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Quality Characteristics of Ogi Supplemented with cashew Nut Flour

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Abstract

Quality of ogi supplemented with cashew nut flour was studied. Ogi was made and supplemented with cashew nut flour at 100%Ogi: 0%cashew nut flour, 90%Ogi:10% cashew nut flour, 80%Ogi:20%cashew nut flour and 70%Ogi: 30% cashew nut flour ratios respectively. Chemical, functional and sensory evaluation of the blends showed an increased value chemical and some functional parameters with a comparative sensory acceptability with respect to control (100% Ogi). The results showed that moisture content (6.32-7.49)%the protein (8.49-15.24)%, fat (0.96-2.2%) , Crude fibre (0.25-0.43%),Ash (0.25-.7%) , carbohydrates (82.25-75.04%),pH(4.67-5.21%),TTA (2.90-1.60%) increased with the increase in cashew nut flour. The pH value (4.67 - 5.21)% Titratable acidity (2.90 -1.60%).Bulk densities ranged from (1.62 - 1.65 g/ml), swelling index (8.60-1.90 g/ml), water absorption capacity (1.07-1.53) g/mg .Oil absorption capacity(2.74-2.46g/ml) and gelation capacity (2.-3.33g/ml) changed as proportion of cashew nut flour increased . The panelists rated the product high with statistical differences for appearance and aroma. The samples were generally acceptable and therefore recommended for homes to alleviate hidden hunger.

Keywords: Ogi; Cashew nut; Flour; Supplementation; Quality; Hidden hunger

Introduction

Ogi is a staple cereal fermented product found predominantly in western and Southern Nigerian and is usually the first native food given to babies at weaning. It is produced generally by soaking maize grain (zea may) in warm water for 2-3 days followed by wet milling and sieving through a screen mesh [1] reported the use of Ogi as a weaning food in western Nigeria to Supplement breastfeeding between ages of 3-6months for young children. Ogi is usually prepared from fermented maize, sorghum or millet in West Africa (Akingbala et al., 1981) [2]. It is a popular breakfast cereal and infant weaning food in Nigeria [3]. It can be diluted into solids content of 8 to 10% and boiled into a pap, or cooked and tunred into a stiff gel called “agidi” or “eko” before consumption . This same product is often eaten along with meat, stew, vegetable soup, steamed bean cake (moin-moin’) or fried bean cake (akara) [4]. The economic strength of the consumers does influence the choice of the supplements (Teniola and Odunfa, 2001) [5]. It has been established that substantial nutrient losses during the various stages of production of Ogi, these losses have been evaluated and reported by several workers [2]. Various supplements of Ogi have been developed including: tempeh [6], soya beans, pawpaw and cowpea [7,8] reported the development of an Ogi product (dogik), which have therapeutic properties on the basis of its ability to control diarrhea among infants.

Cashew (*Anacardium occidentale Linn*.) belonging to family Anacardiaceae, is an extremely hard tree that grow on poor soil under various climatic conditions. It is a native to Brazil and is being extensively shown in India, East Africa, Nigeria and Vietnam by (Muniz et al., 2006) [9]. These countries including Nigeria are the main producers of cashew by Honorato et al. [10]. Cashew is one of the most important plantation crops earning huge amount of foreign exchange through its kernel and Cashew Nut shell Liquid (CNSL). India is the World’s largest exporter of cashew nuts followed by Brazil. Africa is third in terms of global production of cashew, producing approximately 100,000 tonnes of cashew nut per year. Africa gains little from the production as most of the nuts produced are exported to the USA, Netherlands and other European countries unprocessed. ,

However there are no consensus that dietary supplements are the best to treat malnutrition, but throughout the human history, supplements have been used in the treatment of diseases. Many families had continued to use dietary natural products to combat malnutrition by Sayyad-Neerkorn [11] Dietary supplementation may be effective in the recovery of malnourished children, when it is composed of essential nutrients for growth and development and is also linked with periodic anthropometric, biochemical, and nutrient assessments. Cashew nut (*Anacardium occidentale L*.) , had been found to be high in carbohydrates, proteins, phosphorous, iron, zinc, magnesium, fibers, and fatty acids (Food and Nutrition Information). However, the biochemical effects of the use of dietary supplements in malnourished children, such as the cashew nut seed flour, are not well established. Blood

biochemical parameters are rarely used in the evaluation of malnourished children in primary care services but had discovered water content of 4.8%, lipids of 43.2%, protein was 14.6%, fiber was 1.2%, ash was 2.6%, and carbohydrates were 33.6%. and Approximately 388 kcal (kilocalories) was found in 100 grams of the cashew flour, hence biochemical measurements are used as a supplement for the nutritional, anthropometrical, and clinical assessments. The evaluation of glycaemia, total cholesterol and its fractions, minerals, and vitamins were also underutilized in this professional clinical routine. It has been reported that the use of cashew nut seed flour in a 24-week period had positive effects on glycated hemoglobin, HDL, and LDL parameters in moderately malnourished children. This work seeck to supplement ogi with bioactives from cashew nut seed flour for denser nutrient in ogi , to alleviating hidden hunger.

