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Prevalence of Obesity among Undergraduate Students of Tai Solarin University of Education, Ijagun, Ijebu-Ode

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Abstract: In recent years, developing countries like Nigeria have been experiencing a nutritional transition in food choices from the typical starchy (mainly carbohydrate diets) to the fast food pattern and as a result of this, the dietary habits of young adults like university students have been affected. Thus, overweight and obesity are increasingly being observed among the young adults. This study assesses the prevalence of obesity on a sample of students from Tai Solarin University of Education in Ijebu-Ode, Ogun State, Nigeria. 371 students were randomly sampled from 100 level to 400 level between ages 16 and 27 years old. 151 male students (40.7%) and 220 female students (59.3%) made up the population. Daily intake of snacks apart from regular meals was more common among females than males (79.5% vs. 70.6% respectively). More female students engaged in physical exercise and reading (16.4% and 36.1% respectively) as compared with male (11.1% and 22.9% respectively). Based on BMI classification, the prevalence of overweight and obesity was more common among female students compared to male (10% and 5.1% vs. 4.6% and 1.3% respectively). Also, the findings revealed that age is the most potent predictor of obesity followed by gender while family background and recreational activities did not significantly predict obesity. Thus, this study should provide incentive for the private and public sectors to mobilize all available resources to stem the tide of increasing body mass index in university students and adults. Also, public health strategies to prevent obesity should begin with schools and extend to the entire community.

Key words: Obesity, body mass index (BMI), food pattern

INTRODUCTION
According to Wardlaw and Kessel (2002), food provides both the energy and the materials needed to build and maintain all body cells. Food is part of everyday life. Nutrition is the process of taking in and using food nutrients for growth, repair and maintenance of the body. Simply defined, nutrition is what you eat and how the body uses it (Ajala, 2005). Poor nutritional practices and heightened levels of stress, two common attributes of university life, are strongly linked with ill-health or decreased health.

Little research has examined or evaluated the nutritional status of undergraduate university students. Many researches have been done on nutritional status of children (school-age), infants and the elderly because they are believed to be among the groups at risk or the vulnerable group but adolescents and young adults, like the undergraduate university students, are not believed to be a part of this vulnerable group and so little attention is paid to this group especially nutritionally.

Olusanya (2008) defined obesity as an abnormal accumulation of fat in the adipose tissue throughout the body. It is the most common nutritional disorder in infants, children and adults in affluent societies. Obesity

is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health (WHO, 2000). It is defined by Body Mass Index (BMI) and further evaluated in terms of fat distribution via the waist-hip ratio and total cardiovascular risk factors (Sweeting, 2007).

Obesity increases the likelihood of various diseases, particularly heart disease, type 2 diabetes, breathing difficulties during sleep, certain types of cancer and osteoarthritis. Obesity is most commonly caused by a combination of excessive dietary calories, lack of physical activity and genetic susceptibility, although a few cases are caused primarily by genes, endocrine disorders, medications or psychiatric illness (Haslam and James, 2005).

Possible reasons for over-eating these days include: cheaper foods (relative to income), more varied foods; supermarkets, advertising and promotion of foods, more eating outside the home (fast food chains, pubs, ethnic restaurants), more fatty food; more snack foods, over-eating because of anxiety for example, work stress or depression) grazing and irregular meal times etc. possible reasons for under-exercising these days include: more labour-saving machinery at work and at

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home, television, personal computers (e-mail, face book etc), more cars; less walking and cycling, less open space for recreation, fear of violence in the streets etc (Haslam and James, 2005).

Obesity is a leading preventable cause of death worldwide, with increasing prevalence in adults and children and authorities view it as one of the most serious public health problems of the 21st century (Barness *et al.*, 2007). Obesity is stigmatized in much of the modern world (particularly in the Western world), though it was widely perceived as a symbol of wealth and fertility at other times in history and still is in some parts of the world (Haslam and James, 2005; Woodhouse, 2008).

