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Intake of Fruits and Vegetables as Self Prescribed Weight Reducing and DASH Diets among Obese-Hypertensive Individuals Attending Irrua Specialist Teaching Hospital Irrua, Edo State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author NEU designed the study, performed the proof reading and corrected the manuscript. Authors OC, EP reviewed the results. Author PMB designed the study, collected the data, analyzed and interpretated the results and wrote the first draft of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Background: Five servings of fruits and vegetables each day, along with relatively unprocessed whole grains or legumes with each meal, are essential for reducing the risk of obesity, hypertension and other related non communicable diseases. While being low or relatively low in calories, fruits and vegetables include a large amount of dietary fiber and a range of micronutrients, antioxidants and phytochemicals which are all essential for health.
Aims: To investigate the intake of fruits and vegetables as self prescribed weight reducing and DASH (Dietary Approach to Stop Hypertension) diets among obese - hypertensive individuals attending Irrua Specialist Teaching Hospital Irrua, Edo State.
Methods: A descriptive cross sectional study design was used with a sample size of 440 obese hypertensive individuals (with body mass index of = or > 30Kg/m^2 and blood pressure of = or > 140/90mmHg). Questionnaires, personal interviews and anthropometric measurements were used to collect data using purposive sampling technique. Data collected were analyzed using Statistical Package for the Social Sciences (IBM SPSS) 22 Version.
Results: A total of 440 respondents were used in the study and data were elicited from all of this number giving a 100% response rate. A total of 242 (55.0%) and 215 (48.9%) of the respondents consumed fruits and vegetables only one to two days per week with only 36 (8.2%) and 26 (5.9%) consuming fruits and vegetables every day.
Conclusion: It can be concluded based on the key findings of this study that there is statistically significant mean difference in fruits and vegetables consumption amongst obese - hypertensive individuals attending Irrua Specialist Teaching Hospital, Edo State, Nigeria ($p<0.05$).

Keywords: Fruits; vegetables; DASH; obese hypertensive; hospital.

1. INTRODUCTION

In Nigerian market places, certain fruits and vegetables are always easily accessible. Garlic, cashews, almonds, fruits (papaya, mango, avocado, watermelon, etc.), vegetables, potatoes (high in potassium, magnesium, and fiber), fish, bananas (high in potassium), beans and cowpeas (nutritious chock-full of magnesium, soluble fiber, and potassium), fish oil and almonds seem to be affordable and readily available to those with low incomes [1].

Robert et al., made the following dietary recommendations to control obesity and hypertension: A diet with a high intake of vegetables, fruits, and whole grains. Other recommendations include consuming low-fat dairy products, poultry, fish, legumes, non-tropical vegetable oils, and nuts; and limiting intake of sweets, sugar-sweetened beverages, and red meat [2]. This dietary pattern should be adapted to appropriate calorie requirements, personal and cultural food preferences, and nutritional therapy for other medical conditions, including diabetes mellitus. One way to achieve this is by following plans such as the DASH diet [2]. It is critical to consume five servings of fruits and vegetables per day, as well as relatively unprocessed whole grains or legumes with each meal [3].

A study by Emefa et al. concludes that increased physical activity, abstaining from alcohol and smoking, increased intake of fruits and vegetables, and reduced intake of carbohydrates, meat and fat have a positive influence on blood pressure control [4]. According to the World Health Organization, potassium is typically found in a variety of unprocessed foods, including fruits and vegetables, cowpeas, pigeon peas, lima beans, and African yam beans, which have a potassium content of 1300 milligrams per 100 grams of fresh weight [5,6,7].

The present network meta-analysis suggests that DASH might be the most effective dietary measure to reduce blood pressure among obese hypertensive and pre-hypertensive patients based on high quality evidence [8]. Findings showed that intake of fruits, vegetables and dairy products is associated with a healthier weight status in adults [9]. In another study, Arnotti and Bamber revealed that fruit and vegetable consumption promotes weight loss and prevents weight gain, thereby reducing risks for obesity and hypertension [10].

