ECRONICON OPEN ACCESS

EC NUTRITION
Research Article

Comparative Study of Complementary Foods Produced from Cowpea and Melon Sources

Ibironke Samson Ishola*

Department of Food Science and Technology, Obafemi Awolowo University, Ile-Ife, Nigeria

***Corresponding Author**: Ibironke Samson Ishola, Department of Food Science and Technology, Obafemi Awolowo University, Ile-Ife, Nigeria.

Received: February 28, 2022; **Published:** March 30, 2022

Abstract

Food that are of protein origin are succour to malnutrition in infant and children that are under 5 years of age. The research aimed to formulate complementary food from cowpea and melon protein sources and would be fed to 50 albino experimental animals. The complementary foods was prepared as follows: cowpea ogi (1) melon ogi (2) cowpea melon ogi (3) basal (4) commercial diet-control diet (5). The following parameters was taken into consideration, growth response, weight of endocrine system, biological values. The result revealed that food growth has positive response, weight of endocrine system was increasing steadily, and adequate, biological values was also higher, weight of and endocrine system gained weight, both cowpea and melon protein diets was favourable comparable to control commercial diet expect for diet 4 that had no biological value because it was previously design to be negative protein therefore could not support growth of an experimental animal fed to the group. The cowpea-melon ogi had the highest growth response, followed by control diet, cowpea ogi, mellon ogi and the control diet. This was followed by protein contained diets and basal diet had the least diet the best complementary food was produced from the mixture beans and melon seed. Beans has been confirmed to be polyphenol-rich and have potential effects on human health, possess anti-oxidant, anti-diabetic, anti-obesity, anti-inflammatory and anti-mutagenic and anti-carcinogenic properties. Melon protein also reported to improve appetite, prevent anaemia, it is good for bones. It prevents malnutrition promotes heart health also Melon has been reported of many health, improves vision, reduces inflammation, it is highly digestible, and has antioxidant for properties healthy skin. Boost your immune system and promote proper digestion. Therefore, the combination of two protein sources produce excellent result complementary foods could eradicate malnutrition in Sub-Saharan Africa.

Keywords: *Complementary Foods; Cowpea and Melon Protein Sources*

Introduction and Background

Proteins are the main building blocks of body cell. Protein can be derived from both plant and animal protein [1,5,6]. Protein can function as muscles strengthening, tendons, organs and skin, as well as enzymes, hormones, neurotransmitters. There are various molecules in protein that serve as many important functions to providing all essential amino acids. It could help weight loss therapy. According to World health Organisation, children under 5 years of age account for 47 million were wasted, 14.3 million children were severely wasted and 144 million children were stunted, while 38.3 million were overweight or obese. Around 45% of deaths among children under 5

years of age are linked to undernutrition. These are mostly occur in low- and middle-income countries [2-4] cowpea is widely cultivated and consumed in Nigeria; the most important producing areas in Nigeria are relocated in the savannah area cowpea, *Vigna unguiculata* L. (Walp), is an important crop protein source in tropical countries especially in Nigeria, West Africa where it is obtained and used as cheap inexpensive source of dietary protein (Cowpea bruchid, *Callosobruchus maculatus* depredates stored cowpea [30-32]. Beans have excellent anti-oxidant, ant diabetic [5,6,25]. Beans has reported by some authors for its phenolic acids compounds, flavonoids, stilbenes and tannins, it's anti-oxidant activities are primarily due to the reducing capacity of polyphenols as they play vital functions in neutralizing free radicals. Studies of *in vitro, in vivo,* animal studies and clinical studies on health-promoting effects of polyphenol-rich [6-11]. Beans have also confirmed that common beans possess the highest anti-oxidant capacity, as measured in various biochemical parameters including the dry beans have excellent anti-oxidant activities because of its phenolic acids, flavonoids, stilbenes and tannins [1,5,6]. Polyphenol-rich dry beans have potential effects on human health, and possess anti-oxidant, anti-diabetic, anti-obesity, anti-inflammatory and anti-mutagenic and anti-carcinogenic properties According [1,4-6] cowpea is an extremely valuable crop both as a source of revenue and an important source of cheap dietary protein for the third world where meat is expensive.

