

BODY MASS INDEX AND HEALTH RISK STATUS OF PHYSICAL EDUCATION STUDENTS, UNIVERSITY OF NIGERIA, NSUKKA

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Abstract

The study determined the body mass index and health risk status of Physical Education (PE) students, University of Nigeria, Nsukka. Three research questions and two null hypotheses guided the study. A descriptive survey design was adopted to assess Body Mass Index (BMI) and health risk status of PE undergraduates in University of Nigeria Nsukka. The population of the study consisted of all the PE students in University of Nigeria Nsukka. The entire population was used for the study because the population was manageable. In essence, there was no sampling procedure. The instruments for data collection were height scale, tensor metre scale. Questions were asked on age of the respondents orally. In data collection, height and weight were measured with standardized protocols and calibrated equipment in the departmental exercise physiology laboratory. Body Mass Index was calculated as weight in kilograms divided by height in metre squared and rounded to one decimal place. The information elicited on the ages were used to ascertain the health status of the students. Data analyzed were presented using descriptive statistics. The study showed that respondents have the tendency towards a healthy BMI and health status. The study recommended that more emphasis should be placed on nutrition education so as to educate the students on the basic dietary practices that are good. Efforts should be made also to uncover the consequences of poor dieting on the students and other groups of individuals.

Introduction

Body Mass Index (BMI) or Quetelet Index is a measure of relative weight based on individual mass and height. BMI is a person's weight in kilogram divided by the square of the height in metres
$$\text{BMI} = \frac{\text{mass}(\text{kg})}{(\text{height}(\text{m}))^2}$$
. It is one of the most commonly used way of estimating whether a person is overweight, obese or having a desirable weight (Peter-Kio, Briggs, Ogunleye & Legheme, 2013). The BMI is used in a wide variety of contexts as a simple method to assess how much an individual's body weight departs from what is normal or desirable for a person of his or her height. There is however often vigorous debate, particularly regarding at which value of the BMI scale the threshold for overweight and obese should be set, but also about a range of perceived limitations and problems with the BMI.

Body Mass Index provides a simple numeric measure of a person's thickness or thinness, allowing health professionals to discuss overweight and underweight problems more objectively with their patients. However, BMI has become controversial because many people, including physicians, have come to rely on its apparent numerical authority for medical diagnosis, but that was never the BMI's purpose; it is meant to be used as a simple means of classifying sedentary (physically inactive) individuals, or rather, populations, with an average body composition (WHO, 1995). For these individuals, the current value settings are as follows: a BMI of 18.5 to 25 may indicate optimal weight, a BMI lower than 18.5 suggest the person is underweight, a number above 25 may indicate the person is overweight (25 to 29.9), a number above 30 suggests the person is obese (Centre for Disease Control and Prevention-CDC, 2006). World Health Organization (2006) further categorized underweight into very severely and severely, and obese in moderately, severely and very severely obese. These extreme values of BMI are indicators of health risk.

The health risk status of students can be estimated using their BMI and other social determinants of health. These determinants which are complex and interrelated include income, education, stress, social networks and support, studying and living conditions, gender, and behavioural aspects (Flegal, Kit, Orpana & Graubard, 2013), all which are integrated in terms of autonomy and capacity to participate fully in society. Those underweight, overweight and obese are more likely to experience health problems than a person with a desirable or healthy weight. World Health Organization (2006) regards a BMI of less than 18.5 as underweight and may indicate malnutrition, an eating disorder,

osteoporosis, osteopenia or other health problems, while a BMI greater than 25 is considered overweight and above 30 is considered obese. Overweight persons have moderate risk of developing coronary heart disease, high blood pressure, dyslipidemia, osteoarthritis, stroke, and type 2 diabetes while the obese are at high risk (Eknoyan, 2007).

