Breakfast Consumption and Body Mass Index of Undergraduate Students of Human Nutrition and Dietetics, Lead City University, Ibadan, Oyo State, Nigeria

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ABSTRACT

Background: Increased body weight is one of the detrimental health effects of skipping breakfast.

Objective: This study examined breakfast consumption and body mass index (BMI) of students in the Human Nutrition and Dietetics Department, Lead City University Ibadan, Oyo State, Nigeria.

Methods: This cross-sectional study involved one hundred (100) undergraduate students. The students were selected randomly and a proportionate method was used to calculate the number of students selected at each level. A semi-structured questionnaire was used to collect data from the eligible respondents. Data were analyzed using SPSS version 23.0 for descriptives such as frequencies, percentages, mean, and standard deviations and Chi-square was used to determine the relationship at $p<0.05$

Results: The mean age of the undergraduate students was 21.5 ± 2.8 years. More than half (53.0%) of the students did not consume breakfast on a daily basis. Ready-to-eat foods (27.0%) were the most commonly consumed breakfast foods. Although more than half of the students were of normal weight status (58.0%), the prevalence of overweight was high (22.0%). Chi-square test results showed that there was a significant relationship between breakfast consumption and BMI ($x^2 = 44.282$, $p = 0.000$). Overweight (22.0%) and obesity (8.0%) were higher among undergraduate students who skipped breakfast than those who did not.

Conclusion: Consumption of breakfast has a significant influence on the nutritional status of undergraduate students. It is important, therefore, to develop policies within institutions that will provide an avenue for breakfast consumption among university students.

INTRODUCTION

Obesity is a major health concern, particularly among children and adolescents. The prevalence of overweight and obese among children and adolescents is progressively increasing worldwide, , over 18% of children and adolescents (5-19 years) were overweight or obese in 2016 [1]. It is estimated that by 2030, over half (57.8%) of the world's population will be overweight [2]. Overweight and obesity previously considered to be a problem in high-income countries are becoming increasingly prevalent in the urban regions, of low- and middle-income countries [1]. In Africa, the trends are increasing. In 2014, 13% and 39% of adults (≥18 years) were obese and overweight, respectively [3]. The WHO analysis projects that by 2023, in 10 high-burden African countries, the prevalence of obesity will range between 13.6 and 31% among adults, and 5 - 16.5% among children and adolescents [4]. In Nigeria, the prevalence of overweight and obesity between 2001 and 2012 ranged from 20.3-35.1% and 8.1-22.2%, respectively [5]. Body Mass Index (BMI) is a metric used to assess overweight and obesity. It is the easiest and most commonly accepted primary measure of body mass although it is not the most accurate measurement for excess fat [6]. It is calculated using the ratio of an individual's

weight (Kg) and square of the height (meters) [1]. The World Health Organization (WHO) defines overweight as Body Mass Index (BMI) >25 kg/m2 and obesity >30 kg/m2.

Breakfast is a crucial meal in the day according to published statements by international agencies, national governments, and non-governmental groups [7]. Having sufficient and appropriate food at the start of the day qualifies breakfast as the most important meal of day [8]. Skipping breakfast is becoming fashionable, especially among adolescents [9] but has a detrimental impact on body mass index [10]. Breakfast is a crucial dietary component for regulating energy levels and has a substantial impact on body weight [11]. Increased body weight is one of the numerous detrimental health effects of skipping breakfast [3] as studies have shown that skipping breakfast is correlated with increased BMI and poor nutrition in adults [12-16]. However, some reviews argue that the relationship between breakfast frequency and adiposity remains inconclusive and results from a number of experimental studies compared with cross-sectional studies remain inconsistent [17-20]. Additionally, studies link breakfast eating to adolescents' physical and mental health. Students who ate breakfast were less likely to experience emotional stress, and they also had better attendance and grades. On the other side, skipping breakfast has been linked to negative effects on cognition, psychosocial function, attendance at school, and mood in both young adults and children [21, 22]. University students are known for an unhealthy lifestyle which includes poor dietary patterns which could be a result of moving away from home, and low income among other factors [23]. It is therefore imperative to assess the breakfast consumption pattern and its effect on the BMI status of university students.

MATERIALS AND METHODS
Study design and location
This was a cross-sectional study carried out at the Department of Human Nutrition and Dietetics, Lead City University, Ibadan, Oyo State, Nigeria. Lead City University is a private university in Ibadan, Oyo State, Nigeria. The university was established in 2005 by the Eduserve Consult.

