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Dietary Intake, Anthropometric Characteristics and Clinical Assessment of Elderly in Ondo State, Nigeria

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Abstract

This study was designed to assess the nutrition status of the elderly in Ondo State Nigeria. Random sampling techniques were used to select 1155 elderly for this study. Socio-demographic characteristics, clinical assessment, food consumption pattern, anthropometric measurements of the elderly were determined. Data entry and analysis were done with the use of scientific instruments. This involved the SPSS version 17. It detailed the analytical tools, including frequencies, percentage and correlations. The result showed that Intake of nutrients by the elderly was shown to be inadequate. Protein containing foods intake was low, as 4% of the elderly took milk daily while 8.3% and 4% took organ meat and fleshy foods daily. Anthropometric assessment as indicated by MUAMA mean and standard deviation (23.80±54.203, 25.50±62.001 for male and female respectively) and MUAFA mean and standard deviation (12.00±23.063, 14.90±48.105 for male and female respectively) showed that the females' elderly were having normal skin fold thickness as well as BMI but the males' MUAMA and MUAFA indicated wasting. The clinical assessment tool for the elderly revealed various form of sign and symptoms of malnutrition. Night blindness was 61.03%, angular stomatitis was 7.1%, and joint pains were 41.03% and 7.01 % had dementia. The result showed the correlation between some variables and nutritional status of the elderly. Age and BMI (r=-0.26, p=0.05); socio-economic status and milk intake (r=0.46, p=0.05); protein intake and muscle wasting (r=0.46, p=0.05); fruits and vegetable intake and constipation (r=0.52, p=0.05). The study concluded that micro-nutrient deficiency was prevalent among the elderly studied. Therefore recommended that, government intervention is needed to improve the quality of life of the elderly. Also, there should be organized nutrition education among the elderly on adequate diet.

Keywords: Dietary Intake; Anthropometric Characteristics; Clinical Assessment; Elderly

Background

The United Nations defined the elderly as those in age 60 years and above [1]. Nigeria, like other African countries should see the rapid expansion of aging population as a serious future challenge. The population of elderly in Ondo State, Nigeria is 128,053 this made up the 3.7% of total population of Ondo State [2]. It is anticipated that the increasing elderly population would lead to more resources to be devoted to various health and nutritional challenges in the developing countries [3]. The physiological and psychological changes that occur among elderly have nutritional implications but the efforts of government and non-governmental organization on this age group are not pronounced as it is in other age groups.

Nutritional changes facing the elderly as a result of changes associated with their age must be managed through dietary means. Instead of the older adult receiving adequate nutrition to meet up with nutrition demand of the present physiological status, reverse is the case especially in the developing countries. The nutritional status is either too low or too high, which usually leads to health complication among the elderly. Revealed that 5-10% of elderly people living in the community setting are malnourished [4]. Nutritional status assessment of the elderly should be the first step taken in determining the policy framework for elderly wellbeing in Nigeria.

Malnutrition is becoming increasingly more common among the elderly population [5]. Also, [6] discovered malnutrition among 42.2% of elderly population assessed for morbidity pattern in a Nigeria health care institution The nutritional status of elderly have not been adequately studied in Ondo State, whereas its importance to health policy framework cannot be over-emphasized, hence this research.

Research Objectives

- To verify pattern of feeding, food intake as well as nutrients composition of the food of the elderly in Ondo State in order to establish a profound solution to situation of malnutrition among elderly
- To determine body composition of the elderly, using anthropometric indices
- To examine physical manifestation of malnutrition among the elderly

Materials and Methods

Sampling Frame

The population of Ondo Sate according to [7] and [2] revealed that the population was three million, four hundred and sixty thousand and eight hundred and seventy seven (3,460,877).

Sampling Techniques

Multistage sampling techniques were involved in this study in order to get the participants for the study. Ondo State was purposively selected because literature indicated low nutrition status among elderly in Ondo State but the causes of low nutrition status was not identified [8]. The research was conducted at three geo-political zones of Ondo State known as Senatorial Districts. These are; Ondo South, Ondo Central and Ondo North Senatorial Districts, each Senatorial District consists of six Local Government Areas (LGAs). Three Local Government Areas (LGAs) were selected out of the eighteen LGAs in the three Senatorial Districts (one from each Senatorial District) using simple random sampling method. Also, simple random sampling was used to select households with eligible participants. A total of three hundred and eighty five elderly was selected from each LGA which made up the total of one thousand five hundred and fifty five (1,155) elderly from the three Senatorial Districts. This means 0.9% of the total elderly population (128,053) was used as the sample size for the study.

