

In our opinion, the rural childhood overweight and obesity prevalence found from our study should be regarded as a serious public health concern, more so due to its potential impact on cardiovascular health beginning in childhood itself. The possible risk factors contributing to childhood overweight and obesity in the rural setting could be urbanization and increasing mechanization leading to a sedentary lifestyle and increased intake of calorie-rich food as in urban areas.

The limitation of our study is that it is restricted to only one school of a rural Pune area. The findings may not be representative of the entire rural children population in Pune. However, this was conducted as a pilot project to evaluate whether the problem of childhood overweight and obesity exists in rural Pune, and if yes, to what extent. We feel that the results of this study certainly warrant further exploration in this field.

CONCLUSION

The high prevalence of rural childhood overweight and obesity found in our study definitely warrants attention. Aggressive measures for prevention and management of childhood obesity seems to be the most effective strategy for prevention of adult obesity and its complications. Thus, creating awareness programs in schools and counseling parents to bring about a positive change in children's nutrition and lifestyle could be an effective intervention to decelerate the rise in childhood overweight and obesity.

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