2. METHODS

This study complies with a reporting guideline by Lachat et al [11]. A descriptive cross sectional study design was used with a sample size of 440

obese hypertensive individuals. A purposive sampling technique was used in recruiting the study subjects. Questionnaires, personal interview and anthropometric measurements were used to collect data. The questionnaires and the research instruments were approved by the supervisors; they were pre-tested on 40 individuals attending Irrua Specialist Teaching Hospital Irrua; the questionnaires was administered by the researcher after the respondents have signed the written informed consent form; it was ensured that the structured instrument/questionnaire was reliable and valid for the purpose of the research after validation by the supervisors and two expert from the community. The Study was carried out by the researcher incorporating other scientists/ professionals on the need arises basis. The written informed consent forms were given (and after consenting) was followed by the collection of samples and other research procedures. Data collected was analyzed using Statistical Package for the Social Sciences (IBM SPSS) 22 Version and ENA Software Version 2011. Hypotheses were tested using Chi-square, t-test and Pearson Product Moment Correlation Coefficient at 95% confidence level.

2.1 Study Area

The study area was Irrua Specialist Teaching Hospital located at KM87 Benin - Auchi expressway Edo State. Irrua Specialist Teaching Hospital is one of the federal teaching hospitals where people from different parts of Edo State, other states and different countries seek seeks for medical attention. Edo State is one of the 36 states of Nigeria, located in the south – south geopolitical zone of the country. It is bounded by the states of Kogi to the northeast and east, Anambra to the east, Delta to the southeast and south, and Ondo to the west and northwest; the Niger River flows along the state's eastern boundary. Benin City is the state capital and largest urban center. Edo state lies at elevations between 500 feet (150 m) in the south and more than 1,800 feet (550 m) in the north. Tropical rain forest covers most of the area. The state is inhabited largely by the Edo (Bini) people, who are linked to the historic kingdom of Benin [12]. The state population figure is expected to be about 8,000,000 in 2022 [12].

2.2 Study Population

The study population was the obese hypertensive individuals attending Irrua Specialist Teaching Hospital Irrua, Edo State. The state population figures are expected to be about 8,000,000 in 2022 [12]. The estimated obese hypertensive sub-population in the study area is 19%.

2.2.1 Inclusion criteria

The study included all obese - hypertensive individuals between the ages of 20 to 65 years attending Irrua Specialist Teaching Hospital Irrua, Edo State who gave both verbal and written consent to be part of the research with the exclusion of those who are critically ill and none consenting individuals.

2.3 Sampling and Sampling Size

A purposive sampling technique was used for this study. The sample size was achieved within the period of six (6) months; it was based on individuals attending Irrua Specialist Teaching Hospital Irrua, Edo State who were screened and confirmed to be obese and hypertensive.

Sample size determination [13]:

$n= Z^2 pq/d^2$

Z= Level of significant = 1.96^2
p= Prevalence of indicators= 0.061(6.1%)
q= 1-p
d^2=Degree of Precision = 0.05^2

$n = 1.96^2 \times 0.061 (1-0.061)$

0.05^2

n=88.01
n= 88

- Minimum sample size

  Sample size of 440.

2.4 Study Stools

Questionnaires, personal interviews, instruments for anthropometrics (weighing scale with stadiometer and measuring tape) and clinical assessments (sphygmomanometer, stethoscope and electronic blood pressure apparatus) were used.

2.5 Data Collection

Data were collected from the anthropometric and clinical measurements and also from the questionnaires. Section "A" of the questionnaire captured the socio-demographic data of the individuals while section "B" anthropometry, fruits and vegetables consumption data of the obese

hypertensive individuals attending the Irrua Specialist Teaching Hospital, Edo State

2.6 Data Analysis

Analysis of the data was based on the information obtained from the questionnaires, personal interviews, anthropometric and clinical measurements that was computed and presented in frequency distribution Tables. Statistical Package for the Social Sciences (IBM SPSS) 22 Version and ENA Software Version 2011 was used for analyzing the data. Hypotheses were tested using Chi-square, t-test and Pearson Product Moment Correlation Coefficient at 95% confidence level [14].

