

Original Research Article

Assessment of Obesity and Functional Capacity among School Going Children

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Received: 04/04/2016

Revised: 26/04/2016

Accepted: 28/04/2016

ABSTRACT

Background and objectives: Overweight and obesity is confined not only to adults but also being reported among children and adolescents. This study was done to evaluate the prevalence of obesity and functional capacity in school going children.

Methods: A cross sectional study was carried out at schools randomly selected across Pune. Total 216 school going children were screened among them 100 children satisfying inclusion criteria were recruited. A written consent of the students and school was taken. The clinical examination of students included assessment of body mass index (BMI) and waist hip ratio (WHR). The students were categorized into underweight, healthy weight, overweight, and obese using WHO approved CDC age specific charts (percentile BMI). The students undergone six minute walk test to determine 6MWD as a measure of functional capacity.

Results: Total 100 school going children 49 female (mean age 14.2 years) and 51 male (mean age-14.0 years) were examined. The study showed 13% underweight, 47% healthy weight, 22% overweight and 18% obese students. The mean 6MWD varied significantly (P 0.000) and was 557.6m (± 56.03) in underweight, 522.8m (± 60.79) in healthy weight, 456.66m (± 64.46) in obese and 457.95m (± 64.09) in overweight children. Almost 11% boys showed WHR above 0.90 and 18% girls showed WHR above 0.85.

Conclusion: Overweight and obese children showed less functional capacity compared to healthy weight children and found to be at risk of developing metabolic disorders in adulthood.

Keywords: School going children, Obesity, Functional capacity, Six Minute Walk test.

INTRODUCTION

The world health organization (WHO) describes overweight and obesity as one of today's most important public health problems, which is escalating as global epidemic. ^[1] Overweight and obesity is confined not only to adults but also being reported among children and adolescents of developed as well as developing countries. ^[2] About 43 million children and adolescents are estimated to be affected with obesity and overweight across the globe and

this number is rising exponentially. ^[3] The prevalence reported in India in various studies ranges from 8.5 to 29% for overweight and 1.5 to 7.4% for obesity. ^[4,5]

Since, adolescence is period of transition from childhood to adulthood; it assumes critical position in life cycle of human beings, characterized by an exceptionally rapid rate of growth. ^[2] Body mass is modulated from birth to adulthood by physiological mechanism such as balancing intake, caloric expenditure and

energy reserves. Hypercaloric diet and sedentary lifestyle have resulted in the development of obesity in younger populations.

The development of obesity triggers a vicious cycle in which subjects become obese, and systemic repercussion of their disease process make them intolerant to exercise; therefore, they become more sedentary, which promotes additional weight gain. Multisystem dysfunction, an entity previously observed only in adults, has become more common among children and adolescents, resulting in physical exercise intolerance and increasing the prevalence of obesity, which affects the cardiorespiratory system. [6,7]

There are several modalities available for the objective assessment of functional capacity. The most popular clinical exercise tests in increasing a complexity are stair climbing, 6MWD, a shuttle walk test, detection of exercise induced asthma, cardiac stress test (e.g. Bruce protocol) and cardiopulmonary exercise test.

The 6-MWT is easy to perform with better acceptability by participants, and provides a better reflection of activities of daily living than other walk tests. The lack of 6MWD reference values from normal, healthy children hinders the clinical usefulness of this test in the paediatric age group.

Obesity in childhood is associated with increased risk of hypertension, diabetes, coronary artery diseases and osteoarthritis during adult life. [8] Health risk associated with obesity is multisystemic with cardiovascular and pulmonary risks being even life-threatening. Hence, it is necessary to detect the obesity and factors leading to it at the early age and effectively correct the obesity during childhood and adolescence by advocating some life style changes.

So, the aim of this study is to study the prevalence of obesity in school going children and to assess their functional capacities.

MATERIALS AND METHODS

Study design: Exploratory cross sectional survey.

Participants: The participants selected for the study were school going children (both boys and girls) from underweight, healthy weight, overweight and obese category aged between 13-16 years. The students with any physical or mental illness or on any medications were excluded from the study.

Procedure: The synopsis was approved by institutional ethical community, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune. Total 216 school going children were screened amongst five different schools selected randomly across the city and 100 children satisfying inclusion criteria were recruited using simple random sampling. Aim and objectives of the study was clearly stated in a cover letter in order to obtain the consent of respondents. The respondents were made clear that the information gathered will be remaining confidential and will be used only for research purpose and written consent was taken. This was followed by clinical examination of subject including height (m), weight (kg), body mass index (BMI) examination (kg/m^2) and waist hip ratio was recorded in both the sexes. The CDC and the American Academy of Pediatrics (AAP) recommend the use of BMI to screen for overweight and obesity in children. Percentiles are used for children and teens because the amount of body fat differs between boys and girls and body fat also changes with age. The percentile BMI was calculated by using CDC's online Child and Teen BMI Calculator. [9] WHO approved CDC age specific charts of BMI was used as reference standards. Children with BMI above 95th percentile were considered obese; those between 85th to 95th percentiles were considered overweight and accordingly were categorized into underweight, healthy weight, overweight, and obese.

