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BODY MASS INDEX AND WAIST CIRCUMFERENCE IN ADOLESCENT BOYS

Physiology

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ABSTRACT

INTRODUCTION- Obesity has emerged as an epidemic in developed countries during the last quarter of the 20th century. The prevalence however increasing in the developing countries as well, often coexisting in developing countries with under nutrition. Under-nutrition during the adolescent is an important public health problem in developing countries particularly in India. Adolescent form an important vulnerable, neglected sector of population which constitute about 21.4 % of India population. Many boys and girls in developing countries enter adolescence undernourished making them more vulnerable to disease. Childhood obesity is equally challenging, yet under-recognised, problem in many emerging countries. Now there is a growing evidence of a major shift toward overweight an obesity, but a few effort have been made to address these issue mong adolescent. As measurement of waist circumference is better predictor of cardiovascular risk than Body Mass Index (BMI), we have measured the Waist Circumference (WC) among the boys who are overweight.

MATERIAL AND METHOD- In this study we have selected the subjects randomly from different schools of Berhampur town, Odisha. The number of subjects were 363. Anthropometric parameters and Waist Circumference (WC) were measured. Mean WC in normal and overweight subjects was studied.

RESULT- Out of 363 boys 37.19% were having normal Body Mass Index (BMI), 54.82% less than normal BMI and 7.9% have more than normal BMI. Out of total number of subjects the mean WC among normal subjects was 67.7 but in overweight category it was 82.38.

CONCLUSION- Though more number of subjects were underweight, few were overweight & obese and they need regular health check-up in order to prevent future obesity related complication.

KEYWORDS

School Children, BMI, Overweight, Obese, Waist circumference.

INTRODUCTION:

The prevalence of obesity has been increasing at alarming rate. Worldwide obesity has been associated with type-2 diabetes as well as with other chronic diseases like cancer, heart disease and stroke. Obesity is a major health problem and may contribute to health disparities that exist in various population. (1)

On the other hand under -nutrition during the adolescent is an important public health problem in developing countries particularly India. Adolescence is a period of transition from childhood to adulthood with various challenges to be overcome. Adolescence is the second critical period of rapid physical growth and changes body composition physiology and endocrine function (2). Poor nutrition among adolescent resulting in short stature and low lean body mass associated with many concurrent and future adverse health problem (2).

Additionally children and adolescents with a high proportion of visceral fat and a relatively low proportion of subcutaneous fat may suffer from severe metabolic complication (3). It has been suggested that it is unlikely that waist circumference and BMI provide a valid quantification of visceral fat depot and that waist circumference is a better marker for total body adiposity than it for visceral fat.(4)

Further both WC and BMI appear to perform equally well for estimating adolescent; total and abdominal visceral fat (4). These observation may have implication in diagnosing obesity related cardio-metabolic complication in adolescent ages (5). Hence the present study focus on the BMI and waist circumference was assessed to elicit the health status of the study population.

MATERIAL AND METHOD:

This study was conducted in urban area of Berhampur, District Ganjam, Odisha and it was conducted between March 2015 & May 2015. It was a cross sectional school based study on 363 school children (boys) with in age group of 12-16 years.

INCLUSION AND EXCLUSION CRITERIA-

Study subjects who were present on the day of visit to the different school and had given informed consent with prior consent of the class teacher and permission from the principals of concerned Schools were included in the study. Subject with water electrolyte imbalance (oedema or ascites), skin abnormalities (skin abnormalities (pachydermia secondary to hypothyroidism) abnormal geometry (amputation, limb atrophy or BMI more than 38kg/m square), or has any implant in the body were excluded from the study.

ETHICAL CONSIDERATION: - The permission and ethical clearance for the study were obtained from the Institutional Ethics committee of MKCG Medical College, Berhampur, Odisha (no-254/chairman-IEC, MKCG Medical College, Berhampur-4).

METHODOLOGY:

Before the study the participants were explained about the procedure and the permission of the principal and consent of the teachers were also taken. The purpose and process of the study was explained to all the boys and teachers. Study included 363 boys, randomly selected within the age group 12-16 years.

