JDAN JOURNAL OF DIETITIANS ASSOCIATION OF NIGERIA

GENERAL INFORMATION
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Journal of Dietitians Association of Nigeria, official organ of Dietitians Association of Nigeria, is a peer reviewed journal published biannually (two volumes per year).

The major objectives of the journal are to:
- publicize the profession of Dietetics.
- disseminate information in the area of Nutrition and Dietetics and other related field of study.
- maintain high journal standards.
- produce two issue publications yearly.

The information for authors appears in the first volume issue of each year. Subject and author indexes appear in the second volume issue of the year.

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JOURNAL OF DIETITIANS ASSOCIATION OF NIGERIA
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1.   **Journal**:
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About Dietitians Association of Nigeria (DAN)

Dietitians Association of Nigeria (DAN) is an association of all dietitians in Nigeria. According to the International Confederation of Dietetic Association's (ICDA) definition, "a Dietitian is a person with a qualification in nutrition and dietetics recognized by national authority (s). The minimum level of education of a dietitian is a bachelor's degree and a period of supervised professional practice of at least 500h (internship programme in an accredited health facility). A dietitian applies the science of nutrition to the feeding and education of individuals and groups in health and disease ". DAN is an off shoot of Nigerian Dietetic Association (NDA) following the Federal Government approval on 4th August, 2008 of a Scheme of Service for Dietitians in Nigeria, structured on: GL 08-17(Federal) and GL 08-16 (State) for graduate dietitians (Professional/Officer Cadre) and re-designation of the sub-professional cadre as Assistant Dietitian cadre on GL 07-14 for those with Higher National Diploma.

DAN is registered with the Corporate Affairs Commission (CAC) of Nigeria and the International Confederation of Dietetic Associations (ICDA), incorporated in Canada. DAN is primarily a national association of all graduate dietitians with membership strength of over 250 registered Dietitians (RDs). Dietitians in any country are represented in the International Confederation of Dietetic Associations (ICDA) by only one national association and DAN is the national association for dietitians in Nigeria. DAN has participated in three major activities organized by ICDA in 2009/2010.

Mission: To ensure that Dietitians in Nigeria meet uniform minimum education and practice standards set by ICDA through accreditation of programmes and continious monitoring. Create awareness and promote evidence-based medical nutrition therapy.

Dietitians Associations of Nigeria supports members and the general public to achieve:
- An integrated communication system
- An enhanced image of the Dietetics profession
- An increased awareness of standards of education; training and practice in dietetics.

Role of Dietitians
Most people think that dietitians work primarily in a hospital or a Food Service setting. With increased consumer interest in healthy eating and advent of information technology, the role of the registered dietitian has evolved beyond this. Dietitians are essential members of the health care team and have a wide range of job opportunities.

Work places of Dietitians:
Hospital/ rehabilitation centre
Medical clinic with family physicians
Community health centre
Home Care services Nursing home/long term care facility
Health education/public health agency
Employee cafeteria
School food and nutrition service
Military food and nutrition service

Corrections food and nutrition service
Food industry (manufacturers/producers)
Catering/ hospitality industry
Pharmaceutical industry
Universities and/or colleges
Media
Consultant/ private practice
Other government department/ agency

Clinical Dietitians
They identify nutrition problems and assess the nutritional status of patients; develop care plans and monitor effectiveness of nutrition interventions; and counsel patients on therapeutic diet modifications.

In the community:

Public Health Nutritionists / Dietitians; Dietitians working in Community Centers:
They assess the nutritional needs of populations; identify community nutrition problems; and develop health promotion strategies, nutrition education programs and healthy eating resources. They work with individuals and groups to improve their nutritional well-being; prevent nutrition-related diseases; increase access to food and enhance personal control of health.

In Food Service management:

Administrative Dietitians manage food production, distribution and service of high quality meals/snacks, ensuring adherence to sanitation and safety standards and a cost effective operation. They manage Food Service Departments in hospitals and other health care facilities, schools, universities, and businesses and may be employed by contract food companies.

In private practice:

Consulting Dietitians:
They provide expertise in nutrition to promote health and prevent disease, counseling services for nutrition-related disease and disorders, and management advice to food service operations. They operate their own private consulting practices or businesses and work with, groups, workplaces, and media.

In industry:

Dietitians in Business and Industry assist the private sector with research, development, marketing, and consumer education. Working with food and pharmaceutical companies, marketing association and food service providers, dietitians are able to develop, promote and market better food and nutritional products.

In government, education and research:

Dietitians in government develop nutrition and food policy based on scientific evidence in consultation with stakeholder groups. They also direct and administer nutrition programs and services and may work at the Federal, State, Local Government or Community level.

Dietitians in Education teach nutrition, food chemistry or food services administration to students in nutrition and dietetics, nursing, medicine, pharmacy, or the food and hospitality industry. These courses are taught at various levels elementary and secondary school, college, university, professional schools and hospitals.

Research Dietitians plan and direct research projects which will ultimately enhance patient care and

improve the cost effectiveness of food service. Universities, health care facilities and industry all support research by Dietitians.

Standards of dietetic professional service.
To help clarify activities that are within defined RDs' scope of practice, six Standards of Professional Practice are described by ICDA and American Dietetic Association which can be adapted in individual area of practice:

STANDARD 1: PROVISION OF SERVICES

Dietitians provide effective quality client-centered dietetic service.

STANDARD 2: APPLICATION OF RESEARCH

Dietitians should be able to use research findings, generate or participate in research to enhance practice.

STANDARD 3: COMMUNICATION AND APPLICATION OF KNOWLEDGE
Dietitians should be able to apply and communicate unique body of knowledge in food and nutrition with others in different disciplines.

STANDARD 4: UTILIZATION AND MANAGEMENT OF RESOURCES
Dietitians should use available resources effectively and efficiently in practice

STANDARD 5: QUALITIES IN PRACTICE
Dietitians should continue to ensure that service rendered is in accordance with the ethical guidelines of the profession

STANDARD 6: CONTINUED COMPETENCE AND PROFESSIONAL ACCOUNTABILITY
Dietitians should engage in life long continuous learning to ensure competence in his/her area of practice.

From the editorial suite

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Vol. 6 (1) 2015

ORIGINAL ARTICLES

EFFECT OF PROCESSING ON THE NUTRITIONAL CONTENT AND ACCEPTABILITY OF AFRICAN YAM BEAN (AYB) (Sphenostylis Stenocarpia)

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ABSTRACT

BACKGROUND: African yam bean seed is a good source of protein (21-29% on dry matter basis). Despite its distinct food value, its use is still limited due to its hard-to-cook phenomenon, unacceptable beany flavor and odour.

OBJECTIVE: The study was carried out to determine the effect of processing (steaming and frying) on the nutritional content and acceptability of AYB.

MATERIALS AND METHODS:
Cream- colored AYB seeds were purchased from Umuahia main market, Abia State, Nigeria. The seeds were sorted, washed, soaked (for eight hours), dehulled and wet-milled into a paste, which was used in making moi-moi and akara ball respectively. The proximate and mineral content were assessed using the standard analytical methods.

A 20-member panel, who were regular consumer of cowpea moimoi and cowpea akaraball, assessed the sensory qualities (color, taste, Texture, aroma and overall acceptability) of the products using Nine-Point –Hedonic scale. Data were analysed using analysis of variance and Duncan;s multiple range test.

RESULTS: Frying increased the moisture (11-36%), ash (3.7-5.1g/100g), fat (1.4-27.3g/100g), protein (22.5-26.3g/100g) and sodium (2344-4336mg/l) contents, but decreased crude fibre (5.4-2.9/100g), carbohydrate (61-38g/100g), potassium (5419.19-4238mg/l), magnesium (948 -907mg/l), calcium (1592 - 1028mg/l), manganese (48.2-45.1mg/l) and Zinc (24.5-17.2mg/l) contents. Levels of sodium magnesium, manganese and zinc was significantly ($p<0.05$) increased by steaming. The akaraball and moimoi made from AYB were not significantly ($P<0.05$) different in colour, texture, aroma and overall acceptability compared to the cowpea akaraball and moimoi.

CONCLUSION: This study had shown that the moimoi produced by steaming and akaraball by frying have promising nutritional attributes. The sensory evaluation showed that akara and moimoi made from AYB were generally acceptable by the panellist.

KEYWORDS: African yam beans, processing, nutritional content and acceptability

INTRODUCTION

Protein energy malnutrition is endemic in Nigeria (case study south eastern part of Nigeria). The situation is now complicated by continual inflation, economic recession and insufficient local production of annual protein sources, inefficient system for distribution of animal protein sources and above all exorbitant cost of things making it out of reach of the common man (15). The low income group who constitute the bulk of the population are particularly at risk in such situation. They usually have no alternative but depend on cereals and legumes, which are cheaper than animal product (15).

African yam bean (SPHENOSTYLIS STENNOCARPA) is a grain legume which belongs to the papilicionaceae family of flowering plant. It is thought to originate from West Africa (12). The other names of African Yam bean in various languages are yam beans (English), girigiri (Hausa), sese (Yoruba), ukpodudu, ijiriji, asama (Igbo) and nsama (Ibibio)(12). The African Yam is produced and eaten in Imo, Anambra, Enugu, Cross River, Delta, Edo, Ondo and Oyo states. It has many seed types, which vary in seed size, shape and seed

coat colour. The colour of the seed coat varies from white to various shades of cream, brown and grey; some are mottled, with hilum being dark brown in colour. Some cultivars produce edible tubers, under the soil which may be up to 0.5kg in weight. (12). AYB seed is a good source of protein (21%-29% on dry matter basis). Although protein level of AYB is lower than that of soyabeans which is 38%, amino acids indicates that its lysine and methionine levels are better than that of soyabean (7). When properly cooked, AYB is very filling and lasting giving a lot of staying power and causing consumers of its meal to drink much water probably to aid digestion (8).

Akobundu et al.(3) reported that lack of the knowledge of functional, chemical and nutritional properties of legumes grown in developing countries is responsible for inextensive use of these traditional crops in different food formulation.

However, legumes such as AYB seeds are not generally eaten in the fresh state or raw but as processed products- such as akaraball, moimoi, pottage using the following processing methods-frying, steaming, cooking, toasting e.t.c (3).

The different processing methods given to foods are important in agricultural production and marketing, as it adds value to agricultural products by converting them into a form that is readily available and more acceptable to the consumer. The different processing methods given to AYB seeds influence their nutritive contents and acceptability. Hence, there is a need to study the effect of the processing method on the nutritive content of AYB seeds in order to advice the consumers on the best processing methods to use.

MATERIALS AND METHODS.
Sample collection:
The raw material for the research work-cream coloured AYB seeds were purchased from Umuahia main market Abia State. Nigeria .

PREPARATION OF FOOD SAMPLES FOR ANALYSIS
Standard recipe are developed for the preparation of the foodstuff. Developed recipe used were extracted from a text book (5)

PREPARATION OF AYB AKARABALL(FRIED BEAN PASTE)

INGREDIENTS	QUANTITY
AYB seed	500g
Onions (sliced)	120g
Fresh pepper(ground)	60g
Salt	5g
Water	750ml
Vegetable oil for frying	1.5l

The AYB seed was stored, washed with clean water and soaked for 8 hours, dehulled and wet-milled into a paste. Then the paste was emptied into a mortar and whipped continuously with a pestle in a clockwise direction until it is was fluffy. Sliced onions, ground pepper, salt and maggi were added into it and mixed gently. The mixture was scooped with a tablespoon into the hot oil and fried both sides for 5-8 minutes until it turned golden brown in colour . The fried AYB paste was removed from hot oil and drained in a colander.

PREPARATION OF AYB MOIMOI (STEAMED BEAN PASTE)

INGREDIENTS	QUANTITY
AYB seed	500g
Fresh pepper(ground)	30g
Vegetable oil	180ml
Onions (ground)	100g
Hot water (70°C)	1.5l
Maggi cube	4g
Salt	5g

The AYB seed was sorted, washed with clean water and soaked for 8 hours, dehulled and wet milled into a paste. Then hot water was added and stirred until a smooth paste was formed. All the ingredients were mixed into the paste. The groundnut oil was poured into the mixture. The mixture was stirred thoroughly with a spatula then scooped into aluminium cups and steamed over a boiling water in a pot for 30-45 minutes.

