

# Prevalence of Overweight / Obesity among School Children In Karnataka, South India

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## ABSTRACT

Worldwide, non-communicable diseases (NCD) represent 43% of the burden of disease and are expected to be responsible for 60% of the disease burden and 73% of all deaths by 2020.Obesity in children and adolescents is gradually becoming a major public health problem in many developing countries, including India. The present study was undertaken to identify the prevalence of childhood overweight /obesity and to find the relationship between BMI and waist circumference of the children. Eleven schools were selected randomly from Udupi district of Karnataka state, India. A school based survey was carried out among 2938 school children in the age group of 10 – 16 years. On the day of survey, the purpose of the study was explained. The demographic proforma was administered and standard procedures were followed to assess the anthropometric measurements.

Result showed that 7% of children were overweight and 5% were obese. The Pearson Correlation computed between BMI and waist circumference showed a positive ( $r = 0.763$ ,  $p = <0.0001$ ) relationship between BMI and waist circumference. The study concluded that childhood obesity prevalence is increasing among children. Higher BMI was found among children in the age of 10 – 12 years and among girls than the boys. The gender difference in BMI could be due to sedentary lifestyles of girls. As the BMI of children increases the waist circumference also increases.

Key words: childhood, overweight, obesity, prevalence, school children

## INTRODUCTION

Throughout much of the history of mankind, the overt manifestations of body weight gain in children and adults have been considered as the signs of personal health and family wealth and an indicator of the economic prosperity of the societies. Until recently, in most developing

societies, being thin has been equated with poor health. Increase in body weight and girth have often been perceived as being attractive. As developing societies are industrialized and urbanized, the standards of living continued to rise, obesity and weight gain began to pose a growing threat to the health of the citizens. Obesity is now widely prevalent in several developing countries, particularly those in rapid transition and is affecting both children and adults.<sup>1</sup>

Overweight and obesity in childhood have a significant impact on both physical and psychological health; overweight and obesity are associated with hyperlipidaemia, hypertension, abnormal glucose tolerance, and infertility. In addition, psychological disorders such as depression occur with increased frequency in obese children. Overweight children were more likely to have cardiovascular and digestive diseases, and die from any cause as compared with those who were lean.<sup>2</sup>

More than 1 billion adults are overweight - and at least 300 million of them are clinically obese. Current obesity levels range from below 5% in China, Japan and certain African nations, to over 75% in urban Samoa. But even in relatively low prevalence countries like China, rates are almost 20% in some cities (WHO). In every case the origin of obesity can be traced back to childhood and adolescence. Childhood obesity is one of the most serious public health challenges of the 21st century. The problem is global and is steadily affecting many low- and middle-income countries, particularly in urban settings. The prevalence has increased at an alarming rate. Globally, in 2010 the number of overweight children is estimated to be over 42 million. Close to 35 million of these are living in developing countries.<sup>3</sup>

Obesity in children and adolescents is gradually becoming a major public health problem in many developing countries, including India. The prevalence is higher in urban than in rural areas. The results of studies among adolescents from parts

of Punjab, Maharashtra, Delhi, and South India revealed that the prevalence of overweight and obesity was high, which ranges from 11% to 29%. A similar study conducted in Chennai, in South India, showed the prevalence of overweight as 17% and of obesity as 3%.<sup>4</sup>

A few studies could be traced in the literature about the prevalence of childhood overweight and obesity in southern part of Karnataka. Hence the present study was undertaken to identify the prevalence of childhood overweight /obesity and to find the relationship between BMI and waist circumference of the children.

## METHODS AND MATERIAL

A school based Survey was carried out among school children in the age group of 10 – 16 years. Eleven English medium schools were selected randomly from Udupi district of Karnataka state, India. Administrative permission was obtained school authorities and the principals of respective schools. Ethical clearance was obtained from the Ethical Committee. Sample size was decided on the basis of findings of previous studies. Cluster of children studying in grade 6<sup>th</sup> to 9<sup>th</sup> from selected schools and in the age group of 10 – 16 years were selected for anthropometric assessment. Total of 2938 children were included in the study. Their exact ages were ascertained from school register.

