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Prevalence and determinants of overweight and obesity among undergraduates in a university in Owerri, Southeastern Nigeria

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Abstract

This study investigated the prevalence and determinants of overweight and obesity among undergraduates of a university in Owerri, Southeastern Nigeria. The study was carried out in Federal University of Technology in Owerri. The University is located in Owerri, Owerri West Local Government Area which is surrounded by three (3) communities of Eziobodo, Ihiagwa and Obinze, Imo State, Southeastern Nigeria. The study design was a descriptive cross-sectional study. It involved the administration of questionnaires to students in the University according to the various schools in order to ascertain the prevalence and determinants of overweight and obesity among students of the University. The research instrument used to collect data was questionnaire; which covered the following areas: socio-demographic data, genetic disposition of obesity, diet, physical activity, drug use, and measurement. Data generated were subjected to descriptive and Chi-square statistical analysis. The study found that students consumed more of foods that were of high risk to being obese, this included high alcohol consumption. It was also found that overweight and obesity accounted for about 40 % of all the weight classes, indicating greater chances of increased obesity among the studied population. Strong correlation existed between genetic predisposition to being obese and obesity level of the students.

1. Introduction

Obesity is rising to alarming levels around the world. The development of overweight and obesity is usually so slow, and insidious that people hardly notice it is happening. It is genetically related to multi-factorial disease of excess fat, progressively lifelong with life threatening multiple co-morbidity (Akpa and Mato, 2008).

Obesity has been looked at as an excess of body fat that pose health risk with increasing prevalence and significance worldwide. The term informally was used to

describe people who are grossly overweight which is more frequently used to designate mild degree of adiposity (Haslam and James, 2005).

Overweight and obesity is a global health problem and the prevalence varies with socioeconomic status. In developed countries, the poor have the highest prevalence while in the developing world; the affluent is at the highest risk (Haslam and James, 2005).

Obesity is different from Overweight which means weighing too much. Mark (2011) opined that it is important to note the factors that are associated with overweight are not the same factors that are associated with being obese. For example, higher income persons are more likely to be overweight but are less likely to be obese. Men are more likely to be overweight but less likely to be obese. Race has no relationship to overweight, but African-Americans and Hispanics are more likely to be obese. The weight may come from muscle, bone, fat and/or body water.

Both term means that a person's weight is greater than what is considered healthy for his or her height. Obesity has increased steadily in many countries; its progression the world over has led to the use of the word 'epidemic' in describing it (WHO, 2000).

The world health Organization (WHO, 1998) predicts that overweight and Obesity may replace more traditional public health concerns such as under nutrition and infectious disease as the most significant cause of poor health. Obesity in the entire world has nearly doubled since 1980. More than 1.4 billion adults, 20 and older, were overweight in 2008. Of these over 200 million men and nearly 300 million women were obese. 35% of adults aged 20 and over were overweight in 2008, and 11% were obese. 65% of the world's population lives in countries where overweight and obesity kills more people than underweight. More than 40 million children under the age of five were overweight in 2011 (WHO, 2013).

The factors that contribute to obesity have been looked at as excessive calories consumption and physical inactivity. The cause of overweight and obesity include both genetic and environmental factors. Drugs may also induce Obesity. There is also genetic predisposition to gaining weight. The risk is increased when the parents themselves are obese or when siblings have the same weight problem. Some behavioral and environment factors are living a sedentary life and inadequate physical activity, often combined with the bad eating habits (eating fatty foods, snacking, consuming sweetened drinks) cause imbalance in the amount of energy taken in and expended by the body (Davis and sherer,1994).

The risk factors of obesity include: genetics, inactivity, unhealthy diet and eating habits, family lifestyle, quitting smoking, pregnancy, lack of sleep, certain medications, age, social and economic issues and medical problems. Obesity itself is a risk factor for several chronic diseases including hypertension. Being Overweight and obese has serious impact on health. Carrying extra fat lead to serious health

consequences such as High cholesterol and triglycerides; type 2 diabetes; high blood pressure; metabolic syndrome — a combination of high blood sugar, high blood pressure, high triglycerides and high cholesterol; heart disease; stroke; cancer, including cancer of the uterus, cervix, ovaries, breast, colon, rectum and prostate; sleep apnea, a potentially serious sleep disorder in which breathing repeatedly stops and starts; depression; gallbladder disease; gynecologic problems, such as infertility and irregular periods; erectile dysfunction and sexual health issues, due to deposits of fat blocking or narrowing the arteries to the genitals; nonalcoholic fatty liver disease, a condition in which fat builds up in the liver and can cause inflammation or scarring; osteoarthritis; skin problems, such as poor wound healing (Haslam and James, 2005).

