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PREVALENCE OF OBESITY AND AWARENESS OF DIABETES AMONG STUDENTS OF ACHIEVERS UNIVERSITY, OWO, ONDO STATE, NIGERIA

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ABSTRACT

The level of awareness and knowledge regarding the disease among the population helps a community manage it properly both on the prevention and management front. It is essential to evaluate and update the knowledge, education, and awareness of obesity related-diabetes, especially among students in Achievers University Owo Ondo, State, In order to avoid the obesity complications and health problems of diabetes. The aim of this study is to investigate the prevalence of obesity and awareness of diabetes among students of Achievers University Owo Ondo State. The study employed a descriptive cross-sectional research design. A multistage sampling technique was used to select a sample size of 190 among students of Achievers university, in Owo , Ondo State. . Descriptive and inferential statistics were used in analysing data and the results were presented in frequency tables and charts. The study showed that the mean age of the students, was 21.47 ± 2.74 years and the highest (49.5%) age category was 20-24 years. Around half (53.2%) of respondents had a high level of knowledge on the relationship between obesity and diabetes; none of the students was obese; around half (53.2%) of the participants had good dietary lifestyle; and the vast majority (83.2%) had good health status. participants' age and gender were associated with BMI category and dietary lifestyle. participants are not obese and the awareness and knowledge on the relationship between obesity and diabetes among the study population was high. More efforts should be made to increase the awareness about obesity and diabetes among university students.

Keywords: Awareness, Dietary lifestyle, Diabetes, , Knowledge, Obesity.

Introduction

Obesity is the condition in which excess body fat has accumulated to the extent that it may lead to an adverse effect on human health (Alharbi *et al*., 2022). It can occur as the result of an interaction between, behaviour, environment, and genetic factors (Genc & Yigitbas, 2021). Data from the third national health and nutrient examination survey showed that the rate of obesity is 31% in men and 33.2% in women and its prevalence continues to be rising at alarming rates (Moalif *et al*., 2021). Therefore, obesity has become a public health concern for both developed and developing countries (Rotich *et al*., 2023). Hence, it is urgent to make effective and decisive actions to hinder the rise in the prevalence and its incidence. It is important and necessary to prevent and treat obesity and other obesity-related comorbidities, among which type 2 diabetes mellitus (T2DM) is a health issue growing at an alarming speed in all regions as another global health emergency of the 21st-century (International Diabetes Federation [IDF], 2022).

The booming increase in the prevalence of obesity in all age groups is one of the main culprits of the exponential growth of the population of T2DM (IDF, 2022). The steady increase in the prevalence of overweight and obesity in African countries like Nigeria is not lower than that observed in developed countries of the world (Templin *et al.,* 2019). Studies among university students in Sub-Saharan African (SSA) countries show a high prevalence of obesity. For example; an obesity prevalence of 25.3% -59.4% has been reported among university students in Egypt, 36.8% in Botswana, 10.8% - 24% in South Africa and 10% in Nigeria (Rotich *et al*., 2023). The public health importance of obesity lies in its associated risk of cardiovascular disease (CVD), type-2 diabetes, and some forms of cancers, the major non-communicable diseases (Chukwuonye *et al*., 2022).

According to the World Health Organization (WHO), 2.8 million people die annually due to obesity-related complications, majorly CVDs (WHO, 2018). The burden of heart disease, type-2 diabetes, and cancer attributable to overweight and obesity is 44%, 23% and 41%, respectively (WHO, 2020). The rising trend in obesity and its related CVDs in developing countries is due to urbanization and adoption of unhealthy lifestyles characterized by increased consumption of processed/fast foods, sedentary lifestyle, and stress (Okafor, 2017; Kumah *et al*., 2020). University students are more likely to consume processed/fast foods rich in sugar, salt, refined carbohydrates, and fat- factors that favour the development of obesity (Mujallid *et al*., 2021). Evidence shows that the highest percentages of college students who consume fast foods are in the obese group (Shah *et al*., 2019).

