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Research Article

Dietary Pattern, Lifestyle, Anthropometric Indices and Prevalence of Hypertension among Undergraduate Students in Farm Practical Year of the Federal University of Agriculture, Abeokuta, Nigeria

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Abstract

Background: In the past few years the aetiology of hypertension has been linked to a variety of dietary, body size and lifestyle variables.

Objective: To assess the dietary pattern, lifestyle, anthropometric indices and prevalence of hypertension among undergraduate students at the Federal University of Agriculture, Abeokuta, Nigeria, during their active period of on-farm work doing their farm practical year.

Methods: A cross-sectional descriptive study among 320 students was determined by stratified random sampling and colleges by purposive sampling technique. A sphygmomanometer was used to measure blood pressure. Food data were obtained through a food frequency questionnaire, anthropometric and lifestyle were collected using a standard structure questionnaire used to collect weight, height, physical activity and other risk factors.

Results: Our findings revealed that the majority of 70.6% are within age 21-25, 79.4% live off-camp, The BMI categorized as normal had 69.5%, 14.5% were overweight, 11% were underweight and 5% were obese. 90% WC were not at risk, 88.4% WHR were acceptable and 90% WHtR were not at risk. In addition, 69.5% undergo high physical activity. Also, the majority consume high sodium and low potassium, The energy intake was between 1789.14 – 1985.54 kcal/day. A significant relationship was established between sex, BMI, WHtR and prevalence of hypertension using ($p < 0.05$).

Conclusion: The study revealed that the prevalence of hypertension is higher in male than female, also obesity and people who have a very high risk of WHtR has a higher magnitude of hypertension. More so, an increase in body size variable had a relative increase in blood pressure variable.

Keywords: Dietary Pattern; Lifestyle; Anthropometric Indices; Hypertension; Farm Practical

Introduction

Diet has been identified as one of the major modifiers in the pathogenesis of hypertension. The increase in the prevalence of hypertension and other degenerative diseases in developing countries has been related to the increase in people's nutritional transition and global shifts in food consumption behaviour and patterns and [1,2]. Over the past decade, many researchers have studied the association between food, nutrition and hypertension [3]. Furthermore, research has examined the risks associated with foods, nutrients, and hypertension and the risks associated with single foods as well as nutrients for hypertension which does not allow considering the effect of the diet as a whole because of the effect of nutrients within foods and the complexity in identifying the relatively small influence of specific foods and nutrients on disease outcome [4,5].

Dietary patterns are the amounts, proportions, diversity, or contributions of various foods and beverages in diets and regular consumption [6]. The aetiology of hypertension has been attributed to a variety of dietary and lifestyle variables [7], Poor diet, which includes high sugar, salt, saturated fat, and other unhealthy foods, as well as an unhealthy lifestyle, which includes smoking, drinking, and physical inactivity; are known to be key risk factors for cardiovascular disease (CVD) and other noncommunicable diseases (NCDs) [8].

Hypertension is a sustained increase in a person's systolic blood pressure and diastolic blood pressure above what is deemed normal in terms of the person's age, gender, race, BMI, and body size [9]. Cardiovascular diseases have been identified to often starts in childhood to adulthood [10]. However, hypertension risk factors include age, hereditary (genetic and ethnic), diet (obesity, salt intake, and alcohol), and lifestyle (exercise, smoking, and stress). The most identified risk factor connected with hypertension is age, with the disease's risk directly proportional to one's age [11,12].

Although, body mass index is the commonly used technique to assess and determine nutritional status; however, other metrics include waist circumferences, waist-hip ratio, and waist-to-height ratio, which are also used to assess these relationships [13]. Recently a systematic review recommended that the waist-to-height ratio is a strong discriminant of heart related disease risk factors [14]. BMI was considered to be an important marker in the association between blood pressure and central adiposity indices in further research [15]. Furthermore, it was shown that the build-up of adipocytes in the body's central region is a stronger predictor of the development of high blood pressure than overall adiposity [16].