Data was gathered from January 2009 to March 2009. On the day of survey, the purpose of the study was explained. The subjects absent for the particular day were given second visit and if found again absent, they were excluded. For all the subjects, the demographic proforma was administered to collect the demographic information. Anthropometric measurements were taken after collecting the demographic information. Measurements for boys and girls were taken separately to ensure privacy. The investigator was assisted by one of the community health nurse with PG qualification in nursing in taking the anthropometric measurements. Height of the subject was taken using the wall mounted measuring tape, after removing the footwear, the subject standing erect with feet parallel; heel,

buttocks, shoulders and occiput touching the wall, position of head being comfortably erect with the lower border of orbit of the eye in the same horizontal plane as external canal of ear and arms hanging loosely by the sides, measurement was recorded to the nearest 0.5 cm. Weight was recorded without wearing the footwear, using the calibrated beam balanced type of weighing scale. Waist circumference for each child was measured with the child standing, without heavy outer garments and with empty pockets, using a calibrated tape to an accuracy of 0.1 cm. The waist circumference was measured at the level midway between the lower rib margin and the iliac crest, at the umbilicus, with the girl breathing out gently.

Body Mass Index (BMI) was calculated using the formula  $BMI = \text{weight in kg} / (\text{height in m})^2$ .<sup>2</sup> Based on WHO (2007), standards BMI for age and sex children were classified as underweight, normal, overweight and obese. BMI of 85<sup>th</sup> percentiles for age and sex was taken as cut-off point for overweight and above 95<sup>th</sup> percentile for age and sex was considered obese. The data was analyzed using SPSS version 11.5.

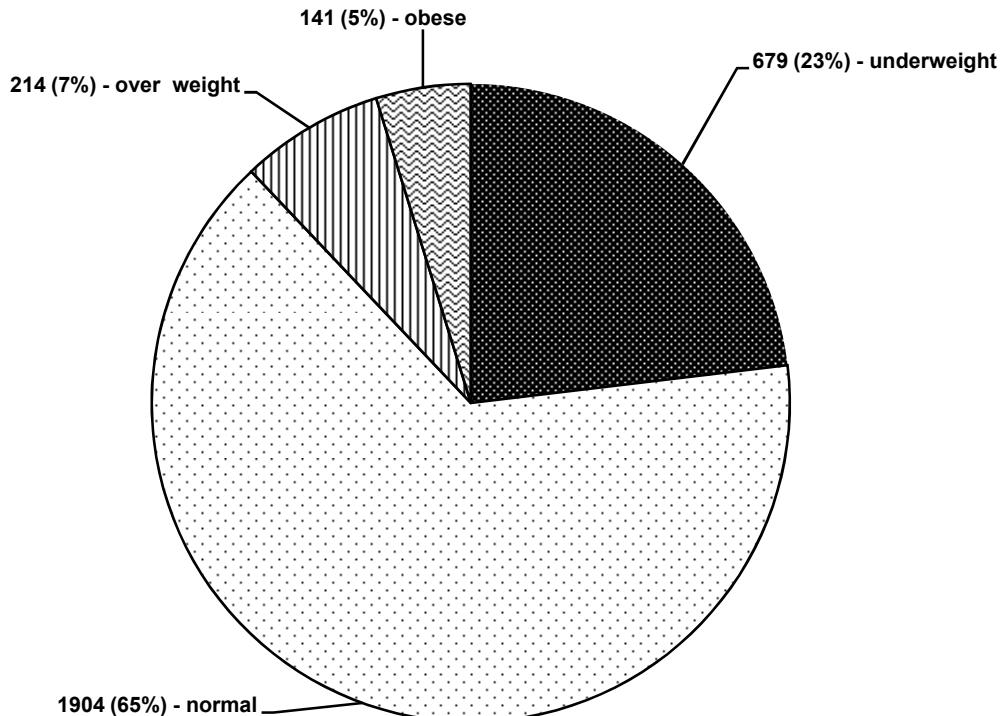
## RESULT

### Demographic characteristics

The study comprised of 2938 school children in the age group of 10 – 16 years from eleven randomly selected English medium schools of Udupi District, Karnataka State. Out of 2938 children, 1666 (57%) were males, 1216(42%) were living in a family with four family members, 1773 (60%) children were residing in the rural area, 1934(65.8%) were in the age group of 13 – 16 years, 2193(74.6%) were belonging to nuclear family, 1838 (63%) were Hindus.