Obesity increases the risk of many physical and mental conditions. Complications are either directly caused by obesity or indirectly related through mechanisms sharing a common cause such as a poor diet or a sedentary lifestyle. The strength of the link between obesity and specific conditions varies. One of the strongest is the link with type 2 diabetes. Excess body fat underlies 64% of cases of diabetes in men and 77% of cases in women (WHO, 2009). On the average, obesity reduces life expectancy by six to seven years: (Haslam and James, 2005; Peeters *et al.*, 2003), a BMI of 30-35 reduces life expectancy by two to four years, while severe obesity (BMI>40) reduces life expectancy by 10 years (Whitlock *et al.*, 2009).

Like many other medical conditions, obesity is the result of interplay between genetic and environmental factors. The percentage of obesity that can be attributed to genetics varies, depending on the population examined, from 6-85% (Yang *et al.*, 2007). At an individual level, a combination of excessive caloric intake and a lack of physical activity are thought to explain most cases of obesity (Lau *et al.*, 2007). A limited number of cases are due primarily to genetics, medical reasons, or psychiatric illness. In contrast, increasing rates of obesity at a societal level are felt to be due to an easily accessible and palatable diet (Drewnowski and Specter, 2004) increased reliance on cars and mechanized manufacturing (Nestle and Jacobson, 2000; James, 2008).

A 2006 review identified ten other possible contributors to the recent increase of obesity: (1) insufficient sleep, (2) endocrine disruptors (environmental pollutants that interfere with lipid metabolism), (3) decreased variability in ambient temperature, (4) decreased rates of smoking, because smoking suppresses appetite, (5) increased use of medications that can cause weight gain (e.g., atypical antipsychotics), (6) proportional increases in ethnic and age groups that tend to be heavier, (7) pregnancy at a later age (which may cause susceptibility to obesity in children), (8) epigenetic risk factors passed on generationally, (9) natural selection for higher BMI and (10) assortative mating leading to increased

concentration of obesity risk factors (this would not necessarily increase the number of obese people, but would increase the average population weight) (Keith *et al.*, 2006).

A sedentary lifestyle plays a significant role in obesity. Worldwide there has been a large shift towards less physically demanding work (WHO, 2009) and currently at least 60% of the world's population gets insufficient exercise (WHO, 2009). In both children and adults there is an association between televisions viewing time and the risk of obesity (Gortmaker *et al.*, 1996; Vioque *et al.*, 2000). A 2008 meta-analysis found that 63 of 73 studies (86%) showed an increased rate of childhood obesity with increased media exposure, with rates increasing proportionally to time spent watching television (Emmanuel, 2008). The main treatment for obesity consists of dieting and physical exercise (Lau *et al.*, 2007). Diet programs may produce weight loss over the short term (Strychar, 2006) but keeping this weight off can be a problem and often requires making exercise and a lower calorie diet a permanent part of a person's lifestyle (Shick *et al.*, 1998; Tate *et al.*, 2007).

Consideration for healthy eating, weight control and general wellness is of growing importance within our society. Despite this focus on wellness, an average university student still involves in poor nutritional practices, sleeping less and experiencing more stress. Earlier prevalent studies of anthropometric indices of nutrition in adolescent and university students showed that poor nutritional practices are a major problem with undergraduate students (Yahia *et al.*, 2008).

This research therefore focuses on the prevalence of obesity among Tai Solarin University of Education students.

The findings of this study are limited by the use of a sample of university undergraduate students from just one university (Tai Solarin University of Education) which may not be representative of all university students in Nigeria or in Ogun State. Furthermore, samples from different universities may provide a more inclusive picture of university students taking into consideration religion and socio-economic status.

Research hypothesis: The research used the hypothesis stated below to advance the scope of the study which includes:

H_{o1}: There is no significant relationship between obesity and age of the students.

H_{o2}: There is no significant relationship between obesity and gender of the students.

H_{o3}: There is no significant relationship between obesity and family background.

H_{o4}: There is no significant relative contribution of age, gender, family background and recreational activities to prevalence of obesity.

