Anthropometric Indices of Undergraduate Students of Edo State University, Uzairue, Edo State

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ABSTRACT

Background: The adoption of unhealthy dietary habits has been reported in adolescents who are predominantly in tertiary educational institutions. This has an implication in the aetiology of obesity, a major risk factor of chronic metabolic diseases.

Objective: This study was conducted to determine anthropometric indices of undergraduates of Edo State University, Uzairue, Edo State, Nigeria

Methods: Four hundred undergraduate students of Edo State University, Uzairue aged between 16 and 22 years participated in this cross-sectional descriptive study. Three hundred and sixteen participants completed age and anthropometric indices while 301 participants responded to questions on diet. Eighty-four questionnaires were incompletely filled. Additionally, anthropometric indices including, body weight and height were obtained using standard methods while body mass index was calculated

Results: Individuals with normal BMI accounted for the highest percentage (63.9%) of study participants. No significant difference was observed in the anthropometric indices between male and female participants. A higher percentage of participants consumed dairy products; female (64%) and male (80%). A similar observation was made regarding egg consumption; female (55%) and male (70%). Conversely, a lesser percentage consumed organ meat; female (26%) and male (40%).

Conclusion: It appears the dietary pattern of study participants may not adversely affect the anthropometric indices of study participants.

Keywords: nutritional assessment, undergraduates, fruits, dairy products, egg consumption

Introduction

Anthropometric indices are non invasive tools which are indicators for risk identification and intervention. They are also of significance in assessing nutritional status (Piqueras et al., 2021) [1].

Body mass index calculated from body weight and height is a universal indicator for the diagnosis of obesity. Different cut off ranges have been set to classify individuals using the BMI. Individuals in the range 18.5-24.9 kg/m^2 are considered normal, individuals in the range 25-29.9 kg/m^2 are considered overweight, while values above 30 kg/m^2 are considered obese.

Obesity is a global health challenge and a major risk factor of chronic non communicable diseases including hypertension, type 2 diabetes mellitus and cancer among others. A replacement of traditional diets rich in micronutrients and dietary fiber with western diet which are mainly processed, sedentary lifestyle, binge eating have significantly contributed to the increase in the prevalence of obesity, particularly in the third world countries [2].

The prevalence of obesity in children and

adolescents has been reported to be on the rise [3]. The teenage-adulthood transition phase of life is critical in terms of habits already developed that could have implications on the quality of life later in life [4]. A lot of young people are often affected by this dietary transition. The independence of young people usually predisposes them to poor dietary choices which are usually due to paucity of knowledge, available resources, accessibility to unhealthy foods and a change of environment [5]. The poor dietary choices eventually develop into poor dietary habits which increases their risk of chronic diseases in adulthood.

In spite of the studies carried out on anthropometric indices amongst Nigerian students, there is however paucity of information on the anthropometric indices of University undergraduates in Etsako West Local Government Area of Edo State. Therefore, this study was designed to determine the anthropometric indices of undergraduate students of Edo State University, Uzairue, Edo State, Nigeria

MATERIALS AND METHODS

Study design and Study Participants
Four hundred (400) undergraduates of Edo State University, Uzairue aged between 16 and 22 years participated in this cross-sectional descriptive study. Convenience sampling was used in recruiting study participants. Information on dietary pattern and socio-demographic indices were obtained from administered pre-test questionnaire. Three hundred and sixteen (316) participants; male (125) and females (191) completed age and anthropometric indices while 301 of these participants responded to questions

on diet. In all, 84 questionnaires were incompletely filled.

Informed consent was obtained from the participants after the details of the study were explained to them before recruitment into the study. The study was conducted in accordance with the Declaration of Helsinki,

Inclusion and exclusion criteria
Study inclusion criteria include; male and female registered students of the University not less than 16 years and not above 22 years. Furthermore, participants' willingness in participating in the study is another criterion. Students that did not meet the above criteria were excluded from the study.

