Feeding habits, Overweight, Obesity and Hypertension and Associated Factors among Polytechnic Students in Ekiti State, Southwest Nigeria

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ARTICLE INFORMATION

ABSTRACT

Overweight and obesity is a risk factor to chronic non-communicable diseases. This study assessed level of overweight/obesity and blood pressure among students of a higher institution in Southwest Nigeria. This cross-section study involved 300 students of a public higher institution in Ado-Ekiti, Southwest, Nigeria. A validated self-administered questionnaire was used to collect data on personal characteristics, feeding pattern and lifestyle of the students. Body Mass Index (BMI) was categorized into normal weight (BMI<25) and overweight/obesity (BMI ≥ 25). Waist circumference and waist-hip-ratio (WHR) were classified as normal and at risk. Hypertension was defined as systolic blood pressure (SBP) ≥ 140 mmHg and diastolic blood pressure (DBP) ≥ 90 mmHg. Chi square test was used to establish relationship between variables at 5% level of significance. The mean age of the students was 22.25 years and 62.8% were above 20years. Monthly allowance less than ₦30000.00 was received by 64.4% of the students, 47.3% skipped breakfast meal, 96% consumed carbonated soft drinks and 37.1% did not engaged in physical exercise. Prevalence of general obesity was 17.1% (BMI≥25); 7% and 15.5% were at risk of abdominal and central obesity respectively. Students in systolic pre-hypertension and stage I hypertension were 33.3% and 3% respectively whereas 15.5% and 2.4% were in diastolic pre-hypertension and stage I hypertension respectively. Female gender, monthly allowance less than ₦30000.00 and adolescent stage were associated with obesity. Older age, male gender and monthly allowance less than ₦30000.00 were associated with BP. Nutrition education is recommended for this population group.

1. Introduction

Polytechnic students are mostly adolescents and young adults. During this period, their total nutrient needs reach the highest peak and healthy eating is important to meet the increased body demands. This is a period of risk, a period when health problems with potentially serious consequences occur. This is a time when many develop important habits that are carried through into adulthood. Thus, this population group experience variety of transformations including eating behaviour and they may start skipping meals or possibly over-eat. Skipping breakfast which leads to a higher level of snacking among this population group had been observed (Olumakaiye et al., 2010). Such erratic eating habits in this population group may predispose them to nutritional risk that leads to the development of various non-communicable diseases including overweight and obesity. Lifestyle practices such as consumption of alcohol and smoking are common among these young adults (Alhaji & Alqubati, 2020; Arisa et al., 2020). A study on students of a Federal Polytechnic in Nigeria revealed that more than half of the students consumed alcohol (Agwo & Adewunmi, 2020).

Studies had implicated overweight/obesity as one of the main risk factors that predispose individuals to various chronic non-communicable diseases such as hypertension, type 2 diabetes mellitus, gallstones, respiratory system problems, sleep apnoea, cardiovascular diseases, cancer (WHO, 2003; Agwu et al., 2017). Globally, there is a rising prevalence of overweight and obesity among this population group in both developing and developed countries. Studies in Africa revealed a prevalence of 13% and 5% in Ghana (Mogre et al., 2014), 39% and 17% in Egypt (Moussa et al., 2016) and, 24% and 2% in Cameroun (Niba et al., 2017) of overweight and obesity respectively. The prevalence of overweight/obesity in Uganda and Botswana was 15% (Kolawole et al., 2017) and 36% (Tapera et al., 2017) respectively. In the

Middle East, overweight and obesity prevalence of 28% and 16% respectively was observed in Saudi Arabia (Issa, 2015). Asia statistics show a prevalence of 14% overweight/obesity in Malaysia (Gan et al., 2011; Kutty et al., 2015), 11% and 2% overweight and obesity prevalence in China (Ren et al., 2015) and in Pakistan 13% and 2% overweight and obesity prevalence respectively (Irfan, 2018). Eastern Europe has a record of 37% overweight/obesity prevalence in Mexico (Sofia et al., 2015). The results of studies in South America showed an overweight prevalence of 35% (Moretti et al., 2014) and 5% obesity prevalence (Obesidade & Obesidad, 2017) in Brazil.

Previous studies on students of higher institutions across Nigeria reveal high prevalence of overweight ranging from 4% to 40% and obesity was between 2.7% and 18% (Oghagbon et al., 2009; Ayodele et al., 2009; Aliyu et al., 2014; Oladoyinbo & Ekerette, 2015; Ukegbu et al., 2015; Attah et al., 2016; Agwu et al., 2017; Maduka et al., 2017; Okafor et al., 2018; Obasi et al., 2019). The highest prevalence of overweight was recorded in the Eastern part (Okafor et al., 2018) while the least was in the Northern part (Aliyu et al., 2014) of the country. The highest and lowest prevalence of obesity on the other hand was recorded in the Western Nigeria (Olusanya & Omotayo, 2011; Olufemi & Abiodun, 2013; Oladoyinbo & Ekerette, 2015). Recent studies on university students still showed high prevalence of overweight and obesity. A 40% prevalence of overweight/obesity was recorded among private university students in Southwest Nigeria (Kayode & Alabi, 2020) and 31% obesity prevalence was found among students of public university in Northern Nigeria (Gwarzo et al., 2020).