MacKay (2010) described BMI as a mathematical ratio of height to weight that can be linked with body composition (or body fat percentage) and with indices of health risk. A high BMI assumes a higher percentage of body fat, which places a person at greater risk for developing chronic diseases such as diabetes mellitus, hypertension, heart disease and cancer. However, for some people, the BMI is not a reliable indication of health (Jeremy, 2009). According to the author, highly muscled individual who is very fit and healthy may have a somewhat heavy body weight because muscle pack on a lot of pounds. This person may have a high BMI that improperly puts him or her in the overweight or obese categories. Likewise, thin individuals who have a low body weight with very little muscle and a high percentage of fat may have a normal BMI, which would be an incorrect indication of healthiness. BMI is the commonest tool for measuring obesity.

Obesity is a medical condition characterized by storage of excess body fat. The human body naturally stores fat tissue under the skin and around organs and joints. Fat is critical for good health because it is a source of energy when the body lacks energy necessary to sustain life processes, and it provides insulation and protection for internal organs (Jeremy, 2009). Obesity is defined as having a BMI of greater than 30 (Wainer, 2010). Recent studies (Abdullah, Peters & de Courten, 2010; Delahanty, Peyrot, Shrader, Donald, Williamson, Meigs & Nathan, 2014) recommend healthy weight as an antidote to obesity and overweight. To maintain healthy weight means keeping one's body weight at a healthy level and to achieve this, exercise and a healthy diet are very important (Rizza, Go, McMahon & Harrison, 2002). Rizza and his colleagues asserted that people's habit can help in maintaining a desirable body weight. The authors added that the type and amounts of food eaten and the exercise performed will determine whether one will gain, lose, or maintain weight. However recent research has shown that those classified as overweight, having a BMI between 25 and 29.9, show lower overall mortality than all other categories (Flegal et al, 2013).

Obesity and overweight are risk factors to cardiovascular diseases. Overweight and obesity are responsible for 5 per cent of global mortality (WHO, 2009). Despite the high mortality and morbidity rate associated with overweight and obesity, some people seems not to be conscious of their lifestyle. The lifestyles that are core to weight management are nutrition, physical activity and behaviour modification. A good weight management programme can help forestall the risks associated with obesity. This study thereby seeks to establish the state of the PE students in University of Nigeria, Nsukka. This study is believed to expose the health risks associated with obesity and overweight thereby promoting the lifestyle changes of the PE students towards healthy weight.

Research Questions

3. What is the BMI and health risk status of PE students in University of Nigeria Nsukka?
4. What is the BMI and health risk status of PE students according to gender?
5. What is the BMI and health risk status of PE students according to year of study?

Hypotheses

- Ho₁. There is no significant difference on the BMI and health risk status of PE students according to gender.
- Ho₂. There is no significant difference on the BMI and health risk status of PE students according to year of study.

Methods

A descriptive survey design was adopted to assess BMI and health risk status of PE undergraduates in University of Nigeria Nsukka. The population of the study consisted of all the PE students in University of Nigeria Nsukka (28 students). The entire population was used for the study because the population was manageable. This is consistent with the submission of Nwana (1990) which posited that where the number in the target population is small, it is preferable to utilize all the respondents in order to ensure representativeness and generalizability of findings. In essence, there was no sampling procedure. The instruments for data collection were height scale, tensor metre scale and a

questionnaire on the health risk status. The question was the researchers self-developed questionnaire that elicited information on the health status of the students.

In data collection, height and weight were measured with standardized protocols and calibrated equipment in the departmental exercise physiology laboratory. BMI was calculated as weight in kilograms divided by height in metre squared and rounded to one decimal place. Ages of the respondents were gotten from the respondents through questioning. The ages were compared with the calculated BMI to ascertain the health status of the students. The analyses included one pregnant woman. Data analyzed were presented using descriptive statistics of frequency and percentages.

Results

Table 1
BMI and Health Risk Status of PE Students in UNN (n=28)

Category	Range of BMI (Kg/m ²)	f	%	Health Risk
Underweight	15.96 – 18.49	10	35.7	Moderate
Normal weight	19.11 - 24.76	15	53.6	Very Low
Overweight	25.56 – 29.41	2	7.1	Low
Obese	30.52	1	3.6	High

Table 1 show that 15 (53.6%) of the PE students have normal weight with a very low health risk. The table also show that 10 (35.7%) of the PE students are underweight with a moderate level of health risk, 2 (7.1%) are overweight while one pregnant woman (3.6%) is obese.