3. RESULTS

3.1 Demographic Data

A total of 440 respondents/participants were used in the study and data were elicited from all of this number giving a 100% response rate. Out of the 440 (100%) participants, 133 (30.2%) were males while 307 (69.8%) were females. The age distribution shows that the highest proportion 424 (96.4%) were 31 years and above, 13 (3.0%) were within the age group 21-25 years, 3 (0.7%) were within the age bracket 26-30 years while none were recorded for age group 15 – 20 years. The mean age for the respondents was 33 years. Majority of the study participants 348 (79.1%) were married, followed by 40 (9.1%) who were widowed, 39 (8.9%) were single while 13 (3.0%) were divorced. Majority, 409 (93.0%) of the respondents subscribed to Christianity, while 30 (6.8%) subscribed to Islam. Most of the respondents 254 (58.0%) had tertiary education, followed by 92 (20.9%) who had secondary education, 86 (19.5%) had primary education while 7 (1.6%) had no formal education. Few of the respondents 46 (10.5%) were into business as their occupation, followed by 43 (9.8%) who were civil servants and 13 (3.0%) who were farmers. Details of this result are presented in Table 1.

Table 1. Socio-demographic characteristics of respondents (N=440)

Variables	Frequency	Percent	Mean	Standard deviation
Sex of respondents			1.70	0.460
Male	133	30.2%		
Female	307	69.8%		
Age of respondents			*33.37	2.503
15-20 years	0	0.0%		
21-25 years	13	3.0%		
26-30 years	3	0.7%		
31 years and above	424	96.4%		
Marital status			2.12	0.684
Single	39	8.9%		
Married	348	79.1%		
Divorced	13	3.0%		
Widowed	40	9.1%		
Religious affiliation			1.07	0.269
Christianity	409	93.0%		
Islam	30	6.8%		
Others	1	0.2%		
Educational status			2.35	0.846
No formal education	7	1.6%		
Primary level of education	86	19.5%		
Secondary level of education	92	20.9%		
Tertiary level of education	254	58.0%		
Occupation			3.24	1.815
Civil servants	34	9.8%		
Housewives	5	1.1%		
Farmers	13	3.0%		
Business Women/men	46	10.5%		
Applicants	4	0.9%		
Others	23	5.2%		

**Mean age*

3.2 Anthropometric and Clinical Status Data

On account to determine the Body Mass Index (BMI) of respondents, 234 (53.2%) were within 30-34.9 (class 1 obesity), 127 (28.9%) were within 35-39.9 (class 2 obesity) while 79 (18.0%) were within 40 and above (class 3 obesity). The waist circumference of the male response was 7 (1.6%), 26 (5.9%), and 92 (20.9%) for < 94cm (Normal), 94-102cm (High), and > 102cm (Very high) respectively while the waist circumference for the female respondents was 0 (0.0%), 10 (2.3%) and 305 (69.3%) for ≤ 80.9cm (Normal), 81-88.9cm (High), and ≥ 90cm (Very high) respectively (Table 2). A total of 135 (30.7%) had normal (110/70-130/85) Blood Pressure (BP), 146 (33.2%) had mild (131/86-139/89) BP while 159 (36.1%) had severe (140/90 and above) BP (Table 2).

3.3 Consumption of Fruits, Vegetable and DASH Diet

The frequency of fruits intake for a greater proportion of the respondents 242 (55.0%) was one to two days per week, followed by those 96 (21.8%) whose frequency was 3-4 days per week, and 66 (15.0%) had it for 5-6ays/week while only 36 (8.2%) had a frequency of fruits intake to be every day. Most of the respondents 377 (85.7%) had fresh fruits, 10 (2.3%) had dried or processed fruits while 53 (12.0%) had both. The frequency of vegetable intake for most respondents 215 (48.9%) was one to two days per week, followed by those 149 (33.9%) whose frequency was 3-4 days per week, and 50 (11.4%) had it for 5-6days/week while only 26 (5.9%) had a frequency of vegetables intake to be every day. Majority of the respondents 393 (89.3%) had fresh vegetables, 7 (1.6%) had dried or processed vegetables while 40 (9.1%) had both. Majority 377 (85.7%) had less than 400 grams and few 63 (14.3%) had 400 grams of fruits and vegetables per day while none had above 400 grams (Table 3).