Studies across Nigeria and other countries among students of tertiary institutions identified predisposing factors to overweight and obesity. These include: skipping meals and consumption of unhealthy snacks (Ukegbu et al., 2017). Other factors are intakes of fibre, gender, sedentary lifestyle, older age, alcohol consumption, higher pocket money, sleeping less than 8hours in a day, and being in marriage (Aliyu et al., 2014; Moretti et al., 2014; Mogre et al., 2014; Issa, 2015; Kutty, 2015; Sofia et al., 2015; Katuka et al., 2016; Kolawole et al., 2017; Obesidade & Obesidad, 2017; Deng et al., 2017).

Recent findings of studies in Southwest region of Nigeria revealed that different level of physical activity and days of physical activity correlated with general and central obesity among university students (Sedodo et al., 2020; Arisa et al., 2020; Ikujenlola & Adekoya, 2020). Lack of physical activity was found to contribute to obesity in 86% of private university students in the region (Okondu et al., 2020). In Yemen, more than half (58%) of university students who did not involve in physical activity had overweight/obesity prevalence that was more than three times higher compared

to other students (Alhaji & Alqubati, 2020). Similarly, smokers were found to be more than two times overweight and obese compared with non-smokers.

Unhealthy feeding habit is a risk for non-communicable diseases (Abdulfatah, 2020). The study of Sedodo et al. (2020) showed that not less than 60% of polytechnic students in Abeokuta preferred fast foods to homemade meals. Two thirds of private university students in Ede, Osun State consumed snacks daily; fruits (18%) and vegetables (25%) were consumed by a small proportion of the students (Kayode & Alabi, 2020). The authors observed that vegetable intakes lower general obesity. In another study in Osun State, about half of university students consumed fruits and vegetables less than three times in a week (Ikujenlola & Adekoya, 2020). A study among university students in Lagos showed that 83% skipped meals and 75% skipped breakfast (Arisa et al., 2020). These authors found skipping of breakfast as a predictor of overweight and obesity. In a study among polytechnic students in Ogun State, 72% of the students skipped breakfast and replaced lunch with snacks (Alaba, 2018). Among Iranian university students, eating breakfast more than four days in a week lower the risk of overweight by 15% and obesity by 33% (Mansouri et al., 2018).

Hypertension is a metabolic factor that is associated with overweight and obesity. It has been observed to be higher in overweight and obese university students (Moretti et al., 2014; Issa, 2015; Moussa et al., 2016; Maduka et al., 2017; Ukegbu et al., 2017; Gyamfi, 2018). In Egypt and Ghana, more than 50% of university students were hypertensive (Moussa et al., 2016; Gyamfi et al., 2018). Studies in Nigeria among university students found hypertension to be higher in males than in females (Gwarzo et al., 2020; Ezeh & Kadiri, 2020).

Most of the previous study on overweight and obesity were on university students. There is a dearth of information on polytechnic students on this nutritional issue. Hence, this study was designed to assess the prevalence of overweight and obesity and hypertension among polytechnic students in Ado-Ekiti, southwest, Nigeria. The study will add to the existing data on the nutritional status of this population group in Nigeria. It will equally provide valuable information for nutritionists and health personnel to understand the nutritional challenge of this group and help to plan adequate intervention strategy to address nutritional problems of the group.

2. Materials and Methods

Study Design

This study was a descriptive cross-sectional design involving 300 students of Federal Polytechnic, Ado-Ekiti. Federal

Polytechnic Ado-Ekiti, Ekiti State, South West, Nigeria was established in 1977 and now has a student population of over 10,000 (full-time and part-time National Diploma and Higher National Diploma, Certificate and Professional programmes). The respondents were students of Federal Polytechnic, Ado-Ekiti. They were from the four faculties of the institution which are faculty of Business studies, faculty of Engineering, faculty of Environmental studies, Faculty of Sciences and Computer science. The students either leave on campus or off campus. Most students prepare their meals themselves or buy food from local food vendors.

