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Chemical and sensory properties of bread from composite wheat and sesame (*Sesamum indicum*) seed flour

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Abstract

Background: The aim of this paper is to investigate the effect of complementing whole wheat flour (WF) with sesame seed flour (SF) on the chemical and sensory properties of bread products, baked bread from the composite flour of WF and SF at ratio 90:10, 80:20 and 70:30 with 100% WF control. All the four bread samples were subjected to chemical (moisture, crude protein, fat, ash and crude fibre) evaluation.

Methods: The sensory evaluation of the samples was conducted by a 24- member panel of randomly selected male and female adults. The results were statistically analysed, using ANOVA, and Duncan multiple Range test were used to test the difference between the treatment means.

Results: The increasing ratio of sesame flour in the bread product significantly (<0.05) increased the percentage crude protein, fat and ash of the products while the percentage moisture decreased. Thus, the 30% sesame supplementation (D) gave the highest nutrient contents. The sensory evaluation revealed that the bread product B with 10% sesame supplementation was the best acceptable among the products of the composite flour but slightly less preferred than the whole wheat bread which ranked highest in general acceptability.

Conclusions: It was apparent that a supplementation of wheat bread with 10% sesame flour improved the nutrients contents without affecting the overall acceptability of the bread product and also increased the protein and the unsaturated fatty acids, will reduce the risk of cardiovascular diseases in man as it has been reported in many countries. Further research can be done on reducing the slight odour (smell and taste) of the product for better acceptability.

Keywords: Chemical properties, sensory properties, bread, wheat, *Sesamum indicum*

Introduction

It is a known fact that many people, especially population at risk, in the developing countries of the world including Nigeria, Latin America and other African countries are malnourished because of their poor consumption of proteins and micronutrients with a resultant poor health (FAO, 2006, WHO, 2007 and Nutrition Council, 2008)

There have been attempts to reduce the high trend of malnutrition and its resultant diseases through nutrition intervention and increased consumption of protein fortified and commonly eaten foods like bread.

Bread is a popular cereal food among Nigerians. It is made from wheat, which like other cereals, has low quality protein due to low levels of essential amino acids(lysine and tryptophan). This low protein is not adequate to meet the protein requirements of our malnourished population, hence the realization that fortification of the bread through the supplementary additions of protein-rich grains and legumes will help to improve the quality of bread and ensure better protein intake of the people.

Sesame/Beniseed (*Sesamum indicum*) crop is a tropical and traditional legume containing oil seeds but which is less known for its functional nutritional qualities. The seed contains substantial amount of iron, magnesium, phosphorus, zinc and high quality protein (17.9%) with a balance of amino acids (tryptophan, cystine, lysine and methionime) which can conveniently supplement the limiting amino acids in wheat and other grains (Edwards, 1997) [2]. These seeds are also rich in monounsaturated fatty acids (47% oleic and 39% linoleic acids) which help to lower the Low Density Lipoprotein (LDL) which is "bad cholesterol" and increase the (HDL) High Density Lipoprotein "Good cholesterols" in the blood. (USDA National Nutrient Data Base, 2006). This causes a reduction of this bad cholesterol in human blood.

The quality protein and quality of fat makes it a health promoting food with both preventive and curative properties and benefits.

Thus, the identified nutritive potentials of these oily seeds prompted the investigation into the effects of complementing the whole wheat flour (WF) with sesame seed flour (SF) on the chemical and sensory properties of the composite bread products.

Materials and Methods

Market purchased sesame seeds were de-stoned, washed and soaked in water overnight. The seeds were drained, spread in a tray to dry in the sum for five days and were later ground into fine flour, packaged and preserved. The packaged whole flour was mixed with fine flour of sesame in ratio 100% (A), 90:10 (B), 80:20 (C), and 70:30 (D) respectively to produce 3 composite flour samples with A as a control. Each of the 4 flour samples was mixed with the same amount of butter, salt, sugar, yeast and water. Kneaded, shaped, proofed, baked and cooled.

The cooled products were subjected to chemical analyses (% moisture, crude protein, crude fiber, fat and ash) (AOAC, 2001) while the sensory evaluation was conducted by a 24 – member panel of randomly selected male and female adults, using hedonic scale to evaluate for taste, odour, texture, appearance and overall acceptability. The results were statistically analysed

using ANOVA and Ducan Multiple Range Test to test the difference between treatment means.