CHEMICAL ANALYSIS

The moisture, protein, ash, crude fibre and fat content of the samples were analyzed using the standard methods of AOAC (4) . Carbohydrate was determined by difference. The minerals sodium (Na) and potassium (K) were determined by using the flame photometer. Others were determined by atomic absorption spectrophotometer as described by Ranjiham and Gopa (18).

Sensory evaluation

This was carried out using 20-member panel which was made up of both students and staff of the College of Food Processing and Storage Technology, Michael Okpara University of Agriculture Umudike, Abia State, Nigeria. The sensory parameters-colour, taste, texture, aroma and overall acceptability were rated on a 9-point hedonic scale. The evaluation was carried out in a well ventilated spacious room. The samples were served simultaneously in clean white plates with cutleries. Portable water was provided for rinsing of mouth between samples. Cowpea akara and moimoi served as control

Data analysis

Data were subjected to analysis of variance and means were separated by Duncan's new multiple range test. (20).

RESULTS
Proximate composition

The effect of frying and steaming on the proximate contents of AYB seed is shown on table 1. The moisture content was increased to 36% by frying and 39% by steaming. Frying showed an increase in the ash content relative to the raw samples, while steaming decreased the ash content. Frying showed a drastic increase in the fat content. Frying and steaming increased the protein by 16.9% and 6.67% respectively. Frying caused a decrease in the crude fibre content as compared to the raw AYB likewise steaming. Frying reduced carbohydrate content drastically as compared with the raw AYB (61-38/100g edible portion). While steaming showed a slight decrease by 6.6%.

Mineral composition

There was significant ($p < 0.05$) reduction in potassium content. Frying reduced it by 21.8% while steaming was by 16.6% (table 2). Frying and steaming significantly ($p < 0.05$) increased sodium but decrease calcium content. Frying significantly ($p < 0.05$) decreased magnesium, manganese and zinc content by 5.1%, 6.4%, and 29.8% respectively. The magnesium, manganese and zinc contents were significantly increased by steaming.

Sensory attributes

Table 3 shows the sensory evaluation of akaraball and moimoi made from AYB and cowpea paste. The akaraball made from AYB were not significantly different ($p < 0.05$) in colour, taste, texture, aroma, and overall acceptability compared to the cowpea akaraball (CPA), while there was significant ($p < 0.05$) difference between the taste of AYB moimoi and cowpea moimoi. The colour, texture, aroma and general acceptability of the AYBM had no significant ($p > 0.05$) difference with the CPM.

Table 1. EFFECT OF FRYING AND STEAMING ON THE PROXIMATE CONTENTS OF AFRICAN YAM BEAN SEED

Nutrients	Raw AYB	Frying	Steaming
Moisture (%)	11	36	39
Ash g/100g	3.7	5.1	2.9
Fat g/100g	1.4	27.3	12.0
Protein g/100g	22.5	26.3	24.0
Carbohydrate g/100g	61	38	57
Crude fibre g/100g	5.4	2.9	2.4

Table 2. EFFECT OF FRYING AND STEAMING ON THE MINERAL CONTENTS OF THE AYB SEED

Mineral elements (mg/l)	Raw AYB	Frying	Steaming
Potassium	5419.19[a]	4238.00[b]	4519.00[b]
Sodium	2344.00[c]	4336.00[a]	4238.00[b]
Calcium	1592.00[a]	1028.00[b]	971.00[c]
magnesium	948.00[a]	907.00[b]	952.00[a]
Manganese	48.200[b]	45.100[c]	51.450[a]
Zinc	24.500[b]	17.200[c]	27.300[a]

Means in the same row with different superscript are significantly different ($p<0.05$)

Table 3. Sensory scores of akaraball (fried bean paste) and moimoi (steamed bean paste) from AYB and cowpea paste

Attributes	AYBA 100%	CPA 100%	AYBM 100%	CPM 100%
Colour	7.50±1.40[a]	6.05±2.21[b]	5.45±1.82[a]	5.75±1.83[a]
Taste	6.20±1.77[a]	6.35±1.98[a]	4.20±1.85[b]	6.20±2.04[a]
Texture	6.85±1.32[a]	5.35±1.84[b]	6.30±1.89[a]	6.65±1.46[a]
Aroma	5.95±1.99[a]	6.30±1.72[a]	6.05±2.30[a]	6.65±1.60[a]
Overall acceptability	6.85±1.60[a]	6.75±1.59[a]	6.00±1.30[a]	6.70±1.45[a]

Values in the same row with difference superscripts are significantly different at $p<0.05$ for each snack.
Sample:
AYBA= African Yam Bean Akara; CPA= Cowpea Akara
AYBM= African Yam Bean Moimoi; CPM= Cowpea Moimoi

DISCUSSION

The increase in the moisture content by frying and steaming might be attributed to the pre-treatment given to the seed (i.e. soaking for 8hours) and also the addition of water during wet milling and in the preparation of the products. The above report corresponded to the earlier remark of Omnigho et al., (17) and Frank et al., (9).

Frying showed an increased in the ash content by 37.8% and there was a decrease by steaming method in the ash content by 21.6%, this could be linked to the different processing method used. The significant increase in fat content by both frying

and steaming was due to the oil used in the pre-preparation of the products, this is in an agreement with the report of Mcwatters (11) and Frank et al., (9). Frying and steaming increased the protein content by 16.9% and 6.67% respectively. The increase in the protein content is in close agreement as reported by Achinewhu et al.,(1). The significant decrease in crude fibre content of both frying and steaming compared to the raw samples were due to the pre-preparation treatment-dehulling. Seed coats of legumes contributes significantly to their fibre content (10,21).

It was observed that there was a slight reduction in the carbohydrate content of the steaming method. Frank et al.,(9) reported similar reduction in the carbohydrate content of steamed bean paste.

A significant reduction in potassium, magnesium, calcium, manganese and zinc content was observed in frying method in relation to the AYB raw samples as well as the potassium and calcium contents of the steaming method. Major minerals in AYB hull in order of magnitude are calcium, potassium, phosphorus, magnesium, sodium and iron, others are in trace (2,13). The increase in sodium content both in the frying and teaming method is due to the ingredients added to the AYB paste.

The result of the sensory evaluation showed that in terms of colour, texture and aroma the AYB akara and moimoi compared favourably with the cowpea akara and moimoi. This agreed with the finding of Achinewhu et al., (1), and Frank et al., (9).
In terms of taste, the AYB akara compared favourably with the cowpea akara but the panellist preferred the cowpea moimoi to the AYB moimoi. The aroma of the AYB products was acceptable by the panellists. This might be attributed to the pre-treatment (soaking for 8hours) given to the AYB seeds. STS (19) and Enwere et al (6) reported that soaking reduces beany flavours in legumes seeds.

There was no significant (p>0.05) difference in the overall acceptability of the AYB products from the control. This indicates that AYB could gain popularity with increased usage. Hence, AYB could be substituted for cowpea, when not available or at a higher prize margin compared toAYB(14,17,1).

CONCLUSION
The study had shown that moimoi (steamed bean paste) and akara (fried bean paste) have promising nutritional attributes. Moimoi contained more potassium, magnesium, manganese and zinc than the raw seed and akara. While akara contain more sodium and calcium than moimoi. This indicates that the under-utilized African Yam Bean could be used with advantage to economically produced nutritious diets to combat malnutrition.

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PREVALENCE OF CARDIOVASCULAR DISEASE RISK FACTORS AMONG ADULTS IN OZUBULU, ANAMBRA STATE, Nigeria

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ABSTRACT

Background and Objective of the Study: Cardiovascular diseases (CVD) are growing contributors to global disease burdens in many regions of the world experiencing rapid health transition. Risk factors are diabetes, high blood pressure and obesity. The objectives of the study include assessing the prevalence of diabetes, high blood pressure and obesity in adults in Ozubulu, Anambra State, Nigeria and relationship between anthropometric indices and risk of developing CVD.

Methods: Four hundred adults (males and females) forty to sixty were randomly selected. Standard methods were used to determine the height measurement, weight measurement, mid-upper arm circumference waist-hip circumference, blood sugar and blood pressure. The data collected were analyzed using descriptive statistics (means, standard deviation, frequency, percentage, student's t-test and correlation coefficient).

Results: Results show that prevalence of diabetes was 29.0%, 13.4% of the subject had mild high blood pressure, 5.8% had moderate high blood pressure, 14.0% had severe high blood pressure and 66.8% had normal blood pressure. The prevalence of obesity was 13.5%, 9.3% of the subjects were at low risks of developing coronary heart disease, 12.5% were at moderate risk while 78.2% were at high risk. Significant association ($p<0.05$) exists between waist-hip ratio and sex. Females (51.4%) were at higher risk of developing CHD than males (48.6%). A strong and positive significant correlation ($r=0.113$, $p=0.024$ at 0.5 level of significant) with blood sugar.

Conclusions: The study has shown a prevalence of 12.8%, 21.3% and 11.5% underweight overweight and obese respectively. High arm circumference and waist circumference are indicators of overweight and obesity which has been found to be predisposing factors to diabetes.
Keywords: Adult, Diabetes, High Blood Pressure, Obesity and Anthropometric Indices.

Introduction

Cardiovascular diseases (CVD) are groups of underlying disease that affect the heart.
They are growing contributors to global disease burdens in many regions of the world experiencing rapid health transition (1). Cardiovascular diseases are the number one cause of death globally and are projected to remain the leading cause of death (2). Diet and nutrition are associated with cardiovascular disease risk factors e.g. diabetes, high blood pressure and obesity (1). Cardiovascular disease deaths contributed to 34% of global mortality in women and 28.2% of all deaths in men (3). Nutrition transition characterized by changes in diet and lifestyle increasing urbanization going on in developing countries of which Nigeria is one has contributed to increased prevalence of some cardiovascular risk factors. Studies have reported a high prevalence of cardiovascular risk factors among Nigeria population (4, 5, 6). This study is therefore aimed at assessing the prevalence of diabetes, high blood pressure and obesity (cardiovascular disease risk factors) amongst adults in Ozubulu, Anambra State, Nigeria.

Materials and Methods:

The cross sectional study was carried out in Ozubulu in Ekwusigo Local Government Area of

Anambra State, Nigeria. Ozubulu is made up of four villages which include, Ezeara Amakwa, Nza and Egbema. The major occupations of the people are subsistence farming, trading, craft work and civil service.

Subjects: A total of four hundred adults comprising of 164 males and 236 femaleswithin the age range of 40 to 60years were used for the study.

Data Collection:

For this cross sectional study, the four villages that made up Ozubulu were used as a study site for four different days. A preliminary visit was made to the village heads and oral consent was then obtained. Announcement was made for adult men and women from 40years and above to gather in a village town hall. They were asked during the announcement to be on fasting state 10 – 12 hours in order to benefit from the study.

Three trained research assistant were used for data collection. One research assistant measured their weight, height, mid-upper arm and waist-hip circumference. Another measured their blood pressure and the other measured their fasting blood sugar. The ethical committee of Nnamdi Azikiwe Teaching Hospital Awka, approved the study protocol.

Anthropometric Measurements: Body weight and height were carried out using standard procedure (7). Body weight was measured with a Hanson bathroom scale of 120kg capacity and recorded to the nearest 0.1kg.the bathroom scale was calibrated from time to time with known weights. The measurement was done with minimum indeect clothing without shoes. Height was measured with wooden wall metre rule without shoes and with the subjects arm hanging freely at his/her sides. Recording was done to the nearest 0.1kg. The body circumference of waist and hip were obtained using tape measure calibrated in cm as described by Satzman and Mogensen (8). Body mass index (BMI) was calculated as the weight in kilograms divided by the height in meters square (kg/m^2). The BMI of the subjects were classified accordingly to WHO (9) to detect underweight, normal weight, overweight.The waist hip ratio was analyzed accordingly to WHO (10).

Biochemical Test: Blood Pressure and fasting blood glucose was carried out according to method described by Ngwu et al. (11). Blood pressure was measured with sphygmomanometer and a stethoscope.

In a sitting position with leg uncrossed and arm supported, a compression cuff was wrapped around the respondents' upper arm and inflated. The machine was set out as the air in the cliff was released. Stethoscope was used to detect when blood starts to flow through the artery and readings (Systolic and Diastolic) were recorded.