Sample Size Determination

The sample size was calculated using Fisher's statistical formula. Taking a precision of 0.05 at 95% confidence interval (Z), the minimum size (N) calculate by single proportion formula based on 26.2% (Oghagbon et al., 2009) estimated prevalence of overweight was calculated thus,

$$N = \frac{Z^2 pq}{D^2}$$

Where, Z^2 = Confidence level 95%

       N = Minimum sample size

       D = Desired precision = 0.05

       p = Estimated prevalence of overweight and

         Obesity at 26.2%

       q = 1-p = 0.738

$$N = \frac{1.96^2 \times 0.262 \times 0.738}{0.05^2}$$

The minimum number of students that was used for this study was 300.

Sampling Procedures

Respondents were taken from all four faculties. There are 5 departments in Faculty of Business studies, 3 departments in faculty of Sciences and Computer science, 4 departments in Environmental sciences and 10 departments in Engineering. Seventy-five students were randomly selected from each faculty.

Instrument for Data Collection

A semi-structured interviewer-administered questionnaire was used to collect data; the questionnaire had different sections based on study objectives. A weighing scale was used to weigh the respondents. A measuring tape was used to measure the waist and hip circumferences.

Data Collection

Data collection took place in participants' classroom with a questionnaire to obtain information on their personal characteristics, feeding pattern, physical activity level and lifestyle.

Measurement of Weight

The weight of the respondents was measured using a bathroom scale (Model: H89 DK Blue, serial number 5099838000448). The bathroom scale was placed on a hard level surface. Calibration was done at regular interval of measurements to ensured quality control. Respondents were asked to remove their heavy garments and shoes and other items that may affect the weight. Reading was done to the nearest 0.5Kg

Measurement of Height

The height of the respondents was measured using a calibrated standiometer consisting of a horizontal base with a vertical tape. Each respondent was asked to remove his/her shoes, heavy garments and hair ornaments before reading was taken to the nearest 0.1cm.

The Body Mass Index was calculated using the weight (kg) and height (m); this was categorized into normal weight (BMI < 25) and overweight/obesity (BMI ≥ 25).

Measurement of Waist Circumference

Waist circumference was measured using a tape rule. The subject was asked to remove all heavy clothing around the waist (belts and other thick clothing) before the measurement was taken to ensure accuracy. The waist circumference was taken at the midpoint between the lower border of the rib cage and the iliac crest, the subject was asked to stand erect and the tape rule was wrapped round the waist from zero mark and the reading was taken to the nearest 0.1cm. The waist circumference was categorized into safe for male (<94cm) and female (<80cm) and at risk for male (≥94cm) and female (≥80cm).

Measurement of Hip Circumference

Hip circumference was measured using a tape rule. The respondents were asked to spread their arms and the tape was placed round the highest circumference of the gluteal region. Moving the tape to and fro until a highest value was read. Care was taken to prevent indenting the buttocks. The measurement was taken to the nearest 0.1cm. The hip circumference was divided by waist circumference to obtain waist-hip-ratio. The waist-hip-ratio was classified into safe for male (≤0.95) and female (≤0.80) and at risk for male (>0.95) and female (>0.80).

Blood Pressure Measurement

An electronic blood pressure monitor (Andon, model KD-595) with serial number CE 0197, was used in the measurement of the blood pressure of the respondent. Each subject was made to seat quietly for at least five minutes before reading was taken. Both the SBP and DBP were recorded. The measurement was taken twice and the average was recorded. The measured blood pressure values were classified as normal, pre-hypertension, stage I or II hypertension. Hypertension was defined as systolic blood pressure (SBP) ≥ 140 mmHg and diastolic blood pressure (DBP) ≥ 90 mmHg.

Inclusion and Exclusion Criteria

Students who were pregnant, on medication, pursuing certificate courses and professional courses and those that were physically challenged were not included in the study.

Ethical Consideration

Approval for the study was obtained from the Ethical Research Committee of Afe Babalola University, Ado-Ekiti, Nigeria. The consent of the respondents was taken verbally. They gave their approval to be assessed and measured. To ensure confidentiality, their names were not mentioned on the questionnaire.

Data Analysis

Data entry and analysis was done using Statistical Package for the Social Sciences (SPSS) software version 20.0. Data cleaning was done by running frequencies of all relevant variables to identify inadequate entries and missing values. Descriptive statistics was generated; categorical variables were presented using frequencies and percentages. Chi-square analysis was done to establish relationship between variables at 5% level of significance.

3. Results and Discussion

Personal Characteristics of the Respondents

The personal characteristics of the respondents are presented in Table 1. A total of 300 respondents were sampled with 56·7% males and 43·3% females. The mean age was 22.25±3.30 and more than half (62.8%) were above 20 years. Respondents were majorly (90.6%) Yoruba and about half of the respondents' fathers (47.5%) and mothers (48.1%) had tertiary education. More (42.8%) respondents collected a monthly allowance of less than ₦20,000, and 30.1% collected above ₦40,000.

