



IJCRR

Vol 04 issue 20

Section: Healthcare

Category: Research

Received on: 22/08/12

Revised on: 29/08/12

Accepted on: 03/09/12

**PREVALENCE OF OVERWEIGHT AND OBESITY AMONG ADOLESCENT SCHOOL GOING CHILDREN (12-15YEARS) IN URBAN AREA, SOUTH INDIA**Prasanna Kamath B.T.<sup>1</sup>, Girish M. Bengalorkar<sup>2</sup>, Deepthi R.<sup>1</sup>, Muninarayan C.<sup>1</sup>, Ravishankar S.<sup>1</sup><sup>1</sup>Department of Community Medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka, India<sup>2</sup>Department of Pharmacology, Sri Devaraj Urs Medical College, Kolar, Karnataka, India

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**ABSTRACT**

**Background:** Prevalence of overweight and obesity has increased for the past few decades. World Health Organization refers obesity as a global epidemic. There is a need to assess the prevalence and to find the factors responsible, so as to implement timely interventions.

**Aims:** To assess the prevalence of overweight and obesity among school going children and the factors responsible for the same. **Method:** The study was conducted in children studying at a private school in Bangalore aged 12-15years. Obesity was assessed using International Obesity Task Force criteria based on the body mass index. Pretested and semi structured questionnaire was used to collect the data on physical activity, eating habits and leisure time activity.

**Results:** The overall prevalence of overweight was 10% and obesity was 5% among 761 adolescents studied. The prevalence of overweight and obesity was 11% and 4% among boys and 9% and 5% among girls respectively. Factors like junk food, chocolate eating, physical inactivity and time spent in watching television and computer gaming were directly related to overweight and obesity.

**Conclusion:** Overweight and obesity are multifactorial and needs a multi pronged interventions at the earliest for control and prevention.

**What this study adds:**

1. Obesity and overweight among school going children are the common nutritional problems in developing countries including India.
2. Prevalence of overweight and obesity is more in school children in urban areas, there is no gender difference and lack of physical activity is one of the main culprits.
3. During annual health assessment of children, equal importance has to be given for undernutrition as well as overnutrition; policy has to be made to inculcate adequate physical activity and healthy dietary habits compulsorily in addition to academic excellence.

**Keywords:** Overweight, Obesity, leisure time activity, Commutation, Body mass index, adolescence

**INTRODUCTION**

Childhood overweight and obesity are global problems that are on the rise.<sup>1</sup> Obesity is one of the most prevalent nutritional diseases of children and adolescent in many developed and developing countries. During the past two decades, the prevalence of overweight and obesity in children has increased worldwide.<sup>2</sup> Obesity in childhood

and adolescence has adverse consequences on premature mortality and physical morbidity in adulthood.<sup>3</sup> Outcome related to childhood obesity includes hypertension, type 2 diabetes mellitus, dyslipidemia, left ventricular hypertrophy, non-alcoholic steato-hepatitis, and obstructive sleep-apnea, orthopaedic and psychological problems. Childhood obesity is associated with a higher

chance of obesity, premature death and disability in adulthood. In addition to increased future risks, obese children experience breathing difficulties, increased risk of fractures, hypertension, and early markers of cardiovascular disease, insulin resistance and psychological effects.<sup>4</sup> Once considered a problem of affluent developed countries, obesity is fast growing to enormous proportions in many developing countries also. Rapid economic growth has overcome the nutritional, socio-economic and health status of many countries.<sup>5</sup> Obesity has increased markedly with this nutritional evolution in most Asian Countries. A similar nutritional transition is underway in India as well. In addition to the nutritional and socio-economic transitions, the behavioural transition of children is also possibly contributing significantly to the rapidly rising prevalence of obesity. Unhealthy eating habits and physical inactivity are the major culprits

There is significant increase in the consumption of fats, sugars and energy rich foods. Rising income and urbanization leads to substitution of servants or appliances for physical household work and motor vehicles for short distance travelling, instead of walking or cycling.<sup>6</sup> Junk food and fast food has replaced healthy homemade meals due to paucity of time. This attitude has altered the lives of school children in terms of bad eating habits, lack of exercise, habits like computer gaming and television viewing replacing the outdoor games. The causes of childhood obesity are multifactorial. Overweight and obesity in children and adolescent is generally caused by a lack of physical activity, unhealthy eating patterns resulting in excess energy intakes, or a combination of both.<sup>7</sup> Changes in dietary and physical activity patterns are often the result of environmental and societal changes associated with development and lack of supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food processing, distribution, marketing and education.<sup>8</sup> Added to this, academic competitiveness, overzealous parents and teachers

leave the children little or no time to play or exercise. Studies on urban Indian school children from selected regions report a high prevalence of obese and overweight children.<sup>9</sup> Hence this study was undertaken to assess the prevalence of overweight and obesity among high school children (12-15years) and to determine the factors responsible for it.