Sampling size determination
The study population comprised of undergraduate students of the Department of Human Nutrition and Dietetics. A proportionate sampling method was used to calculate the number of students that were recruited from each level

Total Population of undergraduate students = 174

Sample size
$$= \frac{\text{Number of students in each level} \times 100}{\text{Total population size}}$$

100 level = (30/174) × 100 = 17.2 = 17 students
200 level = (57/174) × 100 = 32.7 = 33 students
300 level = (58/174) × 100 = 33.3 = 33 students
400 level = (29/174) × 100 = 16.7 = 17 students
                                              100 students

Therefore, one hundred students were recruited for the study.

Data Collection methods
A semi-structured interview administered questionnaire was used to obtain data from each respondent (student). Students who were unwilling to participate were exempted from the study. The questionnaire obtained information on the socio-demographic, and breakfast consumption. Anthropometric measurements of height and weight were carried out to determine the BMI of the respondents.

Weight: A portable calibrated digital weighing scale was used to measure the body weight of undergraduate students to the nearest 0.1kg. the students wore light clothes and were without shoes, wrist watches, and phones.

Height: A calibrated stadiometer made up of a sliding headboard and a based food plate was used to measure the heights of each student to the nearest 0.1m.

Body Mass Index (BMI): The BMI was determined and categorized based on WHO standards

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height (m}^2)}$$

Data Analysis
Data analysis was carried out using IBM Statistical Package for Social Sciences (SPSS) Version 23.0. Descriptive statistics was used to analyze the socio-demographic characteristics of the students. Chi-square test was used to elucidate the association between BMI and breakfast consumption with the level of significance set at 5%.

Ethical Considerations
Approval for the study was obtained from the Lead City University Ethics Review Committee with ethical review number LCU/ERB/21/019. Verbal informed

consent was obtained from each student willing to participate in the study. Students were informed that all information given would be kept confidential and would be used only for this research.

RESULTS
Demographic characteristics and anthropometric parameters of respondents
Table 1 presents the demographic characteristics and anthropometric parameters of respondents . The mean age of students was 21.5 ± 2.8 years with the majority between 15-25 years (93.0%) and females (89.0%). The majority of the students were in 200 and 300 levels (33.0%) each while 17% were in 100 and 400 levels, respectively.

Breakfast consumption pattern of respondents
Table 2 shows the breakfast consumption habits of respondents. Almost half (47.0%) of the students usually skip breakfast mostly due to lack of time (22.0%) and not feeling hungry early in the morning (14.0%). The majority of those who consumed breakfast preferred ready-to-eat foods (27.0%) such as bread and margarine, tea or beverage, breakfast cereals. while very few (6.0%) consumed locally available foods such as rice and stew, moin-moin, pap, akara. More than half of those who consumed breakfast ate between 8 and 0 am (54.0%) and mostly at home (62.0%). Most of the students reported that the consumption of breakfast energizes them (15.0%), helps them to stay healthy (15.0%), and increases their concentration (10.0%) while lack of breakfast made them feel tired (14.0%) and headache (12.0%), although some of the students reported feeling active (10.0%) even when they skipped breakfast.

**Table1. Demographic characteristics and anthropometric parameters of respondents**

Variables	Frequency	Percentage
Mean age	21.5 ± 2.8	
Age (years)		
15 – 25	93	93.0
26 – 31	7	7.0
Gender		
Male	11	11.0
Female	89	89.0
Level of study		
100	17	17.0
200	33	33.0
300	33	33.0
400	17	17.0
Body Mass Index (BMI) (kg/m^2)		
Underweight (<18.5)	12	12.0
Normal weight (18.5-24.9)	58	58.0
Overweight (25.0-29.9)	22	22.0
Obese (≥30.0)	8	8.0

Table 2. Breakfast consumption pattern of respondents

Variables	Frequency	Percentage
Breakfast consumption every morning before going to school		
Yes	47	47.0
No	53	53.0
Reasons for skipping breakfast		
Lack of money	7	7.0
Lack of food at home	2	2.0
Stress of cooking	5	5.0
Lack of time	22	22.0
Usually not hungry	14	14.0
Watching weight	0	0.0
My family does not take breakfast	1	1.0
Stomach ache	1	1.0
School	1	1.0
Commonly consumed breakfast foods		
Locally available foods	6	4.0
Ready-to-eat foods (Bread and mayonnaise, butter, or beverages)	27	27.0
Snacks and soft drinks	5	5.0
Fast Foods (Restaurants)	5	5.0
Easy to prepare foods (e.g., Noodles)	4	4.0
Frequency of breakfast consumption per week		
Sometimes (1-3 days)	37	37.0
Often (4-6 days)	41	41.0
Daily	22	22.0
Time for breakfast consumption		
8:00 am – 10:00 am	54	54.0
10:00 am – 12:00 noon	46	46.0
Place of breakfast consumption		
At home	62	62.0
Inside the bus	6	6.0
At school	32	32.0
Health benefits of consuming breakfast		
Helps me to be healthy	15	15.0
Helps me to pay attention	10	10.0
Gives me energy	15	15.0
Helps me to be in the right frame of mind	6	6.0
Makes me feel sleepy	1	1.0
Lack of breakfast makes me feel		
Tired/Fatigue	14	14.0
Active	10	10.0
Hungry	8	8.0
Lack of concentration	9	9.0
Headache/stomach ache	12	12.0

