

NUTRIENT COMPOSITION OF KUNNU-ZAKI BEVERAGE FORTIFIED WITH BLENDS OF GROUNDNUT (*arachis hypogea*), TIGER-NUT (*cyperus esculentus*) AND BROWN RICE (*oryza sativa*)

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Abstract:

Introduction: Plant foods are the major source of nutrients in many Nigerian dishes because they are available, affordable and widely accepted. The nutritional benefits are more improved and more available when combined with other plant foods. The study assessed the nutrient composition of Kunnu-zaki, a known beverage consumed mostly in the Northern part of Nigeria, enriched with blends of Groundnut (*arachis hypogea*), Tiger-nut (*cyperus esculentus*) and Brown rice (*oryza sativa*)

Method: The samples, sorghum, roasted groundnut, dried tigernut and brown rice were all purchased from Ekeonunwa, a local market in Owerri, Imo State Nigeria. The samples were separately cleaned, washed, and processed in line with traditional method of processing Kunnu. The processed samples were subjected to different standard forms of analysis and results were obtained.

Result: The Kunnu-zaki beverage prepared from sample B (sprouted brown rice and tigernut) had the highest scores of carbohydrate (4.91g), protein (3.86g), fiber (0.187g) and lipid (1.05g) followed by sample C (tigernut and groundnut) and lastly sample A (sorghum and sugar).

The micronutrient content of the Sample B was also highest. Organoleptic evaluation of the samples showed higher acceptability of the fortified Sample B and C than the commonly consumed Sample A (sorghum and Sugar).

Conclusion: the fortified, enriched Kunnu-zaki beverages were more nutritious for human consumption and had enhanced organoleptic attributes than the commonly consumed Kunnu-zaki. The improved, Kunnu-zaki beverage will enhance the daily nutrient intake of those individuals that consume it very often.

Keywords: Kunnu-zaki, beverage, fortified, nutrient composition, blends

1. INTRODUCTION

Micronutrient deficiency and undernutrition, largely experienced in Nigeria is partly due to inadequate dietary intake, as a result of poverty and ignorance.

Kunu, popularly known as Kunnu-zaki is a popular beverage drink, commonly consumed throughout Nigeria, mostly, the Northern part of Nigeria. It is a Non-alcoholic and Non carbonated drink, produced from Sorghum, a type or cereal grain commonly known as "Oke Ojata" in Igbo and "daa" in Hausa. (Sowono la et al., 2005). It serves as breakfast drink, appetizer and weaving food (Nkama et al., 2004)

Little information exists on the nutritional and health benefits of this beverage drink. Ajibola, (2000) recorded that plant foods are the major sources of nutrients in most Nigerian meals. They are more readily available and affordable to the average Nigerian (Olayemi, 1999). The animal protein that has higher quality and greater concentration of protein are either very expensive or unavailable to the common man and this therefore make cereal grains, tubers, legumes and other starchy foods more readily available. (Wardlaw et al. 2005) Ihekoronye and Ngoddy, (2002) recorded the prevalence of Pellagra and Beriberi in some Northern part of Nigeria, where the consumption of cereals and polished rice are majorly on the increase. Also, prevalence of Kwashiorkor is also recorded in those areas due to the poor and low consumption of proteinous foods. To reduce the prevalence of protein energy malnutrition (PEM) in Nigeria, strategies such as dietary diversification, fortification and nutritional supplementary are needed.

There is urgent need for the supplementation of plant foods to enrich the nutrient composition and as well meet up with the daily requirement of other nutrients.

Combining foods of plant origin will help to improve the nutritional benefit of the meal and on the long run, fight malnutrition. This study focused on the improvement of the nutrient quality of the commonly consumed beverage, Kunnu-zaki by producing an

enriched drink with blends of groundnuts & tigernuts or brown rice & Tigernut. The study also determined the blend with highest acceptability rate and greater Nutritional value.

2. METHOD

100 grains each of the samples; sorghum, (sorghum bicolor), Dried groundnuts (arachis hypogeal), Dried tigernuts (cyperus esculentus) and Brown rice (oryza saliva) were purchased from the local market in Owerri.