This study was conducted among undergraduate students at the Federal University of Agriculture, Abeokuta, Nigeria, during their active period of on-farm work doing their farm practical year, to examine the correlation and relationship between dietary pattern, lifestyle, and anthropometric indices with the prevalence of hypertension.

Methodology

Study area

This cross-sectional descriptive research was conducted among undergraduate students at the Federal University of Agriculture, Abeokuta, Nigeria, during their active period of on-farm work doing their farm practical year. The Farm Practical Year (FPY) is a yearly program for 400-level agriculture students at the university that focuses on supplementing classroom teachings in agriculture with on-farm training and development of hard agricultural skills, such as livestock, crop production, fisheries, and farm management units. This training location is located in rural agro-allied farms around Ogun State, and it is equipped with a variety of contemporary farming equipment and machinery to allow participants to experiment with a variety of modern agricultural approaches.

Study population and sample size determination

The target populations were FUNAAB Students doing their Farm Practical Year from. Three (3) different colleges in the University: College of Animal Science, College of Agriculture Management and Rural Development, and Livestock Production, and College of Plant Science and Crop Production., A total of 1207 students participated in the Farm Practical Year (Academic Planning Unit, FUNAAB).

The sample was calculated based on Yamani Taro Formula

$n3\_\_\_\_\_N\ 2$

$$1\square N(e) \qquad n\square\frac{1207}{1+1207(0.05)^2}\square 300.4$$

320 students were selected using stratified random sampling based on the respondents' registration using the Yamani Taro Formula:

Sample size and technique

Based on the respondents' registration, 320 respondents were selected using stratified random selection. Only three (3) colleges out of ten (10) had respondents doing farm practical year; respondents were then sorted into departments using purposive sampling.

Data collection

The respondents' socioeconomic and demographic data, in addition to their dietary patterns (food frequency questionnaire - FFQ and 24-hour recall), physical assessment (anthropometric and blood pressure measurements), and lifestyle, were all collected using a standard structured interviewer-administered questionnaire. The instruments were pre-tested among 32 FUNAAB undergraduate students in pilot research and required adjustments were made based on the results.

Food intake and dietary patterns

The food frequency questionnaire (FFQ) required respondents to record and estimate the number of times and quantity of food consumed from each of the food groups on the questionnaire. Cereals, roots and tubers, snacks, legumes, meat and meat products, fish and fish products, milk and milk products, fruits and vegetables, fats and oils, and drinks were among the dietary groups whose consumption frequency was measured [17].

Blood pressure measurement

Blood pressure measurement was measured with a sphygmomanometer and a standard cuff appropriate for the individual's age throughout the study measured their Blood Pressure. The World Health Organization [18] and the British Hypertension Society [19] define hypertension as a systolic blood pressure of 140mmHg and above and a diastolic blood pressure of 90mmHg and above. In adults, normal blood pressure in people varies from 100/60 to 140/90. High blood pressure (BP) is divided into three grades: ESH-ESC 2003 Classification of Hypertension [20].

Anthropometric measurement

Weight was measured using bathroom weighing scales. The scales were calibrated before each student's weight was measured, and the weight was measured to the closest to 0.5 kg.

A portable stadiometer made by a carpenter was used to measure height. It was a wall-mountable type of stadiometer, which had measurements up to 200cm[8]. Hips circumference was measured when respondents were standing upright, arms at the sides and both feet together; The tape was snug, and the reading was to the nearest 0.1 cm.

Waist circumference was measured at the respondents' midpoint between the lowest ribs as well as the anterior superior iliac spine; the measuring tape was placed snugly around this point, with a reading nearest 0.1 cm.

Lifestyle measurement

The behavioural measurement questions were adapted from the WHO STEPS instruments for chronic disease risk factor surveillance, which were used in a nationwide survey of Nigerian adults' population health behaviour monitoring [21].

