EFFECT OF SOYMILK ON THE NUTRITIONAL AND SENSORY PROPERTIES OF KUNNU

Quadri J.A, Ojure M.A, Edun B.T, Omilani T & Edun M.

Department of Nutrition and Dietetics, Ogun State College of Health Technology, Ilese-Ijebu, Ogun State.

ABSTRACT

The nutritional and sensory characteristics of improved kunnu produced from cereals enriched with soymilk at different substitution levels were investigated. Proximate composition was determined using AOAC(2002) while sensory evaluation was done using 20 panelists. Data generated from the study were analyzed by ANOVA with SPSS 17.0 The result shows that enrichment with soymilk increased the protein, ash and moisture content of the improved kunnu but resulted in a decrease in carbohydrate. The protein content of the samples ranged between 2.57% and 4.47% while that of the control was 2.20%, the moisture content was between 76.20% and 78.03%. There was a significant difference ($p < 0.05$) in the sensory attributes, acceptability decrease with increase in soymilk addition which maybe because of the beany flavour.

Keywords: Sensory; enrichment, kunnu, soymilk

No: of Tables: 3 **No:of References:17**

INTRODUCTION

The consumption of cereal based food products from maize (*Zea mays*), sorghum (*Sorghum bicolor*), millet (*Pennisetum typhoideum*), rice (*Oryza sativa*) etc is very common and popular worldwide especially in developing African countries where they constitute a major source of their staple food (Gernah *et al.*, 2011).

The main cereals grown in Nigeria are maize, guinea corn, rice, millet and sorghum. These cereals can supply sufficient qualities of carbohydrate, fat, protein and many minerals, but diets consisting primarily of cereals are high in carbohydrate and deficient in vitamins and protein (Onwueme and Sinha, 1991). Nigeria was reported to have come fifth and second respectively in terms of annual world production figures of maize and sorghum relative to other producing countries (FAOSTAT, 2005; USDA, 2005).

One of the common traditional products is kunnu, a non-alcoholic beverage made mainly from millet. It is of low viscosity and has a sweet-sour taste, milky cream appearance and is popular with people in northern Nigeria (Adeyemi and Umar, 1994). It is generally consumed on its own by adults as a thirst quencher or serves as refreshment in some communities. It is sometimes used as a weaning drink for infants. However, since this drink is produced from cereals, its protein is incomplete and needs to be supplemented. To make up for amino balance, millet protein should be supplemented with legume protein since the percentages of protein in kunu were found to be 1.17% for millet, 1.07% for maize and 0.88% for guinea corn (Adebayo *et al.*, 2010).Soybean (*Glycine max*) is an important legume reported to have contained large amount of protein along with other nutrients (IITA, 1990). The protein is high in lysine but low in methionine (Ogazi *et al.*, 1996; Omueti *et al.*, 2000). However, Nigeria produces about 592,000 metric tonnes of soybeans annually and accounts for 95% of production in Africa (FAO, 2009).

Soybean is a good substitute since it is a good source of protein (about 40%), edible oil of high quality that is cholesterol free (about 21%) and carbohydrate (34%) (Singh *et al.*, 1987). It is one of the most promising foods in Africa available to improve the diet of millions of people.

Researchers have been carried out on the fortification of carbohydrate-rich foods with protein-rich food especially soybean, in order to improve their nutritional value. These improved carbohydrate foods have helped in correcting malnutrition in children and for maintenance and repair of adults' body tissues, with examples such as *soy-eba, soy-moimoi, soy-gari, soy-ogi* etc (IITA, 1990). Soybean is also an excellent economical source of nutrients and the cheapest source of protein for rural households in a nutritional and economic comparative analysis with other major sources of protein like eggs, beef, milk and cowpea. Thus, it is a cost-efficient source of quality protein and most anti-nutritional factors of soybean are eliminated by heat treatment (Ogundipe, 1989). It is also a good source of many

required vitamins and minerals. Among cereals and other legumes, it has the highest protein content about 40%, whereas other legumes have 20-30% and cereals have a protein content of 8-15% (Salunkhe *et al.,* 1983).