Target Population

The target population in this study is the elderly people in Ondo State with age 60 years and above.

Sample Size

The Kish-Leslie [9] formula: $n_o = Z^2 \frac{pq}{e^2}$

n_o = estimated necessary sample size
z = the standard normal deviates
p = the estimated proportion of incidence of cases in the population
q = confidence level
e = the proportion of the sample error in a given population i.e. tolerable amount of error
At prevalence of 0.037 (prevalence of elderly in Ondo State 3.7%) was used to obtain the population of 1039.5 for the three Senatorial Districts and 10% of non-response 115.5 was added to make it 1155.

Study Design

This study is a cross-sectional study design, involving the three geo political zones in Ondo State.

Materials

Skin fold caliper, food models, dietary diversity score, Diagnostic scale, Height-o-meter, Non stretched tape and structured questionnaire.

The structured questionnaire accompanied with food models was used to determine
(i) Food intake (food history and rated using food diversity score).
(ii) Clinical Assessment; clinical examination such as abnormal changes in skin, eyes, muscle and other parts of the body was conducted to determine signs of vitamins and mineral deficiencies. This was assessed by physical examination of part of the body by trained personnel. Also, doctor's report presented by some of the respondents helped in determining their health condition.

Anthropometric assessment was taken using skin fold caliper, diagnostic weighing scale, height-o-meter and non-stretched tape. Height, weight and arm span were measured according to internationally accepted standard and protocol [10]. Arm span was used where the participant can no longer stand erect.
Body composition was determined using [11] equation;

$$\text{MUAMA} = \text{MUAC} - \pi \times \frac{\text{TSF}}{10}$$

$$MUAFA = MUAA\text{-}MUAMA$$

$$MUAA = \pi \frac{(MUAC^2)}{2\pi}$$

Note:
*MUAMA (Mid-Upper Arm Muscle Area); MUAA (Mid Upper Arm Area); MUAFA (Mid-Upper Arm Fat Area) and TSF is Triceps Skin Fold.
*Π= 3.14

Data Management

Pre meeting with the research assistants was held on how to relate with the participants. For example, questions asked by the participants during interview as observed during the pilot survey. The interviewers were interviewed with English language written questionnaires but were interpreted to the participants in Yoruba language when the participants seem not to understand the question clearly.

Data Analysis

Data entry and analysis were done with the use of scientific instruments. This involved the SPSS version 17. It detailed the analytical tools, including frequencies, percentage; Chi Square was used to determine the relationship between variables and Pearson correlations co-efficient was used to determine the strength and relationship between the variables.

Study Period

The research was conducted between July and December 2014. Prior to the main research, a pilot survey was conducted outside the study area by June2014 to test the reliability of the research materials and equipment. The same structured questionnaire and tools were used to try the cooperation of the participants, the error detected were corrected before the main research commencement.

Validity

In order to ensure validity for clinical examination, some standard previously validated questionnaire from Cambridge Scientific instrument for clinical assessment and tools for assessing vitamins and minerals deficiencies in seniors were used to validate questionnaire and modified accordingly for this study [12,13]. Also, Mini-nutrition assessment score and the risk for under nutrition in Free-living older persons were also used in the modification of the physical assessment tool used for this study [14]. Guidelines for measuring dietary diversity: A simple tool for developing and evaluating food and Nutrition security interventions was used to validate the tool used for dietary diversity [15].

Result

The socio-economic characteristic of the respondents show that 48% were males while 52% were females. The mean and standard deviation for age were 69.99±67.180 and 69.34±58.232 for males and females respectively. Some of the respondents engaged in different occupations but 34.89% depends on children and relatives. It also shows that 65.71% of the elderly monthly income/ allowance was between 5000 and 14000 naira and 14.89% earned 35000 and above (Table 1).

