

SCREENING FOR OBESITY IN A 12 TO 14 YEAR SCHOOL GOING POPULATIONSubha Sankar Dutta¹, Arunabha Tapadar²¹Demonstrator, Department of Anatomy, Malda Medical College, Malda, West Bengal.²Associate Professor, Department of Anatomy, Malda Medical College, Malda, West Bengal.**ABSTRACT****BACKGROUND**

Obesity in the adolescent school going population is an emerging problem in both affluent countries and in developing economies. Different authorities have devised different charts and tables for assessment of pediatric obesity. Different growth charts are based on different population studies in different countries. The two most prevalent assessment tools for paediatric obesity are the CDC 2000 and WHO 2007 Growth Charts.

MATERIALS AND METHODS

The present study was carried out on an adolescent school going population of 12 to 14 years of age. The study was carried out in a high school located in a semi urban area of Aurangabad. Body weights and heights of 84 boys and 46 girls were taken and the Body Mass Index (BMI) was calculated. The BMI was plotted against the age in growth charts designed by the Centre for Disease Control (CDC 2000) and the World Health Organization (WHO 2007). The results of the different charts were then compared.

RESULTS

Both the CDC 2000 and the WHO 2007 growth charts showed a similar distribution of values. In the CDC growth chart, one boy was found to be obese (> 95th percentile). In the WHO growth chart three boys and four girls were found to be overweight (>1 SD from the mean), while one was obese (>2 SD from the mean).

CONCLUSION

Although both charts have shown a similar distribution of most values, the WHO growth chart is more useful and acceptable as it has gradations showing the levels of overweight and obese individuals. Moreover, the chart has been developed from data which are more representative of global trends.

KEYWORDS

Obesity, Overweight, Body Mass Index, Growth Charts.

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BACKGROUND

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight (in kilograms) divided by the square of his or her height (in metres).

The problem of pediatric obesity, once considered the problem of affluent countries with overfed children, now extends to countries with lower incomes across Asia. The trend of increasing pediatric obesity is revealed in India in studies combining the data of previous research papers spanning the last few decades.¹ This is the partly the result of economic uplift with higher incomes and partly due to an improper diet, sedentary habits and lack of exercise.

Obese children are more likely to end up as obese adults and wind up with diseases like diabetes² and ischemic heart disease. Adolescence is the period of transition from childhood to adulthood. Adolescents undergo physical, functional, psychological and social changes on the threshold of maturity. Attainment of sexual maturity and reproductive capacity along with the pressures of coping with adult responsibilities makes this a highly stressful period and girls are particularly vulnerable. This teenage period is at the same time a "golden age" and a "terrifying age" in the lives of most individuals, full of hope as well as uncertainty and apprehension about the future.

The World Health Organization (WHO) defines adolescents as those people between 10 and 19 years of age. This view is also held by the Canadian Pediatric Society.³ According to the WHO obesity fact sheet 2018, over 340 million children and adolescents aged 5-19 were overweight or obese in 2016.⁴

Within the adolescent group, the children 12-14 years of age constitute the "early teens" according to the Centre for Disease Control (CDC). During this period girls start their periods and develop breasts and pubic hair. Boys grow facial and pubic hair and their voices deepen.

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This is also the age of increasing independence from parental control. Teenagers develop their own tastes, likes and dislikes of food and clothing. The adolescents often develop unhealthy notions of body image and attractiveness. This may lead to crash dieting, food fads and a tendency to ignore balanced diets on one hand and a tendency to overeating on the other.

Overweight and obesity together represent a leading preventable cause of death. Obesity is a serious, chronic disease that can inflict substantial harm to a person's health. Overweight and obesity are not the same; rather, they are different points on a continuum of weight ranging from being underweight to being morbidly obese.

Different anthropometric indices have been developed to study the problem of obesity. Of all the conventional measurements, the Body Mass Index is the most suitable as a screening test of pediatric obesity.⁵ The percentage of people who fit into these two categories, overweight and obese, is determined by body mass index (BMI).