Soy protein has been used and accepted as food ingredients to enhance the value of finished foods. Soybean and soy-foods have been identified with their protein content from a nutritional perspective and as such there is much interest among clinicians and researchers on their potential role in preventing and treating chronic diseases (Messina *et al.,* 2010) and since Kunu is becoming widely acceptable throughout Nigeria, so this research is embarked upon to improve the nutritional value and acceptability of this product in order to meet the daily dietary requirements of most especially the weaning infants and the teeming populace and this in-turn will help in correcting malnutrition in children, also in maintenance and repair of adults' body tissues.

Methodology

Collection of Sample Materials

Soybean, pearl millet and spices were bought from Oke-Aje market in Ijebu-Ode. Soymilk and kunnu samples were prepared, as shown in Figure 1 and 2, while the level of enrichment is shown on Table 1.

Soymilk Preparation

For soymilk preparation, the soybean seeds were manually cleaned and then soaked in boiling water for 25 minutes. The blanched seeds were rinsed, milled with water and the slurry was sieved using a muslin cloth sieve. The filtrates were boiled for 5 minutes with vanilla flavour and sugar (Figure 1).

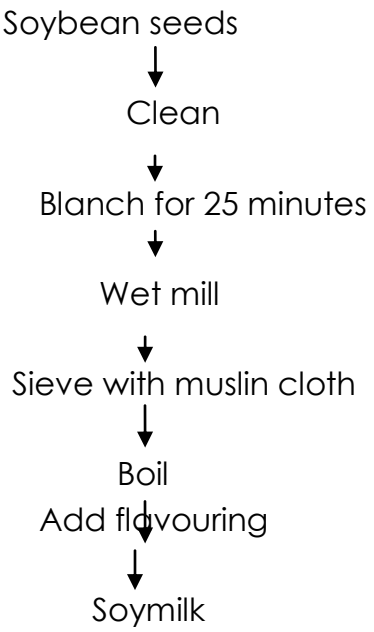

Figure 1: Flowchart for soymilk production

Kunnu Preparation

Kunnu was prepared by cleaning the millet seeds and soaking in water for 2 hours. The soaked seeds was wet milled and the slurry sieved with a muslin cloth. The filtrate was fermented for 1 day, during which the slurry was allowed to settle and sediment. The supernatant liquid was decanted and the residue was mixed with water and divided into two. Half of the residue was boiled and the second half was poured into it to produce Kunnu (Figure 2).

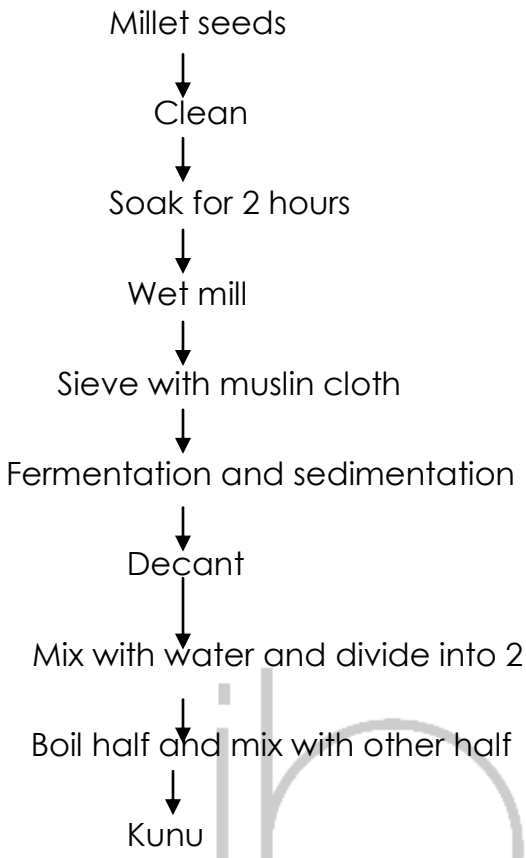

Figure 2: Flowchart for kunu product

ENRICHMENT OF KUNNU DRINK WITH SOYMILK

The Kunnu beverage was enriched with soymilk at four levels; one part of soymilk was added to one part, two parts and third parts of Kunnu respectively. While the kunu sample without soymilk was used as control.

PROXIMATE ANALYSIS

The proximate composition of the samples (Kunnu enriched with soymilk) was determined using the standard methods already described in the (AOAC, 2002). The parameters were: moisture content, crude protein, lipids, ash and crude fibre. The carbohydrate content was determined as the weight difference using moisture, crude protein, lipids and ash content data.