Ready-to-eat foods: foods that do not require any form of cooking

Easy-to-prepare: foods that require less than 15 minutes to prepare
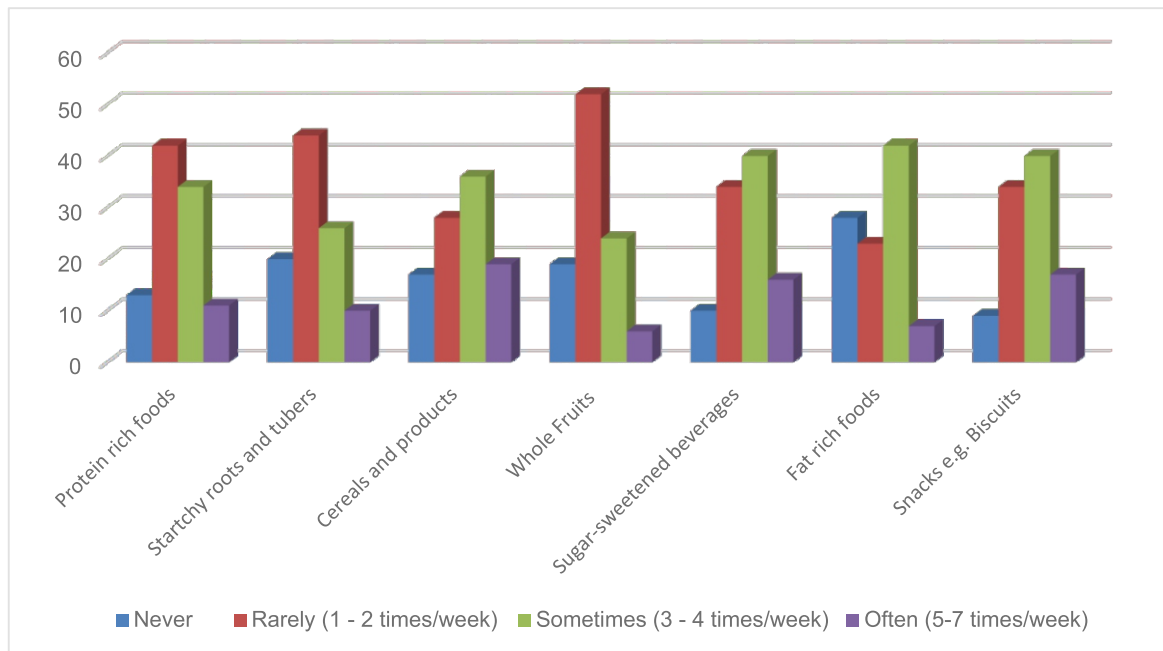
Figure 1: Respondents' food frequency consumption

Respondent's food frequency consumption

The frequency of food consumption among the students is shown in Figure 1 below. The results showed that most of the students rarely (1 -2 times per week) consume protein-rich foods (42.0%), starchy roots and tubers (44.0%), and fruits (52.0%), while cereals (36.0% and 19.0%), sugar-sweetened beverages (40.0% and 16.0%), fat-rich foods (42.0% and 7%) and biscuits (40.0% and 17.0%) were frequently consumed.

Relationship between breakfast consumption and Body Mass Index (BMI)

Table 3 reveals the relationship between breakfast consumption and the BMI of the respondents. There was a significant relationship between breakfast consumption and the BMI of the students. Overweight (22.0%) and obesity (8.0%) were higher among undergraduate students who skipped breakfast (p=0.000) compared to those who did not skip breakfast.

DISCUSSION

This study examined the association between breakfast consumption and body mass index among students of Human Nutrition and Dietetics, Lead City of University, Ibadan, Oyo State, Nigeria. Findings from this study showed that the mean age of the students was 21.5 ± 2.8 years which supports previous findings that undergraduate students are mostly late adolescents and young adults between 17 and 25 years [24-27].