A study revealed that university students consume more calories from eating fast food, which results in obesity and consequently diabetes (Mujallid *et al*., 2021). Busy college schedules and activities, examination and assignments related pressure and the peer pressure to socialize results in consumption of easily accessible junk foods, a major risk factor for obesity (Abraham *et al.,* 2018). The widely available fast-food restaurants and advertising media in urban places influence people's food choices, particularly college students (Shah *et al.,* 2019). Targeting Universities students may provide an opportunity to reach out to a large number of young adults through education intervention programs that may positively influence students' behavioral/lifestyle habits (Yahia *et al*., 2018).

Statement of Problem

For decades, the number of overweight and obese persons has been on the increase, a trend that shows no signs of slowing down (Yang *et al.,* 2020). Overweight and obesity affect more than 1.9 billion persons worldwide, 38 million children under the age of five, and more

than 340 million children and adolescents aged 5 to 19 years (Rivers *et al*., 2018). Obesity is linked to a higher risk of chronic diseases such as hypertension, type 2 diabetes, heart disease, stroke, gallbladder disease, and breast, prostate, and colon cancer (Yang *et al.,* 2020). Due to their sedentary lifestyle, lack of exercise, disordered eating habits due to a lack of leisure time, increased stress, and wide topics to learn, university students are more prone to obesity (Alharbi *et al*., 2022).

As a result, students are at risk for issues associated with obesity, such as hypertension, dyslipidaemia, and impaired glucose tolerance. However, despite the dangers, obesity is frequently overlooked (Thomas *et al*. 2019). Dealing with chronic diseases like obesity and its associated complications, various aspects need proper attention like health knowledge, the importance of regular exercise, taking a balanced diet and avoiding junk foods and above all creating a healthy atmosphere in the society so that each individual realize ones' responsibility to keep himself and his family members in optimal healthy state (American Diabetes Association, 2019).

The level of awareness and knowledge regarding the disease among the population helps a community manage it properly both on the prevention and management. It is essential to evaluate and update the knowledge, education and awareness of the diabetes especially among university students, because in future they are going to avoid the obesity complications and health problem of diabetes (Gillani, *et al*., 2018; Saraswathi, *et al* 2019). It is against this background this study seeks to investigate the prevalence of obesity and awareness of Diabetes among students of Achievers University Owo, Ondo State.

Specific Objectives of the Study

The specific objectives of the study are:

1. To determine the prevalence of Obesity among students in Achievers University Owo Ondo, State.
2. To examine the Dietary lifestyle among students of Achievers University Owo Ondo, State.
3. To determine the health implications associated with Obesity among students Achievers University Owo Ondo, State.

Research Questions

This study will provide answers to the following questions:

1. What is the prevalence of obesity among students in Achievers University Owo Ondo, State?
2. What are the dietary lifestyles among students in Achievers University Owo Ondo, State?
3. What are the health implications associated with obesity among students in Achievers University Owo Ondo, State?

Hypotheses

1. There is no significant association between age and prevalence of obesity among students in Achievers University Owo Ondo, State.
2. There is no significant association between gender and prevalence of obesity among students in Achievers University Owo Ondo, State.
3. There is no significant association between age and dietary lifestyle among students in Achievers University Owo Ondo, State.
4. There is no significant association between gender and dietary lifestyle among students in Achievers University Owo Ondo, State.
5. There is no significant association between dietary lifestyle and prevalence of obesity among students in Achievers University Owo Ondo, State.

Review of Literature

Family History and Lifestyle

Family history, lifestyle, and psychological factors all function in propensity for obesity. The likelihood of becoming obese can be affected by nature and nurture, enhanced by family genetics (propensity to accumulate fat) or life style (poor dietary or exercise habits) (Romero-Ibarguengoitia *et al*., 2018; Fitzgerald *et al*., 2019). A child with one obese parent has a three times risk to become obese as an adult, while when a child's parents are both obese, this child has a 10-fold risk of future obesity. A cross-sectional observational study of 260 children (139 female, 121 males, aged 2.4 and 17.2 years) demonstrated that the family history of cardiometabolic diseases and obesity are critical risk factors for severity of obesity in childhood (Corica *et al,* 2018).