## METHOD

**Design:** A cross-sectional study was conducted in a private school in an urban fast growing city, Bangalore. All the children belonging to 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> standard (12-15years) were included for the study. A prior informed consent for the study was taken from the school administration. Those children who were absent on those days of study were called on a separate day and a sincere effort was made to cover all children. Data regarding physical activity, leisure time activity, mode of commuting to school, food preferences, eating chocolates, fast food and junk foods, time spent for television viewing, computer gaming were collected using a pre-tested, semi-structured questionnaire. The anthropometric data, height and weight were also recorded for all the children using the standard equipments.

Weight was recorded using a calibrated and standardized mechanical bathroom weighing scale to nearest 100grams. Height was recorded using the standard wall mounted anthropometric height board to the nearest 0.1 cm. Two readings of height and weight were taken and the mean was considered as final.

BMI was calculated using the standard formula- weight (kilograms)/height (meter<sup>2</sup>) and BMI percentile was calculated according to Barlow SE and Expert Committee recommendations.<sup>10</sup>

### **Assessment of overweight and obesity:**

International Obesity Task Force (IOTF) classification was referred for the classification of the adolescent children as overweight or obese.<sup>11</sup> Overweight was defined as children BMI value between 85<sup>th</sup>-95<sup>th</sup> percentile for a specific age and

gender. Similarly obesity was defined as with BMI value above 95<sup>th</sup> percentile for that specific age and gender.

On completion of the study, we provided health education and created awareness regarding overweight and obesity, their implication on their health and how they can inculcate healthy lifestyle practices.

### Statistical analysis

Sample size was calculated as 788 considering the prevalence of overweight as 17.8% and  $e=2.67$  as in the study.<sup>12</sup> The data collected was collated using Excel spreadsheets with double checking of errors. The results were assembled in tabular and graphical formats. All data was expressed as percentage. Comparison of nutritional status between boys and girls was done by using chi square test.  $P < 0.05$  was considered statistical significant.

### RESULTS

A total of 761 children in the age group of 12-15years were included in the study. Among them 421 children (55.32%) were boys and 340 (44.68%) were girls.

The Table 1 depicts the summary of the assessed children's BMI for age and their classification into those who are overweight and obese as per International Obesity Task Force (IOTF).<sup>11</sup> On the whole there were 10% (76) of the children who were overweight i.e. BMI value equal to or more than 85<sup>th</sup> percentile but less than 95<sup>th</sup> percentile for that age and sex. There were 5% (38) children who were obese i.e. BMI value equal to or more than 95<sup>th</sup> percentile for that age and sex. Another incidental point of note worth is the presence of 19% of undernourished children. The prevalence of overweight 11% among boys and 9% among girls and 4% and 5% were obese respectively, according to IOTF.<sup>11</sup>

As observed in table 1, the difference in the nutritional status among boys and girls was statistically significant. ( $p=0.002$ ). But the

difference in overweight and obesity among them was found to be not significant statistically.

Data regarding the leisure time activity during games period at school, after school at home and on holidays, revealed that 70% of the children involved in playing outdoor games while among the remaining 5% were involved in household activities and the rest spent time either reading, gaming on the computer or sleeping.

Regarding the mode of transportation from home to school and back 45% used school bus, 20% were dropped by their parents in their own vehicles and the remaining walked or came by cycling.

About 55% of children brought home made food for lunch, while 30% brought bakery products and the remaining ate at the fast food centres near their school.

### DISCUSSION

The overall prevalence of overweight among children was 10% and obesity was 5%. The prevalence of overweight was 11% among boys and 9% among girls; 4% and 5% were obese respectively. In a study by Kotian MS *et al*, it was reported that prevalence of overweight was 9.9% and obesity was 4.8%.<sup>13</sup> They also reported that overweight and obesity among boys was 9.3% and 5.2% and among girls was 10.5% and 4.3%. Our study reflects similar findings. A similar study in Hyderabad showed that the prevalence of overweight was 7.2% among 12-17 year group.<sup>14</sup> In this study, it was observed that there was not much difference in the prevalence of overweight and obesity between genders. It was 11% and 4% for boys and 9% and 5% for girls, respectively. Prevalence of overweight and obesity was more in the males as compared to females in the studies conducted at Delhi, India<sup>14</sup> and Punjab.<sup>9</sup> Prevalence of overweight was 14.3% among boys and 9.3% among girls and obesity was 2.9% in boys as compared to girls which was 1.5% as reported by Ramesh Goyal *et al*.<sup>8</sup> The presence of overweight and obesity on almost same level in

our study may be attributed to the equal amount of encouragement and participation of both girls and boys in the physical activities. This is to be appreciated on the part of the school administration in inculcating this attitude.