Statistical analysis

Data entry and analysis were carried out using the SPSS version 20.0. In examining the association between the dependent and independent variables, the Chi-square test was used. In addition, logistic regression analyses were used to discover the factors that predict respondents' nutrition status and hypertension. All statistical analysis level of significance was set at P-values < 0.05.

Results

The socio-economic and demographic status of respondents is shown in table 1. More than half of the respondents (57.2%) were men, while (42.8%) were females; the majority of the respondents (70.6%) were between the ages of 21 to 25 years followed by (19.7%) between the age group of 16 to 20 years. A large percentage of students (79.4%) reside off-campus and are financially dependent. The table also revealed that (32.8%) of respondents earned between #5,000 to #10,000, followed by (30.3%) earned #10,000 to 15,000.

Table 2 shows the nutritional status of the respondents, which was classified into indices. BMI indices revealed a high prevalence of normal weight (69.5%), with just (5%) of obese respondents distributed equally across both genders, (11%) were underweight and (14.5%) were overweight, with males having a slightly higher frequency than females. Furthermore, waist circumference indices indicated that only (2.8%) were substantially increased at risk, which consists of females only. The waist-to-hip ratio (88.4%) had an acceptable ratio, while the waist-to-height ratio showed (90%) were not at risk.

In Table 3, the majority of the respondents (69.5%) engage in high physical activity, while (23.9%) engage in moderate physical

Variable	N (%)
Sex Male	183(57.2)
Female	137(42.8)
Age (years) 16-20	63(19.7)
21-25	226(70.6)
26-30y	26(8.1)
>30	2(0.6)
No response	3(0.9)
Marital Status Single	312(97.5)
Marital	7(2.2)
No response	1(0.3)
Residence Hostel	66(20.6)
Off-camp	254(79.4)
Financial Situation Dependent	254(79.4)
Independent	66(20.6)
Income (naira) <5,000	37(11.6)
5,000-10,000	105(32.8)
10,000-15,000	97(30.3)
15,000-20,000	40(12.5)
20,000-25,000	10(3.1)
25,000-30,000	18(5.6)
>30,000	13(4.1)

Table 1: Socio-Demographic and Socio-Economic Status of Respondents.

activity and (6.6%) engage in low physical activity. Most of them (70.9%) had no history of hypertension. However, (92.2%) of them were not currently smoking. (53.4%) do consume alcohol while (46.6%) revealed not to consume alcohol. The rest of the results are shown in Table 3. Table 4 shows the classification of categories of nutrient intake of the respondents. It reveals that the majority of the respondents (87.5%) consume high calorie, (42.2%) consume high carbohydrate, (86.3%) consume high protein, (76.9%) consume high fat, (70.6%) consume high vitamin A, (65%) consume low vitamin C, (67.5%) consume low calcium (Ca), (83.1%) consume high phosphorus (P), (94.1%) consume low potassium (K), (63.1%) consume high sodium (Na), (56.3%) consume high iron, (71.6%) consume high zinc and 143 (44.7%) consume low magnesium.

Indices	Category	Male	Female	Total
		N (%)	N (%)	N (%)
BMI (kg/m^2)	Underweight Normal BMI Overweight	15(4.7) 135(42.5) 24(7.5)	20(6.3) 86 (27) 22(6.9)	35(11) 221(69.5) 46(14.5)
	Obese	8(2.5)	8(2.5)	16(5)
WC (cm)	Not at risk Increased risk Substantially Increased Risk	178(55.8) 5(1.6) 0(0)	109(34.2) 18(5.6) 9(2.8)	287(90) 23(7.2) 9(2.8)
WHR (cm)	Acceptable Unacceptable	173(54.2) 10 (3.1)	109(34.2) 27(8.5)	282(88.4) 37(11.6)
WHtR (cm)	Not at risk High risk Very high risk	168(54.4) 9(2.9) 1(0.3)	110(35.6) 18(5.8) 3(1.0)	278(90) 27(8.7) 4(1.3)

Table 2: Nutritional Status of the Respondent.