Sensory Qualities Analysis

The sensory qualities of the soymilk-kunnu blend such as; Colour, taste, texture and odour were analyzed and hedonic scale was used to determine preference of panelists from (extreme dislike, dislike, neither like nor dislike, like, extreme likeness) in the nutrition laboratory of Nurition and Dietetics department, Ogun State College of Health Technology, Ilese Ijebu.

Data Analysis

Data generated from the study were analyzed by ANOVA with SPSS at 5% level of significance. Means were separated by Tukey's honestly significant difference test (SAS, 1995). Results were expressed as mean ±SEM.

Results

Table 1: Mixed Ratio of Kunnu enriched with Soymilk

Sample	Mixtures	Mixture ratio (%)
Control	Kunnu	100
A	Kunnu + Soymilk	50:50
B	Kunnu + Soymilk	60:40
C	Kunnu + Soymilk	70:30
D	Kunnu + Soymilk	80:20

Table 2: Proximate Composition of Kunnu-Soymilk Blends

Samples	Moisture	Protein	Fat content	Ash content	Crudefibre	Carbohydrate
Control	75.13±0.15	2.20±0.10	0.90±0.10	1.73±0.15	0.67±0.06	19.57±0.29
A	76.53±0.25	4.47±0.08	1.50±0.10	1.33±0.06	0.23±0.06	12.93±0.21
B	78.57±0.25	4.43±0.15	1.30±0.10	1.47±0.15	0.37±0.06	13.87±0.38
C	78.03±0.12	3.77±0.12	1.17±0.12	1.67±0.15	0.57±0.05	14.80±0.20
D	76.20±0.30	2.57±0.15	0.97±0.06	1.70±0.10	0.63±0.15	17.93±0.38

Evaluate the Sensory Qualities of Kunnu Drinks enriched with Soymilk

Evaluation was done by 20 judges selected randomly from Ogun state college of health technology, Ogun. The five (5) point hedonic scale was used (score "5" having like very much attribute and Score "1" indicating extremely dislike) Samples were coded with three digit random numbers and presented in random order. The characteris-tics evaluated, were texture, odour, taste, colour and overall acceptability [Larmond, 1977]. The responses were statistically analyzed.

Table 3: Sensory evaluation of the kunnu enriched with soymilk

Samples	Texture	Odour	Taste	Colour	Acceptability
A	7.80±9.17	7.80±1.37	7.80±1.37	9.20±1.18	8.20±1.37
B	8.60±1.26	7.60±9.63	7.60±9.60	8.00±1.09	9.10±1.16
C	8.20±1.08	8.60±1.05	8.60±1.04	8.20±1.08	8.80±1.05
D	8.00±9.27	8.60±1.14	8.60±1.15	8.20±1.08	8.60±1.05

DISCUSSION

The proximate composition of the enriched kunnu is as presented on Table 2. The protein content of the improved kunnu ranged from 2.57% to 4.47%, which shows significant difference among the samples ($p< 0.05$). Protein content of Kunnu enriched with soymilk is more than that of ordinary kunnu used as control and it also reflects that the more the percentage of soymilk used then the more the protein content and was buttressed by the work of Adelekan et al. (2013) which reported that Soymilk added at different percentages to Kunu may have had a significant effect on the protein content. The protein content increased due to fact that protein content of the soymilk is higher than that of kunu and it is noted that addition of legume to cereals gives a better protein value. On the other hand, soybean is a very good source of protein, fat and minerals (IITA, 1990).

The result also shows that carbohydrate content decreased with increased in addition of soymilk. The control contains more carbohydrate than all the experimental samples and the Kunu with highest soymilk (50%) had the least carbohydrate. It indicated that, the addition of the soymilk may have contributed to the decreased in carbohydrate content in the kunu.

The fats content also increased significantly ($p < 0.05$) as soymilk was added to the kunu, 100% has the least fats content, sample A (1.50), Sample B (1.30), Sample C (1.17) and Sample D (0.97) having the lowest compared with other experimental samples but with more fat content than the control, The higher fat content of soymilk may have had effect on the fats content of the kunu as the percentage of soymilk increases. A similar observation has earlier been reported by Adelekan *et al*., (2013). The moisture content of the samples increased significantly ($p < 0.05$) as the level of the soymilk increases. This

indicated that the soymilk had higher moisture content, so as the level of kunu to soymilk increases, the moisture content increases.