One of the major reasons for childhood obesity was watching television, using computers for long durations instead of outdoor games. Physical activity during leisure period either at school or at home was found to be related inversely to overweight and obesity. Children with outdoor game activity in association with good eating habits were found to be healthy and protected from obesity and overweight. Similar reports were given by a study by Kotian MS *et al*<sup>13</sup>, Laxmaiah A *et al* at Hyderabad<sup>14</sup> and Eisenman JC *et al* in US<sup>16</sup> Supreet *et al* in a study at Punjab.<sup>9</sup> Moazeri H *et. al* reported that the analysis of association between BMI and physical activity in children revealed that as the amount of physical activity increased the prevalence of overweight and obesity decreased in Tehran<sup>17</sup> and similar findings were reported by Foldmark CE *et al*<sup>18</sup> Kelishadi R *et al.*<sup>19</sup> In our study as in table 2, 70% of the children have mentioned that one of the chief passtime is television viewing. Similarly Bar-or O *et al* have reported that the sedentary lifestyle of children and adolescents has been attributed to television viewing, computer games, internet, overemphasis on academic excellence and ever increasing automated transport.<sup>20</sup>

The habit of eating chocolates and junk food was more in those who were overweight and obese than other children. This is similar to the one reported by Ramesh K Goyal *et al.*<sup>8</sup> In their study they have stated that junk food and chocolate eating habit have positive relation with prevalence of obesity and overweight. These correlate well with previous reports which suggest that junk food(bakery items, pizza, burger, cheese, butter, oily items) and chocolate intake tends to be more common among overweight and obese adolescents than among normal weight adolescents.<sup>21,22</sup> A study by Bhav S *et al* have reported that food in

urban areas has been replaced by high calorie snacks and junk foods and also that unsafe roads, lack of free space for playing and increased television viewing and computer use has made life sedentary comparable this study.<sup>23</sup>

Some of the children who were obese were found to be academically low achievers, rarely mingled with others and spent most of their free time sleeping, eating junk food or reading non-academic books. This may be either their low achieving nature clubbed with eating habits made them obese or it may be that the combination of obese, loneliness made them low achievers- point which needs further study. The best measure available to prevent and protect the child from overweight and obesity is to start at their young age itself, for the dietary habits and practices instilled at their young age will last their entire lifetime.

**Limitations of this study-** In our study waist-hip ratio and skin fold thickness were not used for assessing the nutritional status of overweight and obesity, the application of international standards of BMI in an Indian setting may have limitations. Quantification of physical activity and calorie intake could have been done before correlating with overweight and obesity. Information regarding the parents' and familial history of overweight and obesity could have been considered.

## CONCLUSION

To conclude, among the 761 children in the study, the overall prevalence of overweight was 10% and obesity was 5%. Overweight and obesity were 11% and 4% among boys and 9% and 5% among girls respectively. The prevalence was high among children who were physically inactive, using motor vehicles for commuting, eating junk foods, chocolates and those who were spending more time indoor either watching television or computer gaming. This problem of obesity and overweight is truly a multifactorial one.

The obese adolescents reach adulthood and add to the spiralling problem of diabetes, heart disease and hypertension. The impact of this on the health scenario of our country will be devastating and alarming. Obesity does not have any mentioning in the nutritional health status of school children, may be, due to the large number of undernourished children in our country even to this day of commendable growth and development in other fields.

Unless effective interventions and preventive strategies are initiated at the local and national level, the present increasing trend of obesity suggests that the trend of increasing cardiovascular diseases in adults observed in the recent decades will increase even further. This calls for concerted effort targeted at improving lifestyles of children and adolescents.

It is appropriate time that both under-nutrition and over-nutrition are given equal importance during health assessment of children annually. Measures have to be taken to improve the dietary habits which last, life time if imparted and implemented at young age itself. The physical growth and development has to be made a part of the overall personality development on par with academic excellence.

If done at the earliest with right earnest, our children can grow up into healthy young adults with better health indices and parameters for a better India.

#### **ACKNOWLEDGEMENTS**

We would like to thank the head of the institution, the teachers and more so the students for having been very co-operative in the collection of the data. We thank our entire department faculty for being encouraging and supportive throughout this study. Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals and books from where the literature for this article has been

reviewed and discussed. No financial funding was taken for preparation of this manuscript.

#### **ETHICS COMMITTEE APPROVAL**

Name of committee- Institutional Ethics Committee of Sri Devaraj Urs Medical College, Kolar, Karnataka, India. Approval reference number-No:DMC/KLR/MEU/IEC/CER/229/2011-12. DATED 16-05-2012.

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**Table 1. Nutritional Status of children according to IOTF <sup>11</sup>**

	Boys (%)	Girls (%)	Total (%)
Total Children Studied	421(100)	340(100)	761(100)
Undernourished (BMI<5 <sup>th</sup> percentile )	101(24)	47(14)	148(19)
Normal (BMI 5 <sup>th</sup> -85 <sup>th</sup> percentile)	255(61)	244(72)	499(66)
Overweight (BMI 85 <sup>th</sup> -95 <sup>th</sup> percentile )	47(11)	32(9)	79(10)
Obesity ( BMI >95 <sup>th</sup> percentile )	18(4)	17(5)	35(5)

$\chi^2$  is 14.36, df-3, p=0.002

**Table 2. Transportation, physical activity and food preferences**

Sl. No.	Transportation	Leisure time activity	Food Preferences
1	School bus (45%)	Outdoor games (70%)	Homemade food (55%)
2	Parents vehicles (20%)	Household activities (5%)	Bakery products (30%)
3	Walking/Cycling (35%)	Read, Computer, sleep (25%)	Fast food (15%)

**Figure1. Showing distribution of children and nutritional status**