The students undergone six minute walk test to determine 6-minute walk distance (6MWD) as a measure of

functional capacity. Data was collected and statistical analysis was done.

Statistical analysis:

The data includes mean and standard deviation. One-way ANOVA test was applied using SPSS19 and Excel 2007 software. Table no.1 demonstrates relation between 6MWD and BMI. When BMI was compared with 6-minute walk distance, it was noted that there is no significant difference between distance walked by overweight and obese children similarly as healthy weight and underweight children. The mean and the standard deviation values show that there is significant difference (P 0.000) between the 6MWD covered by obese, overweight children compared with healthy weight, underweight children.

RESULTS

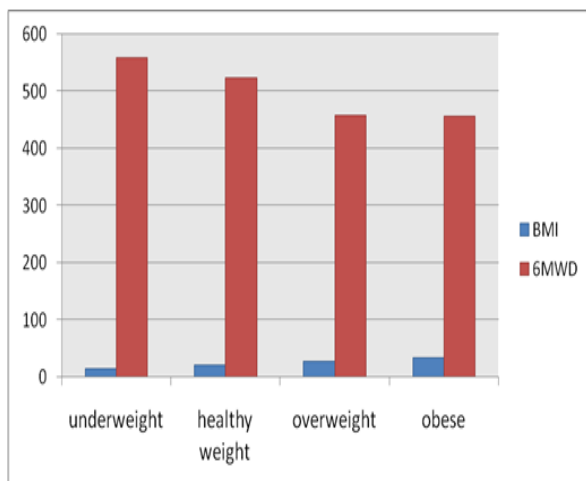
Out of 100 school going children aged 13-16 years, 49 girls (mean age 14.2

years) and 51 boys (mean age-14.0 years) were examined. Amongst these, 13 students were found to be underweight ($15.11 \pm 2.15 \text{ kg/m}^2$), 47 healthy weight ($21.18 \pm 3.13 \text{ kg/m}^2$), 22 overweight ($27.54 \pm 4.12 \text{ kg/m}^2$) and 18 obese ($33.12 \pm 4.34 \text{ kg/m}^2$). The prevalence of obesity in study population was 18% in which 8% were girls and 10% were boys. The prevalence of overweight and obesity was significantly higher among males than females in present study.

According to Table no.1, the mean and the standard deviation values show that there is significant difference (P 0.000) between the 6MWD of obese, overweight and healthy weight, underweight children. The 6MWD covered by underweight ($557.6 \pm 56.03 \text{ m}$) and healthy weight ($522.8 \pm 60.8 \text{ m}$) individual were more than obese ($456.6 \pm 64.46 \text{ m}$) and overweight ($457.9 \pm 64.09 \text{ m}$) individual.

Table no.1: Relation between 6MWD and BMI

	BMI (kg/m^2)		Percentile mean	6MWD(m)	
	Mean	SD		Mean	SD
Underweight	15.11	± 2.15	0.69	557.69	± 4.34
Healthy weight	21.18	± 3.13	47.4	522.8	± 60.8
Overweight	27.54	± 4.12	89.18	457.95	± 64.09
Obese	33.12	± 4.34	97.33	456.66	± 64.46
P values				0.000	



Graph1: Relation between BMI and 6MWD

DISCUSSION

The present cross sectional community based study conducted showed that out of 100 school going children, prevalence of obesity in study population was 18%. Increasing prevalence of

Childhood obesity is being observed with the changing life style of families with increased purchasing power, increasing hours of inactivity due to addiction to television, videogames and computer, which have replaced outdoor games and other social activities. [10,11]

A person's environment (at home, school, at play in the community etc.) can have a significant impact on his or her risk of developing morbid obesity. His or her environment in this regard would be comprised of, types of food that is available to the individual, the quantity of food available, the level of physical activity available or attainable, and the diet and exercise habits of the individuals.

It has been suggested that increase in body weight have been caused primarily by reduced levels of physical activity, rather

than by changes in excess food intake or by other factors. ^[12] Children of obese parents are at two to three times increased risk of obesity as adults compared to children in families in which neither parent is morbidly obese. ^[13]

A recent study conducted among school going children in urban area of Eluru, Andhra Pradesh, revealed prevalence of obesity was 9.3%. Similarly affluent public school children in New Delhi, reported that prevalence of obesity was 7%. Subramanyam et al have reported that the prevalence of obesity among the affluent adolescent school in Chennai, Tamil Nadu was about 15%. There are evidences that children and adolescent of affluent families are increasingly becoming overweight/obese in recent times.