Variables	Frequency (n)	Percentage (%)
Age (yrs)		
60-64	465	40.26
65-69	489	42.34
≥70	**201**	**17.40**
Religion		
Christianity	782	67.70
Islamic	358	31.00
Traditional	15	1.30
Ethnicity		
Yoruba	987	85.45
Ibo	37	3.2
Ebira	131	11.34

Variables	Frequency (n)	Percentage (%)
Sex		
Male	554	48.00
Female	601	52.00
Civil servants	15	1.30
Private business	213	18.44
Artisan	56	4.85
Retired	312	27.01
Farmer	156	13.51
Depending on children/ relatives	403	34.89
Monthly income in Naira/Pounds (€305/naira)		
5000-14,000/ /16.39-45.9	759	65.1
15,000 -24,000/49.18-78.69	199	17.23
25,000- 34,000/81.96-111.48	25	2.17
35,000 and above114.75 above	172	14.89

Table 1: The socio-demographic/economic characteristics of the elderly (n=1155)

Daily Dietary Diversity

The daily dietary intake of the subject was assessed following the Guidelines for Measuring Households and Individual Dietary Diversity [15]. It shows that 30.48% ate cereals daily, 91.26% ate tubers daily. Vitamin A rich foods were only taken by 18.70% daily. Intake of milk and milk products was very low among the respondents, 4% only consume milk daily. Legumes, nuts and seeds were not taken by 50.82% of the respondents. Organ meat was poorly consumed by 8.83% of the respondents, fish was generally consumed by the elderly but the quantity was unable to meet the recommended food intake according to the food models used (Table 2).

Food groups	Example	Frequency (n)	Percentage (%)	Yes=1 No= 0
Cereals	Corn, rice, wheat, sorghum, millet or foods made from these (e.g., bread, *Pap*	352 803	0.48 69.52	Yes=1 No= 0
Tubers	White yam, white cassava, or other foods made from roots	1054 101	91.26 8.74	Yes=1 No= 0
Vegetables	Pumpkin, carrot, okro, amaranthus, corchorus	361 794	31.26 68.74	Yes=1 No= 0
Vitamin A rich foods	Ripe mango, ripe papaya, carrots	293 936	18.70 81.30	Yes=1 No= 0
Legumes, nut and seeds	Cowpeas, soybeans groundnut, melon seed	568 587	49.18 50.82	Yes=1 No= 0
Organ meat	Liver, kidney, heart or other organ meats	102 1053	8.83 91.17	Yes=1 No= 0
Flesh meat	Beef, pork, lamb, goat, rabbit, game, chicken, duck, other birds, insects	46 1109	4.00 96.00	Yes=1 No= 0
Fish and fish products	Fresh or dried fish or shellfish	1034 121	89.52 10.48	Yes=1 No= 0
Milk and milk products	Milk, local cheese or yoghurt	46 1109	4.00 96.00	Yes=1 No= 0
Oil and fat	Vegetable oil, animal fat	1139 16	98.60 1.40	Yes=1 No= 0
Spices and condiments	Turmeric, ginger, bouillon cube	531 624	48.57 54.03	Yes=1 No= 0

Table 2: Daily Dietary Diversity of the Elderly

Clinical Examination of the Respondents

The clinical assessment revealed physical manifestation of malnutrition among the respondents, there was general assessment

which shows wasting and skinning among 14.80% of the respondents. The assessment on the skin shows that 39.39% had no skin problem, eczema affected 9.95%, scaling skin was discovered among 10.21% and 31.34% had pigmentation changes. In the head 18.00% had temporal muscle wasting, in the hair 0.26% had easy to pull out hair. The mouth assessment especially the gingival showed that 18.01% had swollen, red, and easy to bleed gums. Also, 7.01% had angular-stomatitis and 61.29% had problem with chewing. In the abdomen 65.19% complained of constipation. The bone assessment accompanied by doctor's report of some of the respondents showed that the respondents have various form of bone and muscle problems. Bone ache affected 36.01%, osteoporosis affected 2.42% and 41.03 complained of joint pain (Table 3).