A prospective survey of 3148 school boys (aged six to ten years) in Ariana highlighted several child obesity risk factors, including parental obesity of parents, the snacks between meals especially after the dinner, lack of sleep (< 8 hours), and daily consumption of juice, sparkling drink, sweets, and sugary foods (Ben Slama *et al*., 2022). Two studies of mother-child pairs in the United States found that the healthy lifestyle of mothers during the childhood and adolescence of their offspring was closely associated with a significantly reduced risk of obesity in their children (Dhana *et al*., 2018). These results underscore the benefits of intervening at the family- or parental-level to reduce the risk of obesity in children (Dhana *et al*., 2018). However, parents are not the sole instigators of childhood obesity. For example, in the United States, physical education was used as a regular part of a public education curriculum (Mulligan *et al.,* 2020).

Starting 2011 physical education programs were curtailed such that 25 percent of students could achieve four out of five the national standards of at least 225 minutes weekly at the senior school levels and at least 150 minutes weekly at the primary level (Beets *et al.,* 2020). Other factors that may have resulted in the decline of physical activity in children include increasing time spent on video game consoles and mobile devices at a reduction of time spent actively or outdoors. It is hard to argue against technological progress, but based on these studies, such innovations may be taking a toll on children's health (Salam *et al*., 2020).

Genetic Factors and Causes

The studies from family and twin studies showed that around 40-70% of the obesity variation in human are resulted from genetic factors (Wu *et al.,* 2018). While during the last 20 years, environmental alterations have increased obesity rates, the genetic factors play key roles in development of obesity (Kasuga, 2020). Genome-Wide Association Scans (GWAS) approaches have identified over 400 genes associated with T2DM (Chen *et al.,* 2019; Srinivasan *et al*., 2021), however, these genes only predict 5% of obesity risk (Bogardus, 2019). The low predictive power may be due to the situation that gene-gene, gene-environment, and epigenetic interactions have not been thoroughly identified using the current methods based on population genetics (Wang et al., 2018). Many obesity -associated genes have been identified to be involved in energy homeostasis regulating pathways.

Genetic causes of obesity can be broadly classified as: 1) monogenic causes that result from a single gene mutation, primarily located in the leptin- melanocortin pathway. Many of the genes, such as AgRP (Agouti-related peptide), PYY (orexogenic), or MC4R (the melanocortin-4 receptor), were identified for monogenic obesity disrupt the regulatory system of appetite and weight, hormonal signals (ghrelin, leptin, insulin) are sensed by the receptors located in the arcuate nucleus of the hypothalamus (Thaker, 2017). 2) Syndromic obesity were severe obesity

results from neurodevelopmental abnormalities and other organ/system malformations. This may be caused by alterations in a single gene or a larger chromosomal region encompassing several genes (Huvenne *et al*., 2016). 3) Polygenic obesity is caused by cumulative contribution of many genes. Further, some people with obesity gain excess weight due to the multiple genes they have, and these genes make them to favour food and thereby have a higher caloric intake (Czajkowski *et al*., 2020).

The presence of these types of genes can cause increased caloric intake, increased hunger levels, reduced control overeating, reduced satiety, increased tendency to store body fat, and increased tendency to be sedentary (Koochakpour *et al*., 2019). Rare single-gene defects are associated with high level of hunger and can cause dramatic obesity in young children. Those individuals with severe obesity developed before two years old should consult obesity medicine specialists and consider to be involved in screening for MC4R Deficiency, leptin deficiency, and POMC deficiency (Martins *et al*., 2018). Leptin deficiency can cause diet induced obesity and metabolic dysregulation. About 50% of female with polymorphism came up with binge eating (Yupanqui-Lozno *et al*., 2019).