Table 2
BMI and Health Risk Status of PE Students in UNN According to Gender (n=28)

Category	Range of BMI (Kg/m ²)	Male (n=13) f (%)	Female (n=15) f (%)	Health Risk
Underweight	15.96 – 18.49	3 (23.1)	7 (46.7)	Moderate
Normal weight	19.11 - 24.76	10 (76.9)	5 (33.3)	Very Low
Overweight	25.56 – 29.41	0 (0)	2 (13.3)	Low
Obese	30.52	0 (0)	1 (6.7)	High

Table 2 show that more PE male students (76.9%) had normal weight than their female counterparts (33.3%). The table also show that more than two fifth of the female PE students (46.7%) were underweight with a moderate health risk, against slightly more than one-fifth of the male PE students (33.3%). The table further show that 13.3 per cent of the females were overweight while the other 6.7 per cent obese.

Table 3
BMI and Health Risk Status of PE Students in UNN According to Year of Study (n=28)

Category	Range of BMI (Kg/m ²)	100 level (n=9) f (%)	200 level (n=3) f (%)	300 level (n=11) f (%)	400 level (n=5) f (%)	Health Risk
Underweight	15.96 – 18.49	2 (22.2)	2 (66.7)	6 (54.5)	0 (0)	Moderate
Normal weight	19.11 - 24.76	7 (77.8)	1 (33.3)	2 (18.2)	5 (100)	Very Low
Overweight	25.56 – 29.41	0 (0)	0 (0)	2 (18.2)	0 (0)	Low
Obese	30.52	0 (0)	0 (0)	1 (9.1)	0 (0)	High

Table 3 show that 66.7 per cent of 200 level PE students, 54.5 per cent of 300 level PE students and 22.2 per cent of the 100 level PE students were underweight with moderate health risk. The table also show that all (100%) the 400 level PE students, 77.8 per cent of the 100 level PE students, 33.3 per cent of the 200 level PE students and 18.2 per cent of the 300 level PE students have normal weight.

The table further show that 300 level PE students were overweight (18.2%) and obese (9.1%) with a low and high health risks respectively.

Table 4

Summary of Chi-Square Analysis Testing the Null Hypothesis of no Significant Difference in BMI and Health Status of PE students According to Gender

Category	Under weight	Normal weight	Over-weight	Obese	Total	df	α	χ^2 -cal	χ^2 -crit	Decision
Male	3 (4.6)	10 (7.0)	0 (0.9)	0 (0.5)	13					
Female	7 (5.4)	5 (8.0)	2 (1.1)	1 (0.5)	15	3	.05	6.09	7.815	Accepted
Total	10	15	2	1	28					

#Figures in parenthesis indicate expected frequency *df = degree of freedom

Data in Table 4 revealed that χ^2 -cal value (6.09) is less than the observed χ^2 -crit value of 7.815 at df 3 and at .05 level of significance. The hypothesis that there is no significant difference in BMI and health status of PE students according to gender is therefore accepted. The acceptance means that gender does not make any difference in BMI and health status of the PE students in University of Nigeria, Nsukka.

Table 5

Summary of Chi-Square Analysis Testing the Null Hypothesis of no Significant Difference in BMI and Health Status of PE students According to Year of Study

Category	Under-weight	Normal weight	Over-weight	Obese	Total	df	α	χ^2 -cal	χ^2 -crit	Decision
100 level	2 (3.2)	7 (4.8)	0 (0.6)	0 (0.3)	9					
200 level	2 (1.1)	1 (1.6)	0 (0.2)	0 (0.1)	3	7	.05	13.96	14.06	Accepted
300 level	6 (3.9)	2 (5.9)	2 (0.8)	1 (0.4)	11					
400 level	0 (1.8)	5 (2.9)	0 (0.4)	0 (0.2)	5					
Total	10	15	2	1	28					

#Figures in parenthesis indicate expected frequency *df = degree of freedom

Data in Table 5 revealed that χ^2 -cal value (13.96) is less than the observed χ^2 -crit value of 14.067 at df 7 and at .05 level of significance. The hypothesis that there is no significant difference in BMI and health status of PE students according to year of study is therefore accepted. The acceptance means that gender does not make any difference in BMI and health status of the PE students in University of Nigeria, Nsukka.