Table 1: Personal characteristics of respondents

Characteristics	N	(%)
Age		
15-20	107	37.2
21 and above	181	62.8
Total	288	
Mean	22.25±3.303	
Ethnicity		
Hausa	1	0.3
Igbo	8	2.7
Yoruba	271	90.6
Others	19	6.4
Total	299	
Religion		
Christianity	266	89.3
Islam	30	10.1
Others	2	0.7
Total	298	
Faculty		
Business studies	79	26.4
Engineering	74	24.7
Computer science and sciences	79	26.4
Environmental sciences	67	22.4
Total	299	
Level		
OND 1	147	49.2
OND 2	26	8.7
HND 1	40	13.4
HND 2	86	28.8
Total	299	
Educational level of mother		
None	15	5.1
Primary	36	12.1
Secondary	103	34.7
Tertiary	143	48.1
Total	297	
Educational level of father		
None	20	6.8
Primary	36	12.2
Secondary	99	33.6
Tertiary	140	47.5
Total	295	
Monthly allowance		
Less than ₦20,000	115	42.8
₦20,000-₦29,000	58	21.6
₦30,000-₦39,000	15	5.6
Above ₦40,000	81	30.1
Total	269	

Respondents' Feeding Pattern and Lifestyle

The feeding pattern and lifestyle of the respondents are presented in Table 2 with 48.2% of the respondents eating three times daily and 43.4% eating less than three times daily; 74.9% skipped meals. Nearly half (47.3%) of the respondents skipped breakfast and 59.5% had their breakfast 7 days a week. Lifestyle of respondents revealed that alcohol was consumed by 24.1% of the respondents and 96.0% of them consumed carbonated soft drink with 19.6% consuming it daily. More than one third (37.1%) of the students did not engage in physical exercise and a total of 12.7% engaged in physical exercise more than three days in the past one week.

Weight Status and Blood Pressure of Respondents

The mean BMI of the students was 22.35±3.36 with 82.9% having BMI below 25 and 17.1% had BMI of 25 and above. Figure 1 shows that 82% of males and 66% of females had normal weight, The prevalence of overweight and obesity was higher among females (18% and 5%) compared to males (12% and 1%). The mean waist circumference was 73.84±7.08. Figure 2 presents the waist circumference of the respondents. Only female (7.0%) respondents were at risk. The mean waist-hip-ratio was 0.80±0.05. Figure 3 presents the waist-hip-ratio of respondents. Only female (15.5%) respondents were at risk. The mean systolic BP was 115.33±13.19 and 63.3% of the students were normal, 33.3% were in pre-hypertension stage and 3.0% were in stage I hypertension. The mean diastolic BP was 72.88±0.05 with 81.8%, 15.5% and 2.4 of the students in normal, pre-hypertension and stage I hypertension respectively. Figure 4 presents the blood pressure of the respondents. Majority (67.2%F, 47.9%M) of the respondents were of normal blood pressure. Pre-hypertensive respondents were higher in male (46.7%) than female (30.5%). Respondents at stage I hypertension were higher in male (4.7%) than female (1.6%).
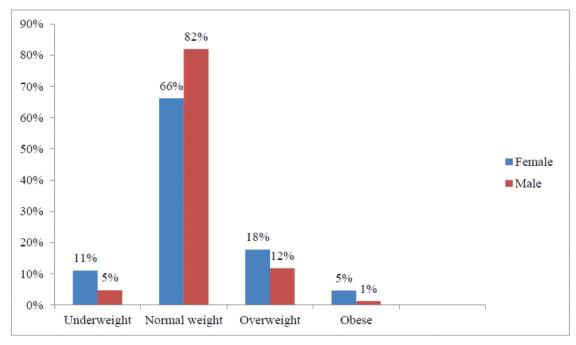
Association of Anthropometry Indicators with Other Variables

Table 3 shows the body mass index (BMI) according to personal characteristics of respondents. Among the respondents with BMI ≥ 25, 67.3% were above 20years and more than half (56.9%) were females. Overall, 69.7% of the students that received less than ₦30,000.00 as monthly allowance were overweight or obese.