Public health professionals agree that overweight and obesity have reached epidemic proportions in USA. Public health officials say physical inactivity and poor diet are catching up to tobacco as a significant threat to health. According to the most recent data from the 2009-2010 National Health and Nutrition Examination Survey, 1 out of 5 U.S. children ages 6 to 19 are overweight or obese. In addition, about 1 in 3 U.S. adults is obese. However, the trend of increasing BMI of children in affluent countries is tapering off while the graph continues to rise alarmingly in many Asian countries adding to the burden of pediatric health care.⁶

BMI is a measure of weight proportionate to height. BMI is considered a useful measurement of the amount of body fat. Occasionally, some very muscular people may have a BMI in the overweight range. However, these people are not considered overweight because muscle tissue weighs more than fat tissue. Generally, BMI can be considered an effective way to evaluate whether a person is overweight or obese.

WHO 2007 Growth Charts

Prevalence of overweight and obesity in adolescents is defined according to the WHO growth reference for school-aged children and adolescents. In adults, a person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweight. In adolescents, the definitions of overweight and obesity vary by age and gender. The prevalence of overweight is defined as the percentage of adolescents with sex specific BMI-for-age above +1 SD from the WHO 2007 growth reference median, and the prevalence of obesity as the percentage of adolescents with sex specific BMI-for-age above +2 SD from the WHO 2007 growth reference median.

CDC 2000 Growth Charts

According to the Centers for Disease Control and Prevention (CDC), BMI ranges for adults can't be used for children. Instead, a child is considered obese if he or she has a BMI the same as or greater than the 95th percentile on the 2000 CDC growth charts. The growth charts were developed with data from five national health examination surveys and limited supplemental data. The 2000 CDC growth charts were developed with improved data and statistical procedures. Health care providers now have an instrument for growth screening that better represents the racial-ethnic diversity and combination of breast and formula feeding in the United States. It is recommended that these charts replace the 1977 NCHS charts when assessing the size and growth patterns of infants, children, and adolescents.⁷

MATERIALS AND METHODS

The present study was carried out on school going children of both sexes between the ages of 12 and 14 years at the Department of Anatomy, Mahatma Gandhi Mission's Medical College and Hospital, Aurangabad. The study was conducted on 130 apparently healthy school age children (84 boys and 46 girls) between the age of 12-14 years of MGM's Sanskar Vidyalaya, Aurangabad with prior permission of the principal of the school and parents of the children.

Children with known skeletal pathology, congenital anomalies and history of skeletal trauma like fractures of the long bones of upper and lower limbs were excluded from the study.

In calculating the Body Mass Index (BMI), the weight was recorded with the subject standing erect on the manual weighing machine without wearing shoes. The height was recorded with the subject standing upright touching his or her back, buttocks, heel and back of head to the wall. The subject was asked to look forward in the Frankfurt plane. The horizontal scale of the anthropometer was placed on the vertex of the head of the subject and the height was recorded.

RESULTS

The values of the Body Mass Indices of the test subjects was plotted against the ages in both the CDC 2000 and WHO 2007 Growth Charts. The numbers of obese students were then seen from both charts and compared. Of all the subjects one boy was considered to be obese according to the CDC Charts, a prevalence of 0.77% (Figures 1 & 2, Table 1). According to the WHO Growth Charts, 3 boys and 4 girls were considered to be overweight while 1 was obese (Figures 3 & 4, Table 2). The prevalence of overweight individuals amounts to 6.15%. In a similar study on a total of 900 adolescents in the age group of 12 to 15 years by Kotiyani et al showed an overall prevalence of overweight among adolescents of 9.9%.⁸ The distribution of all other values was within normal limits.