Methodology

Sample Procurement

Maize and cashew nut were purchased from Wurukum market in Makurdi, Benue State. All other materials and chemicals were of analytical grade and were obtained from the Processing laboratory of the Department of Food science and Technology, University of Agriculture, Makurdi, Nigeria.

Cashew nut flour preparation

Dried cashew nut was pounded into powder using laboratory porcelain mortar and pestle. Grounded and weighed sample stored in air tight plastic containers and preserved for laboratory analysis.

Preparation of powdered Ogi

Cleaned maize grains were washed steeped in clean water at room temperature from 24hrs. the steep water was decanted and there fermented grain with clean water and wet-milled. The bran was removed by wet sieving and the sievate was allowed to settle for 24hrs. the solid starchy matter, Ogi was then dried in hot air oven at 600c for 24hrs to obtain dried flakes which were then milled to obtain powdered maize Ogi.

Functional Properties

The functional properties of the flour determined were water /oil absorption capacity, swelling capacity and bulk density (BD), emulsion and gelation capacity. The blend samples was used for the chemical analysis

Bulk density

Bulk density was determined exactly 10ml capacity graduated measuring cylinder and filled gently with each sample. The bottom of the cylinder was gently tapped on a laboratory bench several times until there was no further diminution of the sample level. Bulk density was calculated as shown below

Bulk density = Weight Sample(g)/Volume of the sample (ml)

Gelatin capacity

The method was used to determine the least gelation respectively in a boiling test tube containing 5ml of distilled water and heated for 1 hour in a boiling water bath. The heated dispersion were cooled rapidly under running cooled water then further cooled at 40c for 2 hours. Gelation capacity is the least gelation concentration determined as the concentration when the sample from the inverted test tube will not fall or slip.

Chemical Composition

The proximate analysis was done to obtain for the moisture content, dry matter, crude protein, crude fiber, crude fat, and ash content following the procedures. The blend samples from was used for the chemical analysis

Moisture Content Determination

A clean aluminum dish was oven dried and weighed after cooling in a dessicator. (Two grams (2g) of sample was weighed into the dish and oven dried at 800C for 2hrs ad at 105°c for 4hrs. the sample was cooled in a desicator and weighed.

Determination of crude fiber content

The crude fiber was determined according to the method described by petroleum ether was used to defat 2g of sample. The defatted sample was boiled in 200ml of 1.25ml of 1.25% H_2SO_4 and boiled for 30 minutes, the solution was then filtered through muslin/linen clothe on a fluted funnel. It was washed with boiling water until it is free of acid. The residues was returned into 200ml boiling NaOH and allowed to boil for 30minutes. It is further washed with 1%HCL and hot water, to free if acid, the final residue was rained, dried and transferred to crucible and ignited in a muffle furnace.

Sensory Evaluation

The method was used by the organoleptic properties of the prepared supplemented Ogi samples were carried out by a ten man panel comprising the students of the university who are familiar with the product. The parameters evaluated were appearance, colour, aroma taste and texture using a 9-point hedonic scale, ranging from 9=like extremely to 1=dislike extremely.

Statistical analysis

The data was analyzed using one-way analysis of variance (ANOVA). Differences in means were compared using Fishers least significant difference (LSD). The statistical analytical was performed using the statistical package for social Scientists (SPSS for windows version 21.0). A significant level of 5% was used.

Results

The functional properties of the Ogi supplemented with

cashew nut flour are presented. There was no significant ($p<0.05$) difference in the bulk densities of the samples and has mean values ranging from 1.62% to 1.65%. The result implies that bulk density increases with increase in the level of cashew nut supplementation. Bulk density plays an important role in packaging. Transportation of food products and decreases porosity of materials due to surface properties. There was a significant difference in the swelling index of the Ogi. Sample A (100% Ogi) which has the highest mean value of 3.60% differs from all other samples. Sample C (80:20) showed no significant difference with samples B (90:10) and D (80:20) while both samples are significantly different. The swelling index of the samples ranged from 3.60% to 1.90%, reducing with increase in cashew nut flour addition. This reduced observation in swelling index might come from ogi that had undergone malt fermentation. Water absorption capacities for all samples are significantly the same with values ranging from 1.67 to 1.53, which implies that WAC of the samples decrease with increase in cashew nut addition. The water and oil absorption capacities of Sample D is lowest with mean values 1.53% and 2.38% respectively which is as a result of the gelation capacities of the flour blends. Sample D (70:30) has the least gelation capacity of 2.00%, while sample A (100%Ogi) has the highest gelation capacity with mean value of 3.33%. This result implies that gelation capacity decreases with increase in addition of cashew nut flour. These decrease observation in water absorption capacity and gelation capacities might be the micro fiber nature of cashew nut flour ,holding absorption surfaces and the fermentation Ogi might had undergone , converting the maize amylose and amylopectin's sugars to other substrates in the process.