These conditions cause system disability and subsequently premature death. Study has shown that healthcare providers, like others in society describe overweight individuals as repulsive, disgusting, weak and lacking self-discipline (Klauer and Aronne 2001). Overweight and obesity as well as their related chronic diseases are largely preventable. Preventing Obesity is first a matter of combating its causes. In view of the foregoing, this study has the primary objective of ascertaining the prevalence and determinants of overweight and obesity among undergraduates of the Federal University of Technology, Owerri, Southeastern Nigeria.

2. Research Methodology

2.1. Study Area

The study was carried out in Federal University of Technology Owerri (FUTO). The University is located in Owerri, Owerri West Local Government Area which is surrounded by three (3) communities of Eziobodo, Ihiagwa and Obinze, Imo State, Nigeria. It was one of the Universities that was set up by the Federal Government in 1980 for each of the geopolitical zones of the country, in order to increase skills, innovation and technologically oriented manpower for the technological growth of Nigeria's national economy. The University has six (6) schools namely:

School of Agriculture and Agricultural Technology (SAAT),

School of Engineering and Engineering Technology (SEET),

School of Sciences (SOSC),

School of Management and Management Technology (SMAT),

School of Health Technology (SOHT), and

School of Environmental Technology (SOET).

The University's current enrolment for the 2012/2013 session has a total population of twenty one thousand and thirty nine (21, 039) students comprising seventeen thousand seven hundred and thirteen (17, 713)

undergraduates and three thousand three hundred and twenty six (3, 326) post graduates students and an academic staff strength of nine hundred and twenty six (926) [including 156 professors] plus over one thousand two hundred (1, 200) administrative and technical support staff.

2.2. Study Design

The study design was a descriptive cross-sectional study. It involved the administration of questionnaires to students in the University according to the various schools in order to ascertain the prevalence and determinants of overweight and obesity among students of the University.

2.3. Study Population

The population for this study was undergraduates of Federal University of Technology Owerri (FUTO). The male and female students in the University were selected by simple random sampling. The sample consisted of three hundred and twenty three (323) undergraduates; male and female were selected randomly.

2.4. Research Instrument

The research instrument used to collect data was questionnaire. Perceived parental authority was adapted. The questionnaire covered the following sections:

Section A: socio-demographic data,

Section B: Genetic disposition of obesity,

Section C: Diet,

Section D: Physical activity,

Section E: Drug use, and

Section F: Measurement

2.5. Sample Size Determination

This study was a descriptive cross-sectional design which involved the administration of questionnaires to students in their various schools in FUTO and randomly selecting only fifty (50) students from each of the schools in order to ascertain their various body length and width sizes towards prevalence and determinants of overweight and obesity among the students of Federal University of Technology, Owerri. The reliability of the instrument was ascertained to be in correlation with coefficient of 0.95. The minimum sample of this study was calculated using the Cochran formula:

$$n = Z^2Pq/d^2$$

Where

n = Sample size,

P = Prevalence of overweight and obesity in Federal University of Technology Owerri (FUTO) which was 30%,

q = (1-P),

Z = standard deviation using set at 1.96 which correspond to the 95% confidence interval (CI), while

d = degree of accuracy desired set at 0.05.

Therefore,

$$n = \frac{(1.96)^2 \times 0.30 \times 0.70}{(0.05)^2}$$

$$= 322 \approx 323$$

The minimum size of 323 was intended to allow for a response rate of 1.82 % \approx 2 % from the study population.

N = 17, 713.

N = study population

The subjects were selected by the multi-stage Chester sampling method in various departments. Each of the subjects gave verbal consent to engage in the study (Farmer *et al.* 1996). Consented students/subjects who have not been fully admitted in the school, unwilling to caps, shoes and heavy garments, pregnant women and medically ill students were excluded from the study.

