

Assessment of Nutritional and Sensory Quality of Kunun Zaki - A Home-made Traditional Nigerian Beverage

Adeniji Paulina Olufunke^{1*} and Keshinro Oluremi O²

¹Department of Transport and Tourism Studies, Redeemer's University, P.M.B. 230, Ede, Osun State, Nigeria

²Department of Human Nutrition, University of Ibadan, Ibadan, Oyo State, Nigeria

Abstract

Kunun zaki, home-prepared beverage relished by the Northern people of Nigeria as a refreshing drink was enriched with soybean and analyzed alongside commercially prepared Kunun zaki [Control] for proximate, mineral and vitamin C composition using the standard methods of analysis of AOAC. Sensory evaluation was carried out on the beverages substituted with soybean using 9-point hedonic scale. The protein content of the drinks ranged between 3.1- 8.1 g and carbohydrate 4.0-6.0 g/100 g for commercial Kunun Zaki preparations respectively ($p < 0.05$). Similarly, carbohydrate value of soybean substituted KZ (6.0 ± 0.9 g) was found to be significantly. The fat content of soybean enriched and commercial Kunun zaki [18.0 g and 17.3 g/100 g respectively] were very close with no significant difference ($P < 0.05$). Soybean enriched Kunun zaki showed increased macro and micronutrient content over that of commercially prepared one, and was also the most acceptable to the panelists. The beverage can be consumed by children and adult alike; hence the soybean enriched Kunun zaki drink production on commercial scale should be encouraged in every part of Nigeria as a means of improving nutrient intake of its consumers.

Keywords: Nutrient composition; Kunun zaki; Millet; Traditional beverage; Soybean

Introduction

Human beings cannot survive without water for a long period of time, as normal functioning of the body requires a continual supply of fluid in various forms including beverages. Beverages are food items that are consumed in liquid state, but have lower food values relative to milk and milk products. They are consumed either for their thirst quenching properties or for their stimulating effects [1]. They may exist as liquid or thin gruel preparation with high water content which supplies the body with water necessary to maintain health [2]. Often consumed beverages include beer, wine, spirits, fruit juices, tea, coffee, cocoa drink, and carbonated water [3]. It is easier to consume a large volume of beverages than the same volume of water.

Artisans, traders, market women, commercial drivers and children drink home-prepared beverages frequently while working under tropical heat to quench thirst [4]. Kunun zaki is non-alcoholic beverage commonly consumed in the Northern Nigeria during the dry season [5,6]. Kunun zaki is affordable and the cereals used are one of the staple foods in Northern Nigeria. This is consumed daily by adults and children alike as a refreshing drink, or as appetizer before the main meal or served at social gatherings [7,8]. The beverage is non-alcoholic, affordable, readily available and cheaper than carbonated beverages [7,9].

Although there are various types (Kunun zaki, gyada, akamu, tsamiya, baule, jiko, gayamba) processed and consumed in Nigeria, Kunun zaki is the most commonly consumed. It is nutritious than the carbonated beverages, thus contributing to daily nutrient intake of consumers [10].

Traditional processing of Kunun zaki involves steeping of cereal, milling with spices (ginger, cloves, and pepper), sieving and partial gelatinization of the slurry, followed by addition of sugar and bottling [11]. Staple foods such as cereals grain products and soybeans are considered appropriate vehicles for enrichment [12].

It is therefore worthwhile to ensure sensory evaluation of this

beverage and its contribution to daily nutrient intake of the individual. There is paucity of information on nutrient composition and safety of consumption of Kunun zaki. Consequently, the objective of this work is to evaluate the nutritional composition and safety of Kunun zaki substituted with soybeans.

Material and Methods

Materials

Millet grains was purchased in Bodija Market, Ibadan, were cleaned and steeped in water for two days, then washed thoroughly and milled with spices (ginger, clove etc.). After wet sieving, the slurry was divided into two equal parts and allowed to undergo partial gelatinization. The resulting products were sweetened with sugar and packaged [13]. Two Kunnu zaki beverage samples were prepared in the Department of Human Nutrition Laboratory, University of Ibadan, Nigeria, using traditional methods. One of the samples was without addition of soybean (LKZ) while the other was enriched with soybean (SKZ) at the ratio of 2:1 (w/w) – millet grains/soybean. Similar sample of the beverage was purchased from commercial mobile vendors at Bodija market, Oyo State, Nigeria, and labeled as commercially-prepared kunnu zaki (CKZ).

Methods

Proximate nutrient composition of the samples was determined

***Corresponding author:** Paulina Olufunke, Department of Transport and Tourism Studies, Redeemer's University, P.M.B. 230, Ede, Osun State, Nigeria, Tel: +2348023009059; E-mail: aduk1012@yahoo.com

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using the methods of the Association of Official Analytical Chemist (AOAC, 1995). Mineral composition was determined using atomic absorption spectrophotometer (calcium, copper, and manganese), flame emission spectrophotometer (potassium) and vanado-molybdate colorimetric method (phosphorus). Vitamin C content was determined using 2, 6, dichlorophenol indophenol dye. The Sensory quality of the local beverages was determined using Turkey's multiple range tests. The least significant difference (LSD) was calculated using Analysis of variance (ANOVA) [14].

Sensory evaluation

The soybean-enriched Kunun Zaki (KZ) sensory attributes were evaluated using a 9-point hedonic scale, where a score of 1 is "dislike extremely" and a score of 9 is "like extremely". A panel of judges comprising thirty-five participants randomly selected from the staff and students of the faculty of Technology, University of Ibadan was chosen to participate in the study. Taste, aroma, colour, flavor, texture and general acceptability of the beverages were determined.