MATERIALS AND METHODS

The study sample consisted of 400 students-involving both male and female and made up of 100 students from each college. There are four (4) colleges viz; College of Applied Education and Vocational Studies (COAEVOT), College of Social and Management Sciences (COSMAS), College of Science and Information Technology (COSIT) and College of Humanity (COHUM). The students were recruited randomly by the researcher from all levels-100 level to 400 level.

Data collection took place in two steps. The first step was to fill out the questionnaire and the second step involved the use of anthropometric measurements for the determination of Body Mass Index (BMI).

Recruited students were asked to fill out a questionnaire related to demographic factors, such as what they eat, when they eat it and how they spend their leisure time. Body Mass Index (BMI) was used to assess students' health status.

Weight was taken using bathroom weighing scale (CAMRY Model) and height meter to determine their height in meters.

Statistical analysis was performed using the Statistical Package for Social Sciences (version 13.0, SPSS, Inc) software.

Regression and Pearson Correlations were used to examine differences in the anthropometric characteristics of students. Results were expressed as Percentages (%), mean and ± SD (standard deviation). All reported P values was made on the basis of 2 sided tests and compared to a significance level of 5% (0.05 level).

RESULTS

Table 1 showed that out of 371 respondents, 151 are male representing 40.7% while 220 are female representing 59.3% which depicts female gender being higher in number/population than the male.

From Table 2 above, the largest percentage (14.6%) representing 54 of the respondents were 24 years old, followed by 20 years old respondents which is 13.2% (49 respondents) and the lowest percentage of 1.4% (5 respondents) between 16 and 17 years old.

Table 3 shows the percentage of underweight, normal weight, overweight and obesity of respondents between ages 16-26. None of the 16 years old respondents was obese for both male and female. Out of the respondents that were 20 years old, 33.3% of the male were obese while 5.9% of the female were obese. Among the 21 years old respondents, none of the male was obese while 17.7% of the female were obese. 66.7% of the 22 years old male were obese while only 11.8% of the female were obese.

From this table, it can be inferred that in all, the majority of the students (67.7%) were of normal weight, out of which 74.8% of the female students compared to 37.2%

Table 1: Distributions based on the gender of respondents

Gender	Number of respondents	Percentage (%)
Male	151	40.7
Female	220	59.3
Total	371	100.0

Table 2: Distributions based on the age of respondents

Age in years	Number of respondents	Percentage (%)
16	5	1.4
17	5	1.4
18	12	3.2
19	37	9.9
20	49	13.2
21	44	11.9
22	43	11.6
23	43	11.6
24	54	14.6
25	44	11.9
26	29	7.8
27	6	1.6
Total	371	100

of the male. Based on BMI classification, the prevalence of overweight and obesity was more common among female students compared to male (10% and 5.1% vs. 4.6% and 1.3% respectively). Also, 7% of the female students were underweight as compared with 4.3% males.

From Table 4 above, it could be seen that 29.4% of the female who were obese have fat father and mother, the implication of this is that obesity could be genetic. None of the male respondents have both parents being obese but 29.4% of the male respondents have both parents being overweight.

Table 5 shows frequency of consumption of snacks of the respondents. A large percentage of the respondents from age 16-26 consumed snacks more than thrice daily among the male and the female respondents ate snacks more thrice daily. Eating habits of the students were compared by gender and age as in the table above. The majority (55.5%) reported taking snacks after dinner. Female students showed healthier eating habits compared to male students. The unhealthy eating practice was indicated by the fact that most of the students (87.6%) of the students reported eating snacks more than twice daily and at any period as well. Daily intake of snacks apart from regular meals was more common among females than males (79.5% vs. 70.6% respectively).

From Table 6, it could be noted that all the respondents at one time or the other take snacks but the percentage varies depending on the time or period it was taken before breakfast, between breakfast and lunch, between breakfast and dinner, after dinner and some even take it any period and it ranges between 1.1-83.3%, 5.4-50%, 4.3-37.3%, 6.4-90.9% and 4.3-35.7% respectively for both male and female.