3.4 Hypothesis

There is no statistically significant mean difference in fruits, vegetable and nuts consumption in the management of obese - hypertensive individuals attending Irrua Specialist Teaching Hospital Irrua. The test statistic used in testing this hypothesis was the t-test at 95 CI (0.05 significance level). Analysis using t-test showed that the means actually differs. In other words, there is a difference. That is, the study was statistically significant (P = 0.0001; df = 439; t-tests = 8.565 & 10.764). Accessing the Confidence intervals (CI = 0.11-0.18 & 0.23-0.33) indicates that the values fell within the rejection region; therefore the null hypothesis was rejected. To this end, the researcher concluded that there is statistically significant mean difference in the intake of fruits and vegetables as self prescribed weight reducing and DASH diets among the obese - hypertensive individuals (Table 4).

Table 2. Anthropometric and clinical status data (N=440)

Variables	Frequency	Percent	Mean	Standard Deviation
Body Mass Index (BMI)			1.65	0.767
30-34.9 (Class 1 obesity)	234	53.2%		
35-39.9 (Class 2 obesity)	127	28.9%		
40 & above (Class 3 obesity)	79	18.0%		
Waist circumference in males			2.68	0.576
≤ 94cm (Normal)	7	1.6%		
95-101.9cm (High)	26	5.9%		
≥ 102cm (Very high)	92	20.9%		
Waist circumference in females			2.97	0.176
≤ 80.9cm (Normal)	0	0.0%		
81-88.9cm (High)	10	2.3%		
≥ 90cm (Very high)	305	69.3%		
Blood Pressure			2.05	0.817
110/70-130/85 (Normal/Controlled)	135	30.7%		
131/86-139/89 (Mild)	146	33.2%		
140/90 and above (Severe)	159	36.1%		

Table 3. Consumption of fruits, vegetable and DASH diet (N=440)

Variables	Frequency	Percent	Mean	Standard deviation
Frequency of fruits intake			1.76	0.987
1-2 days/week	242	55.0%		
3-4 days/week	96	21.8%		
5-6 days/week	66	15.0%		
Every day	36	8.2%		
Forms of fruits			1.26	0.660
Fresh	377	85.7%		
Dried/processed	10	2.3%		
Both	53	12.0%		
Frequency of vegetable intake			1.74	0.880
1-2 days/week	215	48.9%		
3-4 days/week	149	33.9%		
5-6 days/week	50	11.4%		
Every day	26	5.9%		
Forms of vegetables			1.20	0.584
Fresh	393	89.3%		
Dried/processed	7	1.6%		
Both	40	9.1%		
Quantity of fruits/vegetables consumed daily			1.14	0.351
Less than 400 Grams	377	85.7%		
400 Grams	63	14.3%		
More than 400 Grams	0	0.0%		
Cereals			2.29	0.915
Whole grains	139	31.6%		
Processed/refined	36	8.2%		
Both	265	60.2%		
Drink			3.20	1.269
1-5% Alcohol	87	19.8%		
6-14% Alcohol	41	9.3%		
15 and above % Alcohol	26	5.9%		
Sugary/Soft/Energy drink	269	61.1%		
None	17	3.8		
Frequency of drinking			1.36	0.703
Occasionally	324	73.6%		
Frequently	92	20.9%		
More frequently	7	1.6%		
None	17	3.9%		
Average salt intake per day			2.21	0.751
1 leveled teaspoon	84	19.1%		
1 heaped teaspoon	181	41.1%		
1.5 teaspoon	172	39.1%		
More than 1.5 teaspoon	3	0.7%		
Pasta			0.91	0.593
None	96	21.8%		
Occasionally	291	66.1%		
Frequently	50	11.4%		
More frequently	3	0.7%		
Nuts and seeds			1.28	0.540
None	20	4.5%		
Occasionally	278	63.2%		
Frequently	142	32.2%		
More frequently	0	0.0%		