Data were analyzed using descriptive statistics, analysis of variance (ANOVA) and Duncan multiple range test, and level of significance was determined at $p < 0.05$.

Results

The proximate nutrient composition of the Kunun zaki samples are as shown in Table 1. Commercially prepared Kunun zaki (CKZ) had the highest moisture content followed by Laboratory-prepared Kunun zaki (LKZ). Soybean-enriched sample (SKZ) had the highest protein content while CKZ had the lowest value. Soybean-enriched Kunun zaki had the highest value of fat, carbohydrates and ash, followed by LKZ. The CKZ sample had the least value of all the nutrients.

Table 2 shows the mineral and vitamin C composition of Kunun zaki samples. SKZ had the highest value of all the selected minerals and vitamin C while the CKZ had the lowest.

Sensory evaluation of the beverages revealed significant differences in preference for taste, aroma, colour, consistency and overall acceptability of the products (Table 3), ($P < 0.05$). The overall acceptability test revealed that SKZ was the most preferred of the beverages with the mean score of 7.3, while CKZ had the least mean score of 5.3 ($P < 0.05$).

Discussion

The moisture content of prepared beverages was very high (Table 1). This is typical of refreshing drinks. The moisture content of the beverages was however lower than the one reported for juice from

Beverage	Protein	CHO	Fat	Ash	Moisture (%)
CKZ	3.1 ± 0.01	4.0 ± 0.6	17.3 ± 2.7	1.3 ± 0.1	74.5
LKZ	4.2 ± 0.3	4.1 ± 3.1	17.8 ± 5.3	2.0 ± 0.3	72.4
SKZ	8.6 ± 1.2	6.0 ± 0.9	18.0 ± 3.1	2.5 ± 0.2	64.9

CKZ: Commercially prepared Kunun Zaki; LKZ: Laboratory prepared Kunun Zaki; SKZ: Substituted Kunun Zaki

Table 1: Proximate Chemical Composition of locally produced beverage (g/100 g).

Spondias mombin and extract of *Hibiscus sabdariffa* [15]. Water is the most important constituent of every living cell. It takes part in various chemical and biochemical processes including hydrolytic breakdown of nutrients during digestion, is continually lost from the body through urine, stools, sweat, and is expelled through respiration. Water imbalance leads to serious conditions such as dehydration which may be fatal [16].

The crude protein, crude fat and ash content of Kunun zaki drinks are higher than that of extracts of guinea corn leaf [17], enriched guinea corn leaf [18], and *Hibiscus sabdariffa* [15], indicating they are of higher nutrient content. Generally, refreshing drinks are not nutrient dense.

Soybean-enriched kunun zaki had higher crude protein, fat, carbohydrates and ash content compared to the commercially-prepared and laboratory prepared samples. This was in line with observation of Adepoju 2012 [18,19] in which enriching dry guinea corn leaf extracts with carrot brought significant improvement in their nutrient composition. The significant increase in nutrient content of SKZ is an indication that it possesses better nourishing property. Soybean has been reported to be nutritious, containing about 44% protein, 28% carbohydrate 19% fat, 5.7% fibre and 4.4% ash, thus, enriching Kunun zaki with soybean can be a good way of improving the macro and micronutrients content of the drink [20-24].

The mineral content of the preparations were highly comparable with those in the literature for refreshing drinks [17,18], however, the calcium and phosphorus content of Kunun zaki drinks were significantly higher. Soybean enrichment resulted in significant increase in the mineral content of the drinks ($p < 0.05$). The calcium and phosphorus content of the drinks were high; hence, the drinks can make notable contributions to their intake [25].

Conclusion

Soybean substituted Kunun zaki (FKZ) showed increased macronutrient and micronutrient content over that of commercially prepared Kunun zaki and was also more accepted by the panelists. The beverage can therefore be included as one of refreshing drinks for consumption by children and adults to add to their daily nutrient

Beverage	Calcium	Phosphorus	Potassium	Copper	Manganese	Vit. C (mg)
CKZ	280.0 ± 0.30	150.0 ± 0.10	150.0 ± 0.20	0.20 ± 0.01	1.20 ± 0.01	0.70 ± 0.01
LKZ	310.0 ± 0.30	170.0 ± 0.10	170.0 ± 0.10	0.40 ± 0.01	1.30 ± 0.01	0.80 ± 0.01
SKZ	480.0 ± 0.30	270.0 ± 0.10	200.0 ± 0.20	1.30 ± 0.01	1.70 ± 0.01	1.70 ± 0.30

CKZ: Commercially prepared Kunun Zaki; LKZ : Laboratory prepared Kunun Zaki; SKZ: Substituted Kunun Zaki

Table 2: Mineral and Vitamin C Composition of Kunun Zaki (mg/100 g).

Beverage	Taste	Aroma	Colour	Consistency	Overall acceptability
CKZ	5.2	5.3	6.8	6	5.3
SKZ	7	7.7	7.8	6.8	7.3

Mean value of forty eight (48) Judges scores-but you mentioned thirty-five panelists in the methods section. Please clarify.

CKZ: Commercially prepared Kunun Zaki; SKZ: Substituted Kunun Zaki

Table 3: Sensory evaluation.

intake. It is recommended that soybean substituted Kunun zaki drink (SKZ) should be introduced to the Nigerian markets to add to improvement in nutritional status of consumers.

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