Fasting blood glucose level was measured using an accu-check glucometer with measuring range of 10 – 600 mg/dl (0.6 – 33.3 mmd/l). Accu-check active glucose test trip was inserted into the glucometer. Glucometer was automatically turned on; cotton wool was used to apply methylated spirit on the respondents' finger tip (the thumb) to sterilize the area. An accu-check softdix lancet was used to prick the fingertip.

When a dropping sign was seen on the display of the glucometer, a small drop of the subjects' blood was applied on the middle of the orange coloured, square application area of the test strip. The level of glucose in the subjects' blood measured and displayed by the glucometer was recorded.

Blood pressure and fasting blood glucose values obtained were classified accordingly (12)

Data Analysis: Data collected were analyzed using Statistical Package for Social Science (SPSS), for windows version 15. Descriptive statistics such as means, standard deviation, frequency, percentage, student's test were computed correlation coefficient was done.

Results:

Table 1 shows the characteristics of the subjects according to sex. Analysis of the table shows that 41% of the subjects were males while 59% were females. The age of the subjects ranged from 40 – 60 years with majority (59.2%) in the age range of 50 – 60 years. The prevalence of underweight was 12.8%, overweight was 21.3% and obesity was 13.5%. More females (51.4%) than males (48.6%) were at risk of developing coronary heart disease. Generally, 78.2% of the subjects were at high risk of developing coronary heart disease and only 9.3% were at low risk significant association (P 0.05) exists between waist hip ratio and sex. More female (58.9% and 56.5%) respectivelyhad severe and moderate high blood pressure. Significant association (P 0.05) exists between systolic blood pressure and sex. The highest prevalence of diastolic blood pressure was found in female (63.6%) while (36.4%) were found in male. The prevalence of diabetes was 29%.

Table 2 shows the mean anthropometric measurement of the respondents by sex. It was observed that the mean weight, BMI, Arm circumference and waist circumference of the male and female respondents were not significantly difference (p0.05) while the male had significantly (P0.05) higher height (1.63m) than the females (1.59m) The hip circumference of the female (101.24cm) was significantly (P0.05) higher than the male (97.06cm) while their waist hip ratio (0.88) was significantly lower than males (0.92).

Table 3 shows the correlation between anthropometric and biochemical measurements of the respondents.Height (m) was strongly and significantly but negatively correlated to systolic blood pressure (r = -0.163, p = 0.001 at 0.01 level of significance).

This implies that respondents that were shorter had higher systolic blood pressure. Height was also significant and positively correlated to diastolic blood pressure which implies that the taller the respondents, the higher their diastolic blood pressure (r =0.116, p= 0.020 at 0.05 level of significance). There was a strong and positive and significant correlation (r = 0.135, p = 0.007 at 0.01 level of significance) between BMI systolic blood pressure. Arm circumference were found to be positively and significantly correlated (r = 0.113, p= 0.024 at 0.05 level of significance) with blood sugar.

Waist hip ratio was significantly correlated (r = 0.107, p = 0.032 at 0.05 level of significance) to diastolic blood pressure.

Discussion: Overweight and Obesity have been recognized as major modifiable risk factor for chronic disease and is a public health problem which requires both preventive and therapeutic control. High prevalence of obesity (64.8%) in female is in line with studies of Flegal et al (13) which reported that nearly one third of US adults are obese (31 %) with black women having the highest rate (50%) and white men having the lowest (27.8%).

Most (78.2%) of the subjects have high risk of coronary heart disease and these were more in females (51.4%). High waist hip ratio is an indicator of risk of diabetes and other chronic disease (14). Abnormal fat distribution is associated with a range of adverse health consequences including an increased risk of coronary heart disease which is closely associated with hypertension (15).Presence of systolic and diastolic hypertension amongst the subjects exposes them to cardiovascular disease. The scenario is worsened when it is coupled with Obesity and diabetes.

Highest prevalence of systolic and diastolic hypertension was found in female (58.9% and 63.6%) respectively. Correlation analysis revealed strong and significant correlation between systolic blood pressure and height which implies that respondents that were shorter had higher systolic pressure. Strong and positive significant correlation between BMI and systolic blood pressure implies that Obesity is a predisposing factor to hypertension and waist circumference. High arm and waist circumference are indicators of overweight and obesity which have been found to be a predisposing factor to diabetes whose prevalence was 29.0%.Positive correlation between waist hip ratio and diastolic blood pressure indicated that increasing WHR predisposes individual to high diastolic blood pressure.

High prevalence of diabetes in females (62.1%) might be connected to the high prevalence of obesity in them.Studies have consistently shown that obesity is more in females than males (16).this implies that females might develop type 2 diabetes Mellitus than males because of their greater susceptibility to Obesity, a risk factor for developing diabetes.

Conclusion

There is an indicator of high prevalence of cardiovascular disease risk factor such as obesity (12.8%) diabetes (29.0%) and high blood pressure (5.8%) respectively among the population studied. Prevalence of these were higher in females than males. Uncontrolled hypertension and diabetes if not properly managed can lead to serious end organ damage which may include heart disease, stroke, blindness and renal disease. There is need for the establishment and strengthening of cardiovascular disease and associated risk factor surveillance systems in the state using the World Health Organization surveillance for non communicable diseases. Such will encourage early detection and life style modification which will help in controlling the hazards associated with such diseases.

Table 1 Characteristic of the Subjects According To Sex

	Male = 164	female = 236	Total
Age range (Years)			
40 – 50 years	30.7	69.3	40.8
51 – 60 years	34.2	65.8	59.2
BMI (kg/m^2)			
Underweight < 18.5	47.1	52.9	12.8
Normal 18.5 – 24.9	39.7	60.3	52.4
Overweight 25 – 29.9	44.7	55.3	21.3
Obese (>30)	35.2	64.8	13.5

$$X^2 (2.243), P(0.523)$$

Waist Hip Ratio

Low risk	10.8	89.2	9.3
Moderate risk	16.0	84.0	12.5
High risk	48.6	51.4	78.0

$$X^2 = (34.26), P(0.01)$$

Systolic Blood Pressure

Mild (140 – 159)	64.8	35.2	13.4
Moderate (160 – 179)	43.5	56.5	5.8
Severe (> 180)	41.1	58.9	14.0
Normal (<140)	36.0	64.0	66.8

$$X^2 = 15.52, P(0.001)$$

Diastolic Blood Pressure

Mild (90 – 99)	46.7	53.3	7.5
Moderate (100 – 109)	47.3	52.7	13.8
Severe (>110)	36.4	63.6	2.8
No HBP (<90)	38.5	61.5	76.0

$$X^2 = (4.417), P(0.220)$$

Fasting Blood Glucose Level mg/dl

Low (<70)	38.9	61.1	13.5
Normal (70 – 99)	44.7	55.3	47.5
Prediabetes (100 – 125)	35.0	65.0	10.0
Diabetes ≥125 mg1dl	37.9	62.1	29.0

$$X^2 (2.243), P(0.523)$$

Variables	Male = 164	female = 236	Total
Age range (Years)			
40 – 50 years	30.7	69.3	40.8
51 – 60 years	34.2	`65.8	59.2
BMI (kg/m^2) Underweight < 18.5	47.1	52.952.9	
Normal 18.5 – 24.9	39.7		
Overweight 25 – 29.9			
Obese (>30)			

Table 2: Mean anthropometric measurement by sex

Variables	Male (n =164) Mean $\pm$ SD	Female (n = 2) Mean $\pm$ SD	Significance Difference
Weight(kg)	64.45 $\pm$ 17.67	61.36 $\pm$ 14.55	NS
Height (m)	1.635 $\pm$ 0.082	1.587 $\pm$ 0.073	SF
Body mass index	23.98 $\pm$ 5.774	24.26 $\pm$ 5.111	NS
Arm circumference	30.05 $\pm$ 3.894	30.13 $\pm$ 4.304	NS
Waist circumference	88.94 $\pm$ 12.00	89.54 $\pm$ 11.53	NS
Hip circumference	97.06 $\pm$ 9.989	101.2 $\pm$ 11.53	SF
Waist hip ratio	0.915 $\pm$ 0.055	0.883 $\pm$ 0.050	SF

NS indicate no significant difference (P > 0.05)
SF indicate significant difference (P < 0.05)

Table 3: Correlation B/W Anthropometric and Biochemical Measurements of the Respondents

Anthropometric	Blood glucose	Systolic	Diastolic
Weight	0.048	0.022	0.037
	(0.339)	(0.667)	(0.460)
Height	0.043	-0.163[xx]	0.116[x]
	0.387	0.001	0.020
BMI	0.051	0.135[xx]	-0.005
	0.312	0.007	0.928
Arm circumference	0.113[x]	0.049	0.036
	0.024	0.330	0.476
Waist circumference	0.099[x]	0.030	0.062
	0.048	0.548	0.220
Hip circumference	0.076	0.020	0.016
	0.129	0.685	0.753
Waist/hip ratio	0.087	0.034	0.107[x]
	0.083	0.497	0.032

Values are pearson correlation coefficient (P- value)
xx correlation is significant at the 0.01 level
x correlation is significant at the 0.05 level

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Vitamin A rich sources and their contribution to intakes of households in Aba South Local Government Area of Abia State.

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ABSTRACT

Objective: This study was undertaken to assess the consumption pattern of vitamin A rich foods and also to determine the nutrient intake among households in Aba South Local Government Area of Abia State.

Methodology: One hundred and sixty-three (163) respondents were selected for the study using a random sampling technique. A structured questionnaire was used to obtain information on the socio-economic status, food habits and consumption pattern of vitamin A-rich foods and the amount of money used weekly in purchasing those foods by the households sampled. Information on food intake was obtained using diet history method (24-hour diet recall). A sub-sample of 7 households was used for the weighed food intake study. The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 18. The average weighed nutrient intakes for the 3-day weighed food intake study were calculated using Platt (1985) food composition table.

Results: It showed less than a quarter (19.3%) of the respondents consumed fruits and vegetables daily and 0.2% spent above N2000 on fruits and vegetables weekly. Twenty four hour dietary recalls revealed that 23.9% consumed pumpkin leaf, 16.0% consumed pawpaw while 14.1% consumed mango. The male subjects did not meet the Recommended Nutrient Intake (RNI) for all ages for vitamin A except for ages 16-19 years while the female subjects did not meet the RNI for all ages for vitamin A.

Conclusion: Most of the vitamin A rich foods consumed by respondents were not cultivated by them but purchased from the market; this must have predisposed them to low consumption of these foods. Home gardening in the area should be encouraged.

BACKGROUND OF STUDY

Vitamin A deficiency is a major public health problem in less-developed and developing countries. It is a major cause of morbidity and mortality in chronically undernourished and undeserved population (1). Vitamin A deficiency affects an estimated 125-130 million preschool-aged children and 7 million pregnant women in low-income countries (2). While there has been substantial progress towards its global control in the new millennium (3), vitamin A deficiency remains an underlying cause of at least 650,000 early childhood deaths from diarrhea, measles, malaria and other infections each year (4). It is recognized as a critical factor in child health and survival. Vitamin A deficiency leads to lowered immunity and increased rate of illness and death. It is one of the most serious nutritional diseases often associated with protein-energy malnutrition (PEM).

Vitamin A is used generically for all β-ionone derivatives (other than carotenoids) that have the biological activity of all-trans retinol (5). Preformed vitamin A is found almost exclusively in animal products such as human milk, glandular meats, liver and fish liver oil, egg yolk, whole milk and other dairy products. Preformed vitamin A is used to fortify processed foods such as sugar, cereals, condiments, fats and oil (6). Provitamin A carotenoids are found in green leafy vegetables (e.g. spinach, amaranthus, and young leaves from various sources), yellow vegetables (e.g. pumpkins, squash and carrots), and yellow and orange non-citrus fruits (e.g. mangoes, apricots and pawpaw). Red palm oil produced in several countries worldwide is, especially rich in provitamin A (7).

Vitamin A plays important roles in the general well being of an individual. Such roles include maintaining epithelial barrier, regulating cellular and antibody-mediated immunity (8) as well as improving colour vision and vision in bright illumination (9). Retinoids control the expression

of enzymes involved in the synthesis of some endogenous compounds (10).The FAO food disappearance data (11) reported that the supply of food vitamin A is generally high in industrialized countries, with most derived from the highly available retinyl esters. Conversely, for most of the developing countries such as Nigeria, the total supplies are appreciably lower. Also, the major source of vitamin A available to most individuals in developing countries is provitamin A, the utilization of which may be affected by dietary and other factors.