High protein and lysine contents of cowpea make it a natural supplement to staple diets of cereals, roots, tuber and fruits. Studies have also suggested that diets rich in common beans reduce the greater risk of various cancers including colon, breast and prostate [1,12-15]. In Nigeria, the production of cowpea is carried out largely by peasant farmers and cowpea production is limited by the attack of insect pests which cause serious post-harvest losses to the cowpea grain. The food value of cowpea lies in its high protein content and low fat, and low sugar ability to tolerate drought and also it's compatibility as an intercrop with maize, millet, sorghum, sugarcane and cotton. This makes the grain legumes an important component of traditional intercropping systems especially in the complex and elegant subsistence farming systems of the dry savannahs in sub-Saharan Africa. Most of these trials mainly confound that natural product are useful in the control of stored pests. However, mellon is another protein source that could be used as alternative complementary food where there is animal protein shortage (melon also known by local name including agusi in Yoruba south western Nigeria or agush igbo south eastern Nigeria) otherwise known as melon is the name for the protein-rich seeds of certain cucurbitaceous plants (squash, melon, gourd), which after being dried and ground are used as a major ingredient in West African cuisine [1-5]. Some of the nutrients and health benefit of melon include, reducing blood pressure, contains some nutrients that are vital to bone health, and improving blood sugar control [14-20]. It is rich in electrolytes and water support, improves appetite. Some studies has been reported that melon could prevent anaemia, also good for bones, prevents malnutrition, promotes heart health, improves vision, reduces inflammation, helps in digestion, and has antioxidant properties, healthy skin. It boost immune system and promote proper digestion the purpose of this article is to produce complementary food from cowpea and melon protein sources and compare their nutrients to obtain the best commercial diet in the market [31-33].

Materials and Methods

Fifty white wister strain albino rats were procured from animal breeding centre Obafemi Awolowo University Faculty of Health Science Ile-Ife, Nigeria. The experimental Animals were ranged from 107 - 129.36g. They were six weeks old. The experimental animals were picked randomly selected and distributed into five groups of ten per group and was caged in a metabolic cage fitted with feeding bottle and plate. They were fed on animal feeds (finisher) for seven days to acclimatize them to the new environment. The experimental animals were again reweighed and distributed into five groups of ten per group. 10g of supplements dietary were supplied daily. The leftover of the dietary samples were carefully recorded and the weights were noted. Weight gain/loss of the experimental animals was taken every three days and graphically sketched as in figure 1. At the end of the experiment, which was twenty-eight days, the experimental animals were anesthetized sacrificed. The organs collected from the animal were heart, kidney and liver were fixed immediately in 10% formyl saline for further analysis [2,17-20].

Results and Discussion

Complementary food	Protein %	Moisture %	Fat %	Ash %	Fibre %	CHO %	Dry Matter %
Cowpea ogi	26.65 ± 0.01	5.2 ± 0.02	49.50 ± 00.0	2.70 ± 0.01	3.2 ± 00.1	45.97 ± .01	94.8 ± .04
Mellon ogi	24.95 ± 00	5.2 ± 0.01	12.78 ± 0.01	2.70 ± 0.02	6.4 ± 00.2	47.97 ± 0.1	94.8 ± .03
Cowpea-mellon ogi	22.76 ± 0.01	2.7 ± 0.03	12.60 ±	2.50 ± 00.0	5.2 ± 00.3	54.24 ± 0.02	97.3
basal	-	2.6 ± 0.02	0.85 ± 0.02	2.42 ± 00.1	4.6 ± 00.3	89.53 ± 0.2	97.4 ± .02
Control	15 ± 00	2.8 ± 0.01	9 ± 0.01	2.45 ± 00.1	6.4 ± 0.01	64.35 ± 0.03	97.2 ± .03

Table 1: *Proximate composition of the ingredient.*

Mean ± SD values of three replicates ($p \leq 0.05$).