The MC4R polymorphism influences the release of ghrelin (Magno *et al.,* 2020). The chromosome 2p22 (a region encompassing the POMC gene) has been identified as the site of gene(s) affecting obesity and obesity-related traits (Yu *et al*., 2020). These studies suggest that childhood obesity should be considered in the light of both environmental context and genetic heritage (Cuncha *et al.,* 2018). There are several genetic, neuroendocrine, and chromosomal precursors that can result in obesity. PWS (Prader-Willi Syndrome) is a neurodevelopmental disorder with hypothalamic dysfunction, due to the deficiency of imprinted genes (Gupta *et al*., 2017). Endocrine disorders such as PCOS (Polycystic Ovary Syndrome) can also lead to increased body fat (Cena *et al*., 2020). Chromosomal defects can lead to obesity, including deletion of 16p11.2, 2q37 (brachydactyly mental retardation syndrome; BDMR), 1p36 (monosomy 1p36 syndrome), 9q34 (Kleefstra syndrome), 6q16 (PWS-like syndrome), 17p11.2 (Smith Magenis syndrome; SMS), and 11p13 (WAGR syndrome) (D'Angelo & Koiffmann, 2017). These conditions rely on the conventional current health recommendations that energy imbalance between calories consumed and expended is the key cause of obesity and present circumstances under which traditional weight management methods may not help.

Mechanism Connecting Obesity and Type 2 Diabetes (T2DM)

The pathogenesis of T2DM is characterized by the inflammatory component inducing progressive loss of β-cell insulin secretion with co-existing insulin resistance (American Diabetic Association [ADA], 2019), impacting early b-cell function and cell fate (Eizirik *et al*., 2020), where overweight and obesity are deemed the most effective “accelerator” (Versini *et al*., 2019). Many patients with obesity can go through a transitional stage called “Prediabetes” before eventually developing hyperglycaemia, which refers to the scenario when the glucose levels are not high enough for a T2DM diagnosis while the normal carbohydrate metabolism is compromised (ADA, 2022). Despite not being a clinical entity but rather an omen prompting possible intervention and other comprehensive screening for T2DM and cardiovascular risk factors, prediabetes has a solid link to obesity (particularly abdominal or visceral obesity), hyperlipidemia, and hypertension (ADA, 2022).

In patients with T2DM, genetic signals mainly regulate β-cell development and function (Eizirik *et al*., 2020; McCarthy, 2020). Numerous GWAS confirmed that the variants markedly affect islet regulatory elements in the heritability of T2DM, and a large part of the association lies in the dysregulation of β-cell development and insulin secretion rather than disruption of

insulin action on tissues (Eizirik *et al*., 2020). In addition, a decline in the transcript encoding insulin in β-cells of patients with T2DM was also shown by single-cell RNA sequencing (Segerstolpe *et al*., 2016). Environmental factors and hyperglycemia contribute to epigenetic changes in DNA and histones, modulating gene expression in organs implicated in the pathogenesis and progression of T2DM and β-cell function (Keating & El-Osta, 2018). Obesity leads to insulin resistance and may even result in earlyb-cell failure in some individuals who develop T2DM, and none of the drugs available is convincingly capable of preventing the gradual decline of β-cell function over time (Eizirik *et al*., 2020).

Higher maternal BMI before pregnancy, greater calorie intake, more significant gestational weight gain, and maternal hyperglycaemia are closely related to childhood obesity and T2DM. More importantly, maternal hyperglycaemia and gestational DM are associated with precursors of T2DM (e.g., insulin resistance) in offspring, further indicating a powerful effect of maternal hyperglycaemia on pancreatic β-cell development and function (Perng *et al*., 2019). Later in adulthood, the aging-associated decline in the b-cell responsiveness to carbohydrates partly explains the growing glucose intolerance with aging (Broughton & Taylor, 2021). As an effective therapeutic option for both obesity and DM, bariatric surgeries are beneficial far beyond contributing to weight loss but also recovering islet function by reversing metabolic disorders and normalizing the levels of glucagon-like peptide 1 (GLP-1) and peptide YY (PYY) (Chen *et al*., 2019).