The waist circumference (Table 4) shows that more females (100.0%) than males (0.0%) were at risk of abdominal obesity. Overall, students that received monthly allowance of less than ₦30,000.00 (77.8%) were at risk
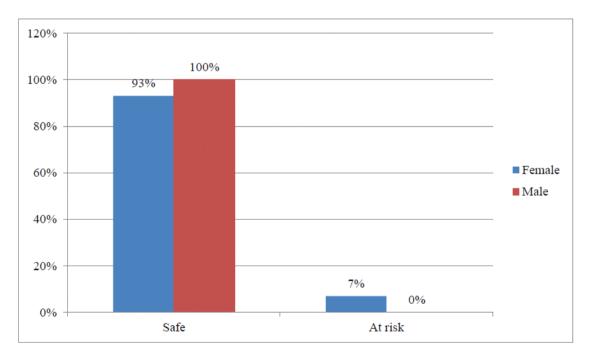
Table 2: Feeding pattern and lifestyle of respondents

Meal	n	%
Number of meals per day		
<3	130	43.4
3	144	48.2
>3	25	8.4
Total	299	
Skipping meals		
Yes	224	74.9
No	75	25.1
Total	299	
Meal skipped		
Breakfast	112	47.3
Lunch	116	48.9
Dinner	9	3.8
Total	237	
Consumption of Breakfast per week		
0-2	42	14.5
3-4	75	25.9
5-7	172	59.5
Total	289	
Lifestyle		
Alcohol consumption		
Yes	72	24.1
No	227	75.9
Total	299	
Smoking		
Yes	10	3.3
No	289	96.7
Total	299	
Carbonated drinks consumption		
Yes	285	96.0
No	12	4.0
Total	297	
Days of exercise per week		
None	111	37.1
1 day	57	19.1
2-3 days	86	28.8
4-5 days	22	7.4
More than 5 days	23	7.7
Total	299	
Days of physical exercise in the past one week		
None	127	42.5
1day	55	18.4
2-3 days	79	26.4
4-5 days	15	5.0
More than 5 days	23	7.7
Total	299	

p=0.055

Figure 1: BMI distribution of respondents

P=0.000

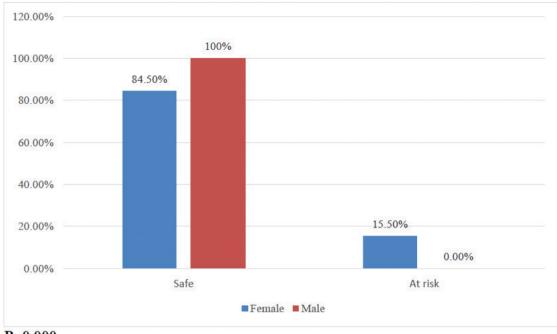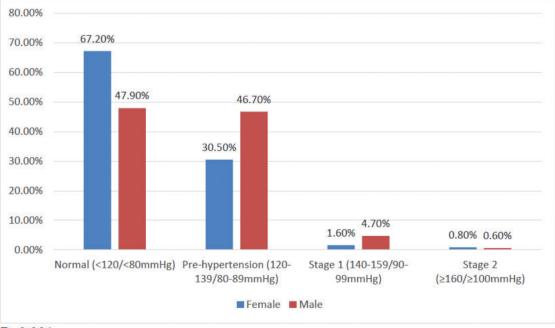**Figure 2:** Waist circumference of respondents

P=0.000

Figure 3: Waist-Hip-Ratio of respondents

P=0.001

Figure 4: Blood pressure of respondents

Table 3: BMI according to personal characteristics

Characteristics	< 25 n (%)	≥25 n(%)	Total n (%)	X²	p-value
Age					
15 – 20	91 (38.2)	16 (32.7)	107 (37.3)	0.542	0.100
21 and above	147 (61.8)	33 (67.3)	180 (62.7)		
Gender					
Female	101 (40.7)	29 (56.9)	130 (43.5)	4.482	0.013
Male	147 (59.3)	22 (43.1)	169 (56.5)		
Level					
OND 1	124 (50.2)	23 (45.1)	147 (49.3)	1.092	0.041
OND 2	20 (8.1)	6 (11.8)	26 (8.7)		
HND 1	33 (13.4)	6 (11.8)	39 (13.1)		
HND 2	70 (28.3)	16 (31.4)	86 (28.9)		
Monthly allowance (₦)					
Less than 20,000	98 (43.6)	17 (39.5)	115 (42.9)	2.277	0.049
20,000-29,000	45 (20.0)	13 (30.2)	58 (21.6)		
30,000-39,000	13 (5.8)	2 (4.7)	15 (5.6)		
Above 40,000	69 (30.7)	11 (25.6)			

P < 0.05

of abdominal obesity. The waist-to-hip ratio (Table 4) reveals that students ≤ 20 years (63.2%) were at risk of central obesity and it was higher in females (100.0%) than males (0.0%) and in students that were receiving monthly allowance <₦30,000.00 (64.7%).