2.6. Sampling Technique

The random sampling technique was used in the study. The reason was because the cost is lower, collection is faster, and since the data set is too large, it is possible to ensure homogeneity and to improve the accuracy and quality of the data. From the list, 50 students were selected in each school (SEET, SAAT, SOSC, SMAT, SOHT and SOET) through random sampling representing 50% of the sample frame. This also provided everyone an opportunity to be selected.

2.7. Data Collection

The instrument for data collection was structured questionnaire which was administered face to face to the students with the help of trained assistants to obtain socio-demographic data. The body weight and height were measured using Hanson weighing scale and adapted stadiometer, respectively, to the nearest 0.1 kg and 0.1 cm with students standing erect without shoes or headgear. Body Mass Index (BMI) was calculated by dividing the weight in kilogram by the square of the height in the meters (kg/m^2). The WHO diagnostic criteria was used in classifying the students into overweight and obesity (Obesity was $\text{BMI} \geq 30 \text{ Kg}/\text{m}^2$ while overweight was $\text{BMI} \geq 25.0 \text{ kg}/\text{m}^2$ but $< 30.0 \text{ kg}/\text{m}^2$).

2.8. Data Analysis

Collected data were sorted out, coded and imputed into (SPSS) version 17.0 (SPSS, 2009). Frequency tables were used to present relevant variables. Descriptive statistics such as mean and standard deviation were used to summarize quantitative variables (Age) while qualitative variables (sex, marital status, height and weight -body sizes, genetic disposition, e.t.c.) were summarized by proportions. The chi-square test was used to investigate association between categorical variables (prevalence and determinants of obese patients). All analysis was done at the 5% level of significance with $P < 0.05$ considered statistically significant.

3. Results

The results obtained in this study showed the prevalence and determinants of overweight and obesity among undergraduates of Federal University of Technology, Owerri (FUTO). The mean age was 21.9 ± 2.14 years among the respondents who completed the information required. The sex of the respondents was 29 % (87) for male and 71% (213) for female. This female predominance agrees with studies from other developing nations like Iran, Tanzania and Mauritius (Australian Bureau of Statistics, 2004 and Vaidya *et al.* 2006). A total of 40 (13.3%) respondents were married, while 251(83.7 %) of them were single; 7 (2.3%) were divorced while only 2 (0.7%) were widowed. The Chi-square analysis of socio-demographic characteristics of overweight and obesity as shown in Table 1 reveals that there was significant difference between the sexes.

Table 1. Demographic data of respondents

Variables	Frequency (N = 300)	Percentage (%)	X ²	p-values
Sex				
Male	87	29		
Female	213	71		
Total	300	100	52.92	0.02624
Age				
Below 20	73	24.3		
20 – 25	136	45.3		
25 – 30	71	23.7		
30 – 35	16	5.3		
35 and above	4	1.3		
Total	300	100	185.633	0.05152
Marital status				
Married	40	13.3		
Single	251	83.7		
Divorced	7	2.3		
Widowed	2	0.7		
Total	300	100	562	0.053

Result in Table 2 shows that 82.7 % (248) of the respondents said that their parents are not overweight or obese, while 17.3 % (52) noted that their parents were overweight or obese.

Table 2. shows the Obesity level of parents

Yes	17.3	52
No	82.7	248
Total	100	300

With respect to the more pertinent explanatory variables; 50% (150) of students ate more of carbohydrate (rice, yam, cassava, etc.), 20 % (60) ate proteins (beef, fish, beans,

eggs), fats (margarine, butter, oil) was 13.3 % (40), while vegetables and fruits (orange, apple, watermelon, pineapple and pumpkin) had 16.7 % (50) (Table 3).

Table 3. Type of food consumed by respondents

Variables	Frequency	Percentage (%)	Significance
Carbohydrate (rice, yam, cassava, etc.)	150	50	
Proteins (beef, fish, beans, eggs, etc.)	60	20	
Fats (margarine, butter, oil, etc.)	40	13.3	
Vegetables and fruits (orange, apple, water melon, pineapple, pumpkin, etc)	50	16.7	
Total	300	100	X ² =102.66**

** = Highly significant at p = 0.01 confidence interval

In this study, it was found that those who practiced physical activity were the most common among students in FUTO. Table 4 shows the respondents that said 'yes' (been positive) to the genetic disposition of obesity with 255 (85 %) while those that said 'no' were 45 (15%).