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Methodology

This chapter discusses the research methods which include the research design, study setting, target population, sampling technique, ethical consideration and instrument for data collection, validity and reliability of the instrument, method of data collection and method of data analysis. This study adopted a descriptive cross-sectional research design to investigate the prevalence of obesity related Diabetes among women of reproductive age in Owo local government area of, Ondo State. Owo Local Government Area (LGA) is one of the 18 LGAs in Ondo State, Nigeria. Owo which is the head-quarter of the LGA was created in 1976 from the

former Akoko South Local Government and falls within the Ondo Central Senitorial District. Owo Local Government has 12 political wards (I, Owo ward 1, Owo ward2, Owo ward3, Igboroko ward4, Elerewe ward5, Uso ward6, Isuada ward7, Avila ward8, Oke-ogun ward9, Oke oja ward10, Ipele ward 11, Ijebu owo ward12). Demography; the population is approximately 220,000 people (according to the 2006 census)

Inclusion Criteria

i. Women age 15-49 years
ii. Residents of Owo LGA
iii. Willingness to participate

Exclusion Criteria

i. Pregnant women
ii. Women with known diabetes or obesity

The sample size was calculated using the Fisher's formula:

$N_o = Z^2\ pq\ /\ e^2$

Where: N_o is the desired sample size; Z is the standard deviation at desired degree of accuracy; e is the desired level of precision (margin of error); p is the (estimated) proportion of the population; q is 1-p.

Let the value of p = 0.85, q = 0.15, e = 0.05, Z = 1.96

$N_o = (1.96)^2\ (0.85)\ (0.15)\ /\ (0.05)^2$

$N_o = 195.92$

Therefore, the sample size for this study was 196 women

This study used a multistage sampling technique to select the participants who served as the respondents for the study The questionnaire for data collection was self-administered. The process of data collection took place within a timeframe of four weeks. The questionnaires were administered to one hundred and ninety six (196) students of Achievers University as calculated in the sample size determination. Each respondent should fill the questionnaire within 3-5 minutes. A cover letter to respondents was added to ensure prospective respondents are well informed of the purpose of the research exercise and also the confidentiality of the respondents in participating in the study. The questionnaires was administered and collected after the respondents had filled them. The validity of the research instrument was determined using face and content validity technique. The researcher's supervisor and other experts in the field of statistics were critically evaluate the instrument for appropriate design of the question to guarantee coherence towards the objectives. The reliability of the instrument was determined using test-retest method. The researcher tested the instrument on thirty-nine students who do not form part of the final respondent that was used for this study. The reliability co-efficient of the instrument was determined using internal consistency method.

Data generated from the study was sorted out and analysed using Statistical Package for Social Sciences (IBM SPSS version 26) software for both descriptive and inferential statistical analysis. Descriptive statistics of percentage and frequency was used to present the summary tables for relevant variables. Bar and pie charts were equally used to present part of the results. Furthermore, Chi-square test of association was be used to determine the associations between respondents' age, gender and prevalence of diabetes and dietary lifestyle; as well as the association between dietary lifestyle and prevalence of diabetes. The level of significance was be set at $p \leq 0.05$.

Ethical Consideration

i. Health Research Ethics Approval Committee Assigned No. NHREC/18/08/2016

ii. Protocol No OSHREC 19/04/2024/65
iii. Informed Consent
iv. Confidentiality
v. Voluntary Participation

Results

This chapter presents the analysis of results gathered through the research questionnaire. A total of one hundred and ninety-six (196) copies of questionnaires were distributed and one hundred and ninety (190) recovered, giving a return of 96.9%. Results from the data collected and analysed were presented under the following headings:

Socio-demographic Characteristics of Respondents

Table 1: Distribution of Respondents Socio-demographic Characteristics (n= 190)