Discussion

BMI is the most commonly used indicator of weight problems in a given population (Rosehill & Gotshalk, 2009). The findings of this study revealed that about 35.54 per cent of the PE students were underweight based on the World Health classification. This finding is unexpected. The finding of the study is consistent with the study of Sirang, Bashi, Jalil, Khan, Hussain, Baig, Taufeeq, Samad and Kadir (2013) and Kodoma (2010) on weight patterns and perception among female university students of Karachi and problems of underweight in young females and pregnant women in Japan respectively where over a quarter were underweight. WHO (2006) pointed out some health problems that are peculiar to underweight which include unhealthy dietary, nutritional deficiencies and osteoporosis. the commonest nutritional deficiencies anorexia nervosa and bulimia while unhealthy dietary practices include binge eating and overeating.

The study is at variance with the findings of Peter-Kio et al (2013) who reported less than 5 per cent underweight students. The discrepancy might be as a result of course of study as BMI has a limitation of not taking cognizance of lean muscles in athletes. Normal weight in BMI is a function of body size, mass and height. It ranges from 25.0 to 29.9 the findings of the study revealed that about 59.3 per cent of the study respondents have normal weight. This finding is not surprising. Casual observation of the study respondents gives an insight to this finding. The availability of gymnasias, stadia

and other sporting facilities promotes the PE students participation in physical activities. As opined by Sothern, Gordon & von Almen (2006), these activities also burn fats, thereby making people not to be overweight.

Overweight is a major public health problem facing many industrialized regions of the world and its prevalence also increasing in developing nations. The findings of the study indicate that about 3.7 per cent of respondents were overweight. This finding is astonishing. This may be due to the cultural acceptance of the lean people more than the fat ones. In Nigeria, overweight adolescents are usually regarded as not beautiful. Knowledge of the risk factors of overweight might be a contributing factor. Nevertheless, this study is at variance with the findings of Peter-Kio et al (2013) where 21 per cent of the respondents were overweight.

Poor nutrition in relation to physical inactivity has also been linked to increasing risk of malnutrition. Medical complications of eating disorders can be as a result of calorie restriction leading to weight loss, poor nutrition or purging behaviour (National Collaborating Centre for Mental Health, 2004). Bones are at risk in eating disorders as a result of endocrine as well as nutritional inadequacy (Kelly, 2010). The most effective treatment for and prevention of osteoporosis is weight restoration and resumption of endocrine function (Allan, Sharma & Sangan, 2010). Osteoporosis is a bone condition characterized by a decreased density of bone, which leads to bone weakening and an increased risk of fracture. The prevalence is higher among students with nutritional deficiencies of some elements such as calcium, phosphate and vitamin D minerals (Allan, et al, 2010). This disease can be prevented by good dietary practices and lifestyle because adolescence is the time of greatest bone acquisition.

Conclusions

The study showed that respondents have the tendency towards a healthy BMI and health status. This notwithstanding, there exist people who were underweight and overweight. The study tries to ascertain the possible reasons for their state of BMI. Some of the explored causes were lack of exercises, nutritional deficiencies, unhealthy dietary practices and general lifestyle practices. The study also captured that BMI is the best way of ascertaining the obesity level, despite its limitations.

Recommendations

Based on the findings of the study, it is recommended:

1. That more emphasis should be placed on nutrition education so as to educate the students on the basic dietary practices that are good. Efforts should be made also to uncover the consequences of poor dieting on the students and other groups of individuals.
2. Sporting facilities and equipment should be provided for PE students. The students should also be motivated to utilize the available resources so as to improve their outlook and attain desirable weights.
3. That the National University Commission stipulated sports schedules reflecting on the academic lecture time table should be made compulsory for all students and participation in at least one be encouraged.

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