This study was undertaken to assess the consumption pattern of vitamin A rich sources and determine the nutrient intake of vitamin A among households in Aba South L.G.A

MATERIALS AND METHODS
Survey Area
The survey was carried out in households in Aba South L.G.A of AbiaState, Nigeria. Aba South L.G.A is located about 64Km from Umuahia the State Capital and the commercial nerve centre of the Southeastern States of Nigeria. It is situated between longitude 7° 24' and 8° 21' North and latitude 9° 50' and 10° 31' East of the equator with the central coordinate of 1200 meters South and 150 meters West. It is bounded on the North by the Aba North L.G.A., while on the East, it is bounded by Obingwa L.G.A., West and South, it is bounded by the Ugwunagbo L.G.A. It has a population of about 425,033. (12).

Study Design
The study was a cross sectional survey. It was carried out between April and July.

Sample selection
The sample size of this study was determined using the following below:

$$1 - p) \times \left(\frac{z\alpha}{d}\right)^2 \quad \text{according (CDC, 2001)}$$

Where $p =$ Proportion or a best guess about the value the proportion of interest. If we have no information about p, the $p = 0.5$ is a conservative estimate

$d =$ the distance (or tolerance level) - how close to the proportion of interest the estimate is desired to be. For this work, it is within 0.05.

Z $\alpha =$ the probability of making an error under the one-sided comparison table.

$n =$ the sample size.

Data collection
The structured questionnaire was validated by some academic staff of Department of Home Science, Nutrition and Dietetics, University of Nigeria, Nsukka for data collection. The selected questionnaire items were pre-tested on thirty women in Aba North L.G.A who were not involved in the main study. After the pre-test, the questionnaires were modified and used for the main study. The questionnaires were distributed to the respondents by the researcher and a trained assistant in their homes and work places.

The structured questionnaire was used to collect information on the socio-economic status of respondents, their food habits and food consumption pattern of vitamin A rich foods. Information was collected on diet history (24-hour diet recall) by interview. The subjects were mothers who prepare the family meals and some adolescent girls.

Weighed food intake
After the interview, sub-sample of seven households out of the one hundred and sixty-three households interviewed was chosen for detailed dietary study. The seven households were not deliberately selected. They were those that agreed to participate in the detailed food consumption and individual food intake. The weighed food intake was done by weighing the raw ingredients used to prepare the food separately prior to cooking. The cooking pot (empty) with lid was weighed prior to putting anything inside it. After cooking, the cooked food was weighed with the pot and then the initial weight of the pot was subtracted to obtain the actual weight of the food. But for foods that were too much to be weighed on the weighing scale, they were divided into two and weighed. After the weight of the whole food, the portions of food consumed by participants were weighed and subtracted from the weight of the whole food to get the left over. The age of every member of the family who participated in the weighed food intake was recorded.

The average weighed nutrient intake for a 3-day study was calculated using Platt (14) food composition table. The adequacy of each nutrient was estimated as percentage of FAO/WHO (15) requirement for each member using the formula:

$$\frac{Nutrient\ intake}{Nutrient\ requirement} \times \frac{100}{1}$$

The subjects were instructed to report any food consumed outside home when the researcher might

have gone. The Platt Food Composition Table was used to determine vitamin A consumed as well as other nutrients.

Data Analysis

The data collected were subjected to analyses using SPSS (Statistical Package for Social science) Version 14 to obtain frequencies and percentages. Food composition table (14) and Oguntona and Akinyele (16) were used to calculate the nutrient intake of the subjects in a 3-day weighed-food intake study. Food intake data was converted to raw food values and calculated as mean nutrient intakes. Group means were calculated and separated into age groups. Adequacy of nutrient intakes was assessed as percentage of FAO/WHO (15) requirement.

The retinol equivalent was determined by multiplying vitamin A value with 0.3µg. This converted beta carotene to retinal equivalent (the form in which vitamin A is absorbed and used in the body).

RESULTS

Table 1: The Socio-economic status of the Subjects

	Frequency	Percentage
Education		
No formal education	5	3.1
Primary School completed	8	4.9
Secondary School completed	30	18.4
Tertiary education completed	120	73.6
Total	**163**	**100.0**
Occupation (Breadwinner's employment)		
Skilled job	21	12.9
Unskilled job	8	4.9
Unemployed	8	4.9
Civil servant	104	63.8
Trader	18	11.1
Farmer	2	1.2
Pensioner	2	1.2
Total	**163**	**100.0**
Household size		
1-4	50	30.7
5-8	91	55.8
> 8	22	13.5
Total	**163**	**100.0**
Income range (breadwinner) ₦		
Less than 10,000	22	13.5
10,000-30,000	85	52.2
31,000-69,000	32	19.6
70,000 and above	24	14.7
Total	**163**	**100.0**

From Table 1, 3.1% of the respondents had no formal education, 4.9% completed primary school, 18.4% completed their secondary school and 73.6% had completed education. Some 63.8% of the respondents were civil servants, 12.9% had skilled jobs, 4.9% had unskilled jobs, 4.9% were unemployed, 11% were traders and 1.2% were farmers or pensioners.

More than half(55.8%) of the respondents lived in household of 5-8 members, 30.7% had 1-4 members, 13.5% had 7-9 members and 9.2% had 10 and above household members.

Slightly more than half (52.2%) of the breadwinners earned between N10, 000 and N30, 000 per month, 19.6% earned between N31, 000 and N69, 000, 14.7% earned between N70, 000 and above and 13.5% earned less than N10, 000.

Table 2: 24 hour Diet Recall
Table 2a: Roots and tuber/fruits, cereals and legumes

List of foods	No of Subject	Percentage
Roots and Tuber/Fruits		
Yam and Yam product	105	64.4
Cassava & cassava product	135	82.2
Cocoyam	54	33.1
Sweet potatoes	34	20.9
Irish potatoes	23	14.1
Plantain	54	33.1
Bread fruit	28	17.2
Cereals		
Rice	114	69.9
Maize	38	23.3
Wheat flour	66	40.5
Sorghum	22	13.5
Legumes		
Cowpea	51	31.3
Soyabean	40	24.5
Groundnut	87	53.4
Pigeon pea	17	10.4
Bambaranut	8	4.9

Table 2a showed that on the average, 37.9% of the subjects consumed roots &tubers and 36.8% of the subjects consumed legumes. Majority (82.2%) of the subjects consumed cassava and cassava products, 69.9% consumed rice, 64.4% consumed yam and yam products and 53.4% consumed groundnuts.

Table 2b : Vegetables and fruits, Animal products, Fat and oil, Beverages and drinks

Vegetable and fruit

Green vegetables	78	47.8
Pumpkin	39	23.9
Orange	62	38.0
Mango	23	14.1
Banana	50	30.7
Pawpaw	26	16.0
Carrot	56	34.4
Tomatoes	72	44.2

Animal products

Meat	115	70.5
Egg	48	29.5
Milk	59	26.2
Fish	88	54.0

Fat and oil

Palm oil	122	74.9
Groundnut oil	115	70.6
Butter	8	4.9
Other sources such as margarine, olive oil		

Beverages and drink

Bournvita	29	17.8
Pronto	8	4.9
Milo	53	32.5
Ovaltine	33	20.3
Milk	77	47.2
Tea	26	16.0
Palm wine	15	9.2
Beer	6	3.7
Soft drink	65	39.9
Gin	4	2.5

Table 2b shows that on the average,31.1% of the subjects consumed vegetables and fruits, 45.1% consumed animal products, 38.5% consumed fat and oil and 19.4% consumed beverages and drinks during the 24-hour diet recall.

Generally, the subjects consumed vitamin A rich foods for the past 24-hours. About 47.8% of the subjects consumed green vegetables, 14.1% consumed mango, 30.7% consumed banana, 34.4% consumed carrot and 44.2% consumed tomatoes. Less than three quarters (74.9%) of the subjects consumed palm oil which is a good source of pro-vitamin A.

Table 3: The consumption profile and amount spent on the food categories

Categories of foods	Consumption profile Frequency (%)		Amount spent on them weekly Frequency (%)		
	Daily	Weekly	<N500	N510-N2000	>N2000
a. Starchy roots and tubers	35(21.5)	34(20.9)	89(54.4)	34(21.0)	4(2.6)
b. Cereals	17(10.6)	26(15.8)	52(32.2)	22(13.5)	5(2.9)
c. Legumes	19(11.4)	103(63.3)	56(34.2)	9(5.8)	-
d. Fruits and vegetables	32(19.3)	44(27.0)	129(78.9)	10(6.4)	1(0.6)
e. Animal products	53(32.5)	33(20.4)	77(47.5)	36(21.8)	9(5.7)

Table 3 shows less than a quarter (21.5%) of the subjects consumed starchy roots and tubers daily, 10.6% consumed cereals daily, 11.4% consumed legumes daily, 19.3% consumed fruits and vegetables daily and 32.5% consumed animal products daily.

Slightly more than half (54.4%) of the respondents spent less than N500 and 21% spent between N500 and N2000 on starchy roots and tubers weekly. However 32.2% spent less than N500 and 13.5% spent between N500 and N2000 for cereals weekly. About 34.2%spent less than N500 and 5.8% spent between N500 and N2000 on legumes weekly. A higher percentage (78.9%) spent less than N500 and a few (6.4%) spent between N500 and N2000 on fruits and vegetables weekly. Less than a half (47.5%) of the subjects spent less than N500 and 21.8% spent between N500 and N2000 on animal products weekly

Distribution of subjects based on age and sex for the weighed food intake

During the weighed food intake, 13 males and 7 females took part in the dietary study and more adults participated in the dietary study.

A three-day meal consumption is the traditional adopted pattern. However, most of the respondents consumed two meals per day and other occasionally consumed snacks such as groundnuts and biscuits. Some of the households never had breakfast. Some that did, especially those that had school children, consumed cold and small left over foods.

Yams, cassava, rice, cowpea of different varieties were the major sources of nutrients. The quantities consumed were high. Most of the families purchased these foods. The supper was mainly based on garri, yam and cowpea. The subjects that had breakfast and lunch consumed tea, rice and sometimes garri. These foods were consumed in a variety of forms. Vegetable, fish (mostly crayfish and iced fish) and palm oil were not included in their diets.

The civil servants surveyed consumed rice mostly as breakfast and eba (garri) as supper. The subjects consumed fruits mostly when in season and in abundance. Among the vegetables, they consumed and liked most were different forms of starchy vegetables such as plantain. Meat and fish (iced) were also mostly liked and used for preparation of the most of the household's meals.

Energy and nutrient intakes

The individuals used for the individual weighed food intake represented the general population. The food of the present study was compared for adequacy for energy and nutrient requirements using FAO/WHO levels. Table 5 showed the mean energy and nutrient intakes of the males and the female subjects of the population, respectively.

In table 5, the mean daily intake of Vitamin A of the male subjects for most of the varying ages was not met. The subjects did not meet over 100% of their Recommended Nutrient Intake (RNI) for all ages for Vitamin A except for ages 16-19 years.

Table 5: Energy and nutrient intake of males' subjects according to age expressed as percentage FAO (2003) requirements. The FAO/WHO level are shown (figures in parenthesis show the number of subjects in each group)

Age (yrs)	Nutrients	Energy (Kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Vitamin	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Ascorbic acid (mg)
3-5 (1)	Mean intake	1,191.29	36.39	195.82	5.50	293.07	0.77	0.224	9.72	10.20
	Requirement for age/sex	1,550.00	17.50	600.00	4.00	450.00	0.70	0.60	8.00	30.00
	Intake as % requirement	76.86	207.94	32.64	137.50	65.13	110.0	37.33	121.50	34.00
10-12 (1)	Mean intake	641.5	9.51	91.50	4.32	425.95	0.37	0.18	1.77	21.90
	Requirement for age/sex	2220	34.00	1300.00	10.00	600.00	1.20	1.30	16.0	40.00
	Intake as % requirement	29.16	27.98	0.10	43.20	70.83	30.83	13.85	11.06	54.75
13-15 (2)	Mean intake	900.55	23.19	156.68	5.97	113.65	0.80	0.23	4.32	19.39
	Requirement for age/sex	2,650	52.00	1300.00	10.00	600.00	1.20	1.30	16.00	40.00
	Intake as % requirement	33.98	44.60	12.05	59.70	18.94	66.67	17.67	27.00	48.48
16-19 (3)	Mean intake	1131,85	15.62	325.84	6.61	718.86	0.50	0.31	9.31	25.94
	Requirement for age/sex	2,650	52.00	1300.00	12.00	600.00	1.20	1.30	16.00	45.00
	Intake as % requirement	42.71	30.00	25.07	55.08	119.81	41.66	24.10	58.19	57.65
20 yrs and above (6)	Mean intake	1,517.86	45.44	378.71	9.27	430.20	1.68	1.38	11.48	28.55
	Requirement for age/sex	2,800	49.00	1000.00	9.00	600.00	1.20	1.30	16.00	45.00
	Intake as % requirement	54.21	92.00	37.87	103.00	71.10	139.86	106.15	71.76	63.45

In Table 6, the mean daily intake of vitamin A of all the female subjects did not meet over the 100% of their RNI for all ages.