The majority of the undergraduate students in this study were females with few male students. This is consistent with the finding by Otemuyiwa et al. [24] but different from the finding by Arisa et al. [27] where the majority were male students. This disparity in the demographic category may be connected to the fact that the vast majority of the students who were enrolled into the Department of Human

Table 3. Relationship between breakfast consumption and BMI of respondents

Breakfast consumption	Body mass index (kg/m^2)				x^2	p
	Underweight (<18.5)	Normal weight (18.5-24.9)	Overweight (25.0-29.9)	Obesity (≥30)		
Yes	12(12.0)	35(35.0)	0(0.0)	0(0.0)		
No	-0(0.0)	23(23.0)	22(22.0)	8(8.0)	44.282	0.000*

Nutrition and Dietetics were females. Since there were relatively few male students, the program was considered to be one of the female-dominated courses. This also agrees with the findings by Mahmoud et al. [28] in Egypt among female Nursing students.

With respect to BMI categorization of undergraduate students, more than half of the students fell into the category of normal weight, while more than twenty percent were overweight. The prevalence of overweight among these undergraduate students was quite alarming. It implied that one out of every five of the students was above the typical weight status that was expected of them. This finding is consistent with previous results among undergraduate students in a private university in Nigeria [29]. These findings also agreed with previous findings among university undergraduate students in public universities in Nigeria where more than twenty percent of the undergraduate students were reported to be overweight, especially the females [24, 30].

According to the findings of this study, fewer than half of the undergraduate students consumed breakfast each morning before heading to school which suggests that more than fifty percent of the undergraduate students miss breakfast on a daily basis. Several studies have reported skipping breakfast as a prevalent practice among university students around the world hence could be regarded as a common habit among these demographic groups [31-33]. Lack of time and not feeling hungry were the major reasons for skipping breakfast among these undergraduate students, although insufficient feeding allowance and busy schedules were some of the major reasons reported in previous studies [26]. Lack of time or a busy schedule, waking up late, and disliking eating early in the morning have also been reported as reasons for skipping breakfast among university students [34,35]. University students are typically in a rush to get to their classes, and in many instances, they may have a lot of assignments that need to be turned in by certain dates. Thus, their daily routines are frequently disrupted, which, in turn, affects how much time they have for breakfast in the morning. Breakfast is often skipped by university students since they are in such a rush to get to their early morning classes; as a result, the majority of them need to make a concerted effort to ensure that they are able to consume breakfast. Skipping breakfast is associated with an increased danger of non-communicable illnesses including diabetes mellitus, psychological disorders, cancer, and cardiovascular diseases [36-39].

Although the undergraduate students in this study were majoring in Human Nutrition and Dietetics, their food consumption pattern showed that cereals, sugar-sweetened beverages, and biscuits were common components of the undergraduate students' dietary intake. Less than thirty percent of students, or approximately two out of ten students, consumed fruits three to four times each week, while one student out of every ten students consumed fruits five to seven times in an average week. This result is consistent with previous findings that reported that undergraduate students mostly consumed cereals and refined carbohydrates such as biscuits, doughnuts, and cakes more than three times per week [22,23]. These findings, therefore, showed that the majority of the meals consumed by university students were those that provided them with high amounts of kilocalories. This could be one of the factors that contributed to the high rate of overweight among these students. High intake of sugar-sweetened beverages and high-fat foods have been associated with overweight and obesity [40, 41]. In spite of the fact that they were Humann Nutrition and Dietetics students, , they were found to have a low consumption of fruits, which demonstrates that knowledge does not necessarily translate into practice in all situations.

The relationship between breakfast consumption and BMI among undergraduate students showed that there was a significant relationship between breakfast consumption and BMI. In contrast, a previous study among undergraduate students in Ekiti State, Nigeria reported that there was no significant relationship between skipping breakfast and BMI [26]. In agreement with this study, a significant association between meal skipping and BMI has been reported among undergraduate medical students in India [42]. The majority of those who skipped breakfast in this study were overweight and obese.

CONCLUSION

Over half of the respondents in this study skipped breakfast before going to school and a little above a fifth were overweight. BMI was also significantly associated with skipping breakfast. Effective nutrition education programme focused on the benefit of breakfast consumption among students in tertiary institution is therefore imperative. Ready-to-eat breakfast can also be made available to students in their cafeterias at affordable prices to encourage breakfast consumption.

A limitation of this study is that based on the

selection of a particular department in the university and the number of students assessed, the results of this study cannot be generalized to represent the whole university community.

Competing interests
The authors declare that there is no competing interest in this study.

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