Blood Pressure According to Personal Characteristics

Table 5 shows systolic and diastolic blood pressure according to personal characteristics. For systolic blood pressure, students aged ≥20 years were at pre-hypertensive stage (67.4%) and stage I hypertension (77.8%). More males were at pre-hypertensive stage (71.7%) and stage I hypertension (88.9%). Overall, more respondents with monthly allowance <₦30,000.00 were at pre-hypertensive stage (65.5%) and stage I hypertension (71.5%). For diastolic blood pressure, more students ≥ 20years were at diastolic pre-hypertensive stage (72.1%) and stage I hypertension (100.0%). More males were at pre-hypertensive stage (56.5%) and stage I hypertension (57.1%). Overall, more respondents with monthly allowance <₦30,000.00 were at pre-hypertensive stage (76.2%) and stage I hypertension (71.5%). In addition, greater proportion of overweight/obese students compare to normal weight students were in pre-hypertension (56.9% versus 36.2%) and stage I hypertension (5.9% versus 2.8%).

Discussion

In this study, the prevalence of overweight and obesity was assessed using BMI, waist circumference and waist-hip-ratio as parameters; its association with certain personal characteristics was investigated. Feeding habits and blood pressure were also assessed. The study reveals the occurrence of overweight and obesity among the study population.

Feeding Habits

The study shows that many of the students had inadequate feeding habits. More than one third of them consumed less than three meals in a day, although this result was higher than the finding of Ukegbu et al. (2017) which was 34% and lower than 60.7% of undergraduate students in Cameroun (Niba et al., 2017) and 83% Lagos State University students in Southwest, Nigeria (Arisa et al., 2020). A large proportion of the students skipped meals and breakfast was the frequently skipped meal with about half of them. This was lower than the finding of Adesola et al. (2014) with

Table 4: Waist circumference and waist-hip-ratio according to personal characteristics

Characteristics	Safe n (%)	At risk n (%)	Total n (%)	X²	p-value
Waist circumference					
Age					
15- 20	103 (37.1)	4 (50.0)	107 (34.4)	0.557	0.212
21 and above	175 (62.9)	4 (50.0)	179 (62.6)		
Gender					
Female	120 (41.5)	9 (100.0)	129 (43.3)	12.158	0.000
Male	169 (58.5)	0 (0.0)	169 (56.7)		
Level					
OND 1	142 (49.3)	5 (55.6)	147 (49.5)	2.912	0.098
OND 2	26 (9.0)	0 (0.0)	26 (8.8)		
HND 1	39 (13.5)	0 (0.0)	39 (13.1)		
HND 2	81 (28.1)	4 (44.4)	85 (28.6)		
Monthly allowance (₦)					
<20,000	110 (42.6)	5 (55.6)	115 (43.1)	1.032	0.081
20,000-29,000	56 (21.7)	2 (22.2)	58 (21.7)		
30,000-39,000	15 (5.8)	0 (0.0)	15 (5.6)		
Above 40,000	77 (29.8)	2 (22.2)	79 (29.6)		
Waist-hip-ratio					
Age					
15- 20 years	95 (35.6)	12 (63.2)	107 (37.4)	5.761	0.012
21 years and above	172 (64.4)	7 (36.8)	179 (62.6)		
Gender					
Female	109 (39.2)	20 (100.0)	129 (43.3)	28.087	0.000
Male	169 (60.8)	0 (0.0)	169 (56.7)		
Level					
OND 1	135 (48.7)	12 (60.0)	147 (49.5)	1.694	0.048
OND 2	24 (8.7)	2 (10.0)	26 (8.8)		
HND 1	38 (13.7)	1 (5.0)	39 (13.1)		
HND 2	80 (28.9)	5 (25.0)	85 (28.6)		
Monthly allowance (₦)					
<20,000	107 (42.8)	8 (47.1)	115 (43.1)	1.426	0.077
20,000-29,000	55 (22.0)	3 (17.6)	58 (21.7)		
30,000-39,000	15 (6.0)	0 (0.0)	15 (5.6)		
Above 40,000	73 (29.2)	6 (35.3)	79 (29.6)		

$P < 0.05$

52% of undergraduates in Ekiti State and 57% in Malaysian university students (Kutty et al., 2015) and higher compared to the previous results in Nigeria which were between 33% (Nmor et al., 2014) and 41.5% (Ukegbu et al., 2015) and other countries which ranged between 23% and 42% (Gan et al., 2011; Bernardo et al., 2017; Niba et al., 2017). Breakfast is the most important meal of the day and it has been associated with overweight and obesity (Niba et al., 2017; Arisa et al., 2020). Regular skipping of breakfast may open door for excessive consumption of calories in terms