Table 4. T-test analysis of the predictive mean difference in fruits, vegetable and nuts consumption as self prescribed weight reducing and DASH (dietary approach to stop hypertension) diets among obese - hypertensive individuals attending Irrua Specialist Teaching Hospital Irrua, Edo State. (N=440)

Variables	N	Mean	SD	t-test	p-value	CI
Fruits and vegetables consumption	440	1.14	0.351	8.565*	0.000*	0.11 – 0.18
Nuts and seeds consumption	440	1.28	0.540	10.764*		0.23 – 0.33

**Statistical significance based on P-value < 0.05 at 95% CI; df = 439*

4. DISCUSSION

This study showed that 85.7% of the respondents consume fruits, 48.9% consume vegetables one to two days per week as 5.9% consume it frequently (every day) while 63.2% consume nuts as a means of managing obesity and hypertension. As part of intervention in the management of obesity and hypertension, a study by Emefa et al. concludes that increase in physical activity, abstaining from alcohol and smoking, increased intake of fruits, nuts and vegetables, and reduced intake of carbohydrates, meat, and fat have a positive influence on blood pressure control [4]. To further corroborate this finding, Jevon found that, frequent intake of vegetables, fruits and nuts is important for obese - hypertensive individuals in weight reduction, control of blood pressure and helps intervention groups keep fit [15]. A recent systematic review conducted by Zeidan et al. also revealed that adolescents' consumption of fruits and vegetables is inadequate in most Arab countries, leading to a higher risk of poor health outcomes. The review evaluates fruits and vegetables intake among adolescents in Arab countries, the proportion of adolescents meeting the dietary guidelines in these countries, and the dietary assessment tools used to assess fruits and vegetables intake [16].

The findings from this study also showed that intake of fruits and vegetables as self prescribed weight reducing and DASH diets are low among obese hypertensive individuals as represented by only 8.2% (36) and 5.9% (26) who consume fruits and vegetables frequently (every day). This is in line with Van et al. who revealed that it is critical to consume five servings of fruits and vegetables per day, as well as relatively unprocessed whole grains or legumes with each meal. Fruits and vegetables contain a significant amount of dietary fiber and a variety of micronutrients while being low or relatively low in calories [3]. Studies show that by increasing fiber, lean protein, and minerals, such as potassium, calcium, and magnesium, people following DASH can naturally lower their blood pressure by 3-20 points within weeks or months – the greatest benefit coming when they also limit salt intake to about 1,150 mg each day [17].

5. CONCLUSION

It can be concluded based on the key findings of this study that there is statistically significant association between obesity status by Body Mass Index (BMI) and hypertension among obese hypertensive individuals; there is statistically significant mean difference in fruits and vegetable consumption in the self prescribed weight reducing and DASH diet of obese hypertensive individuals attending Irrua Specialist Teaching Hospital Edo State, Nigeria ($p<0.05$).

CONSENT AND ETHICAL APPROVAL

The study was conducted according the National Code of Health Research Ethics in Nigeria (the CODE) and the Declaration of Helsinki. Every other institutional guideline was followed [18]. The study was approved by institutional/local review board) before the field visit. Appropriate culture-sensitive and specific written informed consent was sought and obtained from the parents of the children prior to participants' recruitment. The researcher ensured privacy in handling the participants and confidentiality in handling the data. All examinations were done in a safe, comfortable and private environment and the questionnaire was anonymous; the collected data was stored in a pass-worded computer only available to the principal investigator on a need to know basis. The data is available for inspection by regulatory authorities and for quality assurance for ten (10) years.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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