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Research Paper

Study of Nutritional Values of Some Traditional Foods in Nigeria

Jamal Sokola, Jima Yonakolo[1]

Department of Nutrition, Health Institute of Nigeria

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Abstract

In this study Nutritional status of traditional weaning meals used in Oriade Local Government Area of Osun State Nigeria was evaluated. Five different fortified weaning meals were labelled as Red beans based diet (RBD), White beans based diet (WBD), Groundnut based diet (GND), Soya beans based diet (SBD) and Sorghum based diet (SGD). These meals were also used to feed five groups of young three old rats. Rat's initial weights of rats were recorded and thereafter remained on their ordinary diet for twelve weeks. The final rat's body weight was also recorded after the twelve weeks of the experiment. The rats finally were sacrificed and their liver, heart, and kidney weights were compared with control. In addition, the results revealed that soybeans based diet resulted in the best growth in comparison to other formulas and control treatment. However, this study concluded by advising nursing mothers to complement these weaning formulas with one another to wean their babies since, if prepared hygienically may improve the nutritional status of their babies.

Keywords: Cereals; Legumes; Nutritional Status; Fortified Meals; Weaning Formula

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1. Introduction

The best food for 4-6 months new born by recommendation of World Health Organization is Breastfeeding [1], after this period some semi-solid foods could be introduced to the infant diet [1-3]. Gradually introduction of the infant to its adult diet and withdrawing the mother's milk (weaning) just takes place in mammals; because only these types of animals produce milk. The infant is fully weaned once it no longer receives any breast milk. Therefore, one should be monitored the consistency, and frequency of food, calorie, and nutrient densities for proper development and growth [4]. Studies on nutritional properties considered the body status before and after experiments, as well as the chemical composition of the whole diet and all materials excreted and eliminated from the body in urine and feces (Shils *et al.*, 2005).

Nutrition (nourishment or aliment) is supplying, necessary materials to cells and organisms, (in the form of food) to support their life. The diet of an organism is what it eats and largely determined by the perceived palatability of foods [5]. Children Nutritional status is the most critical factor during the weaning stages while both macro and micronutrients are insufficient to maintain growth and development. Protein-energy malnutrition and micronutrient deficiency could be concomitant [6]. Malnutrition in Nigeria and other developing countries occurred as a result of limited essential sources of protein, vitamins, and minerals, particularly those of animal origin [7]. Many foods originated by protein (like groundnut, fish, crayfish, soybean, beans, and sesame) are also underutilized. In these developing countries, malnutrition has been escalated by poverty and high population growth rate. In order to overcome this imbalanced diet among the vast majority of the poor masses of the growing population of Nigerians, the production of weaning foods with the desirable nutritive quantities and qualities is necessary. Although several types of nutrient in

[1] Corresponding Author: j.y.mikalo@yahoo.com

commercial weaning foods are available in Nigeria, most of them are very expensive and majority of poor population who lived in the rural areas cannot afforded it. Rural mothers, therefore, relay on available mixtures of low-cost foods, which included mainly of un-supplemented cereals and pulses, wean their infants.

Therefore, there is a requirement to study the low-cost traditional weaning diets potentials in the rural areas, to evaluate their nutritive value in comparison with the commercial products to ascertain their suitability as weaning foods. This was the aim of this study.

2. Materials and Methods

2.1 Experimental Animals

thirty albino rats with Three weeks old (Rattusnorvegicus) were selected in both sexes. Their initial weight was between 21 and 50 g while were purchasing from Central Animal Laboratory, College of Medicine, University of Ibadan, Ibadan, Oyo state, Nigeria. All rats were randomly divided into six (6) groups. And then acclimatized and fed with five different diets and commercial formula, and also kept under usual management conditions (as control treatment) in the conventional animal house of the Department of Biochemistry, Kwara State University, Malete, Nigeria.

2.2 Reagents

All reagents were obtained from Pascal scientific stores Nigeria Ltd, Akure and were the products of BDH Laboratory, England.

2.3 Food samples

About 5000 g of each diet samples, (red beans, white beans, groundnut, soybeans and sorghum) and the commercial formula were purchased from Ijebu-Jesha Market, Osun state, Nigeria.

2.4 Methods

Red and white beans were cooked completely, and then dried, milled and packaged. Groundnut samples were also fried and milled while soya beans and sorghums were soaked in distilled water for 24 hours and then milled and sieved by a clean white cloth. The soya beans and sorghum filtrates were allowed to stay for about 3 hours and then decanted. The residues were dried into powder. These processed foods were then used to formulate different weaning meals and also used to feed different groups of three weeks old rats for twelve weeks.