Data were collected on a predesigned, pretested and semi-structured schedule that included the characteristics of respondents such as age, height, weight, BMI (Kg/meter2), waist circumference. Anthropometric measurements like height (measured up to the nearest 0.1 cm by fiberoptic tape, after making them to stand erect with their heel, buttocks, back and occiput touching the wall) and body weight (measured without shoe with minimal clothing with digital weighing machine up to the nearest 0.5 kg) were taken. BMI was recorded by Omron body fat monitor (HBF-306)

Waist circumference was measured at the smallest point between the

tenth rib and iliac crest using flexible tape while the subject breaths in gently and then measurement were taken on the exhale.

RESULTS

The descriptive statistics for age, height, weight, BMI and waist circumference for boys are given in the Table-1.

Table 1: Baseline Characteristics of Study Population

VARIABLES	MEAN	SD
AGE (years)	13.68	0.935
HEIGHT (Cm)	150.84	8.417
WEIGHT (Kg)	42.23	10.648
BMI(kg/meter2)	18.438	3.712
WC (Cm)	64.242	8.405

Out of total study population of 363 boys in the age group of 12-16 years, 6.89% were overweight and 37.19% were normal category, 1.1% were obese and 54.82% were of underweight according to BMI.

Table 2: Distribution of population according to body mass index

BMI (BODY MASS INEX)	PERCENT(N=363)
UNDERWEIGHT	54.82
NORMAL	37.19
OVERWEIGHT	6.89
OBESE	1.1

Table 3: Mean ± SD of Body Mass Index and Waist Circumference

Variable	Overweight	Normal
BMI (Mean ± SD)	27.69 ± 2.03	20.12 ± 1.72
WC (Mean ± SD)	82.38 ± 7.78	67.71 ± 7.07

DISCUSSION:

In the present study we studied BMI in school boys of sub-urban areas of Berhampur town of southern Odisha in the age group of 12-16 years. The study reveals 54.82% of the respondent were underweight, 37.19% were had a normal BMI, Only 6.89%were overweight and 1.1% were obese. Previous such studies on girls by Geethanjali santhanam et al in tribal region of kodaikanal district shows 52% underweight, 38% normal, 10% were overweight, and none of them were obese (2). Another study by T H Jafar et al showed in the urban NHSP and in the Karachi, the prevalence of underweight children was 29.7% versus 27.3% and prevalence of overweight and obese children was 3.0 versus 5.7 respectively (6). Physical activity was inversely correlated with overweight or obesity. Traditionally, a deficiency in macronutrients and micronutrients has been the major problem among children in low income countries which is responsible for underweight in these children. Further measuring the size of waist help us to understand the risk for certain health condition that are related to the overweight and obesity. The search on internet does not reveal any result on absolute values on waist circumference in adolescent boys. To the best of our knowledge our study reports such. The percentiles scores for waist circumference have been reported by previous authors. Though majority were of underweight category only 6.89% were overweight category and are having mean WC 82.38 compared to normal weight having mean WC 67.71. Waist circumference should be routinely measured in school children to prevent obesity related complication in future.

CONCLUSION:

The result of the body mass index (BMI) show that the majority of the study population were undernourished. The lower income status of the respondents might be a factor for undernourishment. The health status might be increased by better living condition. These school children also experiencing overweight and obesity in a few percentage of cases with a high burden of under nutrition. Both community and individual level, initiative should implement for the prevention of obesity epidemic. In community level, we can create a healthy and active environment promoting availability and accessibility of low fat and fibre rich foods as well as provide opportunities for physical activity in public places. At individual level we can transform our life styles and dietary pattern. Daily exercise with consumption of vegetables, nuts, and fruits with a balanced diet according to physical status can decrease the risk of developing obesity Foods which are rich in carbohydrates, fatty acids (animal based fats), oily and junk foods, should be avoided largely. A healthy lifestyle comprising of healthy nutritive balanced diet with regular physical exercise can be the key to succeeding obesity epidemic. Focus on prevention of overweight and obesity in children must include strategies for promoting physical activity and Waist circumference should be routinely measured in school children.

LIMITATIONS AND FUTURE STUDY:

Subsequent studies on larger sample size can be conducted for more robust statistical analysis. The study can be conducted on adolescent girls also.

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