The sensory properties, as shown in Table 3, are generally significantly different at $P < 0.05$, which indicates that the different blends of soymilk-kunnu have distinctively different tastes but it shows that the increase in the quantity of soybean to the kunnu lower the acceptance of the taste and the same also goes for odour and texture. All in all, the sensory properties of kunnu only were more acceptable than that of soymilk, while the sensory properties of the blends decreased with increase in the amount of soymilk added for enrichment. This shows that there is little acceptance for soybean which may be as a result of is taste. Since, the result of the enrichment shows clearly that soybean improves the nutritional quality of kunnu, there is need for more awareness, so that people can be more aware and it will inturn assist many homes in getting adequate diet in different stages of life, most especially for the poor that may wean their children with it.

CONCLUSION

In terms of nutritional composition, soybean improves the quality of the kunnu but overall acceptability is not as good as ordinary kunnu. The study shows that it is possible to develop and produce nutritious beverages from blend of cereals and legumes suitable for different age groups particularly for weaning children in developing countries where hunger and protein-energy malnutrition is increasing.

REFERENCES

Adelekan AO, Adediran EA, Ngozi UA, Yetunde OA, Abidemi SD (2013). Nutritional, Microbiological and Sensory Characteristics of Malted Soy-Kunu Zaki: An Improved Traditional Beverage. *Advances in Microbiology*, 3: 389-397.

Adeyemi IA and S Umar (1994). Effect of method of manufacture on quality characteristics of Kunun Zaki, a millet-based beverage. *Nigerian Food Journal*. 12: 34 – 41.

AOAC, (2002). "Official Methods of Analysis. Association of Analytical Chemists," Washington DC.

FAO (2009): The FAOSTAT production statistics module on crops. Food and Agriculture

Organization of the United Nations. Online at: FAOSTAT@ fao.org. FAOSTAT (2005). Food and agricultural commodities production statistics. Food and Agriculture Organization, Rome.

Gernah DI, Ariahu CC, Ingbian EK (2011). Effect of malting and lactic fermentation on some chemical and function properties of maize (*Zea mays*). American Journal of Food Technology. 6 (5): Pp 404-412.

IITA (1990). International Institute of Tropical Agriculture (IITA). How to grow and use soybeans in Nigeria.

IITA (1990). (International Institute of Tropical Agriculture) Utilization of soybean.: 1-10

Larmond E, (1977). "Laboratory Methods for Sensory Evaluation of Foods," Department of Agric, Ottawa, pp. 18-46.

Messina M, V Messina KDR and Setchell (1994). The simple soybean and your health. New York, Avery Pub. Group.

Ogazi PO, Oyewusi FA, Ozumba AU, Ogundipe HO, Osifo BOA, Lukambi FA (1996). Development and Sensory Evaluation of Soyamusa: A Soybean-Plantain Baby Food. ISHS Acta Hortic., p.540: International Conference on Banana and Plantain for Africa.

Ogundipe MAO(1989). Assessment of soybean fortification with flour in bread making. Ph.D Thesis.: 10-20.

Omueti O, Oguntona EB, Jayeola O, Ashaye OA (2000). Nutritional evaluation of home prepared soy-corn milk. A protein beverage. Brit J. Nutr. Food Sci., 30 (2, 3): 128 - 132.

Onwueme IC and TD Sinha (1991). Field crop production in Tropical Africa. Michael Health Ltd. Reigate Survey RH2 9EL, Technical Centre for Agricultural and Rural Cooperation, CTA.: 190-192.

Salunkhe DK, K Sathe NR and Reddy (1983). Legume Lipids in Chemistry and Biochemistry of Legumes. Arora S.K. (Ed). London, Edward Arnold Pub. Ltd,: 5-20.

Singh SR, KO Rachie and KE Dashiell (1987). Soybean Research, Production and Utilisation. John Wiley and Sons Ltd, 1 – 5, 167 – 170.

USDA (2005). Millet - Production, Consumption, Exports, and Imports Statistics. United States Department of Agriculture.