Table 3: Prevalence of obesity based on BMI (Underweight, normal weight, overweight and obesity) among undergraduate students of TASUED

Age in yrs.	Male (%)				Female (%)			
	Under weight	Normal weight	Over weight	Obesity	Under weight	Normal weight	Over weight	Obesity
16	-	0.9	5.9	-	3.9	1.4	-	-
17	-	1.8	-	-	-	2.1	-	-
18	-	2.6	-	-	19.2	2.8	-	-
19	12.5	10.4	-	-	19.2	12.0	2.8	-
20	12.5	13.9	11.8	33.3	15.4	14.9	5.6	5.9
21	31.3	6.9	23.5	-	15.4	12.1	13.9	17.7
22	6.3	10.4	5.9	66.7	11.5	10.6	13.9	11.8
23	12.5	13.0	5.9	-	-	10.6	19.4	17.7
24	18.7	14.8	17.7	-	11.5	13.5	25.0	-
25	-	15.7	11.8	-	-	11.3	16.7	11.8
26	6.3	8.7	17.7	-	3.9	5.0	2.8	35.3
27	-	0.9	-	-	-	3.5	-	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 4: Prevalence of obesity based on physical status of family of respondents

Parent stature	Male (%)				Female (%)			
	Under weight	Normal weight	Over weight	Obesity	Under weight	Normal weight	Over weight	Obesity
Fat father	9.1	15.7	17.6	33.3	11.5	10.6	13.9	23.5
Fat mother	12.5	24.3	11.7	33.3	34.6	22.7	27.8	23.5
Both parent	12.5	22.7	29.4	-	15.4	19.9	33.3	29.4
None fat	68.8	37.4	41.2	33.3	38.5	46.9	25.0	23.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 5: Frequency of consumption of snacks

Age yrs	Male (%)				Female (%)			
	Once daily	Twice daily	Thrice daily	More than thrice daily	Once daily	Twice daily	Thrice daily	More than thrice daily
16	31.9	21.3	20.2	26.6	22.0	23.1	22.0	32.9
17	-	54.5	-	45.5	-	52.5	47.5	-
18	29.0	21.0	20.0	30.0	20.0	30.0	25.0	25.0
19	45.3	31.4	-	23.3	11.6	21.7	33.3	33.3
20	27.2	18.5	29.3	25.0	41.5	-	42.6	15.9
21	-	34.2	30.1	35.6	33.0	28.7	28.7	9.6
22	-	29.0	29.0	42.0	38.3	-	19.1	42.6
23	25.9	26.8	24.1	23.2	33.3	25.0	24.2	17.5
24	36.1	25.0	20.4	18.5	28.2	18.2	35.4	18.2
25	30.5	20.7	22.0	26.8	18.5	25.0	32.4	24.1
26	23.0	24.1	23.0	29.9	24.4	25.6	23.3	26.7

Table 6: Period of consumption of snacks

Age	Male (%)					Female (%)				
	Before breakfast	Between breakfast and lunch	Between breakfast and dinner	After dinner	Any period	Before breakfast	Between breakfast and lunch	Between breakfast and dinner	After dinner	Any period
16	12.5	41.7	4.2	41.7	-	-	9.1	-	90.9	-
17	-	38.5	38.5	11.5	11.5	83.3	-	16.7	-	-
18	2.5	10.0	77.5	5.0	5.0	63.8	21.3	4.3	6.4	4.3
19	7.5	10.8	32.3	33.3	16.1	13.0	20.4	18.5	29.6	18.5
20	20.8	16.7	20.8	-	41.7	1.1	5.4	7.5	53.8	32.2
21	43.5	7.2	7.2	29.0	13.0	14.3	-	35.7	14.3	35.7
22	18.8	18.8	12.5	-	50.0	16.7	50.0	16.7	-	16.7
23	21.3	2.1	12.8	42.6	21.3	9.8	-	37.3	39.2	13.7
24	50.0	-	-	50.0	-	37.0	-	-	63.0	-
25	14.3	-	71.4	-	14.3	-	29.5	36.4	-	34.1