BMI: Body Mass Index; WC: Waist Circumference; WHR: Waist-Hip Ratio; WHtR: Waist-to-Height Ratio

	Variable	N (%)
Physical Activity	Low Physical Activity	21 (6.6)
	Moderate physical Activity	76 (23.9)
	High physical Activity	221 (69.5)
History of Hypertension	Yes	93 (29.1)
	No	227 (70.9)
Do you currently Smoke	Yes	25 (7.8)
	No	295 (92.2)
Frequency of smoking	Never	292 (91.3)
	Daily	3 (0.9)
	3-4 days per week	1 (0.3)
	1-2 days per week	6 (1.9)
	1-3 days per month	2 (0.6)
	>1/month	2 (0.6)
	Occasionally	14 (4.4)
In the past do you Smoke any Tobacco product?	Yes	55 (17.2)
	No	265 (82.8)
Do you consume any alcohol?	Yes	171 (53.4)

	No	149 (46.6)
Frequency of alcohol intake	Never	146 (45.6)
	Daily	12 (3.8)
	2-6 days per week	1 (0.3)
	3-4 days per week	9 (2.8)
	1-2 days per week	11 (3.4)
	1-3 days per month	13 (4.1)
	>1/month	16 (5.0)
	Occasionally	111 (34.7)

Table 3: Lifestyle of Respondents.

Variable	Low (%)	Adequate (%)	High (%)
Energy (kcal)	20 (6.3)	20 (6.3)	280 (87.5)
Carbohydrate (g)	86 (26.9)	99 (30.9)	135 (42.2)
Protein (g)	18 (5.6)	26 (8.1)	276 (86.3)
Fat (g)	35 (10.9)	39 (12.2)	246 (76.9)
Vitamin A (mcg)	60 (18.8)	34 (10.6)	226 (70.6)
Vitamin C (mcg)	208 (65.0)	27 (8.4)	85 (36.6)
Calcium (mg)	216 (67.5)	31 (9.7)	73 (22.8)
Phosphorus (mg)	35 (10.9)	18 (5.6)	266 (83.1)
Potassium (mg)	301 (94.1)	11 (3.4)	8 (2.5)
Sodium (mg)	92 (28.8)	26 (8.1)	202 (63.1)
Iron (mg)	67 (20.9)	43 (13.4)	180 (56.3)
Zinc (mg)	36 (11.3)	55 (17.2)	229 (71.6)
Magnesium (mg)	143 (44.7)	85 (26.6)	92 (28.8)

Table 4: Classification of Categories of Nutrient Intake by RDA.

Table 5 shows the correction between blood pressure and the respondent's sex, with systolic blood pressure and diastolic blood pressure significance of 0.019 and 0.035, respectively ($P < 0.05$), it is shown that (21.9%) of male respondents were hypertensive, compared to (10.6%) of female respondents.

Table 6 shows the correlation between nutritional status and the prevalence of hypertension among respondents. Mainly two factors (BMI and WHtR) were significant with their blood pressure. (3.1%) obese respondents were hypertensive, whereas (1.3%) of those with a very high-risk waist-to-height ratio were hypertensive.

Category	Male N (%)	Female N (%)	Total N (%)	P-value
Systolic BP Normal BP	129(40.3)	114(35.6)	243(75.9)	
High Normal BP	11(3.4)	9(2.8)	20(6.2)	0.019
Mild Hypertension	35(10.9)	14(4.4)	49(15.3)	
Moderate Hypertension	6(1.9)	0(0)	6(1.9)	
Severe hypertension	2(0.6)	0(0)	2(0.6)	
Diastolic BP Normal BP	121(37.8)	106(33.1)	227(70.9)	
High Normal BP	45(14.1)	27(8.4)	72(22.5)	0.035
Mild Hypertension	1(0.3)	2(0.6)	3(0.9)	
Moderate Hypertension	15(4.7)	2(0.6)	17(5.3)	
Severe hypertension	1(0.3)	0(0)	1(0.3)	
Blood Pressure Hypertensive	70 (21.9%)	34 (10.6%)	104 (32.5%)	
Normal	113 (35.3%)	103 (32.2%)	216 (67.5%)	0.007

Table 5: Blood Pressure of Respondents by Sex.