Results

The mean score of the sensory parameters are presented in Table 1. The results of the mean score of the sensory evaluation showed that 100% whole wheat was the most preferred and accepted sample, followed significantly by the sample (B) with 90:10 percent (composite wheat and Sesame), in taste, odour and acceptability. This highlighted the fact that sample B ranked highest in acceptability among the composite bread samples while (D) 70:30% sample was not acceptable due to increasing bitter taste and odour.

The nutrient contents of the products showed (figure1) increasing contents of % crude protein, ash, fat and crude fiber, while moisture decreased with increasing ratio of sesame.

These results apparently showed that B(90:10), sample with 10% sesame supplementation was the vbest preferred among the composite breads and contained significantly higher nutrient contents than the A(100%) whole wheat sample. The B sample with 10% sesame is thus recommended as the best composite bread because of its higher contents of protein and fat which indicate that 10% sesame will conveniently be a useful protein and fat supplements in the bread, realizing the high quality protein of sesame with a balance of essential amino acids and a chemical score of 62% plus a high concentration of omega 6 fatty acids with its low cholesterol oil.

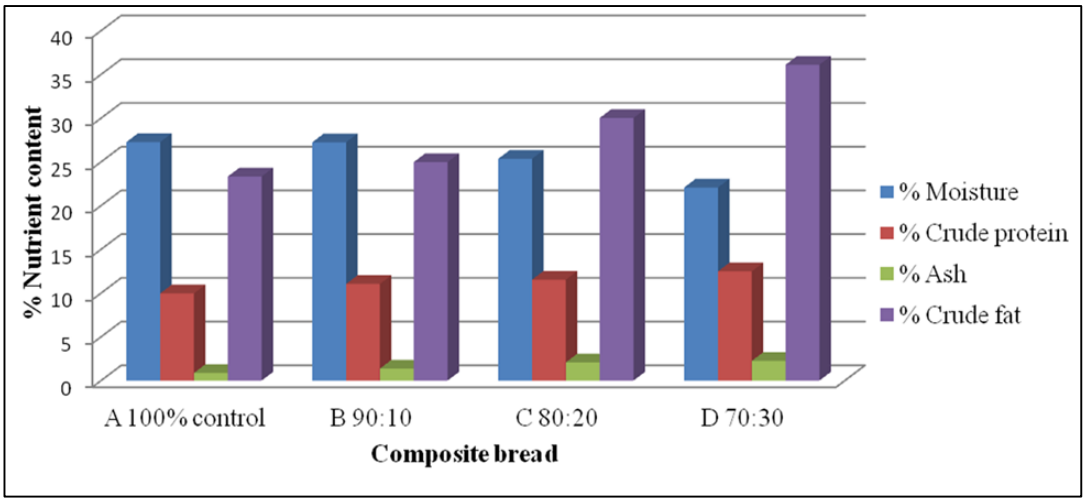

Fig 1: Nutrient Content of Bread Samples

Discussion

These results are in line with the report of Ndife *et al* (2011) and Singh *et al* (2000) [7], Taylor *et al* (2002) and Weiss (2000) which showed an increasing nutrient contents of protein, fat, crude fiber and ash in wheat/soybean composite bread and wheat /grain amaranth composite food products. These researchers and Onwubal (2009) also confirmed similar organoleptic observation and acceptance of 10% supplementation of the composite bread and products.

Conclusion

The composite bread with 10% sesame flour supplementation is found to be nutritionally superior to whole wheat bread because of its higher nutrient contents and ranked next to (100%) whole wheat bread in appearance, texture, odour and acceptability. This makes the 90:10% composite bread acceptable and recommendable as functional bread products to be introduced into Nigeria market. Further research can look into reducing the slight odour of sesame so as to improve the better acceptability of bread products.

The bioassay of these bread products can be performed so as to identify its therapeutics potentials of sesame on its people with cardiovascular and other chronic disease, more publicity should be given to sesame crop because of its nutritional and therapeutic benefits.

Conflicting Interest

The authors declare that there are no conflicting interests

Authors' Contribution

AT: Conceived of the study, and participated in its design and coordination and helped to draft the manuscript.

AR: Participated in the design of the study and performed the statistical analysis

CA: Participated in the collection and preparation of the samples
EU: Participated in the collection, preparation of the samples and carried out the experiment

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