Table 7: Types of activities engaged in during leisure period

Age yrs	Male (%)					Female (%)				
	Sleeping	Reading	PE	Watching TV	PGC	Sleeping	Reading	PE	Watching TV	PGC
16	-	1.2	-	-	-	-	1.5	-	-	2.3
17	-	1.2	2.4	-	2.3	2.1	-	-	2.2	-
18	-	-	-	1.6	-	4.2	1.5	1.6	-	-
19	3.3	10.6	12.2	11.5	11.6	10.4	10.4	9.8	10.9	11.6
20	23.3	11.8	9.8	14.8	16.3	14.6	15.7	13.1	13.0	14.0
21	10.0	5.9	7.3	11.5	9.3	16.7	13.4	9.8	10.9	16.3
22	20.0	10.6	12.2	11.5	11.6	10.4	8.9	9.8	11.9	6.9
23	10.0	15.3	17.1	11.5	11.6	12.5	11.9	3.3	13.0	9.3
24	13.3	21.2	19.5	9.8	16.3	14.6	11.9	13.1	15.3	9.3
25	16.7	12.9	12.2	19.7	16.3	12.5	13.4	13.1	10.9	14.0
26	3.3	9.4	7.3	8.2	4.6	2.1	11.4	26.3	11.9	16.3

PE = Physical Excersice, PGC = Playing Games on Computer

Table 8: Prevalence of obesity based on parents educational status

	Male (%)				Female (%)			
	Under weight	Normal weight	Over weight	Obesity	Under weight	Normal weight	Over weight	Obesity
Father's education								
Illiterate	20.0	66.7	6.7	6.7	13.0	78.3	8.7	-
Elementary	-	88.0	12.0	-	7.4	59.3	29.6	3.7
Secondary	3.4	79.3	13.8	3.4	10.8	73.0	13.5	2.7
Tertiary	15.3	72.9	9.4	2.4	11.6	62.3	15.2	10.9
Mother's education								
Illiterate	13.6	77.3	4.5	4.5	18.2	63.6	15.2	3.0
Elementary	5.9	70.6	17.6	5.9	17.9	64.2	17.9	-
Secondary	6.4	85.1	8.5	-	5.8	69.2	19.2	5.8
Tertiary	12.7	71.4	14.3	1.6	11.2	61.7	14.9	12.1

Table 7 shows types of activities engaged in during leisure period by the respondents. A large percentage of the male involved themselves in physical exercises and sleeping while for females, larger percentage sleep and watch TV. From the table, it could be seen that more female students engage in physical exercise and reading (16.4% and 36.1% respectively) as compared with male (11.1% and 22.9% respectively). This table revealed that a large percentage of the respondents (both male and female) do not engage in physical activities especially the female. This might be one of the reasons for the high prevalence of obesity in the female. Table 8 shows that a large percentage of the male with normal weight have educated parents, only a small percentage have illiterate parents and so also for the female respondents.

Hypothesis 1 revealed significant negative correlation between age and prevalence of obesity ($r = -0.088$; $p<0.05$). Therefore, the postulated null hypothesis is rejected in favour of the alternative hypothesis. This means that age is negatively related to obesity. Hypothesis 2 revealed no significant correlation between gender and obesity ($r = -0.009$; $p>0.05$). Therefore, the postulated null hypothesis is accepted. This implies that gender is not significantly related to obesity. Prevalence of obesity is not gender sensitive. Hypothesis 3 revealed

significant composite contributions of age, gender, family background and recreational activities to the prevalence of obesity ($F_{4; 366} = 3.013$, $p<0.05$). Therefore, the postulated null hypothesis is rejected in favour of the alternative hypothesis. This implies that age, gender, family background and recreational activities significantly made joint contributions to the prevalence of obesity. Hypothesis 4 revealed that age is the most potent predictor of obesity (Beta = -0.268; $t = -2.795$; $p<0.05$); followed by gender (Beta = 0.221, $t = 2.299$; $p<0.05$) while family background and recreational activities did not significantly predict obesity.