Significant at $P < 0.05$.

Variable	Hypertensive	Normal	Total	P-value
	N (%)	N (%)	N (%)	
BMI Underweight	9 (2.8)	26 (8.2)	35 (11.0)	
Normal	68 (21.4)	153 (48.1)	221 (69.5)	0.046
Overweight	17 (5.3)	29 (9.1)	46 (14.5)	
Obese	10 (3.1)	6 (1.9)	16 (5.0)	
WHtR Not at risk	90 (29.1)	188 (60.8)	278 (90)	
High risk	9 (2.9)	18 (5.8)	27 (8.7)	0.017
Very high risk	4 (1.3)	0 (0)	4 (1.3)	

Table 6: Association between nutritional status and prevalence of hypertension of the Respondents.

Discussion

In this study population of 320 respondents, the systolic blood pressure and diastolic blood pressure were found to be strongly correlated with the respondents' sex, revealing that a higher percentage of hypertensive respondents were found among males (21.9%) than females (10.6%); and those with normal blood pressure were found among males (35.3%) and females (32.2%), respectively, with a significant at ($P < 0.05$). Further research has shown a greater incidence of hypertension in males than in women, focusing on men under the age of 65, with over 5% of men reporting hypertension compared to 1.5% of women [22]. Men have a greater risk of hypertension than women; according to research by the Government of India Planning Commission [23], The group of experts on the burden of diseases in Haryana, India, produced a large-scale report that found that men had higher rates of hypertension than women. According to a study conducted by Doumas., *et al*. [24], the prevalence of hypertension in females is subservient to that of males at an earlier age, and also increases with age in males, identifying the protective role of oestrogen until menopausal transition sets invalidated by literature. Several studies have also suggested that sex variations in hypertension might be a defining factor related to several risk variables such as body mass index, physical activity, and smoking [25,26]. Ghosh., *et al.* [27] findings also suggest that biological sex differences can affect sex disparities among young people.

The relationship between nutritional status and the prevalence of hypertension in the respondents indicated that the majority of obese respondents (3.1%) were hypertensive, as well as (1.3%) of those with a very high risk of waist-to-height ratio ($P < 0.05$). This is related to several studies that show that adolescent body mass index (BMI) is the strongest predictor of high blood pressure[28]. According to Landi., *et al.* [29], who found a significant increase in the prevalence of hypertension with a consistent linear increase across BMI levels, hypertension was found to be (45%, 67%, 79% and 87%) among normal, overweight, obese class I and III respectively. Obesity is associated with body fat distribution, which is a substantial health risk factor. Adiposity is also linked with an increased risk of heart-related disease.

Several studies [30,31] have shown a statistically significant relationship between WHtR and the prevalence of hypertension. A study was observed among Korean adults; the research revealed WHtR to be a more accurate covariate after 2.8 years of follow-up; 185 participants recorded new cases of hypertension with WHtR having the highest significance of ($WHtR \geq 0.54$).

Conclusion

Based on our findings, we can conclude that male students have a higher prevalence of hypertension. Obese and WHtR are the only significant predictor related to hypertension prevalence. In addition, their dietary habits reflect a well-known risk factor for cardiovascular disease: a high salt consumption and a low potassium intake. We recommend continuous screening, awareness, and management of individuals, as well as the implementation of hypertension control programs that promote healthy eating and lifestyles.

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Authors Role

The research idea was conceived by OA. OA and IO designed the study. Data was collected by OA. Data analysis was done by OA. Results were interpreted by OA, IO and EJ. The report was drafted by OA, IO and EJ. Concise emendation of the entire report for authenticity on intellectual content was done by all the investigators.

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