The 6MWD healthy weight individuals was more than obese and overweight which demonstrates there is inverse relationship between BMI and 6MWD. Hergenroeder et al. ^[14] who also stated that individuals with obesity had a poorer performance compared to those with normal weight during a 6-minute walking test. An explanation for that might be the previously demonstrated higher energy expenditure during walking and altered mechanical efficiency in obese people compared to a lean population. Perhaps obesity increases the cost of supporting body weight because of less mass specific lower limb power. The combination of supporting more weight on the legs and swinging a heavier leg probably causes greater metabolic expenditure in obese people during walking, and hence decreased aerobic endurance. The slower walking speed may also simply be a strategy to reduce ground reaction forces and net muscle moments or torque. Luis Henrique ST et al. ^[15] in their study of obesity and pulmonary function test in children and adolescents stated that there are decreased spirometric parameters with obesity in children and adolescents.

In this study the sample size was small. Future Study may be conducted in

different regions of India and could be compared, as there are different food habits and cultures. Assessing obesity at early stage in school going children is vital in order to focus exercise regimens and promote appropriate health behaviors at early age. The comparison may be done between Government and Private schools across India in future.

CONCLUSION

The overweight and obese children showed less functional capacity compared to healthy weight and underweight children.

ACKNOWLEDGEMENT

We extend our gratitude towards participants for their consent & co-operation for the study.

Funding: This study is not funded or sponsored by any financial resources.

REFERENCES

1. WHO Nutrition [Internet], Available from: <http://www.who.int/nut/obs/ht>. Last accessed in March 2016.
2. Tanner JM. Fetus into man: physical growth from conception to maturity. New York wells, open book publishing limited, 1978; pp 22-36.
3. De Onis M, Blossner M, Borghi E. Global prevalence and trends of overweight and obesity among preschool children. *Am J Clin Nutr.* 2010; 92:1257-64.
4. Singh RB, Pella D, Mechirova V, et al. Prevalence of obesity, physical activity, and undernutrition, a triple burden of diseases during transition in a developing economy. The five city study group. *Acta Cardiol.* 2007; Apr; 62(2):119-27.
5. Chatterjee P. India sees parallel rise in malnutrition and obesity. *Lancet*, Dec.2002;360 (9349):1948.
6. Ebbeling CB, Pawlak DB, Ludwig DS. Childhood obesity: Public-health crisis, common sense cure. *Lancet* 2002; 360:473-82.
7. Speiser PW, Rudolf MCJ, Anhalt H, et al: consensus statement: childhood

- obesity. *J Clin Endocrinol Metab.* 2005, 90 (supp 3): 1871-1887.
8. Dietz WHJ. Obesity in infants, children and adolescents in the United States. Identification, natural history, and aftereffects. *Nutr Res.*1981; 1:117-137.
 9. CDC Calculator [Internet]: Online BMI calculator:, Available from: <http://apps.nccd.cdc.gov/dnpabmi/>. Last accessed in January 2016,
 10. Guigliano R, Carneiro EC. Factors associated with obesity in school children. *J Pediatr (Rio J)* 2004; 80:17-22.
 11. Veugelers PJ, Fitzgerald AL. Prevalence of and risk factors for childhood overweight and obesity. *Canadian Medical Association Journal.* 2005;173(6):607-613.
 12. Causes of obesity [Internet]; environmental and psychological factors, [Updated vhuly 3, 2015], accessed in February 2016, Available from: www.docshop.com.
 13. Freedman DS, Khan LK, Serdula MK, Dietz WH, Srinivasan SR, Berenson GS. The relation of childhood BMI to adult adiposity: the Bogalusa Heart Study. *Pediatrics.* 2005; 115:22-27.
 14. Andrea L Hergenroeder, Jennifer S Brach, John M Jakicic, The influence of body mass index on self-report and performance-based measures of physical function in adult women, *Cardiopulmonary Physical Therapy Journal*, Sep.2011;22(3):11-20.
 15. Luis Henrique ST, Amilton da CS, Adriana SO, Anna Myrna JL, Maria do Socorro BS. Obesity and pulmonary function test in children and adolescents: a systematic review, *Rev Paul Pediatr* 2012; 30(3):423-30.

How to cite this article: Yeole UL, Dighe PD, Gawali P et al. Assessment of obesity and functional capacity among school going children. *Int J Health Sci Res.* 2016; 6(5):157-161.

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