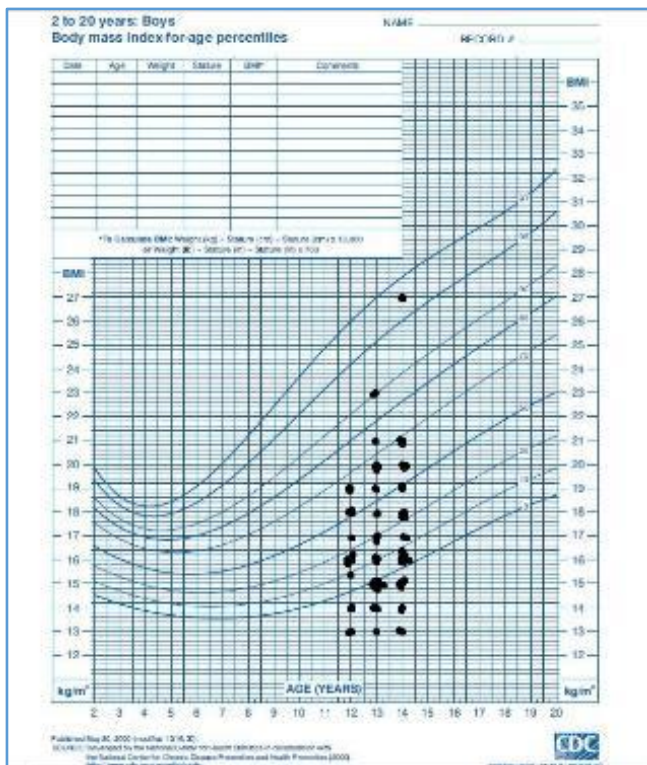


Figure 1. CDC Growth Charts Boys BMI for Age (3 & 97 percentiles)

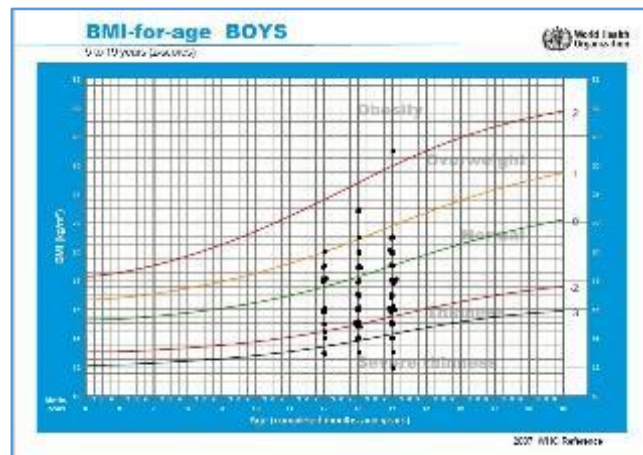


Figure 3. WHO BMI for Age Boys (5-19 yrs.)

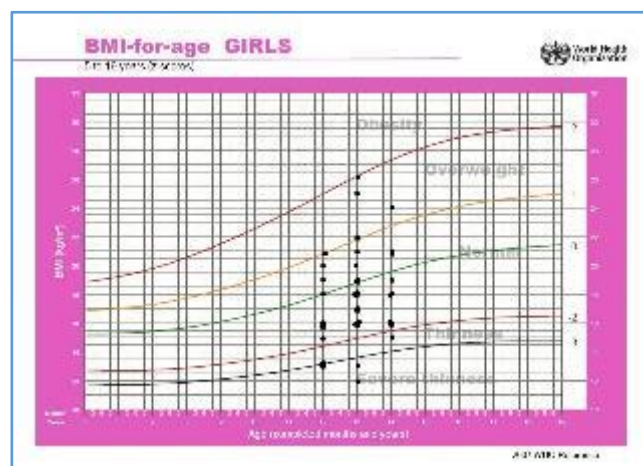


Figure 4. WHO BMI for Age Girls (5-19 yrs.)

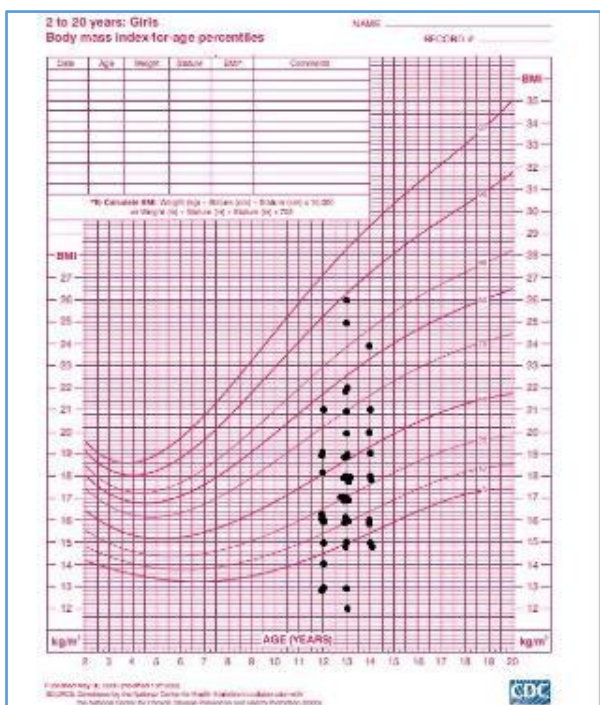


Figure 2. CDC Growth Charts Girls BMI for Age (3 & 97 percentiles)