Table 6: Energy and nutrient intake of female expressed as percentage of FAO (2003) requirement requirements. The FAO/WHO levels are shown (figures in parenthesis show the number of subjects in each age group).

Age (yrs)	Nutrients	Energy (Kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Vitamin A RE(µg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Ascorbic acid (mg)
3-5 (1)	Mean intake	560.04	28.13	167.39	3.83	293.07	0.52	0.16	4.36	7.68
	Requirement for age/sex	1550	17.50	500.00	4.00	400.00	0.50	0.50	6.00	30.00
	Intake as % requirement	36.13	160.74	33.49	95.75	73.27	104.00	32.00	72.67	25.60
10-12 (1)	Mean intake	1,159.31	35.61	397.71	6.75	362.06	0.87	0.32	22.68	13.36
	Requirement for age/sex	1,950	36.00	700.00	6.00	500.00	0.90	0.90	12.00	35.00
	Intake as % requirement	59.45	98.92	56.82	112.50	72.41	96.70	96.70	189.00	38.17
16-19 (1)	Mean intake	1,333.73	21.34	88.64	7.12	162.32	0.99	0.47	5.56	9.27
	Requirement for age/sex	2,150.00	42.00	1300.00	22	600.00	1.10	1.10	16.00	45.00
	Intake as % requirement	62.04	50.81	6.82	32.36	27.08	90.00	42.72	34.75	20.60
20 yrs and above (4)	Mean intake	1,921.11	47.83	224.21	12.21	315.87	3.87	3.29	12.30	27.34
	Requirement for age/sex	2,200	45.00	1000.00	8.00	600.00	1.10	1.10	14.00	45.00
	Intake as % requirement	87.32	106.28	22.42	153.88	52.64	351.81	299.72	87.82	60.76

DISCUSSION

Aba is a business town in Abia State as such it is imperative that the subjects that live in Aba will include both skilled and unskilled labouraccording to their qualification. Hence, it was not a surprise to observe that the subjects were unskilled to skilled from all walks of life.

The low consumption of fruits and vegetable, animal and animal products and legumes daily, respectively are major culprit for levels of

vitamins among the subjects. The low expenditure (less than N500) on fruits and vegetables, legumes and animal products need nutrition education, social marketing and other measures to improve the availability of these foods to these households (17). The poor purchasing power of the Aba community precipitated the low consumption of vitamin A rich foods which may lead to low serum levels. Richard et al. (1) reported that differentials in income levels were not reliable for prediction of risk of vitamin A deficiency, however, it provides the basis in which vitamin A deficiency clusters within households and communities. The low intake of vitamin A rich foods as shown in the 24hr recall reaffirmed the low intake observed among the households.

The lower vitamin A intake when compared with WHO/FAO requirement observed in this work might be attributed to loss of the nutrient (vitamin A) during preparation and cooking. Another reason might be that majority of the respondents were civil servants and purchased most of the vitamin A foods especially fruits and vegetables with their meager income and also do not have enough time for cultivation of these food crops. Richard et al. (1) reported that in developing countries the low nutrient intake was due to poor purchasing power and large expenditure of low income on staple starchy foods. Green leafy vegetables, carrot, tomatoes, meat, fish, palm oil and other foods are good sources of vitamin A however; they are expensive and are not affordable because they are brought from other communities into Aba community.

The unequal distribution of foods among members of families was influenced by low income and age. Many workers had similar observation on low vitamin A intake (18, 19).The quantity consumed and distribution of the meals depends on the availability and traditional method of distribution among household members. The mothers reported that their children frequently consumed green leafy vegetables that are good sources of vitamin A, however, the actual quantities consumed were unable to meet the FAO/WHO requirement. The pattern of consumption of larger servings of fruits for a few months of the year by the children as well as low fat intake, worm infestation coupled with reduced bioavailability of vitamin A in green leafy vegetables raised important questions (20) on the capability of these foods to meet vitamin A needs of young children without consumption of animal foods.

CONCLUSION

This study showed that most of the vitamin A rich foods consumed by respondents were not cultivated by them but were purchased from the market; this must have predisposed them to low consumption of these foods. This was further confirmed by the 24 hour dietary recall. Vitamin A rich foodstuffs and their dietary sources showed that fruits, yellow and green leafy vegetables were not continually part of their meals which reflected in the nutrient intake of household members.

RECOMMENDATION

1. Acceptance, compliance and behavior change in families must prevail among targeted beneficiaries for prevention programmes to be successful e.g. home gardening.
2. Planning, organization, logistics and political will are imperative to launch and sustain vitamin A programmes at community level.
3. Effective policy, funding and legislation are mandatory to enact national programmes on vitamin A deficiency.
4. Preservation of fruits and vegetables all year round using appropriate food processing method should be encouraged.

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COMPLIANCE LEVEL OF DIABETICS IN OWERRI, TO DIETARY ADVICE

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ABSTRACT

Background: Dietary compliance by people suffering from diabetics enables them to have good glycaemic control and thus reduces the frequency of hospital admissions

Objective: The study was undertaken to determine whether diabetics adapt to their diet or not, their reasons for not adapting and their compliance to dietary advice.

Materials and Method:A structural validated questionnaire was used to collect information from 338 diabetic subjects from three major hospitals in Owerri metropolis. Background information, medical and health profile of the subjects were obtained by interview administered questionnaire. Weight, height and body mass index (BMI) of the subjects were done using standard procedures. Data collected were analyzed using statistics package for social sciences (SPSS).

Results: Results showed that 53.25% of the subjects were females while 46.25% were males. Results also showed that in 24.26% of their respondents, diabetes was first diagnosed when they were aged between 21 – 30 years, in 28.4% when they were 31 – 40 years and in 17.75% when they were 51- 60 years. Of the 338 diabetic 93.4% consumed legumes, meat and fish, 89.84% consumed vegetables, 42.25% consumed starchy foods and staple, 26.63% consumed more of fats and oils while only 15.58% consumed fruits. When tested statistically, the proportion of the diabetics that consume starchy foods and staples, fats and oil and fruits in large quantities were not significantly (P0.05) while those that consume legumes, fish, meat and vegetables in large quantities were significantly (P0.05) above average. Time taken for the diabetics in adapting to their diet varied, 26.04% adapted within one month, 21.89% adapted immediately the disease was diagnosed and it took a year for 19.53% to adapt while the rest did not adapt.About 66.38% did not comply with the diet. When BMI of the respondents were compared with WHO standards, none were underweight but 26.04% were overweight and 63.90% were obese.

Conclusion: The study showed poor compliance to dietary advice and poor glycaemic control and poor body mass index among the subjects studied.

Keywords: Compliance, Diabetics, Dietary, Advice, Glycaemic Control

INTRODUCTION

Diabetes mellitus has become one of the most common diseases in existence. The disease can no longer be considered to be that of the affluence as it is rising in frequency worldwide (King, 1994). Studies has shown epidemic of diabetes in many developing countries and disadvantaged sectors of the industrialized countries (Javel, 1995 and WHO, 1997). One hundred and Fifty million people are estimated to have diabetes worldwide in the year 2000 and this figure is expected to reach Three Hundred million in the year 2005 (King et al, 1998 and Diabetes Facts and figures, 2001). In 2000, the prevalence of diabetes worldwide was estimated to be 2.8% and 4.4% in 2003 (Wild, et al, 2006).

Adherence and compliance to instructions and timely administration of drugs is very important in its control. Compliance and adherence to dietary advice is poor among diabetes (Abioye-Kuteyi, et al, 2005). The aim of this study was to assess the health status, dietary practices and barriers to dietary adherence/compliance among people with diabetes mellitus.

Materials and Method

Study Area: The study was carried out in Owerri Urban. Owerri is the capital of Imo State, it has a population of about 587, 150 (National population, 1999) with projects of 3% annually.

Owerri Urban is made up of three Local Government areas namely, Owerri municipal, Owerri North and Owerri .West. A purposive selection of 3 hospitals namely; Federal Medical Centre, Owerri, General Hospital Umuguma and

Umezuruike Hospital from each of these local government areas was done. Federal Medical Centre is located in Amakohia in Owerri North Local Government Area, General Hospital Umuguma is located along Owerri/Port-Harcourt Road in Umuguma in Owerri West Local Government Area, while Umezuruike Hospital is located off Royce Road in Owerri Municipal.

Subjects

A convenient sample of Three hundred and thirty patients (150 males and 180 females) attending Federal Medical Centre, General Hospital, Umuguma and Umezuruike Hospital, Owerri, Imo State were used for the study.

Questionnaire:

A structured questionnaire validated by lecturers in the department of nutrition and dietetics, Imo State University was used to elicit information on the respondents health status/disease condition, dietary practices and adaptability to their diets. The questionnaires were administered to the respondents through oral interview by the researcher.

Anthropometry:

Anthropometric measurement was done following standard procedures (Onimawo, 1995). Weight was recorded with light clothing and without shoes using a bathroom scale. Measurement was recorded to the nearest 0.1 kilogrammes, height was measured with a measuring within height meter. Subjects were measured standing in an upright position without shoes, heads were erect and hands hanging freely at their sides in a natural manner. Readings were taken to the nearest 0.1cm. Body mass index (BMI) an index of weight for height used to classify overweight and obesity in adults (WHO 2009) was calculated for each subject using the equation and compared to WHO standard to determine the incidence of obesity. Results were grouped according to WHO 2009 classification of BMI <18.5kg/m^2 (underweight), 18.5 – 24.9kg/m^2 (normal weight); 25 – 29.9kg/m^2 (over weight); 30kg/m^2 (obese).

Data Analysis:

Data from questionnaire was coded, keyed into computer and analyzed using statistical package for social science (SPSS) programme (version 10). Frequencies, percentages, means, standard deviation, z-test and chi square test were determined

Results:

The prevalence of diabetes was higher in females (53.25%) than males (46.75%) especially among people aged 40 years and above (58.59%). Only 4.73% were on diet alone (table 1).

Dietary advices given were mostly from doctors, nurses and other health personnel (71.19%). About 27.8% get dietary advice from dietitian.

Some (39.05% use the food guide pyramid to plan healthy meals. Majority 85% indicated that they followed a prescribed diet which had been given to them by a doctor or a nurse.

Dietary Practices:

Less than 50% ate three meals a day. Snacks were taken by 96.65%. About 44.38% of the respondent did not measure the quantity of food eaten, 35.50% measure the quality of food eaten and 20.12% ate as desired. Analyzed data showed low consumption of alcoholic beverages, 71.01% abstain from alcoholic beverage while 12.42% drank palm wine, stout and occasionally wine.

Less than 20% followed their dietary regimen consistently, the rest were inconsistent. Reasons were that the measuring cup was too small, they felt hungry afterwards and they dined out more frequently.

Time taken for the diabetic in adapting to their diet varied. About 26.04% adapted within one month, 21.89% adapted immediately the disease was diagnosed and it took over a year for 19.53% to adapt (Table3). Reasons given for non-adaptability to diet were the diet was too monotonous; the quantity was too small they felt hungry afterwards and the diet is too expensive to follow.

The socio-economic factors that significantly affect therespondent consumption of legumes; fish and meat, cereals and vegetables were educational background (P0.05). Occupation affected their consumption of fruits (P0.05) table 3.