Chemical composition of Ogi supplemented with cashew nut flour

The chemical composition of Ogi supplemented with cashew nut flour are presented in the protein content of the Ogi samples was significantly different. Sample D supplemented at a level of 70:30 had the highest mean percentage protein content of 15.24% while the least value was recorded for sample A (100% Ogi) with percentage mean value of 8.49%. The result implies that the high supplemented samples were high in protein content gotten from the cashew nut flour and could be used as alternative protein source in protein deficient foods (Ana Cristiana et al., 2020). The protein content of the ogi ranged from 13.81-15.24% with increase in supplementation.

The samples also show a significant difference ($p<0.05$) in the fat content of the Ogi samples. Samples A (100.0) which served as the control had the lowest value of 0.96% while the highest value was recorded for sample D (70:30) with 2.21%. This result implies that the fat content increase with increase in supplementation. The fat and oil content of cashew nut contributes substantially to its energy content. There was no significant difference ($p<0.05$) in the fiber content. The fiber contents ranged from 0.52 and decrease to 0.43 as the addition of cashew nut flour increases. There was no significant difference between samples C and D in its crude fiber content. Crude fibre is known to aid the digestive system of human.

There was significant difference ($p<0.05$) in the ash content of the samples. Smaple A (0.100.0) had the lowest mean value of 0.25% while the highest mean value was recorded in sample D (70:30) with 0.70%. the result shows that the ash contents of the samples increase with increase in the level of supplementation. Ash in a non-organic compound containing mineral content of food and nutritionally it aids in the metabolism of other organic compounds such as fat and carbohydrate.

The samples also showed a significant difference ($p<0.05$) in their carbohydrate level with sample A (100%Ogi) having the highest mean value of 82.25% and sample D with the lowest mean value of 75.05%.

The result also showed that the supplemented Ogi has the highest pH of 5.21 while that of the control has the lowest pH of 4.67, with a significant difference. Low pH of flours is due to to organic acids. The hydrogen ion activity of a food product is useful in assessing the extent by which spoilage due to enzymes and microorganism can occur. The TTA value also ranges from 1.60, 2.90% and there was no significant difference among all samples. The results of the pH and TTA implies that a low pH the acidity content of the flour increases thereby increasing the shelf life making it stay longer than the control (sample A).

Sensory Evaluation of Ogi samples

The result of the sensory evaluation of Ogi supplemented with cashew nut flour is presented. There was no significant difference ($p<0.05$) in the appearance if the Ogi through sample A (100:0) had the highest means score of 8.005 while the least means score was recorded in sample D (90:10) with 7.10%. the result implies that sample B with mean value of 7.40% was also preferred in appearance by the judges, while sample A was most preferred. Colour is a very important parameter in judging properly that not only reflect the suitable raw materials used for the preparation but also provides information about the formulation and quality of the product.

There was significant difference ($p<0.05$) in taste. Sample A (100% Ogi) had the highest mean score of 8.00% while the least value was recorded in sample D(70:30) with value of 6.50%. The result indicates that sample a (100% Ogi) is the most preferred in terms of taste which was followed by sample B(90:10) with no significant difference between them. There was also no significant difference ($p<0.05$) in the aroma of the Ogi, with sample A (100%) having the highest mean score of 7.70%, while

the least mean score was recorded in sample D (70:30) with 6.90% which indicates that ogi sample A (100% Ogi) is the most preferred in terms of aroma followed closely by sample B (90:10). Flavour is the main criteria that makes the product to be liked or disliked. The sensations of taste and smell are functions of flavour which is a complex of sensations. Food flavor according to arises from a subtle interaction of taste and aroma, which imparts a pleasing and displeasing sensory experience to a consumer. It is the flavour of a food that ultimately determines its acceptance or rejection, even though its appearance evokes the initial response. There was significant difference in texture the Ogi samples with samples A (100%Ogi) having the highest means score of 8.30% and sample D (70:30) having the least mean vaue of 5.80%. this could be due to the particles cashew but flour impacts on the Ogi when constituted with warm water.

Conclusion

The quality characteristics of Ogi were dependent on its level of cashew nut flour supplementation. Chemical, functional and sensory evaluation of the blends showed an increased value and a comparative sensory acceptability with respect to the control (100% maize Ogi). The results showed that chemical, functional properties of the blends increased with cashew nut flour substitution with Ogi flour in almost all samples . Therefore an acceptable blend product that could alleviate hidden hunger in our rural dweller can be made at 10%,20% and 30% substitution levels.

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Conflict of interest

There are no conflicts of interest among the authors

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