Table 1 reported the proximate composition of the ingredient of cowpea ogi, mellon ogi cowpea-melon ogi, basal and control complementary food. Protein % content was ranged between 15 and 26.65. The protein sources are adequate to promote growth in an infant and children. Moisture content was ranged from 2.6 - 5.2 the moisture was low to inhibit microbe. Fat content ranged between 0.85 - 49.50, also the fat is very low in the other hand food is far from rancidity. The ash content was ranged from 2.42 - 2.70, fibre content % was ranged from 3.2 - 5.2, carbohydrate % was ranged from 45.97 - 64.35 and dry matter was ranged between 94.8 and 97.4.

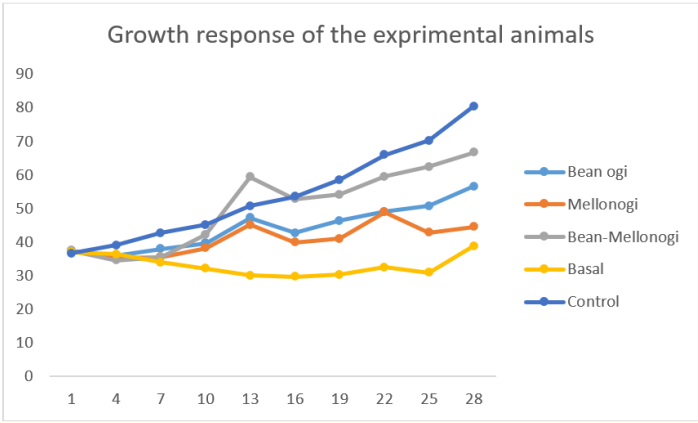

Figure 1: *Growth response of complementary of the experimental animals.*

Figure 1 shows the growth response of complementary of the experimental animal. Cowpea-melon ogi experimental animal had the best growth response. This was followed by protein contained diets, basal diet had the least performance, had little or no growth while animals in groups 1, 2, 3 and 5 had quality protein their food fed to them contain complete amino acid and balance diets therefore enhance their growth but group 4 is deficient in some amino acid. This may be due to the fact that the diet lacked adequate nutrient such as protein, and may be deficient in essential amino acids, that should support growth [1,15-20]. Beans has been confirmed to be Polyphenol-rich and have potential effects on human health, and it has been reported to possess anti-oxidant, anti-diabetic, anti-obesity, anti-inflammatory and anti-mutagenic and anti-carcinogenic properties. Figure 2 shows the weight of the endocrine of the experimental animal. The cow-

pea-melon ogi had the highest growth, followed by control diet, cowpea ogi, mellon ogi and the least, little or no growth response was found in basal diet. Animals in groups 1, 2, 3 and 5 had quality protein that contain balance diets that has contain complete amino acid inclusion into their diet but group 4 is deficient in some amino acid. This may be due to the fact that the diet lacked adequate nutrient such as protein, and may be deficient in essential amino acids, such as tryptophan and lysine that could have should supported growth and enhance their wellbeing [21-25]. Beans was beneficial in the prevention and management of diabetes. Studies have also suggested that diets rich in common beans reduce the greater risk of various cancers including colon, breast, and prostate. Endocrine collected is liver and kidney. Liver ranged between 4.33 - 5.98 and kidney ranged from 0.68 - 1.20 [17-20,31-33].

