

## THE RELEVANCE OF SIMPLE ANTHROPOMETRIC PARAMETER OF BODY MASS INDEX (BMI) IN ASSESSING NUTRITIONAL STATUS OF SECONDARY SCHOOL STUDENTS IN RIVER STATE, NIGERIA

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### **ABSTRACT**

Body mass indices (BMI) were determined in one thousand (1000) subjects of both sexes between the ages of 10–18 years. This comprised of 500 students from day secondary school (261 males and 239 females) and 500 students from boarding school (259 males and 241 females). The result obtained showed that 490 students constituting 98% of day school students had normal BMI with mean BMI of  $22.56 \pm 1.23$ . 10 students constituting 2% of day school students were overweight with mean BMI of  $27.24 \pm 3.08$ . While statistical analyses from boarding school students showed 429 students constituting 85.8% with normal BMI with mean BMI of  $21.56 \pm 1.13.71$  students constituting 14.2% of boarding school students were underweight with mean BMI of  $17.40 \pm 0.34$ .

**Key words:** Body mass index, Anthropometry, Nutritional status, Secondary school.

### **INTRODUCTION**

Anthropometry can be used to evaluate individuals of population in order to determine the prevalence of over nutrition or under nutrition (Onimawo and Cole 2000). Body mass index (BMI) also known as Quetelet index is a ratio of the weight (kg) of an individual to the height squared ( $m^2$ ).

$$BMI = \frac{\text{Weight (kg)}}{\text{Height}^2(m^2)}$$

As an anthropometric parameter it can be used in assessing the nutritional status of an individual and is thus categorized as follows: (Ferro-luzzi *et al.*, 1992)

<b>BMI</b>	<b>CLASS</b>
< 18.5	Under weight
18.5– 24.9	Normal weight
25– 29.9	Over weight
30 or above	Obesity

Anyiam *et al.*, (2008) carried out a study using body mass index in assessing the health status of northern Nigerian children of age 5-11. The subjects consist of 1,871 children from private schools (privileged schools) and 1,931 children from public schools (less privileged schools). The mean BMI of the privileged school boys was  $15.1 \pm 0.7$  compared with  $14.7 \pm 1.2$  for the less privileged school boys. While mean BMI for the privileged school girls was  $15.1 \pm 0.5$  and that of the less privileged school girls  $15.0 \pm 1.7$ .

In another study done by Igiri *et al.*, (2009) in 1000 young adults resident in Calabar, consisting of 500 males and 500 females with mean ages of  $25.34 \pm 0.10$  and  $23.3 \pm 0.12$  respectively; the mean BMI was found to be  $23.33 \pm 0.08\text{kg/m}^2$  for the young adult males and  $22.96 \pm 0.13\text{kg/m}^2$  for the young adult females. The study concluded that young adults resident in Calabar were healthy in accordance with W.H.O standard for normal health. Body mass index has been used in diagnosing health conditions like malnutrition (Nwokoro *et al.*). Choudhary *et al.*, carried out a study using BMI to assess the nutritional status of adolescent girls in the rural area of Varanasi and found that 68.52% of adolescent girls were underweight (BMI < 18.5). As BMI increases, the risk for some diseases increases. Some common condition related to overweight and obesity include; premature death, cardiovascular disease, high blood pressure, osteoarthritis, some cancers and diabetes (W. H. O)

## **MATERIALS AND METHODS**

The study was carried out using 1,000 students from both day and boarding secondary schools in river state. The students were age between 10–18 years. Gender was mixed. Height was measured using measuring tape. It was taken in (m). Subjects were asked to take off their foot wears or shoes to get their accurate

height. They were also asked to stand by a wall with their heels touching the wall. With a ruler placed over the head, touching the wall, a mark was made with a pencil on the wall. The subjects were then asked to step aside and measurements were taken from the floor to the mark made with the pencil. The weight of each subject was taken using the HANA mechanical personal scale also known as the bathroom scale. Foot wears of the subjects were taken off. The subjects were made to stand on the scale with heads raised and kept at eyes level. Reading was then taken respectively. Other materials used were, recording papers for collecting data, pencil and pen for taking down data and marking the wall and calculator for evaluating BMI from data obtained. BMI of each subject was evaluated by dividing the weight of each subject in kilogram (kg) by squared the height in meters (m<sup>2</sup>).