Rat weights were also recorded after twelve weeks of feeding. The weight gain percentage byof each group was then calculated. The rats were finally sacrificed by chloroform and the total-body weight ratios of each group were also calculated by formala.

2.5 Proximate analysis

Proximate analysis was carried out on both gross food samples and processed weaning meals using A.O.A.C. method (1995).

2.6 Diet composition

Table 1 describes the composition of different traditional diets with food samples fortified with crayfish in 3:1 ratio.

3. Results

Proximate analysis results of the raw food samples revealed that soybean has the least moisture content while groundnut has the highest. The protein content of soybeans was significantly higher ($P < 0.05$) than other raw food samples. Results also showed that the crude fat of groundnut and its ash contents was significantly higher ($P < 0.05$) than white beans, red beans, soybeans, and sorghum samples. Sorghum had the highest percentage of crude carbohydrates while groundnut has the least in comparison with other food samples (Table 2).

The proximate analysis of composed traditional diets demonstrated that soybean (SBD) and groundnut diet (GND) had the highest (44.71%) and the lowest (22.17%)protein content, respectively. However, carbohydrate percentage in soya beans diet (SBD) was the lowest (8.94%), sorghum diet (SGD) had the highest (46.58%) carbohydrate content. The ash contents percentage of all the composed diets were not significantly different from another. Furthermore, the fiber composition percentage of all diets were also not significantly different from other except of GND which was significantly higher ($P<0.05$) than others (Table 3).

Table 1. Diet Composition

Food samples (g)	Diet 1(RBD)	Diet 2(WBD)	Diet 3(GND)	Diet 4(SBD)	Diet 5(SGD)
Red beans (RB)	75	---	---	---	---
White beans (WB)	---	75	---	---	---
Groundnut (GN)	---	---	75	---	---
Soya beans (SB)	---	---	---	75	---
Sorghum (SG)	---	---	---	---	75
Cray fish	25	25	25	25	25
Total	**100**	**100**	**100**	**100**	**100**

Diet 1(RBD) = Red beans diet; Diet 2(WBD) = White beans diet; Diet 3(GND) = Groundnut diet; Diet 4 (SBD) = Soya beans diet; Diet 5 (SGD) = Sorghum diet.

Table 2. Proximate Analysis of Raw Food Samples

Food Samples	Moisture content	Crude Fat	Crude Protein	Crude Ash	Crude Fibre	Total Carbohydrate
Red beans	9.25±0.28^{c}	11.20±0.28^{b}	11.32±0.28^{b}	3.70±0.28^{b}	2.25±0.71^{a,b}	62.28±0.71^{d}
White beans	8.50±0.35^{b}	10.47±0.47^{a}	24.34±0.04^{d}	3.83±0.04^{c}	2.49±1.20^{a,b}	50.39±0.37^{c}
Groundnut	9.40±1.98^{e}	51.40±1.98^{e}	14.34±0.47^{c}	5.34±0.47^{e}	3.40±0.01^{b}	16.13±0.01^{a}
Soya beans	7.83±0.04^{a}	25.71±0.02^{d}	42.37±0.04^{e}	1.73±0.04^{a}	1.03±0.52^{a}	21.36±0.50^{b}
Sorghum	9.28±0.18^{d}	11.98±0.25^{c}	9.13±0.18^{a}	5.23±0.18^{d}	1.58±0.25^{a}	62.83±0.18^{d,e}

Results are means of ± S.D of two independent determinations.

Table 3. Proximate Analysis of Composed Diets

Diets	Moisture content	Crude Fat	Crude Protein	Crude Ash	Crude Fibre	Total Carbohydrate
1. RBD	6.21±0.16^{b}	9.31±1.57^{b}	37.27±0.71^{b}	6.00±0.71^{a}	4.40±0.85^{a}	36.81±0.57^{b}
2. WBD	1.10±0.14^{a}	14.70±0.14^{a}	40.95±0.71^{a}	6.50±1.41^{a}	4.50±1.41^{a}	32.25±1.41^{a}
3. GND	7.40±0.14^{c}	45.90±0.14^{c}	22.17±0.24^{c}	5.42±0.59^{a}	9.43±0.57^{b}	9.68±0.21^{d}
4. SBD	9.25±0.35^{d}	26.25±0.35^{d}	44.71±0.30^{d}	6.71±0.30^{a}	4.14±0.08^{a}	8.94±0.07^{d}
5. SGD	7.30±0.28^{c}	13.40±0.28^{a}	23.17±0.64^{c}	5.55±0.64^{a}	4.00±0.71^{a}	46.58±0.71^{c}

Results are means of ± S.D of two independent determinations.