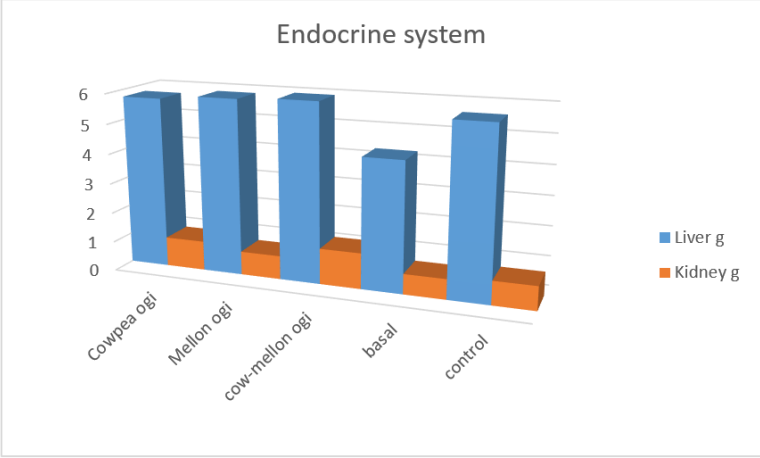

Figure 2: *Weight of the endocrine of the experimental animal.*

It has been confirmed by some workers that Polyphenol-rich dry common beans have potential effects on human health, and possess anti-oxidant, anti-diabetic, anti-obesity, anti-inflammatory and anti-mutagenic and anti-carcinogenic properties [1,11,12,21-25].

No	Complementary food	Kidney mg/g	Liver mg/g	Muscle mg/g
1	Cowpea-ogi	88 ± 0.01	84 ± 0.04	85 ± 0.02
2	Mellon ogi	84 ± 0.01	85 ± 0.04	84 ± 0.03
3	Cowpea-Mellon	*78 ± 0.02*	86 ± 0.03	88 ± 0.03
4	basal	*24 ± 0.03*	22 ± 0.03	26 ± 0.02
5	Control	*88 ± 0.03*	86 ± 0.02	85 ± 0.01

Table 2: *Nitrogen retention of the experimental animal.*

Mean ± SD values of three replicates ($p \leq 0.05$).

Nitrogen retention of the experimental animal gave the detail of retention kidney mg/g ranged from 24 - 88, Liver mg /g ranged from 22 - 86 and Muscle mg/g ranged from 26 - 88. Protein content has translate to nitrogen retention experimental animal [1,6-10,25-30].

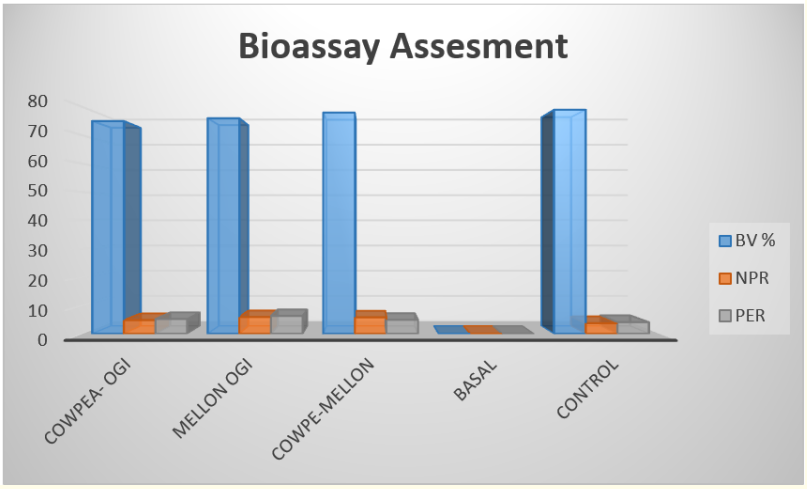

Figure 3: *Bioassay assessment of cowpea and mellon protein sources fed to experimental animal. Bioassay study reflected that BV% ranged from -78, NPR -5.9 and PER-6.3 respectively beans is rich in polyphenol and have potential effects on human health, and also possess anti-oxidant, anti-diabetic, anti-obesity, anti-inflammatory and anti-mutagenic and anti-carcinogenic properties [1,18,20-22,25-33].*