Body weight
The respondents showed varying degrees of obesity as follows

·Grade I obese/mild (25-29.9)   26.04%
·Grade II obese/mild (30.0-39.99)   52.07%
·Grade III obese/mild (>40)   11.83%

Table 1: Physical Characteristics of the Respondents by Hospital

PARAMETER FMC OWERRI		GENERAL HOSPITAL UMUGUMA	UMESURUIKE HOSPITAL OWERRI	TOTAL
Sex				
Males	80(47.62)	52(49.63)	26(40.63)	158(46.25)
Females	88(52.38)	54(50.94)	38(59.38)	180(53.25)
Age (Years)				
Between 20s	4(2.38)	2(1.89)	2(3.13)	8(2.37)
21 – 40	66(39.29)	40(37.73)	26(40.63)	132(40.05)
41 – 60	58(34.53)	38(35.84)	26(40.63)	122(36.10)
Above 60	40(23.81)	26(24.53)	10(15.63)	76(22.49)

Figures in parenthesis are percentages of subjects.

Table 2: Age of Respondents at Diagnosis of Diabetes

AGE (YEARS)	FMC OWERRI	GENERAL HOSPITAL UMUGUMA	UMESURUIKE HOSPITAL OWERRI	TOTAL
Below 20	8(4.70)	4(3.77)	4(6.25)	16(4.73)
21-40	90(53.57)	52(49.05)	36(56.25)	178(52.66)
41 - 60	46(27.32)	32(30.19)	18(22.13)	96(28.40)
Above 60	24(14.29)	18(16.98)	6(9.38)	48(14.20)

Figures in parenthesis are percentages of subjects.

Table 3: Socio economic factors affecting diabetic consumption of different food groups.

Socio-economic factors	N	Df	X^2- Cal	X^2-tab
Starchy staples				
Educational background	338	12	23.7328*	21.026
Occupation	338	18	30.4313*	28.869
Income	338	15	19.2178^{ns}	24.996
Fruits				
Educational background	338	4	0.7616^{ns}	9.488
Occupation	338	6	12.8632*	12.592
Income	338	5	4.00064	11.070
Vegetable				
Educational background	338	4	3.8362^{ns}	9.488
Occupation	338	6	6.5655^{ns}	12.592
Income	338	5	2.2894^{ns}	11.070
Fats and oils				
Educational background	338	8	2.6639^{ns}	15.507
Occupation	338	8	4.597^{ns}	21.026
Income	338	10	16.1968^{ns}	18.307
Legumes, fish and meat				
Educational background	338	4	13.8554*	9.488
Occupation	338	6	4.0899^{ns}	12.592
Income	338	5	3.8814^{ns}	11.070

ns = not significant at 5% level
ns = not significant at 5% level
* = significant at 5% level

Discussion

Diabetes is a disease that us gradually controlled and automatically cured. Combination of health counseling, physical exercise and drug therapy are important for a successful treatment. Compliance and adherence with dietary advice still remains poor. Abioye Kuteyi et al (2005) reported similar findings. Income educational background and occupation were barriers to dietary compliance coupled with the small quantity they were all allowed to eat. Almost all the respondents ate all the classes of food at very high quantity or percentage and when tested statistically, they were significantly above average ($P<0.05$).their consumption of staples, fat and oil should be at moderation. Management by diet alone was very difficult. The use of food guide pyramid to plant healthy meals should be encouraged.

Conclusion

Diabetic patients should be made to understand the importance of complying with instructions regarding the diet and timely administration of drugs. Adherence to instructions is a goal towards achieving the best quality of life thereby rreducing and delaying acute and chronic complications. In settings where dietitians are scarce, physicians managing diabetic patients must be skilled in the dietary management of the condition and show commitment to it.

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Childcare and Feeding Practices among Organized Crèche in Owo Local Government Area, Ondo State, Nigeria.

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ABSTRACT

Background:

The rising incidence of communicable diseases and malnutrition due to improper care and feeding practices among caregivers have become a problem of public health dimension. Therefore, the need for studies on these practices is of utmost importance in order to reduce infant morbidity and mortality in Nigeria.

Objective: The study aims at assessing childcare and feeding practices among organized crèche in Owo Local Government Area of Ondo State, with a view to identify inadequacies in caring resources and nutritional status of the children.

Method: Random sampling method was used in selecting fifty care centres from 153 that were registered in the local government. Data on available infrastructure, caring resources, qualifications of caregivers, caring skill, feeding practices and mid upper arm circumference of children were obtained through semi-structured and pretested questionnaire and these were analyzed using SPSS (version 15).

Results: Result shows that 54% of the daycare assessed were private schools daycare and only 3.5% of the caregivers have personnel with nursing skill and caring experience. Forty-six percent practiced bathing and cleaning of children, diapering and nappy changing 98%, and 44% have bedding materials. Only 42% of the daycare centres practiced one form of hygiene and sanitation, while 16.8% and 6.3% practiced spoon feeding and bottle feeding respectively. Four percent of the children were given exclusive breastfeeding either by mothers or expressed into bottles and complementary foods were given to 37.9% of the children. One of the crèche room type met the Federal Ministry of Education standard of $0.8m^2$/pupil in a room and all the room type were deficient in one caring material or the other. About 8.9% and 4.2% of the children were moderately (MUAC <13.5cm) and severely (MUAC <12.5cm) malnourished respectively.

Conclusion: The period children spend with mothers and caregivers is a critical stage that will determine cognitive development, health and future nutritional status of these children.

Keywords: Childcare, Feeding Practices, Organized Crèche, Nutritional Status.

INTRODUCTION

Childcare can be defined as the process of attending to a child's basic needs of shelter, protection, food, clothing and health. These functions can be delegated to caregivers or carried out by the mother of the child (1). Caring capacity is the ability to perform care behaviour, to use human, economic and organizational resources to the benefit of infants and young children (2). Caring activities include preparing meals, feeding, carrying infants, dressing children, body cleaning, breastfeeding, comforting, and general nurturing. Hence, adequate childcare is an important intermediary between women's economic participation and child welfare. Inadequate caring capacity is one of the second major causes of malnutrition. Caring is the provision in the households and communities of time, attention, and support to meet the physical, mental and social needs of the growing child (3, 4).

Various researches have elucidated some merits and demerits of childcare either by nannies, nurseries or organized crèches. Some findings show that children with extensive non-parental care in their first year of life may be negatively affected by the quality of the care (5). It has also been found that children enrolled in childcare centres typically have more experience interacting with peers than children raised at home (3). These children typically show greater independence, self-confidence, and social adaptness (9). Although in-home childcare typically is provided by nannies, friends and families, the children are monitored inside the caregiver's home, thereby reducing exposure to children outside and illness (3, 5).

According to American Academy of Pediatrics (3) children attending crèche or daycare are very good at sharing a number of bacterial, viral, and parasitic infections with each other. This is because children move about and interact with each other, their personal hygiene is less than ideal, their ability to control their bodily secretions and excretions is poor and their immune response systems are not yet fully developed.

A study conducted in Nigeria by Asumugha and Okeke (6), indicated that the age, work experience and educational status of caregivers were found to be essential attributes needed in order to ensure adequate provision of care for young children. It was also shown in the study that food intakes of the children were generally inadequate both in quality and quantity.

Feeding practices and optimal feeding are crucial for good nutritional status, growth and development, health and ultimately the survival of infants and young children under the care giver (7). There are various types of feeding practices among care givers, they include breastfeeding, weaning/supplementary feeding and exclusive breastfeeding. Bottle feeding and artificial feeding of cow milk formula, is the method used by the mothers, caregivers and nannies. In some cases, cups and serving plates are used (8, 9).

Growth failure due to repeated infection and over dilution of formula has been reported to cause infantile obesity, iron deficiency anemia, neonatal hypoglycemia in premature infants (10). Poor complementary feed has led to many children becoming vulnerable to irreversible outcome of stunting, poor cognitive development and increased risk of infectious diseases such as diarrhea and respiratory infections (10, 11). However, force-feeding a child should be discouraged among peasant rural women while unwillingness to eat should be determined. A normal child will eat without coaxing. Refusal of food is due to child being inactive or other factors and it may also be due to inadequate attention given to child by the mother (11)

Literature search shows that there is scarce information on childcare and infant feeding practices in Ondo State and in particular Owo local government area. Therefore this study aimed at assessing Childcare and feeding practices among organized crèche in Owo Local Government Area of Ondo State, with a view to identify inadequacies in caring resources and nutritional status of the children.

Subjects and Methods

This study was a randomized survey to assess childcare and feeding practices among organized crèche in Owo Local Government communities of Ondo State, Nigeria.

Location and Period of Study

The study was conducted in Owo Local Government communities of Ondo State, between the period of June 2010 to April 2011. Owo is an ancient urban town with large agrarian activities and markets. The town is blessed with institutions such as Federal Medical Centre, (FMC, Owo); Ondo State Polytechnic (Rufus Giwa Polytechnic); Achievers' University and some processing factories e.g. JOF ideal vegetable oil processing industry. Also, Owo town has childcare centres located in different places within the town.

Among the popular care centres selected and used for this study were: General Hospital crèche, St Louis Daycare, Imade High School Daycare, Owo High School Daycare, Federal Medical
Centre crèche, Rufus Giwa Polytechnic crèche and Fourahbay International Group of Schools Daycare Centres.

Sample Size and Selection

There are over one hundred and fifty (150) care centres spread across Owo Local Government Area. The Local Government has eighteen (18) wards, while eleven (11) out of the eighteen wards were within Owo metropolis. The number and type of care centres were classified into three groups; namely school-based, hospital-based, and church-based care centres. Since the care centres were majorly school-based, three schools were randomly selected from each of the eleven wards within the metropolis, while two schools each were also randomly selected from each of the seven wards within Owo suburbs. Forty-seven (47) school-based care centres were selected. Only one existed church and two of hospital-based crèche were also selected. Overall, fifty (50) organized crèche/daycare were selected for the study. Data were obtained from the fifty crèche/daycare that were selected for the study.

Letter of Consents

Letter of consent was written to the Head teachers, and proprietors of the care centres, and some parents of the children. Permission was granted to obtain primary data.

Data Collection

Semi-structured, pre-tested questionnaire and anthropometry were the two research instruments used in data collection in this study. Questionnaire was used to obtain personal information of the caregivers such as age, sex, marital status, and educational status. Information on available infrastructures, such as play ground, pipe borne water, room sizes per number of children, and toilets were obtained.

Caring materials such as wash-hand basin, type of toys, bedding materials, dinning tables, baby sitters, TV sets, carpet/rug, food warmers, cookers, foodstuffs, etc. were also obtained. Information on various feeding practices and feed types were obtained.

Anthropometric measurement of their mid upper arm circumference (MUAC) was taken to the nearest 0.1mm using a paper tape and measuring tape according to standard procedures (United Nations, 1986; Jellife, 1966).

Data Analysis

Data were analyzed using SPSS (version 11.0) software package for all the descriptive statistics such as percentages and means. Mid upper arm circumference (MUAC) was used to assess the nutritional status of the children with cut-off value $\leq$12.5cm as severe undernutrition.

RESULTS

Table 1 presents the age range of the children in the various crèches. Only 24 (4.86%) of the children were aged 0-6 months. However, majority of the children fell within the age range of 7-18 months.

The various types of crèches found in Owo local government area were represented in Table 2. Greater percentage of the crèches were found in private schools (54%) while 40% of them were run by public schools. Only one and two of the crèches were managed by a church and hospitals, respectively.

Table 1 : Age range of the children (n= 494)

Age Range (months)	n	%
0-6	24	4.86
7-12	115	23.28
13-18	222	44.94
19-24	89	18.02
23-30	34	6.88
31-48	10	2.02

Table 2 : Types of crèches

Crèches	n	%
Public school crèche	20	40
Church crèche	1	2
Private school crèche	27	54
Hospital crèche	2	4
Total	50	100

Table 3 shows the educational qualifications of the caregivers in the crèches surveyed. Out of the 57 caregivers, 40.35% have Senior Secondary School Certificate (SSCE), 38.8% have National Certificate of Education (NCE) whileonly two (3.5%) of the caregivers possessed the Nigerian Registered Nurse (NRN) certificate.

Results on Table 4 shows that majority of the caregivers were trained teachers that have only teaching experience. Only 2 (3.5%) have nursing experience.