Study Instrument
Semi-structured pre-test questionnaire containing three sections was designed and administered to study participants. Section A (socio-demographic indices) sought information on participants' gender, date of birth, marital status, religion, family type, ethnicity etc. Section B sought information on dietary diversity. Participants/ responses on the consumption of food groups including cereal, vegetables, fruits, organ meat, fish, eggs and red palm were obtained. Values of body weight and height were recorded in section C

Anthropometric indices
Body weight
This was obtained using a bathroom weighing scale placed on a flat surface. Study participants wore light clothing with their foot wears removed stood on the scale with the indicator at zero. The reading was recorded to the nearest 0.5 kg
Height

TABLE 1: BMI CLASSIFICATION OF STUDY PARTICIPANTS

S/N	BMI (Kg/m^2)	BMI Classification	n (%)
1	<18.5	Underweight	39 (12.34)
2	18.5-24.9	Normal	202 (63.9)
3	25-29	Overweight	57 (18.0)
4	30-34.9	Obese	11 (3.9)
5	>34.9	Gross obese	7 (2.2)

n: number of participants. BMI: Body mass index

TABLES 2: AGE AND ANTHROPOMETRIC INDICES OF STUDY PARICIPANTS

Index	Male (n=125)	Female (n=191)	t	p
Age (Years)	18.41±1.88	18.34±2.42	0.285	0.526
Height (cm)	1.74±0.09	1.67±0.09	6.334	0.895
Weight (kg)	67.06±13.62	64.60±12.88	1.623	0.856
BMI (kg/m²)	22.17±4.28	23.20±4.51	2.017	0.176

n: number of participants. p: Probability value. Values are mean±SD.
value is significant values at $p < 0.05$

TABLE 3: DIETARY DIVERSITY IN MALE AND FEMALE PARTICIPANTS

Index	Female (n=184) %	Male (n=117) %	X^2	P
Cereal Consumption			0.629	0.890
Yes	166 (90)	107 (91)		
No	18 (10)	10 (9)		
Vegetable Consumption			2.039	0.361
Yes	105 (57)	75 (64)		
No	79 (43)	42 (36)		
Tuber crop consumption			6.314	0.043*
Yes	71 (39)	62 (53)		
No	113 (61)	55 (47)		
Fruit consumption			11.907	0.003*
Yes	58 (32)	60 (51)		
No	126 (68)	57 (49)		
Refined carbohydrate consumption			4.604	0.100
Yes	136 (74)	98 (84)		
No	48 (26)	19 (16)		
Legume consumption			6.343	0.096
Yes	64 (35)	56 (48)		
No	120 (65)	61 (52)		
Fish consumption			5.327	0.070
Yes	59 (32)	52 (44)		
No	125 (68)	65 (56)		
Dairy product consumption			10.321	0.006*
Yes	117 (64)	94 (80)		
No	67 (36)	23 (20)		
Organ meat consumption			6.568	0.037*
Yes	48 (26)	47 (40)		
No	136 (74)	70 (60)		
Flesh meat consumption			2.693	0.260
Yes	122 (66)	88 (75)		
No	62 (34)	29 (25)		
Egg consumption			9.271	0.026*
Yes	102 (55)	82 (70)		
No	82 (45)	35 (30)		
Red palm consumption			2.512	0.285
Yes	68 (37)	54 (46)		
No	116 (63)	63 (54)		

Value is significant values at $p < 0.05$

TABLE 4: CORRELATION OF ANTHROPOMETRIC INDICES IN THE STUDY PARTICIPANTS

Index	Index	r	P
Age	Height	0.094	0.097
	Body weight	0.016	0.771
	BMI	0.076	0.180
Height	Body weight	0.333	0.000*
	BMI	0.246	0.000*
Body weight	BMI	0.826	0.000*

BMI: Body mass index. r: Pearson correlation coefficient. P= probability value. Value is significant at p<0.05

Body height was obtained against a flat, vertical surface with the participants standing in an upright position with their foot wear and head gear pulled. The feet were kept together without raising the heels from the ground. Readings were taken with a sliding headpiece brought to the vertex of the participant's head. Readings were taken to the nearest 0.1 m

Body Mass Index (BMI)
Body mass index was calculated using the formula indicated below;
BMI (kg/m^2) = weight (kg)/height^2 (m^2)

Statistical Analysis
Data obtained in his study was analyzed using Statistical Package for Social Sciences (SPSS) version 18. Comparison of quantitative variables was done using t-test, while chi-square was used for comparison of qualitative variables. The relationships between variables were determined by Pearson correlation coefficient. p<0.05 was considered significant