Table 5: Blood pressure according to socio-demographic characteristics

Variables	Normal <120	pre-hypertension 120-139	Stage 1 140-159	Stage 2 ≥ 160	X^2	p-value
Systolic Age						
15-20	74 (40.9)	31 (32.6)	2 (22.2)	0 (0.0)	3.344	0.017
21and above	107 (59.1)	64 (67.4)	7 (77.8)	1 (100)		
Gender						
Female	98 (52.1)	28 (28.3)	1 (11.1)	1 (100)	20.186	0.000
Male	90 (47.9)	71 (71.7)	8 (88.9)	0 (0.0)		
Level						
OND 1	97 (51.9)	47 (47.5)	1 (11.1)	1 (100.0)	13.903	0.007
OND 2	19 (10.2)	7 (7.1)	0 (0.00)	0 (0.00)		
HND 1	19 (10.2)	18 (18.2)	2 (22.2)	0 (0.00)		
HND	252 (27.8)	27 (27.3)	6 (66.7)	0 (0.00)		
Monthly allowance (₦)						
<20,000	75 (44.4)	37 (41.1)	3(42.9)	0 (0.00)	6.568	0.034
20,000-29,000	33 (19.5)	22 (24.4)	2 (28.6)	1 (100.0)		
30,000-39,000	12 (7.1)	3 (3.3)	0 (0.0)	0 (0.0)		
Above 40,000	49 (29.0)	28 (31.1)	2 (28.6)	0 (0.0)		
Diastolic Age						
15-20	95 (40.6)	12 (27.9)	0 (0.0)	0 (0.0)		
21 and above	139 (59.4)	31 (72.1)	7 (100.0)	1 (100.0)	7.443	0.002
Gender						
Female	104 (43.0)	20 (43.5)	3 (42.9)	0 (0.0)		
Male	138 (57.0)	26 (56.5)	4 (57.1)	1 (100.0)	0.758	0.093
Level						
OND 1	122 (50.6)	22 (47.8)	1 (14.3)	0 (0.0)		
OND 2	20 (8.3)	6 (13.0)	0 (0.0)	0 (0.0)		
HND 1	33 (13.7)	4 (8.7)	2 (28.6)	0 (0.0)	10.111	0.007
HND 2	66 (27.4)	14 (30.4)	4 (57.1)	1 (100.0)		
Monthly allowance (₦)						
<20,000	95 (44.0)	18 (42.9)	2 (28.6)	0 (0.0)		
20,000-29,000	39 (18.1)	14 (33.3)	3 (42.9)	1 (100.0)		
30,000-39,000	14 (6.5)	1 (2.4)	0 (0.0)	0 (0.0)	12.127	0.029
Above 40,000	68 (31.5)	9 (21.4)	2 (28.6)	0 (0.0)		

$P < 0.05$

of snacking and over consumption of food which may lay the foundation of overweight and obesity (Okafor et al., 2018). The skipping of meals by these students might be due to economic reason whereby two third of them received monthly allowance below ₦30,000.00

Lifestyle

Most of the students consumed carbonated drinks and this was higher than 69% recorded in Umudike (Ukegbu et al., 2015) and 67% among private university students in Ogun State, Nigeria (Okondu et al., 2020). One fifth of the students consumed carbonated drinks on daily basis. This result was lower compared to 29% obtained among university students in Lagos, Nigeria (Olatona, 2018). Increasing intake of carbonated drinks along with other junk foods had been observed to lead to inadequate nutrient intake and increasing prevalence of overweight and obesity (Ukegbu et al., 2015; Mohammadbeigi et al., 2018; Bakar et al., 2020).

Physical Activity

More than one thirds of the students did not engaged in physical activity at all and this was comparable to the result on Egyptian students with 37% (Moussa et al., 2016) but lower than 67% to 92% recorded for previous studies in Nigeria (Ayodele et al., 2009; Maduka et al., 2017) and 39% to 54% in America (Katuka et al., 2016; Deng et al., 2017). Not engaging in physical exercise and decrease in physical activity have been associated with high central obesity among university students in Ghana (Mogre et al., 2014) and general obesity in Mexico (Sofia et al., 2015) and in USA (Katuka et al., 2016) and Yemen (Alhaj & Alqubaty, 2020). Overweight and obese students (73%) have been found not to meet physical activity level in USA (Oh et al., 2016).

Overweight and Obesity

The prevalence of general overweight and obesity measured by BMI was below one fifth, this was in line with other studies in Nigeria (Ayodele et al., 2009; Olusanya & Omotayo, 2011; Olufemi & Abiodun, 2013; Nmor et al., 2014; Odili et al., 2014; Bagi et al., 2017; Ukegbu et al., 2017; Maduka et al., 2017) and other African countries (Kolawole et al., 2017; Deng et al., 2017) and Asia (Kutty et al., 2015; Ren et al., 2015; Irfan, 2018). It was lower than other Nigerian studies which ranged from 20% to 60% (Adesola et al., 2014; Oladoyinbo & Ekerette, 2015; Agwu et al., 2017; The GBD 2015 Obesity Collaborators, 2017;

Sedodo et al., 2020; Kayode & Alabi, 2020) and other countries in Africa (Moussa et al., 2016; Niba et al., 2017), Asia (Davar, 2015), America (Katuka et al., 2016; Deng et al., 2017) and Europe (Sofia et al., 2015). The findings of Alhaj & Alqubaty (2020) among private university students in Yemen show a higher prevalence.