Variables	Categories	Frequency	Percentage
Age (years) (Mean= 21.47 ± 2.74)	15-19	64	33.7
	20-24	94	49.5
	25 and above	32	16.8
	TOTAL	190	100
Gender	Male	71	37.4
	Female	119	62.6
	TOTAL	190	100
Marital status	Single	181	95.3
	Married	09	4.70
	TOTAL	190	100
Ethnicity	Yoruba	139	73.2
	Igbo	25	13.2
	Hausa	04	2.10
	Others	22	11.6
	TOTAL	190	100
Religion	Christianity	126	66.3
	Islam	64	33.7
	Traditional	00	00
	TOTAL	190	100

Table 1 presents socio-demographic characteristics of respondents; it could be observed the mean age of the respondents was 21.47 ± 2.74 years with 94(49.5%) of respondents within age 20-24 years. Of the respondents, 119(62.6%) were female while 71(37.4%) were male, 181(95.3%) of were married, 139(73.2%) were from Yoruba tribe and 126(66.3%) were Christians. Forty-eight (25.3%) of respondents were in 400 academic level, 48(25.3%) of them were from College of Basic Health Sciences, 97(51.1%) of them received between #30,000 to #50,000 as average monthly allowance, and 152(80.0%) of them had no family history of obesity.

Prevalence of obesity among respondents

Table 2 presents the description of respondents' weight, height and Body Mass Index (BMI); it could be observed that the minimum, maximum and mean weight of the respondents were 45.0kg, 90.0kg and 61.19 ± 10.63kg respectively. The minimum, maximum and mean height of the respondents was 1.30m, 1.96m and 1.66 ± 0.14m respectively. The minimum, maximum and mean BMI of the respondents were 16.6kg/m^2, 31.20kg/m^2, 22.65 ± 2.79kg/m^2 respectively. Table 4.3.2 presents the distribution of the respondents' BMI categories; it could be

observed that 15(7.90%) of respondents were underweight, 146(76.8%) had normal weight, while 29(15.3%) of them were overweight.

Table 2: Description of Respondents' Weight, Height and Body Mass Index (BMI)

Variables	Minimum	Maximum	Mean ± SD
Weight (kg)	45.0	90.0	61.19 ± 10.63
Height (m)	1.30	1.96	1.66 ± 0.14
BMI (kg/m^2)	16.60	28.20	22.65 ± 2.79

Testing of Hypotheses

Hypothesis One:

There is no significant association between age and prevalence of obesity among students in Achievers University Owo Ondo, State

Table 3: Chi-square Test of Association between Age and Prevalence of Obesity (good)

Age category	Prevalence of obesity				χ^2	p-value
	Underweight	Normal	Overweight			
	f(%)	f(%)	f(%)	Total		
15-19	10(15.6)	43(67.2)	11(17.2)	64(33.7)	12.495	0.014
20-24	5(5.30)	84(89.4)	5(5.30)	94(49.5)		
25 and above	00	19(59.4)	13(40.6)	32(16.8)		
Total	15(7.90)	146(76.8)	29(15.3)	190(100)		

Table 3 presents the result of the chi-square test of association between age and prevalence of obesity; it could be observed that there was a significant association between age and BMI categories of respondents (χ^2=12.495, p=0.014). The null hypothesis is hereby rejected and the alternate hypothesis accepted. Therefore, there is a significant association between age and prevalence of obesity among students in Achievers University Owo Ondo, State.

Hypothesis Two:

There is no significant association between gender and prevalence of obesity among students in Achievers University Owo Ondo, State

Table 4: Chi-square Test of Association Between Gender and Prevalence of Obesity

Gender	Prevalence of obesity				χ^2	p-value
	Underweight	Normal	Overweight			
	f(%)	f(%)	f(%)	Total		
Male	04(5.60)	54(76.1)	13(18.3)	71(37.4)	2.208	0.331
Female	11(9.20)	92(77.3)	16(13.4)	119(62.6)		
Total	15(7.90)	146(76.8)	29(15.3)	190(100)		

Hypothesis Three:

There is no significant association between age and dietary among students in Achievers University Owo Ondo, State