Conclusion

It is thus concluded that complimentary food produced from cowpea and melon protein sources is viable, compare favourable with commercial diet, and could serves as an alternative to curb malnutrition among the children in sub-Sahara region. Cowpea-melon ogi experimental anima group had the best growth response, this was followed by protein contained diets, basal diet had the least growth response the best complementary food is produce from the mixture beans and melon seed. Polyphenol-rich dry beans have potential effects on human health, and it was confirmed to possess anti-oxidant, anti-diabetic, anti-obesity, anti-inflammatory and anti-mutagenic and anti-carcinogenic properties these may attributed to performance of combination of varieties of protein. Improves appetite, some study has been reported to prevent anemia, good for bones prevents malnutrition promotes heart also mellon has been reported of many health benefits such as, vision improvement, reduction of inflammation, highly digestible, and has antioxidant properties, possess healthy skin. Boosting of immune system and promote Therefore, the combination of two protein sources is highly recommended, would totally eradicate malnutrition in Sub-Saharan Africa.

Acknowledgment

I hereby wish to acknowledgment Department of Food Science and Technology, Obafemi Awolowo University, Ile-Ife, Nigeria.

Bibliography

1. Fernández X., *et al*. "Chemopreventive activity of polyphenolics from black Jamapa Bean (*Phaseolus vulgaris* L.) on HeLa and HaCaT cells". *Journal of Agricultural and Food Chemistry* 54.6 (2006): 2116-2122.

2. Achu MB., *et al*. "Nutritive value of some Cucurbitceae oilseeds from different regions in Cameroon". *African Journal of Biotechnology* 4.11 (2005): 1329-1334.

3. World Health Organization. Complementary feeding of young children in developing countries: a review of current scientific knowledge. Geneva, Switzerland (1998, 2002).

4. World Health Organization. Global Malnutrition Fact Sheet (2018).

5. Aparicio-Fernández X., *et al*. "Characterization of polyphenolics in the seed coat of Black Jamapa bean (Phaseolus vulgaris L.)". *Journal of Agricultural and Food Chemistry* 53.11 (2005): 4615-4622.

6. Aparicio-Fernández X., *et al*. "Comparison of antimutagenic activity of phenolic compounds in newly harvested and stored common beans Phaseolus Vulgaris against aflatoxin B1". *Journal of Food Science* 70.1 (2005): S73-S78.

7. Adeniyi MA., *et al*. "Determination of Mineral Contents, Proximate Composition and Functional Properties of Complementary Diets Prepared from Maize, Soybean and Pigeon Pea". *American Journal of Nutrition and Food Science* 1.3 (2014): 53-56.

8. Oloyede FM., *et al*. "Antioxidant Activities and Food value of Five Underutilized Green Leave Vegetables in South Western Nigeria". *Nigerian Journal of Nutritional Sciences* 32.1 (2011): 13-18.

9. Ibironke SI, *et al*. "Nutritional Evaluation of Complementary Food Developed from Plant and Animal Protein". *Nutrition and Food Science* 42.2 (2012): 111-120.

10. Ibironke SI. "Formulation of Infant Weaning Foods from Vegetable Proteins and Cereal". *American Journal of Food Technology* 9.2 (2014): 104-110.

11. Ibironke SI., *et al*. "Nutritional Quality of Animal Polypeptide (Crayfish) Formulated Into Complementary Foods". *American Journal of Food and Nutrition* 2.3 (2014): 39-42.

12. Ibironke SI., *et al*. "Nutritional evaluation of complementary food formulated from fermented maize, pigeon pea and soybeans". *Nutrition and Food Science* 44.5 (2014): 464-470.

13. Ibironke SI., *et al*. "Formulation of Complementary Foods Developed from Plants Polypeptide (Parkia Biglobosa), Soy Bean and Maize". *American Journal of Nutrition and Food Science* 1.4 (2014): 72-77.

14. Ibironke SI and Ige MM. "Growth Pattern and Nutritional Status of School Children Aged 6-14 Years of Selected Schools in Osun State, Southwest-Nigeria". *Annals of Food Science and Technology* 15.2 (2014): 387-391.

15. Sharma A., *et al*. "Polyphenols in food: Cancer prevention and apoptosis induction". *Current Medicinal Chemistry* 25.36 (2018): 4740-4757.