RESULTS
Table 1 showed the BMI classification of study participants. Normal weight individuals accounted for the highest percentage (63.9%) while gross obesity was the least (2.2%)
Table 2 showed age and anthropometric indices (height, weight and BMI) of study participants. There was no significant difference in the indices between male and female participants (p>0.05)

Table 3 showed dietary diversity of study participants according to gender. There was significant difference in tuber crop, fruit, dairy product, organ meat and egg consumption between the male and female study participants (p<0.05). A higher percentage of participants consumed dairy products; female (64%) and male (80%). A similar observation was made regarding egg consumption; female (55%) and male (70%). Conversely, a lesser percentage consumed organ meat; female (26%) and male (40%). 68% female and 49% male did not consume fruits.

Table 4 showed association of anthropometric indices in the study participants. Height correlated positively with bodyweight and BMI. Body weight also correlated positively with BMI.

DISCUSSION
Body mass index is usually used to determine general obesity. It is preferred to other anthropometric indices because it has well defined cut off points, easy to determine, low cost and allows the evaluation of nutritional statuses in a variety of populations [6]. The BMI distribution observed in this study indicated that normal weight individuals accounted for the highest percentage of the BMI classification. It was also intriguing to know that 7 participants were grossly obese. This observation is not unexpected as it reflects a population-based study.

In this study, there was no difference in the age between the male and female study participants. This is in spite of the fact that study participants were not age-matched. The non-significant difference appears to be coincidental. Furthermore, no difference height, body weight and body mass index between the male and female participants in this study.

Tuber crops are good sources of carbohydrates. Although, protein content of tuber crops is low, yam and potatoes have been reported to contain a higher proportion of proteins. Furthermore, cassava, yam, potatoes contain vitamin C [7]. In this study, 61% of the females did not consume tuber crops compared with those that did (39%). Conversely, more males (53%) consumed tuber crops than those that did not (47%) ($p<0.05$). The difference in the percentage of consumption of tuber crops between the genders in this study could be due to the level of knowledge of the nutritional value of the crops. The assumption is that tuber crops are sources of carbohydrates only.

Fruits are rich sources of micronutrients including vitamins, minerals and dietary fiber. Some of these micronutrients are antioxidants. There are evidences of the association of low intake of fruits with chronic diseases including hypertension, cancers among others [8]. In this study, less females consumed fruits compared with those that did not, whereas, more of males consumed fruits in comparison with those that did not ($p<0.05$). The reason for this observation could also be due to personal choice among other reasons

Milk and dairy products are good sources of protein, vitamin A, vitamin B12, pantothenic acid, riboflavin and minerals including calcium, selenium, zinc, magnesium and phosphorus [9]. In this study, more male (80%) and female (64%) consumed dairy products when compared with non-consumers ($p<0.05$). Therefore, regular consumption of dairy products enhances health and protect against diseases. An inverse relationship has been reported between dairy products' consumption and cardiovascular diseases [9]. Regular consumption of low-fat dairy products also reduces the risk of type 2 diabetes mellitus. Furthermore, the risks of colorectal and bladder cancers are reduced with moderate consumption of dairy products [9].
Organ meat of healthy animals are nutritious. Conversely the consumption of organ meat of diseased animal can be dangerous to health. In this study, a higher percentage of the participants did not consume organ meat ($p<0.05$). This could be due to non-availability or a matter of choice
Poultry eggs have been reported as cheap and rich sources of nutrients including protein, fatty acids, vitamins and minerals [10]. In this study, a higher percentage of the study participants of both genders consumed egg ($p<0.05$). The antioxidant effects of egg proteins have been reported. Phosvitin has been reported to contain phosphoserines, the ability of ovalbumin to bind to polysaccharide boosts its antioxidant effects while ovotransferrin has the ability of chelating Fe^{3+} [11, 12]. The anti-oxidative property of these egg proteins protects consumers from degenerative diseases including cardiovascular diseases [13]

The correlation of height with body weight and BMI as well as body weight with BMI appears physiological.

CONCLUSION
Observations from this study show that the dietary pattern of study participants appears not to adversely affect their anthropometric indices. More efforts should be made at educating undergraduates on the significance of consuming nutritious foods including fruits. The knowledge of nutritional value of food is important. This could be included in the curriculum of general study courses. This will go a long way in enhancing their health

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