Table 3: Educational status and Age categories of caregivers (n= 57)

Table 3 : Educational status and Age categories of caregivers (n= 57)

Qualifications	N	%	Age Range
Elementary school leaving cert.	8	14.03	30-42
Senior School Cert Exam, SSCE	23	40.35	18-43
National Diploma, ND	1	1.70	19
National Cert Exam, NCE	21	38.84	21-29
Higher National Diploma, HND	2	3.51	24-28
Nigerian Registered Nurse, NRN	2	3.50	26-30
Bachelor degree	Nil	Nil	Nil
Total	57	100	-

Table 4 : Caring knowledge and skills of the caregivers (n= 57)

Caregivers	n	%
Previous caring knowledge and experience	4	7.02
No caring knowledge but with experience	16	28.07
Teaching experience only	28	49.12
Nursing skill and caring experience	2	3.51
Beginners	7	12.3
Total	57	100

Tables 5 presents available infrastructural facilities and caring materials available in the crèches. Pipe-borne water was available in 28%, bedding materials for children (44%) and only 44% of the crèches have good toilet. Table 6 shows the available caring materials. These include washing basins (24%), food warmers/stoves (26%), baby sitters (6%), washable toys (20%) and about 52% of the crèches have both rugs or carpets.

Table 5: Infrastructural availability in the crèches (n= 50)

Infrastructure	n	%
Pipe-borne water	14	28
Play ground	22	44
Well water	24	48
Toilet	35	70

Table 6 : Caring materials in the crèches (n= 50)

Materials	n	%
Wash-hand basins	12	24
Baby sitters	3	06
Food warmers/stoves	13	26
Bedding materials	22	44
Washable toys	10	20
Food shelf	4	08
Fan	20	40
Rugs	5	10
Carpet/Linoleum	21	42

Table 7 shows the various care practices in the crèches. Forty-six percent of the centres practiced bathing and cleaning of the children, 98% diapering and nappy changing, 90% dressing for children, 100% comforting of children, 42% hygiene and sanitation practice, and 90% child discipline/scolding.

Table 7: Child care practices in the crèches (n= 50)

Care practices	n	%
Bathing and cleaning	23	46
Diapering/Nappy changing	49	98
Dressing	45	90
Comforting	50	100
Hygiene/Sanitation practice	21	42
Child discipline/scolding	45	90

Table 8: Room size per number of children and caregivers ratio

Room Size	Crèche n (%)	Children Range/Room	Space/children	*FMOE standard	Caregiver / children ratio	*FMOE standard (Ideal)
4.6 x 5.5m² (15 x 18ft²)	12 (24)	15-30	0.84m²	0.80m²	2:30	1:10
2.74 x 2.74m² (9 x 9ft²)	3 (6)	15-20	0.40m²	0.80m²	1:15-20	1:10
2.74 x 3.66m² (9 x 12ft²)	35 (70)	10-20	0.67m²	0.80m²	1:10-20	1:10

*Federal Ministry of Education, Guidelines on Minimum Standard in Schools

Table 9: Feeding practices in the crèches (n= 494)

Feeding Methods	n	%	Age Categories (months)
Exclusive breastfeeding (EBF)	20	4.0	3-6
Breastfeeding and complementary foods	187	37.9	3-14
Bottle Feeding	31	6.3	3-8
Force Feeding	40	8.1	2-9
Self Feeding	133	26.9	8-48
Spoon Feeding	83	16.8	4-18

Table 10: Nutritional status of the children

Mid upper arm circumference (cm)	n	(%)	Nutritional Status
≤ 12.5	21	(4.2)	Severely malnourished
12.5 ≥ 14.0	44	(8.9)	Moderately malnourished
≥ 14.0	429	(86.8)	Normal

Table 8 shows the room sizes available in the crèches per number of children to staff ratio was presented in Table 8. Most children (70%) occupied room size of 2.74 x 3.66m² (9 x 12 ft²) and 25% of the children occupied room size of 4.6 x 5.5m² having between 15-30 children. A room size of 2.74 x 2.74m² have 15-20 children.

Presented in Table 9 was the various feeding practices available in the crèches. Out of 494 children available in the crèches only 20 (4%) of them were exclusively breast fed (EBF). Breast milk and complementary foods were given to 37.9% of the children while 6.3% and 26.9% of the children were exposed to bottle feeding and self feeding, respectively. The feeding practices in the crèches include exclusive breastfeeding (EBF),

spoon feeding, self feeding, bottle feeding, force feeding and some were given expressed breast milk and complementary foods. Complementary foods such as indomie, pap, boiled yam with egg, infant formulars, rice and stew, and bean pottage were the common foods been given.

The nutritional status of the children is represented on Table 10. Among the children 4.2% were moderately malnourished while 86.8% of the children were normal.

DISCUSSION

The common practice among Nigerian parents now was the belief that the earlier a child is introduced to a crèche or kindergarten school, the better for the child even if the child was under age. From Table 1, it is seen that the greater number of children found in most of the crèches were within the age range of 7-24 months. This age is a critical period in which a child should still be under the care of their parent (1). Although the excuse of most of the mothers was that they were involved in economic activities. Observation from this study found that not all the mothers were involve in serious economic activities that would warrant putting 4-7 month old babies in the crèches. Moreover, some of the caregivers were young school leavers and adolescents (Table 3) of inexperience in childcare skill. This could have impact on the children been cared for and thereby affecting their health and nutritional status. This same reason was found in Asumugha and Okeke's (6) study which shows that the age of caregiver proved important for enhanced provision of good care.

Observation from Table 4 bothering on the caring knowledge and skills of the caregivers shows that those crèches with personnel that have nursing skill and caring experience give better care to the children and with a well managed crèche. However, most of the crèches lacked requisite materials such as first-aid box, certified potable water supply as recommended by Federal Ministry of Education (15). Caring infrastructure such as pipe-borne water or even well water were available in 28% and 48% of the crèches respectively. Since good water will be used for regular drinking, bathing and cleaning of these children, certified potable water should be made available by all care providers. Water inadequacy and bad water could lead to water borne diseases, infections due to improper washing and cleaning among the children. Foods, utensils, clothes, carpets and toys are materials found in some of the crèches not adequate enough in terms of cleanliness. Only few (24%) of the crèches have washing basins. Therefore, attention to hand

washing and good hygiene can cut the rate of infectious disease transmission substantially (3).

Caring activities may be carried out by people exhibiting a wide range of skills, such as caring with warmth and affection (14). Observation from this study shows that some caregivers do the work out of frustration of not been able to secure employment in a choice place. However, they display apathy, scolding/discipline of child for crying instead of comforting them.

Moreover, it was also observed in this study (Table 8) that the room size to number of children and caregivers to number of children were inadequate enough. Most of the crèches have children numbering over twenty (20) in a room of 2.74 x 2.74m^2 (0.4m^2/pupil) or 2.74 x 3.66m^2 (0.67m^2/pupil) in dimension. The Federal Ministry of Education (15) guidelines on minimum standard recommends 0.8m^2/pupil. This shows that only one of the room size met the minimum standard. Because the immune systems of these toddlers are not yet fully functional, infectious diseases mainly upper respiratory and gastrointestinal could easily spread when ventilation is bad. A situation where only one (1) or two (2) caregivers managed over 30 children compared to FMOE (15) standard of ratio 1:10 (Table 8). This is also not proper since adequate attention may not be given to the children. This situation is peculiar to most of the crèches.

The various feeding methods employed need to be monitored. Among the feeding methods of particular importance to be monitored is force-feeding. This was practiced among 8.1% of the children in the various crèches visited. A situation where a child refusal to eat for reason not well established by caregivers leading to force feeding of the child is not proper. This may make the child develop an aversion to it. Force feeding a child may also lead to suffocation, choking and injury to tongue and oral cavity of the child.

Observation during the assessment of some of the foods being served shows that some were too cold or deteriorating since most of the crèches served the food direct from the food flask given by parents without warming and proper checking of the foods. Similar occurrence was reported by Myers and Indriso (1) in their study. Other practices common among the crèches are premature feeding of complementary foods to infants of 3-5 months and unhygienic practices. Some consequences of feeding complementary foods to infants less than 6 months old include infantile obesity and infectious diseases attributable to unhygienic practices such as diarrhoea

and cholera. This feeding trend was reported by Hop et al (10) in their study of premature complementary feeding of young children in developing countries. It is unhygienic for only two (2) staff handling over 30 children and attending to some other needs of the children that may lead to food contamination.

From table 10, the good nutritional status of majority of the children (86.8%) may be due to adequate nourishment received at home. About 4.2% of the children were severely malnourished, while 8.9% of the children were moderately malnourished. Although the prevalence of malnutrition among the children was low, this poor nutritional status may be due to premature feeding of complementary foods to some of the children that were less than 6 months six, that were still supposed to be taking their exclusive breastfeeding from their mothers. Other reasons may be the refusal of the child to eat in the absence of the mother, lack of proper attention received from caregivers (11), and gastrointestinal infection.

CONCLUSION

The methods of feeding such as complementary feeding, bottle feeding, force-feeding and spoon-feeding of a child less than 6 months old should be monitored and discouraged, since the importance of exclusive breastfeeding of infants for 6 months cannot be overemphasized. Care practices such as scolding, poor hygiene sanitation, regular bathing and nappy changing which may be detrimental to health status of the children should also be discouraged. Government should provide enforcement agency to complement Federal Inspectorate Service of the Federal Ministry of Education to monitor infrastructure provided by daycare providers. Therefore, the period spent with caregivers by these children are critical stages that will determine cognitive development, health and future nutritional status.

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PROCESSING METHODS AND NUTRIENT COMPOSITION OF FLOURS MADE FROM FERMENTED SOYABEAN (GLYCINE MAX), FERMENTED MAIZE (ZEA MAYS) AND UNFERMENTED GROUNDNUT (ARACHIS HYPOGEA) USE IN COMPLEMENTARY FEEDING.

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ABSTRACT

Objectives: The study evaluated the different processing methods and the nutrient composition of fermented soybean (glycinemax) Fermented maize (zeamays) and unfermented groundnut (arachishypogea) used in complementary feeding.

Materials and Methods: The samples used in the study includes raw soyabean grains, maize grains and groundnut seeds. Different processing methods of fermentation, dehulling, sundrying, roasting, dry milling, wet milling and sieving were applied on the samples at different periods. The proximate, minerals, vitamins and antinutrient composition of the flours were determined using standard methods. The mean and standard deviation of triplicate samples were determined.

Result: The result of the analysis showed that fermented soyabean flour and groundnut flour had higher levels of protein(40.7g and 48.6g respectively) in relation to corn flour (0.53g). Phytate, oxalate and tannin were higher in soyabean(0.8mg, 0.6mg and 0.5mg/100g portion)in relation to corn flour(0.2, 0.1 and 0.1mg/100g portion). The mineral analysis revealed that calcium, potassium and sodium were highest(220.16mg, 214.39mg and 275.62mg) in soyabean flour in relation to corn(78.15mg, 178.31mg and 168.53mg). The mean scores of the porridges regarding the sensory properties (color, taste, texture, flavor and general acceptability) did not vary much. The product with higher flavor was more acceptable. PS was the most acceptable (7.67) followed by PSG (7.40) and PG(6.87).

Conclusions: The result of this study showed that soyabean and groundnut flours were highly nutritious; their judicious combination with pap will result into a rich palatable meal.

Keywords: Processing, fermentation, nutrients and complementary foods.

INTRODUCTION

Appropriate breast feeding and complementary feeding practices are fundamental to infant's nutrition, health and survival. In Nigeria, the commonly accepted complementary food for babies are porridges prepared with unsupplemented starchy foods like maize (zeamays), sorghum (sorghum bicolor) and tubers (1). Animal protein is rarely given due to its high cost.The nutritional adequacy of complementary food is essential for the prevention of infant morbidity and mortality, including malnutrition and overweight. Complementary feeding is defined as the transition from exclusive breast feeding to family foods which typically covers the period from 6 to 24 months of age (2). Complementary foods are specifically designed to meet the particular nutritional or physiological need of the infant as they must be given at the right time in an adequate amount and in a safe manner. When foods of low nutrient density begin to replace breast milk, rates of diarrhea , illnesses due to food contamination come to their highest. When breast milk is no longer enough to meet the nutritional needs of the infant, complementary foods should be added to the diet of the child (3). studies had shown that complementary foods are rich in energy and nutrients, clean and safe and easy to prepare from family meals (4).