16. Oladeji BS., *et al*. "Physico-chemical and nutritional evaluation of co-processed fermented yellow maize ogi (An infant diet) and carrot blends". *Annals of Food Science and Technology* 15.1 (2014): 82-91.

17. Ewuola GO., *et al*. "Formulation and Nutritional Evaluation of Maize, Bambara Groundnut and Cowpea Seeds Blends Complementary Food". *American Journal of Food and Nutrition* 3.4 (2015): 101-105.

18. Fokou E., *et al*. "Preliminary nutritional evaluation of five species of egusi seeds in Cameroon". *African Journal of Food, Agriculture, Nutrition and Development* 4.1 (2004): 11.

19. Ibironke SI and Adepeju A B. "Nutritional Assessment of Breakfast Foods Developed from Animal Polypeptide, Crayfish (*Euastacus* Spp) and Maize (*Zea mays*)". *American Journal of Food and Nutrition* 4.5 (2016): 131-134.

20. Oladeji BS., *et al*. "Comparative analysis of physico-chemical properties and amino acids profile of three tropical maize hybrid cultivars in Nigeria". *Nutrition and Food Science* 46.5 (2016): 695-705.

21. McDougall GJ. "Phenolic-enriched foods: Sources and processing for enhanced health benefits". *Proceedings of the Nutrition Society* 76.2 (2017): 163-171.

22. Mojica L and de Mejía EG. "Optimization of enzymatic production of anti-diabetic peptides from black bean (Phaseolus vulgaris L.) proteins, their characterization and biological potential". *Food and Function* 7.2 (2016): 713-727.

23. Ibironke SI., *et al*. "Comparative Study of Condiment Vegetable Basil Leaf (*Ocimum gratissimum*) and Bitter Leaf (*Vernonia amygdalina*)". *American Journal of Food and Nutrition* 5.3 (2017): 95-98.

24. Adefisola Bola Adepeju and Samson Ishola Ibironke. "Dietary Formulation and Nutritional Composition of Cereal Based Complementary Food". *EC Agriculture* 5.8 (2019): 435-441.

25. Cardador-Martínez A., *et al*. "Antioxidant activity in common beans (*Phaseolus vulgaris* L.)". *Journal of Agricultural and Food Chemistry* 50.24 (2002): 6975-6980.

26. Ibironke Samson Ishola and Isaac Owotomo. "Effect of Processing on the Nutritive Value of Fluted Pumpkin Vegetable Leaves (ugu) and Seed Nutrients (*Telfairia occidentalis*) on the Health of Wister Rats". *Acta Scientific Nutritional Health* 4.3 (2020): 127-131.

27. Ibironke SI. "Physico-Chemical, Nutritional Evaluation, Haematology of Water and Amaranth Vegetable Leaves". *Journal of Nutrition and Health Sciences* 7.2 (2020): 204.

28. Ibironke SI. "Biotechnological Evaluation of Dietary Formulated from inoculation of Three Micro-Organisms". *Nutrition and Food Technology* 7 (2021): 110.

29. Ibironke SI. "Nutritional Status and Cognitive Value of Egg White, Egg Yolk Whole Egg based Complementary Food.): 101". *Journal of Nutrition and Health Sciences* 8.1 (2021): 101.

30. Sharma A., *et al*. "Polyphenols in food: Cancer prevention and apoptosis induction". *Current Medicinal Chemistry* 25.36 (2018): 4740-4757.

31. Ganesan K and Xu B. "A Critical review on polyphenols and health benefits of black soybeans". *Nutrients* 9.5 (2017): 455.

32. Villegas R., *et al*. "Legume and soy food intake and the incidence of type 2 diabetes in the Shanghai Women's Health Study". *American Journal of Clinical Nutrition* 87.1 (2008): 162-167.

33. Tang GY., *et al*. "Antidiabetic components contained in vegetables and Legumes". *Molecules* 13.5 (2008): 1189-1194.

Volume 17 Issue 4 April 2022