## RESULTS

The results of the study are presented on tables 1, 2a and 2b. Table 1 show the age distribution and frequency of the subject. Table 2a and 2b show the mean distribution of BMI, frequency of occurrence and percentage of occurrence of day students (male and female) and boarding student (male and female) respectively.

**Table 1: Age distribution and frequency of the subjects**

Age group (years)	Frequency of day students		Frequency of boarding students	
	males	females	males	females
10– 11	52	40	44	43
12– 13	73	58	73	79
14– 15	76	91	75	71
16– 17	47	41	52	39
18	13	10	15	9

**Table 2a: Mean distribution of BMI, frequency of occurrence and percentage of occurrence of day secondary school students (males and females).**

Age group(years)	Frequency		% frequency		Mean BMI	
	Males	females	Males	Females	Males	Females
10– 11	52	40	10.4	8.0	21.23 ±1.50	22.31 ±1.89
12– 13	73	58	14.6	11.6	21.60 ±1.07	22.69 ±1.34
14– 15	76	91	15.5	18.0	22.84 ±0.96	22.92 ±0.88
16– 17	47	40	9.4	8.5	22.34 ±0.76	23.62 ±1.12
18	13	10	2.6	2.0	27.24 ±1.60	27.24 ±3.08

**Table 2b: Mean distribution of BMI, Frequency of occurrence and percentage frequency of boarding secondary students (males and females).**

Age group(years)	Frequency		% frequency		Mean BMI	
	Males	females	Males	Females	Males	Females
10– 11	44	43	8.8	8.6	21.27 ±1.64	22.16 ±1.79
12– 13	73	79	14.6	15.8	21.52 ±1.06	21.79 ±1.05
14– 15	75	71	15.0	15.2	21.36 ±0.79	17.40 ±0.34
16– 17	52	39	10.4	7.8	20.87 ±0.61	21.79 ±0.85
18	15	9	3.0	1.8	20.04 ±0.54	23.41 ±1.90

Table 2a shows an increase in mean BMI with increase in age with students in the 18 years age bracket having the highest mean BMI 23.55 ± 1.60 for day school males and 27.24 ± 3.08 for day school females. Table 2b however showed a decrease /fluctuations in mean BMI of boarding students. 15.2% of female boarding students in age bracket 14– 15 had the lowest mean BMI of 17.40 ± 0.34.

## DISCUSSION

The study was directed towards establishing a relevance of body mass index in assessing nutritional status of secondary school students in river state. Dietary intake has been found to have a direct effect on BMI (Wood ruff et al 2008). This goes to show that the type of food provided, where it is provided and the

atmosphere it is provided has an overall effect on body mass index. The study showed a progressive increase in height in all subjects. This is in agreement with the second growth period which is the period of rapid growth. It occurs between 10– 18 years. This rapid growth is due to hormones (Brabin et al., 1997). Furthermore, fluctuations in weight of the subjects were observed. This is in accordance with the different diets of the individuals. Those in the boarding secondary schools were restricted to a particular food menu while those in the day secondary schools are open to a variety of food nutrients. This restriction does not imply however that those in the boarding schools are not healthy. As a result of this fluctuation in weight, the body mass index of the subjects was affected. Statistical analyses from subjects of the day school show 98% of students with normal BMI with mean BMI of  $22.56 \pm 1.23$ . 2% were overweight with mean BMI of  $27.24 \pm 3.08$ . While statically analyses from students in the boarding school show 85.5% of student with normal BMI with mean BMI of  $21.56 \pm 1.13$ . 14.2% were found to be underweight with mean BMI OF  $17.40 \pm 0.34$ . The difference in means of the BMI was found to be significant ( $P < 0.01$ ).

## CONCLUSION

This study has been able to establish the relevance of BMI in assessing nutritional status of secondary school students in river state, Nigeria both in day and boarding schools. With boarding school secondary students having a lower percentage of normal BMI compared with the students from day secondary schools and this may require careful follow up. Therefore, it is important that clinicians and medical scientist be aware of the need for more accurate assessment of nutritional status of children and the relevance of anthropometry in the assessment.

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**Reference** to this paper should be made as follows: Bienonwu E.O. (2013), the relevance of simple anthropometric parameter of Body Mass Index (BMI) in assessing nutritional status of secondary school students in River State, Nigeria, *J. of Biological Science and Bioconservation*, Vol.5, No.1, Pp. 18-24.

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