Table 4. Engagement in physical activity

Variables	Frequency	Percentage (%)
Yes	255	85
No	45	15
Total	300	100

Respondents that indulge in physical activity and practiced daily were 78 (26 %), once a week were 129 (43 %), twice a week 70 (23.3 %) while three times a week were 23 (7.7 %) (Table 5).

Table 5. Frequency of physical activity

Variables	Frequency	Percentage (%)
Daily	78	26
Once a week	129	43
Twice a week	70	23.3
Thrice a week	23	7.7
Total	300	100

With regards to duration of the physical exercise by the respondents, 121 (40.3%) noted that they spent 0-9 minutes a day, 10 - 19 minutes was observed by 71 (23.7%) respondents in a day, 20-29 minutes was spent by 63 (21%) while 30 minutes and above was spent by 45 (15%) respondents in a day (Table 8).

Table 8. Frequency (in minutes) of physical activity

Variables (minutes)	Frequency	Percentage (%)
0 – 9	121	40.3
10 – 19	71	23.7
20 – 29	63	21.0
30 & above	45	15
Total	300	100

Among the undergraduates of Federal University of Technology, Owerri, 154 (51.3 %) reported alcohol consumption, the number that made use of contraceptive was 39 (13 %) while none were 107 (35.7 %) (Table 9).

Table 9. Drug/alcohol use by the respondents

Variables	Frequency	Percentage (%)
Alcohol	154	51.3
Contraceptive	39	13.0
None	107	35.7
Total	300	100

Body mass index (BMI in kg/m^2) was categorized using the World Health Organization (WHO) definitions: BMI of 18.5 - 24.9 kg/m^2 was used as the reference (normal BMI), 25 - 29.9 kg/m^2 were used to define overweight while ≥ 30 kg/m^2 were used for definition of obesity. As shown in Figure 3, 176 (58.7%) of the respondents had normal weight (18.5 - 24.9 kg/m^2), 6 (2.0%) were underweight (<18.5 kg/m^2), 84 (28%) were overweight (BMI ≥ 25 kg/m^2) while 34 (11.3%) were obese (BMI ≥ 30 kg/m^2). The prevalence of overweight was significantly higher among females compared to male respondents (71.0 % vs 29.0 %, $p < 0.04146$) (Table 10).

Table 10. Measurement of body mass index (BMI)

Variables	Weight class	Frequency	Percentage (%)
< 18.5 Kg/m^2	Underweight	6	2.0
18.5 – 24.9 Kg/m^2	Normal weight	176	58.7
25 – 29.9 Kg/m^2	Overweight	84	28.0
30 Kg/m^2 & above	Obesity	34	11.3
Total		300	100

$X^2 = 222.98^{**}$

** = Highly significant at $p = 0.01$ confidence interval

4. Discussion

4.1. Prevalence of Overweight and Obesity among Undergraduates

The prevalence of overweight and obesity among the undergraduates of the University tilted more on the side of overweight than obese. The prevalence of obesity though

lower than that of overweight among the students is something that should be of concern in this study. This percentage of overweight will definitely spill over to being obese in the nearest future if not properly checked. Those who were overweight in the age bracket of 30 and below constituted 26 %. This therefore indicates that in no distant time, more persons are going to be obese. This reason is because this percentage represents those who are prospectively obese. This calls for action in checking the increased prevalence of overweight and subsequent obesity among university students in predominantly black African population where poverty and illiteracy held sway. An earlier cross-sectional study in the southwestern part of Nigeria also found obesity to be present in 21.2 % of the subjects (Ojofeitimi *et al.* 2007) and that of (Kolawole *et al.* 2011) where the prevalence rate was 21.0 %. It is important to note that the high significant difference ($p = 0.01$) that was observed among the variables of different classes of weight showed that there is great variation among the values that were obtained. This variation among underweight, normal weight, overweight and obesity shows high segregation of weight class among the undergraduates. This implied that the determinant of overweight and obesity among the undergraduates are highly varied.