Factors found to be associated with general overweight and obesity include gender, age and monthly allowance. It was higher in females than males. This finding was similar to the previous studies on Nigerian university students (Ayodele et al., 2009; Aliyu et al., 2014; Odili et al., 2014; Oladoyinbo & Ekerette, 2015; Attah et al., 2016; Ukegbu et al., 2017; Eze & Kadiri, 2020), Africa (Mogre et al., 2014a; Mogre et al., 2014b; Moussa et al., 2016, Niba et al., 2017) and other continent (Davar, 2015). It was contrary to the findings of some other studies in Nigeria (Nwachukwu et al., 2010; Olusanya & Omotayo, 2011; Nmor et al., 2014; Ukegbu et al., 2017), Asia (Gan et al., 2011; Hujova, 2013; Kutty et al., 2015; Ren et al., 2015; Irfan, 2018), America (Moretti et al., 2014; Obesidade & Obesidad, 2017; Deng et al., 2017) and Europe (Sofia et al., 2015) where general obesity was higher in males than females. It was also in contrast to the findings of Alhaj & Alqubaty (2020) in Yemen. It was higher in older students (above 20 years) than adolescents (Issa, 2015). It was higher among students that received monthly allowance less than ₦30,000.00. This was in contrast to Moretti et al. (2014); Kolawole et al. (2017); Obesidade & Obesidad (2017) where students with higher monthly allowance were more obese compare to those with lower monthly allowance.

There was low risk of abdominal obesity measured by waist circumference. This finding was lower than Ukegbu et al. (2017) with 15%. More females and students that received less than ₦30,000.00 monthly allowance were at risk. This was in agreement with previous studies in Nigeria (Ayodele et al., 2009; Odili et al., 2014; Oladoyinbo & Ekerette, 2015; Attah et al., 2016; Ukegbu et al., 2017) and contrary to Davar (2015).

Less than one tenth of the students were at risk of central obesity which was measured by waist-hip-ratio. This result was lower than Ukegbu et al. (2017) and Gyamfi et al. (2018). Risk of central obesity was higher in students less than 20years, females and those that received monthly allowance less than ₦30,000.00. This outcome validated the findings of Odili et al. (2014), Attah et al. (2016) and Ukegbu et al. (2017), and ran contrary to that of Gan et al. (2011) where more males were at risk. Females have the tendency to accumulate fat than males and in Africa, being fatty is associated with beauty and affluence (Ukegbu et al., 2017). The high level of overweight/ obesity among these students was probably due to feeding pattern with skipping of meals and consumption of carbonated drinks coupled

with low level of physical activity. Physical inactivity was found to contribute to obesity in 86% of university students in Southwest Nigeria (Okondu et al., 2020). In addition, students that received low monthly income might settle for less expensive foods which are majorly calorie dense foods leading to excessive weight gain. If overweight and obesity prevalence is not checked among this population group, it can be a risk factor for the development of non-communicable diseases later in life.

Blood Pressure

One third of the students were at systolic pre-hypertension stage and this was higher than the result of Olatona et al. (2018) of 8%. Less than 5% of the students were at stage I hypertension and the finding was similar to that of Olatona et al. (2018). Less than one fifth of the students were in pre-hypertension which was higher than the outcome of Olatona et al. (2018) in Nigeria. Less than 5% were in stage I hypertension which was similar to 2.8% obtained by Olatona et al. (2018) and lower than 5.3% of Okafor et al. (2018) on Nigerian students. Both systolic and diastolic pre-hypertension and stage I hypertension were higher in males than females, this result was similar to the results of previous studies (Ukegbu et al., 2017; Maduka et al., 2017; Alhawari et al., 2018; Agwo & Adewumi, 2020; Gwarzo et al., 2020; Eze & Kadiri, 2020). Elevated BP was more prevalence among students that received low monthly allowance and those that were overweight/obese. These findings were in agreement with those of Aliyu et al. (2014), Maduka et al. (2017); Ukegbu et al. (2017) in Nigeria and other countries (Gyamfi et al., 2018). Hence, there is need to put in place measures that will prevent excessive weight gain among these students.

Conclusion and Recommendation

The prevalence of overweight and obesity was evident among the study participants. There was high incidence of skipping breakfast, consumption of carbonated drinks, less engagement in physical activity and higher BP among overweight/obese students. Health promotion education with emphasis on adequate feeding habits and involving in physical activity is therefore recommended for the students of higher institution in the study area.

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