DISCUSSION
The findings of this study indicated that the majority of students were of normal weight which is similar to a study conducted among Lebanese University students (Yahia *et al.*, 2008). Normal weight was more prevalent among females (74.8%) as compared with males (37.2%). This finding is in contrast to the study conducted on Lebanese University students and some other universities (Arroyo *et al.*, 2006; Bertsias *et al.*, 2003) who reported higher prevalence of obesity among male university students.
In a study conducted among 749 students (68% females and 32% males) recruited from the State University of

the Basque Country, prevalence rate of overweight and obesity was 25% in males compared to 13.9% in females (Arroyo *et al.*, 2006). Another study conducted among 989 medical students (527 men, 462 women) from the University of Crete reported that approximately 40% male students and 23% female students had BMI>25 kg/m^2 (Bertsias *et al.*, 2003).

High prevalence rate of overweight and obesity was also reported in a study conducted in Kuwait University among 842 students, male and female (Al-Isa, 1999), at 32% and 8.9%, respectively. In the United Arab Emirates, a cross-sectional survey conducted among 300 male students reported that the prevalence rate of obesity was 35.7% in males and this figure was higher than the rate in females (Musaiger *et al.*, 2000). According to Galore *et al.* (1993), in terms of eating habits, university students usually do not follow healthy eating habits. The typical university student diet is high in fat and low in fruits and vegetables. Students often select fast food due to its availability, palatability and convenience.

A study conducted at Midwestern University among 105 male and 181 female students, reported that 94.4% of the students agreed that it is important to eat a variety of foods for good health (Davy *et al.*, 2006). Daily intake of snacks was reported by the majority of students. The unhealthy eating habit of students was noticed in the intake of fried food (majority reported eating fried food three or four times per week). This finding was in conformity with that of this study. Frequent snacking and eating fried food can adversely affect students' health status, given the abundance of energy dense and high fat ingredients they contain.

Obesity was more common among female students than males in the studied population (10% and 4.6% respectively) in contrast to a study mentioned above where obesity and overweight was more common among males (37.5%) as compared to females (13.6%) (Arroyo *et al.*, 2006).

In both children and adults there is an association between televisions viewing time and the risk of obesity (Gortmaker *et al.*, 1996; Vioque *et al.*, 2000). A 2008 meta-analysis found that 63 of 73 studies (86%) showed an increased rate of childhood obesity with increased media exposure, with rates increasing proportionally to time spent watching television (Emmanuel, 2008). This is in consonance with the finding of this study whereby gender, (male and female) spend more time sleeping and watching television than engaging in physical activities thereby increasing risk of obesity.

The higher rate of normal weight among female students is expected since females are more cautious about their weight status than males, due to societal perception which encourages females to be slender. This assumption was supported by the fact that only 7% female students were underweight as compared to 4.3% of males in the studied sample.

Conclusion: This study revealed that age is the most potent predictor of obesity, followed by gender while family background and recreational activities did not significantly predict obesity.

Despite the low prevalence of overweight and obesity in the studied university students' sample, results indicate that university students would benefit from a nutrition and health promotion program to reduce the tendency of overweight and obesity among students, particularly females and to improve students' eating habits. This study should provide incentive for the private and public sectors to mobilize all available resources to stem the tide of increasing body mass index in university students and adults.

Recommendations: Public health strategies to prevent obesity should begin with schools and extend to the entire community. Universities should review their policies and procedures to promote healthy eating habits. A curriculum on nutrition education to promote healthy eating habits, healthy body image and weight management is essential for pre-school through high school. Improving students' knowledge about nutrition and healthy eating habits may promote healthy body weight management among students and reduce the prevalence of overweight and obesity.

Therefore, developing nutrition education programs that promote healthy eating habits for university students should be encouraged.

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