### Prevalence of childhood overweight/ obesity

The data presented in figure 1 show that 1904 (65%) children were in the normal category of BMI, whereas 214 (7%) were overweight and 141 (5%) were obese.



**Fig. 1 PREVALENCE OF OVERWEIGHT/OBESITY AMONG CHILDREN**

**Figure 1** Prevalence of childhood overweight/ obesity

#### **Relationship between BMI and Waist circumference**

The Pearson Correlation computed between BMI and waist circumference showed a positive ( $r = 0.763$ ,  $p < 0.0001$ ) relationship between BMI and waist circumference of the children.

#### **Association between BMI and selected demographic variables**

The different demographic variables such as age, gender, number of siblings, number of members in the family, location of residence, religion and type

of family was collected from the children. Chi-square value was computed to find the significant association between BMI of school children and selected demographic variables. To compute the chi-square value, children above 85<sup>th</sup> percentile for age and sex were considered obese and below 85<sup>th</sup> percentile for age and sex were considered non obese.

The computed chi-square values are presented in table 1.

**Table 1** Association between BMI of children and selected demographic variables

Sl.No	Variables	Non obese N (%)	Obese N (%)	Chi-square <sub>(df)</sub>	P value
<b>1.</b>	<b>Age in year</b>				<b>N = 2938</b>
	10- 12	844 (84.1)	160 (15.9)		
	13 – 16	1739 (89.9)	195 (10.1)	21.317 <sub>(1)</sub>	P<0.0001*
<b>2.</b>	<b>Gender</b>				
	Boys	1489 (89.4)	177 (10.6)		
	Girls	1094 (86.0)	178 (14.0)	7.709 <sub>(1)</sub>	0.005*
<b>3.</b>	<b>Area of residence</b>				
	Urban	1008 (86.5)	157 (13.5)		
	Rural	1575 (88.8)	198 (11.2)	3.528 <sub>(1)</sub>	0.06
<b>4.</b>	<b>Type of family</b>				
	Nuclear family	1935 (88.2)	258 (11.8)		
	Joint and Extended family	648 (87.0)	97 (13.0)	0.825 <sub>(1)</sub>	0.364
<b>5.</b>	<b>Number of members in the family</b>				
	3- 4	1326 (87.3)	193 (12.7)		
	≥5	1257 (88.6)	162 (11.4)	1.148 <sub>(1)</sub>	0.2
<b>7.</b>	<b>Religion</b>				
	Hindu	1619 (88.1)	219 (11.9)		
	Muslim, Christian and others	964 (87.6)	136 (12.1)	0.130 <sub>(1)</sub>	0.71

The data presented in table 1 shows that BMI of the children was significantly associated with age of the child ( $P < 0.001$ ), gender of the child ( $P = 0.005$ ). Further it was observed from table 1 that prevalence of obesity was high among children in the age group of 10 -12 years, more among girls than in boys. The study findings also reveals that the obesity is high among children residing in the urban area compared to the children residing in rural area.

## DISCUSSION

Obesity is a global nutritional concern. In the present study the proportion of children who are overweight is higher compared to obese children. The prevalence of obesity is high in developed countries and similar trends are being observed in recent years among children from developing countries<sup>(5,6)</sup>.

Findings of school based data on obesity in India shows a prevalence of 0.4%-14.2% among children and adolescents<sup>(7-9,10)</sup>. The large range in the reported prevalence of overweight and obesity could be due to regional differences, non-uniformity in the use of standards for classification of obesity and different age range of children studied. The difference could also be due to non-

uniformity in the criteria used to classify socioeconomic status.