This study aims at assessing the processing methods and nutrient composition of fermented soyabean, fermented maize and unfermented groundnut flours used in complementary feeding.

MATERIALS AND METHODS
Sources of materials:

The soyabean grains, groundnut seeds and yellow maize seed were purchased from Ekeonunwa Market in Owerri, Imo State, Nigeria.

Preparation of samples:

The soyabean grains, groundnut seeds and yellow maize seed were handpicked and cleaned to remove stones and other foreign particles.

The dried Soyabean grains were soaked in a bowl of water overnight to soften the hard seed coat. It was allowed to ferment for 24h, the soyabean grains were dehulled by rubbing between palms, then water was added to separate the hulls from the seed by floating method. After dehulling it was sundried for 5h, then roasted until it turned light brown and was dry milled into fine flour (70mm meshscreen). The flour was kept for further analysis.

The groundnut seed after sorting, were soaked in warm water for about 10 mins to soften the seed coats, then drained in a basket and salted to taste. It was sundried for 30minutes and roasted with garri until light brown. The mixture of Groudnut and garri were then poured into a basket to sieve out the garri particles, then milled into groundnut paste and futher sundried until floury, the flours were kept for analysis.

The maize grains after sorting, was washed and put in a plastic container with water and allowed to ferment with regular change of water for 72h. The maize was washed and rinsed in clean water, it was wet milled into a coarse paste with little water. The paste was sieved with a Muslim sieve bag into a white clean salt bag, which was tied and pressed on to remove water. The paste was sundried, packed in a clean nylon and kept for further analysis.

Sensory Evaluation:
Sensory evaluation was carried out using 20 mothers panelists, comprising of only nursing mothers attending immunization centre in Owerri metropolis. The panelists were oriented on the sensory procedure. The sensory parameters of color, flavor, texture and overall acceptability were rated on a 9-point hedonic scale. The evaluation was carried out in a good spacious room with conducive atmosphere. The samples were served simultaneously in clean white plates. Portable clean water was provided for rinsing of mouth between samples.

Chemical analysis:
The proximate, and anti-nutrient composition of the flours were determined using official methods of AOAC (13).
Carbohydrate was determined by difference. The vitamins and minerals (Iron(Fe) and Phosphorus(P)) were determined by atomic absorption spectrophotometer as described by Ranjiham and Gopa.

Statistical Analysis: Data were analyzed as means, frequencies and percentages.

RESULTS.
Table 1 shows the proximate composition of the Soyabean, Groundnut and Maize flour samples. Moisture content in maize was found to be the highest (19.75%) and lowest in groundnut paste, (5.20%). The ash was highest in soyabean (5.16%) and lowest in pap (0.06%). The fiber was found to be highest in soyabean (5.16%) and lowest in pap, (1.01%). There was a marked increase in the protein content of groundnut (48.6%) in relation to pap (0.53%). Carbohydrate was highest in soyabean (19.17%) and lowest in groundnut paste (5.5%).

TABLE 1: Proximate Composition of Fermented Flour Samples (%)

Sample	Moisture %	Ash%	Fibre %	Protein %	Carbon %
Soyabean	10.75^a ± 0.01	5.16^a ± 0.01	5.16^a ± 0.01	40.7^a ±0.03	19.74^a ±0.07
Groundnut	5.20^b ±0.01	2.50^b ±0.00	1.25^b ±0.00	48.60^b ±0.00	5.50^b ±0.01
Maize (Yellow)	19.75^c ±0.25	0.06^c ±0.00	1.01^c ±0.00	0.53^c ±0.03	7.62^c ±0.01

Means ± SD of three determinations
Mean values with different superscript, in the same colum are significantly different (P<0.05).

Table 2 presents the micronutrient analysis of the flour samples and the composites. PG had (18.56mg/100g) of vitamin C and appears to be highest in respect to the Pap (9.43mg/100g). The vitamin A content was highest in Soyabean (7.83mg/100g). The sodium content was highest in soyabean (275.62mg/100g) in respect to (PG: Pap +Groundnut) (2.92mg/100g). Iron was highest in Soyabean (7.14mg/100g) in relation to Groundnut (1.33mg/100g).

Table 2: Mineral and Vitamin Levels of Fermented Soyabean, Fermented Maize and Unfermented Groundnut and The Composites.

Sample	Na	K	Mg	Zn	Fe	Ca	P	Vit A
	(Mg/100g)	(mg/100g)	(mg/100g)	(mg/100g)	(mg/100g)	(mg/100g)	(mg/100g)	
Soya	272.62^a ±0.00	214.39^a ±0.14	85.36^a ±0.085	8.30^a ±0.000	7.14^a ±0.28	220.16^a ±0.000	585.23^a ±1.513	7.83^a ±0.035
Pap	168.53^b ±0.106	178.31^b ±0.015	96.27^b ±0.042	5.53^b ±0.106	3.62^b ±0.021	78.15^b ±0.014	380.703^b ±0.007	2.08^b ±0.02
G. Nut	216.81^c ±0.014	156.74^c ±0.035	58.75^c ±0.014	3.78^c ±0.000	1.33^c ±0.014	65.67^c ±0.332	234.5^c ±0.000	5.35^c ±0.014
PS	2.45^e ±0.000	168.41^e ±0.014	78.33^e ±0.000	3.78^e ±0.00	2.66^e ±0.085	125.71^e ±0.127	282.53^e ±0.05	3.48^e ±0.000
PG	1.92^f ±0.000	153.66^f ±0.057	69.46^f ±0.057	2.17^f ±0.014	1.71^f ±0.021	62.63^f ±0.042	254.78^f ±0.028	2.84^f ±0.014
SG	248.71^d ±0.014	162.52^d ±0.057	76.91^d ±0.014	3.64^d ±0.021	2.30^d ±0.000	109.41^d ±0.014	278.41^d ±0.014	3.58^d ±0.028

Means	-	SD of 3 determination
Pap	-	Maize porridge
Soya	-	Soyabean flour
G. Nut	-	Groundnut Flour
PSG	-	Pap + Soyabean flour+ Groundnut flour
PS	-	Pap + Soyabean flour
PG	-	Pap + Groundnut flour

Table 3 shows the Anti-nutrient properties of the flour samples. Oxalate was found highest in soyabean (0.58%) in relation to Pap (0.09%). Phytate and Tannins were highest in soyabean (0.84% and 0.45%) in relation to Pap (0.16% and 0.08%) respectively.

SAMPLE	PHYTATE	OXALATE	HAEM	HCN	WAC	TANNIN	ALK
Soya	0.84[a] ±0.020	0.58[a] ±0.000	3.75[a] ±0.007	0.72[a] ±0.000	2.18[a] ±0.000	0.45[a] ±0.000	0.53[a] ±0.000
PAP	0.16[b] ±0.000	0.09[b] ±0.000	0.06[b] ±0.000	0.06[b] ±0.000	2.30[b] ±0.000	0.08[b] ±0.000	0.12[b] ±0.000
G. NUT.	0.25[c] ±0.014	0.17[c] ±0.000	1.47[c] ±0.021	0.48[c] ±0.000	1.75[c] ±0.014	0.19[c] ±0.000	0.28[c] ±0.000
PS	0.56[d] ±0.000	0.52[d] ±0.000	2.88[d] ±0.000	0.65[d] ±0.000	Not detected	Not detected	0.24[d] ±0.000
PG	0.36[e] ±0.000	0.36[e] ±0.007	1.95[e] ±0.014	0.54[e] ±0.028	Not detected	Not detected	0.18[e] ±0.000
PSG	0.30[f] ±0.000	0.22[f] ±0.014	0.33[f] ±0.035	0.31[f] ±0.000	Not detected	Not detected	0.71[f] ±0.000

Means   -   SD of 3 determinations
SOYA   -   Soyabean flour
PAP   -   Maize porridge
G.NUT   -   Groundnut paste
PSG   -   Pap + Soyabean flour+ Groundnut flour
PS   -   Pap + Soyabean flour
PG   -   Pap + Groundnut flour
Value with different superscript, shows value with significant difference (p<0.05)

Table 4 presents the sensory evaluation report of the formulated complementary foods. The characteristics of color and texture were highest (7.80 and 7.47) in the PG in relation to the PS and PSG mixes (7.33/6.93 and 7.20/6.13) respectively. The mixture of Pap and soyabean (PS) had the best flavor and highest acceptability ratings (7.67 and 7.67) in relation to the others, PG (7.20 /6.87) and PSG (6.93/ 7.40) respectively.

Table 4. Sensory Evaluation of Formulated Complementary Foods

Sample	Colour	Taste	Texture	Flavour	General acceptability
PS	7.33[a] ±1.23	6.67[a] ±1.632	6.93[a] ±1.39	7.67[a] ±1.70	7.67[a] ±1.23
PG	7.80[b] ±1.26	7.27[b] ±1.58	7.47[b] ±1.06	7.20[b] ±1.32	6.87[b] ±1.64
PSG	7.20[c] ±1.57	7.40[c] ±1.99	6.13[c] ±2.13	6.93[c] ±2.15	7.40[c] ±2.10

Means   -   SD of 3 determinations
PS   -   Pap + Soyabean flour
PG   -   Pap + Groundnut flour
PSG   -   Pap + Soyabean flour+ Groundnut flour
Values with different superscript, show significance difference (P<0.05).

DISCUSSION

The moisture content of the flour and paste samples varied significantly (p<0.05). These variations encountered could be attributed to the different processing methods applied on the samples. Fermented soyabean flour and groundnut flour had higher levels of protein (40.7g and 48.6g respectively) in relation to maize flour (0.53g). It is known that the higher the protein content of a given

sample, the higher the moisture content (5).

Phytate, oxalate and tannin were higher in soyabean (0.8mg, 0.6mg and 0.5mg/100g portion,) and least in corn flour(0.2, 0.1 and 0.1mg/100g portion). Recent studies by (6 and 7) shows that Phytates and Oxalates are greatly distributed in Legumes. They are known to inhibit calcium and iron absorption, they are destroyed by heat treatment, fermentation and hydrolysis (8). In addition to inhibition of nutrients, Oxalates interferes with the utilization of minerals in human, thereby causing abdominal pain, several convulsions, non co-gullibility of blood, coma and kidney stone (9). The lower Phytate content of the dehulled maize flour was due to processing (dehulling). (10 and 11) stated that processing (dehulling) have been found to eliminate anti nutritional factors.

Micronutrient values for the studied samples were significantly different and almost in conformity with the findings by (12). Calcium, potassium, sodium, zinc, iron and phosphorus were highest (220.16mg, 214.39mg, 275.62mg, 8.3mg, 7.14mg and 585mg) in soyabean flour while corn flour recorded the least (78.15mg, 178.31mg, 168.53mg, 5.53mg and 3.62mg.

The high micronutrient value recorded in the soyabean could be attributed to the fermentation procedure applied on the legume, which had also taken care of the inhibiting properties of Oxalate. (8) reported that antinutrients inhibits minerals and reduce their bioavailability but when these antinutrients are destroyed or reduced to safe levels during processing, most of the minerals they inhibit will be made available for utilization by humans.

The sensory evaluation result of the various samples of the formulated porridges showed no significant difference (P<0.05). The mean scores of the porridges regarding the sensory properties (color, taste, texture, flavor and general acceptability) did not vary much. This implies that either of the composite could be accepted as complementary food for young children. The color of PG was more acceptable (7.80) to the judges than the others (PS, 7.33 and PSG, 7.20). The taste of PSG was the most acceptable (7.40). The general acceptability of the products was affected by the flavor, texture, taste and color. The product with higher flavor had the highest acceptability rate. PS was the most acceptable (7.67), followed by PSG (7.40) and PG (6.87). The sensory evaluation attribute of the porridges however indicated a general preference of the sample blends.

Conclusions

Soyabean and groundnut flours are highly nutritious, and are good sources of protein, calcium, potassium, iron and zinc. Their judicious combination with pap will result into a rich palatable meal. They could be very valuable in the formulation of high nutrient dense complementary foods. The functional properties of the low cost high-protein complementary diets are nutritionally adequate to meet the nutritional needs of the children and as well beneficial to health.

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