The overall prevalence in this study is however lower than that reported in the US where the prevalence of obesity increased from 22.9 % in the late 1980s to early 1990s to 30.5% between 1999 and 2000 (Flegal *et al.*, 2002). The possible explanation for the difference between the US study and this work could be because Nigeria is just undergoing both nutritional and epidemiologic transitions. In many cities and schools, fast food outlets are rapidly springing up with high patronage, leading to the consumption of energy-dense foods which is probably fuelling the high prevalence. Except a pro-active approach is taken, the situation may even get worse because there are presently no measures in place to stem the tide (Akpa and Mato, 2008). Overweight and obesity have significant impact on society worldwide. In 2010, 54.3 per cent of adults were either overweight or obese. From some of the studies done in Western countries, a significant higher proportion of males (60.7 percent) and females (48.0 percent) were overweight or obese (NSW, 2003), as to compared with this work where the prevalence for overweight and obese put together is less than 40 %.

4.2. Determinants of Overweight and Obesity among Undergraduates

The obesity status of the respondents tends to correlate with the genetic disposition of the parents of respondents. The reason is because both the obesity level of the parents and that of the respondents was less than 20 % each. This corroborates the fact that genetic predisposition of parents has been noted as one of the determinants of overweight and obesity (Davis and sherer, 1994). It can therefore be surmised that the respondents that were obese could have inherited obesity from their parents, in addition to

contributing to the overweight nature of the respondents.

The respondents consumed mostly carbohydrate food. This is also capable of increasing overweight and obesity among undergraduates. Those who were overweight and obese together constitute 39 %. The imbalance in the type of food consumed, which is loop-sided on the side of food that can lead to overweight and obesity is a source of serious concern. This is basically one of the key factors of overweight and obesity among poor Africans. It has been observed that bad eating habits (eating fatty foods, snacking, consuming sweetened drinks) cause imbalance in the amount of energy taken in and expended by the body (Davis and Sherer, 1994). Also, over half of the studied population consumed alcohol. This high rate of alcohol consumption among the studied population has the capacity to accelerate prevalence of overweight and obesity. Fruits and vegetables which help in checking overweight and obesity were poorly consumed by the students. This problem could be associated with the inadequate eating habit of highly impoverished Africans. According to a study (New South Wales, 2003) in a developed economy, since 1997 there has been a significant increase in the proportion of adults aged 16 years and over who consumed 2 or more serves of fruit a day (46.1% to 56.4%); this is in contrast with this study as only 16 % of undergraduates consumed fruits and vegetables in a developing nation like Nigeria. There was high significant difference ($p = 0.01$) among the types of food consumed. This meant that the types of food consumed by the students are closely unrelated. This disparity among the type of food consumed by the undergraduates equally accounted for the trend of the prevalence of overweight and obesity that was observed in this study.

Physical activity has been noted as one of the key determinants of overweight and obesity among the populace (Kolawole *et al.* 2011). In this study, less than 20 % of the undergraduates were obese. Greater number of students indicated that they engage in physical activity for a minimum of 10 minutes to over 30 minutes at least once in a week. This could have contributed to level of prevalence of obesity among the students; although those who were overweight were more than double the number that was obese. The place of physical activity should be strongly encouraged among the students since they are the most physically active age group among the whole population.

5. Limitations

This study may be limited by our choice of sample. Subjects used in carrying out this research were a convenient sample and may not represent that age bracket in the general population. Furthermore, older adults were not included in this study, even though morbidity from adiposity-related disorders is more prevalent in older adults. Our sample size is also not large enough to allow for robust statistical deductions to be made without equivocation. However, in the light of our peculiar climate, it is enough

starting point for future studies. The assumption that % body fat is an improved phenotypic indicator of morbidity and mortality over body mass index, waist circumference, e.t.c. is still debatable and more studies are needed to clarify the issues surrounding body composition.

6. Conclusions

Healthy living in terms of consumption of fruits and vegetables, regular aerobic exercises and discouragement of consumption of calorie-dense diets are some of the issues that should be addressed in educating the populace on this avoidable epidemic. If we consider the fact that the battle against communicable diseases like malaria, multi-drug resistant tuberculosis and HIV/AIDS are still far from being won, all efforts should be made to stem the tide of the rising overweight and obesity so that the burden of other related non-communicable cardiovascular disorders can be reduced and the available meager resources can be properly channeled.

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