Higher BMI was found among children in the age of 10-12 years and more among girls than among the boys. The gender difference in BMI could be due to sedentary lifestyles of girls and also the pubertal changes. The findings of the study are supported by other similar studies<sup>8,11, 12,13</sup>. In the present study variables such as area of residence, type of family, number of members in the family and religion were not associated with BMI of children. However in the present study in urban area the proportion of children who were overweight/ obese was higher compared to non-obese children.

Raj M (2007)<sup>14</sup> reported that the proportion of obese children was higher in urban area and in private schools. In the present study all the schools were belonged to private management. There was no statistical significant difference in the prevalence of obesity was found between urban and rural area. This could be due to selection of only English medium schools and majority of children were belonging to middle and higher socioeconomic status. In the present study obesity was found to be high among the children who belonged to a family size of 3-4. This is supported by the study findings of Laxmaiah A.<sup>15</sup> which

revealed that overweight and obesity was found to be high among children, belonged to a family size of 4 or less. 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 NCDs in developing societies.

## CONCLUSIONS

1. In this regional population, children in the age group of 10 – 16 years, studying in English medium schools, seven percent of the children were overweight and five percent were obese. This problem needs to be addressed at early age to prevent the complications in later life.
2. In the study population, prevalence of obesity was high among children in the age group of 10-12 years, more among girls than in boys.

## REFERENCE

1. Shetty PS, Obesity in Children in Developing Societies: Indicator of Economic Progress or a Prelude to a Health Disaster? Indian Pediatrics.1999; 36:11-15.
2. Dehghan M, Akhtar-Danesh N, Merchant AT, Childhood obesity, prevalence and prevention, Nutrition Journal., , 4(24), 2005 doi:10.1186/1475-2891-4-24.
3. <http://www.who.int/dietphysicalactivity/childhood/en/>-(ACCESSED ON 25.2.2010)
4. Laxmaiah A, Nagalla B, Vijayaraghavan K, Nair M, Factors Affecting Prevalence of Overweight Among 12 to 17 year old Urban Adolescents in Hyderabad, India, OBESITY. June 2007; 15(6):1384-1390.
5. Dietz W H. Overweight in childhood and adolescence. N. Engl J Med 2004; 350:855-857.
6. World Health organization. Obesity: preventing and managing global epidemic-report of a WHO consultation on obesity. Geneva: WHO, 1998.
7. Mitra P A study on the prevalence of obesity among the adolescents in Udupi Taluk, Dissertation submitted to Manipal University 2008.
8. Sood A, Sundararaj P, Sharma S, Kurpad AV, Muthayya S BMI and Body Fat Percent: Affluent Adolescent Girls in Bangalore City Indian Pediatrics, 2007; 44: 587-591.
9. PremnathM, Basavanagowdappa H, Shekar MA, Vikram SB. NarayanappD Mysore Childhood Obesity Study. Indian Pediatrics 2009 APRIL 15.[epub ahead of print] pii:s097475590800364-2.
10. Nayak B, A study to determine the prevalence of obesity among school children of 6-12 years and to compare the lifestyle practices of obese and non obese children in selected schools of Dakshina Kannada District Karnataka state. Dissertation submitted to Manipal University in 2005.
11. Kumar S, Mahabalaraju DK, Anuroopa MS, Prevalence of obesity and its influencing factors among affluent school children of Davanagere City. Indian Journal of community medicine.2007; 32(1): 15-17.
12. Marwaha R, Tandon N, Singh Y, Aggarwala R, Grewal K& Mani K, A study of growth parameters and prevalence of overweight and obesity in school children from Delhi. Indian Pediatrics.2006; 43: 943-951.
13. Chhatwal J, Verma M & Riar SK Obesity among pre-adolescent and adolescents of a developing country (India). Asia Pac J ClinNutr 2004; 13 (3):231-235.
14. Raj M, Sundaram K R, Paul M, Deepa A S, Kumar R K Obesity in Indian children: Time trends and relationship with hypertension. The national medical Journal of India. 2007; 20(6): 288-293.
- NIN report on prevalence study on adolescent obesity in Andhra Pradesh. Available from URLwww.whoindia.org/Link NMH\_Resources\_NCD\_Risk\_NIN\_report.pdf (accessed on 18-05-2008).