Table 5: Chi-square Test of Association between Age and Dietary Lifestyle

Age category	Dietary Lifestyle			χ^2	p-value
	Good	Poor			
	f(%)	f(%)	Total		
15-19	37(57.8)	27(42.2)	64(33.7)	1.818	0.403
20-24	54(57.4)	40(42.6)	94(49.5)		
25 and above	10(31.1)	22(68.9)	32(16.8)		
Total	101(53.2)	89(46.8)	190(100)		

Table 5 presents the result of the chi-square test of association between age and dietary lifestyle; it could be observed that there was no significant association between age and dietary lifestyle of respondents (χ^2=1.818, p=0.403). The null hypothesis is hereby accepted and the alternate hypothesis rejected. Therefore, there is no significant association between age and dietary lifestyle among students in Achievers University Owo Ondo, State.

Hypothesis Four:

There is no significant association between gender and dietary among students in Achievers University Owo Ondo, State

Table 6: Chi-square Test of Association between Gender and Dietary Lifestyle

Gender	**Dietary Lifestyle**			χ^2	**p-value**
	Good	Poor			
	f(%)	f(%)	**Total**		
Male	53(74.6)	18(15.4)	71(37.4)	3.519	0.061
Female	48(40.3)	71(59.7)	119(62.6)		
Total	101(53.2)	89(46.8)	190(100)		

Table 6 presents the result of the chi-square test of association between gender and dietary lifestyle; it could be observed that there was no significant association between gender and dietary lifestyle of respondents (χ^2=3.519, p=0.061). The null hypothesis is hereby accepted and the alternate hypothesis rejected. Therefore, there is no significant association between gender and dietary lifestyle among students in Achievers University Owo Ondo, State.

Hypothesis Five

There is no significant association between dietary lifestyle and prevalence of obesity among students in Achievers University Owo Ondo, State

Table 7: Chi-Square Test of Association between Dietary Lifestyle and Prevalence of Obesity

Dietary lifestyle	**Prevalence of obesity**				χ^2	**p-value**
	Underweight	Normal	Overweight			
	f(%)	f(%)	f(%)	**Total**		
Good	13(12.9)	82(81.2)	6(5.90)	101(53.2)	0.594	0.743
Poor	2(2.20)	64(71.9)	23(25.8)	89(46.8)		
Total	15(7.90)	146(76.8)	29(15.3)	190(100)		

Table 7 presents the result of the chi-square test of association between dietary lifestyle and prevalence of obesity; it could be observed that there was no significant association between dietary lifestyle and BMI categories of respondents (χ^2=0.594, p=0.743). The null hypothesis is hereby accepted and the alternate hypothesis rejected. Therefore, there is no significant association between dietary lifestyle and prevalence of obesity among students in Achievers University Owo Ondo, State.

Discussion of Findings

This chapter presents the discussion of findings, implications to public health, conclusion, and recommendations.

The study revealed that the mean age of the students was 21.47 ± 2.74 years and the highest age category was 20-24 years. This age distribution is in line with that of a study conducted by Alharbi *et al*., (2022) where majority of respondents were within age 20-24 years. The mean age in this current study is also in agreement with what was found in a Turkish study

where the mean age of college student was found to be 21.07 ± 2.03 years (Genc & Yigitbaz, 2021). More than half of the students were female. Equally, majority of the respondents in a similar study conducted in Nairobi Kenya were female (Rotich *et al*., 2023). Virtually all the students were married. Vast majority of respondents were from Yoruba tribe; this is a typical representation of the major tribe in the southwestern Nigeria where the study setting is located. Two-third of the respondents were Christians. A quarter of the respondents were in 400 academic level and from the College of Basic Health Sciences. This result corroborates that of Köksoy (2021) who also claimed that most of his respondents were studying health sciences courses. Half of the respondents received between #30,000 to #50,000 as average monthly allowance. Almost all of the respondents had no family history of obesity and this result is in consonance with what was found in a similar study conducted in Saudi Arabia where larger proportion of undergraduate students had no family history of obesity (Alharbi *et al*., 2022).