Table 4: Growth Response of Experimental Rats Fed Different Composed Traditional Diets

Diets	Body weight		
	Initial	Final	Percentage increase
1. RBD	21.44±0.27	28.08±0.47	30.97^{c}
2. WBD	37.42±0.35	43.18±0.52	15.39^{b}
3. GND	49.33±0.17	63.61±0.98	28.94^{d}
4. SBD	42.80±0.29	58.67±0.77	37.07^{f}
5. SGD	36.04±0.55	40.99±0.49	13.73^{a}
6. Cerelac	39.18±0.32	48.03±0.31	22.58^{c}

Results are means of ± S.D of two independent determinations.

Table 5: Body-weight Ratio of Rats Reared on the Formulated Traditional Diets

Diets	Liver	Kidney	Heart
1. RBD	0.076±0.001^{f}	0.012±0.001^{e}	0.006±0.001^{a}
2. WBD	0.060±0.011^{e}	0.011±0.001^{d}	0.008±0.001^{b}
3. GND	0.047±0.003^{b}	0.006±0.001^{b}	0.012±0.001^{d}
4. SBD	0.057±0.001^{d}	0.007±0.001^{c}	0.014±0.001^{e}
5. SGD	0.030±0.002^{a}	0.005±0.000^{a}	0.009±0.001^{c}
6. Cerelac	0.054±0.001^{c}	0.005±0.000^{a}	0.012±0.001^{d}

Results are means of ± S.D of two independent determinations.

The results also revealed that SBD produced the best growth while SGD resulted in the lowest even when compared with cerelac- the positive control treatment, (Table 4).

Rats fed by RBD had a better growth rate in liver and kidney while the lowest growth was found in the rats fed by SGD. SBD produced the best growth in the heart of rats (Table 5).

4. Discussion

foods moisture content is an important index of their susceptibility to microbial spoilage. When the moisture content is high, microorganism's growth increases [9]. Thus predisposes such foods to degradation and enhances its perishability. This is an important issue in feeding methods of this Local Government Area and especially in Nigeria because most nursing mothers often prepare large quantities of "dry" infant foods and kept in containers, to avoid frequent processing and save time and energy for other works. The low moisture content would, therefore, induced low growth rate of bacteria and fungus. The moisture contents of both raw and composed diets (except white beans) is consistent with those reported by Arkroyed and *Doughty* (2000) and Ige *et al.* (1984) for legumes

The ash contents of the diets was slightly higher than recommended range (1.5-2.5%) for seeds and tubers for animal feed formulation by Pomeranz and Clifton (1981). may be because of crayfish inclusion, in all the diets we could observe a high level of mineral elements in these diets.

According to the observed results Legumes and cereals are known to have a reasonable amount of carbohydrate, in. In addition, high protein content maybe contributed to low carbohydrate foods.

The highest crude fat percentage in GND could be attributed to the inclusion of oil-dense groundnut in the diet. This results is agreed with the recommendations by FAO/WHO (1998) that vegetable oils be included in foods meant for infants and children [13], which will not only increase the energy density but also played as fat-soluble vitamins [6].

all composed diets meet the Recommended Dietary Allowance (RDA) for protein contents up to one year [14].

Legumes are fairly rich in amino acids and fats [7]. In addition, soya bean is also richer in proteins in comparison with many other legumes. This results the best growth recorded in the rats which fed on SBD.

Although the weights of the animals were not the same as the initial grouping. Their increase in the growth percentage response can be calculated by finding their growth differences between their initial and final body weight. This study has been clearly demonstrated that soybean based diet; has a better growth effect compared to other formulas including cerelac (positive control). However, protein percentages of the composed diets differ at the beginning of the experiment, their growth effects on rats depend on their quality but not their quantity. This is demonstrated bythe better growth response of rats fed with

GND, which contained less (22.17%) protein and those rats fed with SGD, which contained more (23. 17%).It is advisable, that legumes and cereals may be combined together to achieve better nutritional status. Legumes can be combined with grain because of having a special amino acid deficit in legumes. Also, legumes are known to lack some essential amino acids (like methionine and tryptophan), which are found in cereals. Similarly, cereals also lack some essential amino acids (like lysine and isoleucine) but are presented in legumes. Therefore, their combination will ensure the supply of all the essential amino acids which are necessary for children growth. mothers or baby keepers of these Local Government Areas could combine some of these formulas and prepare these complementary foods hygienically to wean their babies. It will not be difficult to achieve this because all of the food materials needed are readily available locally and cheaply. These formulas could ameliorate the problem of not being able to afford expensive commercial formulas.

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