Clinical Assessment	Frequency	Percentage (%)
General		
No symptoms	634	54.90
Wasted, Skinny	171	14.80
Loss of appetite	**350**	**30.30**
Skin		
No skin problem	455	39.39
Eczematous	115	9.95
Scaling	118	10.21
Pigmentation changes	362	31.34
Thickness and dryness of skin	105	9.09
Head		
No symptom	782	67.70
Temporal muscle wasting	208	18.00
Hair		
No symptom	186	16.10
Spare and thin, dyspigmentation	172	14.89
Easy to pull out	3	0.26
Eye		
No symptom	138	11.94
History of night blindness	705	61.03
Photophobia, bluring	289	25.02
Conjuctional, inflammation	15	1.29
Corneal vascularization	8	0.69
Mouth		
No symptom	849	73.51
Glossitis	17	1.47
Bleeding gums	208	18.01
Cheilosis/angular stomatitis	81	7.01
Problem with chewing		
Yes	708	61.29
No	447	38.71
Abdomen		
No symptom	396	34.28
Constipation	753	65.19
Hepatomegaly	6	0.52
Bone and muscle		
Bone ache	416	36.01
Osteoporosis	28	2.42
Joint pain	474	41.03
Neurologic		
Dementia	81	7.01

Table 3: Clinical Characteristics of the Elderly

Anthropometric Characteristics

The BMI mean and standard deviation was 22.86±92.014 and 23.93±89.801 of the anthropometric indices showed that the respondents had normal BMI according to principle of nutritional assessment [16]. There was presence of hepatomegaly among some of the male respondents leading to abdominal mass which could affect the results of the waist hip ratio and irregularities in bowel evacuation due to constipation as well as the respondent's body shape. The males and the female's respondent MUAC (21.23±67.008; 22.53±22.53) shows that the respondents were wasting [16]. The mean and standard deviation of the respondents MUAMA is 23.80±54.203; 25.50±30.001 for male and female respectively. Also, the mean and standard deviation of the respondents MUAFA is 12.00±23.063; 14.105 for male and female respectively, which indicates wasting among the males respondents [11] (Table 4).

Variables	Male Mean±SD (n=502)	Female Mean±SD (n=653)
Age	69.99± 67.180	69.34±58.232
Weight (kg)	62.26±34.598	59.70±51.549
Height (m)	165.04±68.759	157.01±38.248
Arm span (cm)	169.74±99.202	162.30±80.999
BMI (kg/m^2)	22.86±92.014	23.93±89.801
Waist (cm)	39.19±73.743	35.01±37.601
Hip (cm)	37.72±24.543	42.87±30.073
Waist/hip ratio	1.03±68.011	0.81±34.579
Triceps (mm)	12.48±48.281	14.74±80.504
MUAC (cm)	21.23±67.008	22.53±60.091
MUAA(cm^2)	35.9±76.006	40.40±34.561
MUAMA(cm^2)	23.80±54.203	25.50±30.001
MUAFA(cm^2)	12.00±23.063	14.90±48.105

Table 4: Anthropometric Characteristics of the Elderly

Factors Influencing Anthropometric, Dietary intake and Clinical Characteristics of the Elderly

Age (r=-0.26; p=0.05) has significant association with BMI with negative correlation indicating that as the age increases, the BMI was reducing. There is a significant association between socio-economic status and milk intakes which shows that socio-economic status determines milk intake among the respondents (r=0.48; p=0.05). Clinical assessment of the respondents showed the relationship between low milk intake and bone ache (r=0.36; p=0.05), also, the analysis revealed a significant association between protein intake and muscle wasting (r=0.46; p=0.05), fruits and vegetables and back bone ache and joint pain (r=0.35; p=0.05) as well as fruits and vegetables and constipation (r=0.52; p=0.05) (Table 5).

Variables	Nutritional status	r	P
Age	BMI (anthropometric status)	-0.26	0.05
Socio-economic status	Milk intake (dietary intake)	0.48	0.05
Low milk intake	Bone ache (clinical status)	0.36	0.05
Protein intake	Muscle wasting (clinical status)	0.46	0.05
Fruits and vegetable intake	Back bone ache and joint pain (clinical status)	0.35	0.05
Fruits and vegetable intake	Constipation (clinical status)	0.52	0.05

Table 5: Correlation of some Variables with the Nutritional status of the Elderly