The result of this study revealed that 76.8% of the students had normal weight, very few of them were underweight, while some of them were overweight. This result supports Omage and Omuemu (2018) in a study among undergraduate students in a private university in southern Nigeria where over two thirds of the respondents had normal BMI, minority were overweight, and very few were underweight. Alharbi *et al*., (2022) in a cross-sectional study among Qassim University medical students in Saudi Arabia also showed that some of their respondents were overweight. Equally, Moalif *et al.,* (2021) also recorded a significant proportion of overweight among college students in Iraq. The current result however, differ from that of Rotich *et al*., (2023) in a study among undergraduate students at a private university, Nairobi, Kenya which revealed that the prevalence of general and abdominal obesity was high.

This study showed that one-third of the students took breakfast daily. This result is in consonance with that of Olatona *et al.,* (2018) in a similar study conducted among a university undergraduate population where only a quarter the population consumed breakfast daily. More than a quarter of the students currently studied took snacks as often as possible per day which uphold what was revealed in another study where majority of students in a private university in southern Nigeria ate snacks (Omage & Omuemu, 2018). Overall, slightly above half of the students in the present study had good dietary lifestyle while significant proportion of them had poor dietary lifestyle. The result supports Omage and Omuemu (2018) who also showed that around half of their respondents had high dietary diversity score. The current finding on the other hand negates that of Hassan *et al*., (2020) who found among university students in Selangor, Malaysia that vast majority of the population were practicing unhealthy eating habit.

This study showed that there was a significant association between age and BMI categories of respondents (p=0.014) with larger proportion of students in age 20-24 years having nor al BMI compared to other age categories. This result corroborates Alharbi *et al*., (2022) and Köksoy (2021) who also reported a significant association between age of undergraduate students and BMI category. This result negates an earlier assertion that age ≥ 20 years is a risk factors of general obesity (Rotich *et al*., 2023). The result showed that there was no significant association between gender and BMI categories of respondents (p=0.331); this finding is not in tandem with what has been established by previous studies that gender was significantly associated with BMI distribution of students with rate of overweight and obesity higher in female (Genc & Yigitbas, 2021; Moalif *et al.,* 2021). This study further showed that there was no significant association between age and dietary lifestyle of respondents (p= 0.403). Omage & Omuemu (2018) published a negating result that age was significantly associated with dietary lifestyle of undergraduate students. Though, good dietary lifestyle was common among male

students, there was no significant association between gender and dietary lifestyle of students (p= 0.061); and the result is not in agreement with that of Omage & Omuemu (2018) who found a contradicting result. Surprisingly, this study revealed that there was no significant association between dietary lifestyle and prevalence of obesity among students (p= 0.743). this result contradicts a general understanding of the significant and causal relationship between dietary lifestyle and prevalence of obesity measure in BMI (Genc and Yigitbas 2021; Köksoy 2021; Moalif *et al.,* 2021; Alharbi *et al*., 2022).

Conclusion

The study concluded that undergraduate students in Achievers University are not obese and the awareness and knowledge on the relationship between obesity and diabetes among the study population was high. Likewise, average students in the institution had good dietary lifestyle. Being male and between age 20-24 favoured normal BMI and good dietary lifestyle among the studied population.

Recommendations

Based on the research findings, the following recommendations were made:

1. More efforts should be made to increase the public health awareness about obesity and diabetes among university students
2. University authorities should focus on behavioural intervention to mitigate the burden of obesity among university students which can be achieved through promoting intervention programmes that lead to changing the built environment, counselling, and behavioural-lifestyle modification of students
3. A robust and enthusiastic engagement between healthcare professionals working in university setting and students is needed for the realization of effective promotion of health and prevention of obesity and diabetes.
4. University authorities should ensure adequate facilities are in place for leisure activities that help students to work on their weight and give close monitoring to their overall health.
5. It is important for all stakeholders to encourage students to imbibe in good health and dietary lifestyle practices to prevent them from diseases associated with unhealthy behaviours.

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