Total no. of subjects	Sex	Subjects > 95 th Percentile (Obese)	Subjects < 5 th Percentile
84	Boys	01	83
46	Girls	00	46

Table 1. CDC 2000 BMI vs. Age Growth Charts

Total No. of Subjects	Sex	Subjects > 1SD from mean (Overweight)	Subjects > 2SD from mean (Overweight)	Subjects < 1SD from Mean
84	Boys	03	01	80
46	Girls	04	00	42

Table 2. WHO 2007 BMI vs. Age Growth Charts

DISCUSSION

Growth charts are commonly used in studies on pediatric populations. They are used to study developmental milestones, anthropometric parameters, nutritional surveys and efficacy of pediatric healthcare delivery systems. In the present study a special variety of growth chart plotting the BMI against age has been used to study the prevalence of obesity in a sample population. Standardized growth charts prepared by different authorities are in current use all over the world. However, there are significant variations in standards and measurements based on racial differences. Such differences are more pronounced between western and Asian populations. Therefore, most standardized growth charts have been prepared taking into account the wide variations in racial features as much as possible.

The most widely used growth charts are the WHO growth charts which represent global standards. The CDC growth charts represent American standards which however have been prepared from a combination of data from most prevalent racial variations in the American population. The API charts represent the Indian standards which are closely influenced by the preceding charts but incorporate data from Indian studies.

In spite of the different growth charts in vogue, it is the opinion of the CDC that Children of all major racial-ethnic groups appear to have similar growth potential. Different studies have shown the effects of environment especially nutrition and healthcare are more important than genetics in pediatric growth patterns. The development of different growth charts for different racial and ethnic groups is neither desirable nor practical. This is because most populations have mixed racial and ethnic features and given an adequate environment most children have similar growth potentials.

In the present study, the BMI of an adolescent population of schoolchildren have been plotted against their ages in all the above-mentioned growth charts. The distribution of the data shows us the prevalence of overweight / obesity and enables us to compare the results according to the WHO and CDC growth charts. In the present study it is seen that the WHO 2007 growth charts have a better gradation of body weight and distinguishes between overweight and obese individuals. Therefore, the presence of overweight students can be clearly seen on the charts although there was only one obese individual. This allows for a timely intervention to reduce weight and maintain physical fitness before the person is labeled as obese. The CDC charts on the other hand are more effective in labeling subjects as obese. However, most of the overweight individuals on the WHO growth chart are within the normal range of the CDC charts. This is probably because the CDC growth charts were based on data collected from American children, while the WHO charts have been prepared from global data. By and large both charts show a similar distribution of most of the normal values.

CONCLUSION

BMI based growth charts are an essential tool for studying the prevalence of obesity in pediatric populations. The present study attempted to study the number of overweight / obese individuals in an adolescent school going population. The comparison between the WHO and CDC growth charts has shown that either of them may be used for the purpose provided we have a standard definition of overweight / obesity based on reliable data derived from surveys of the local population. In fact, use of internationally favored charts helps in comparison of data from different countries.

The present study has revealed a small number of overweight/obese students within the adolescent population studied, which is at variance from the prevailing views of increasing pediatric obesity in third world countries. This is probably due to the fact that the present study population was derived from a semi urban background, where affluence and lack of physical activities were not important issues. In a study on a population including children from affluent families, the number of overweight children is likely to increase.⁹ However many more studies need to be made taking large samples from rural, urban and mixed backgrounds to validate or refute global and regional trends.

In daily pediatric practice and in screening programs it is more convenient to use the WHO 2007 growth charts as it is derived from a broader international database. However, the CDC 2000 growth charts are quite similar in nature and may also be used as a substitute. The ideal situation however would be for each country to develop its own growth charts based on the characteristics of the local population, like the IAP growth charts developed in India.¹⁰ Even then, correlation with WHO growth charts would be essential for international comparisons.

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