Discussion

This study assessed dietary intake, anthropometric characteristics and clinical characteristics of elderly in Ondo State, Nigeria. The total number of elderly that participated in this study was one thousand one hundred and fifty five (1,155). The dietary intake of the subjects was carried out using Guidelines for Measuring Households and Individual Dietary Diversity [15]. The result which was influenced by some factors such as, ageing and economic status showed that intake of milk and milk products among the elderly was 4%. Low intake of milk was discovered among the elderly this was majorly due to socio-economic status (r=0.48, p=0.05). The low intake of milk also had correlation with bone ache among the elderly (r=0.36, p=0.05). This scenario corroborates the work

of which revealed that there was a significant positive relationship between dairy nutrient consumption and Bone Mass Density (BMD) at the total hip and femoral neck in white and black elderly men [17]. Insufficient intake of essential nutrients such as calcium, magnesium, protein and phosphorus which are abundantly rich in milk and dairy products may cause fracture in bones [18]. Intake of flesh meats was 4% and fleshy meats intake was 8.3% among the elderly studied. There was a significant correlation between the protein intake of the elderly and muscle wasting as revealed by this study (r=0.46, p=0.05). Meanwhile, daily protein consumption and dietary derived amino acids, represents one of the few remaining alternatives to slow or prevent muscle protein catabolism [19]. Also, the author stated further that unfortunately, protein intake and efficiency of its use appears to decrease with age. Fish was observed to be taken generally by the subjects but the food models displayed to the respondents, proved low intake as majority claimed not to be taken up to the size of the fish model which was mode according to the size that can provide daily Recommended Dietary Allowance (RDA). The result of low level of protein intake was linked with economic status in this study.

Intake of vegetables and fruits among the elderly in Ondo State failed the Guidelines for measuring dietary diversity [15]. There was a significant correlation between bone ache, joint pain especially back bone pains and intake of fruits and vegetables in this study at r=0.35, p=0.05. The relationship of antioxidants rich foods such as fruits and vegetables as identified by showed that osteoporosis as a result of brittle bone can be reduced with a diet favoring 'alkaline ash' [20]. This is a type of diet emphasizing the ingestion of fruits, vegetables, protein, and moderate amounts of milk. The author stated further that the two nutrients that may have such buffering effects are potassium and magnesium, which are found in a variety of whole, unrefined foods, including fruit and vegetables.

Spices were highly taken by the elderly in Ondo South as it was observed during this study but occasionally taken by the elderly in the Ondo Central and North. Generally the intake of spices was 48.57% (Table 2).

Intake of energy giving foods were revealed to be optimum as the foods sources commonly consumed was cassava across the Senatorial districts, although some of the elderly was unable to afford the three square meal as traditionally taken by the people due to lack of money, isolation and loneliness as it was observed during this study. It was also observed that cereals and cereal products were rarely taken by elderly in Ondo South and Central but was commonly taken by elderly in Ondo North. The major source of carbohydrates is tubers especially cassava. Tubers especially cassava and its products has been discovered to have low or no other nutrient other than energy. Intake of oil and fat was generally high among the elderly studied.

Clinical characteristics of the subjects which were majorly attributed to dietary pattern showed that there was temporal muscle wasting among 14.80% of the sampled subjects. Energy balance and dietary protein intake are critical factors that contribute to the regulation of skeletal muscle mass by influencing whole-body and skeletal muscle protein metabolism [21]. History of night blindness was observed among 61% of the subjects while angular stomatitis was 7%. Constipation was very common among the elderly assessed and it was linked with low fibre intake (r=0.52, p=0.05). Bone ache was 36% and joint pain was 41%.

Dementia was discovered among 7% of the elderly studied. This disease is a sign of degeneration of brain cells as a result of oxidative stress directly damaging the cell component, resulting in synapses and nerve cell death. Antioxidant such as vitamin C and E will protect neurodegeneration1 [22]. Intake of vitamin B12 and folate which is essential to remethylation of homocysteine to cysteine as well as preventing tau protein accumulation and neuronal death will prevent the occurrence of the disease but there was low intake of the food sources of these vitamins among the elderly studied [23].

Anthropometric assessment showed that both the males (22.86kg/m^2) and females (23.93kg/m^2) participants had normal BMI. There was negative correlation between age and BMI (r=-0.26, p=0.05). Body composition of the elderly using MUAFA and MUAMA indicated malnutrition among some elderly males.

Conclusion

This study has revealed that malnutrition occurs in one way or the other among elderly in Ondo State. The BMI showed that majority were having normal nutritional status. Malnutrition was pronounced among the males than the females as revealed by MUAMA and MUAFA. Deficiencies of one or more nutrients were discovered with the use of clinical assessment. Also, it was observed that low socio economic status affect level of food intake among the elderly.

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