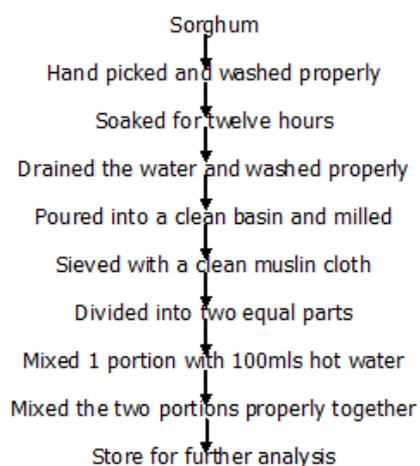
The samples were separately hand picked, cleaned and washed thoroughly.

Sorghum was fermented for twelve hours, wet milled, and sieved. 100mls of boiled water was added to one half and allowed to gell together before mixing with the reaming half and thereafter mixed properly together and kept in the refrigerator, for further analysis. The prepared samples of Tigernut and Rice were mixed together and wet milled and allowed to ferment overnight. The mixture was sieved with a clean muslin cloth and divided into two equal parts. One portion was mixed with 100mls of boiling water and allowed to gell together before mixing everything together. The mixture was kept in the refrigerator, for further analysis.

The third prepared samples of Groundnut and Tigernut were wet milled together fermented overnight, sieved with a clean muslin cloth and divided into two equal portions. One portion was thoroughly mixed with 100mls or boiled water before mixing with the other portion. The mixture was kept in the refrigerator for further analysis.

3. FLOW CHART

Sample A



Samples B & C



Flow chart for the production of Kunnu-zaki using blends of (Brown rice and Tigernut) & (Groundnut and Tigernut)

4. SENSORY EVALUATION

This was carried out using 30 adult panelists consisting of fifteen men and fifteen women drawn from various works of life in Owerri town. The Panelists were oriented on the sensory procedures. The sensory parameters of color, flavour, texture and overall acceptability were rated on a 9-point hedonic scale. The evaluation was carried out in a good spacious room with conducive atmosphere. The samples were served simultaneously in clean white plates. Portable clean water was provided for rinsing of mouth between samples.

5. CHEMICAL ANALYSIS

The moisture, protein, ash, crude fiber and fat content of the samples were analyzed using the standard methods of AOAC (1999). Carbohydrate was determined by difference. The minerals, Iron (Fe) and Phosphorus (P) were determined by atomic absorption spectrophotometer as described by Reanjihan and Gopa (1980)

6. STATISTICAL ANALYSIS

Data were analyzed as means, frequencies and percentages.

7. RESULT

The proximate and micronutrient values of the Kunnu-zaki beverage prepared from varied combinations of

Sample A: (Sorghum Only)

Sample B: (Rice and Tigernut) (50:50)

Sample C: (Tigernut and Groundnut) (50:50) were analyzed.

Their proximate value showed that Sample C, tigernut and groundnut had higher moisture content (90.24) in relation to Samples A (Sorghum only) 89.82 and B (Rice and Tigernut) 89.26. crude protein was higher in Sample C (4.16) than in Samples A (3.75) and B (3.86). but low in carbohydrate (3.53) in relation to A (4.48) and B (4.91) respectively. The micronutrient values for Iron and Betacarotene were higher (6.38 and 7.32) in Sample B, in relation to Samples A (4.73 & 3.10) and C (5.63 & 5.93) respectively.

The result on sensory evaluation showed that Sample C had the highest acceptability rate of 7.78, followed by Sample B (7.33) and lastly Sample A (6.33).

Table I: Proximate Composition of different blends of Kunnu-zaki

Samples	Moisture content (MC)	Dried Matter (DM)	Ash	Crude fibre (CF)	Ether Extraction (EE)	Crude Protein (CP)	Carbohydrate (CHO)
A	89.82 ^a ± 0.091	10.23 ^a ± 0.114	0.867 ^b ± 0.015	0.177 ^a ± 0.015	0.947 ^a ± 0.025	3.75 ^a ± 0.03	4.48 ^b ± 0.023
B	89.26 ^b ± 0.032	10.76 ^b ± 0.060	0.757 ^a ± 0.035	0.187 ^a ± 0.015	1.05 ^b ± 0.025	3.86 ^b ± 0.02	4.91 ^a ± 0.073
C	90.24 ^c ± 0.080	9.83 ^c ± 0.071	0.837 ^b ± 0.015	0.0257 ^b ± 0.025	1.06 ^b ± 0.01	4.16 ^c ± 0.025	3.53 ^a ± 0.023
LSD	0.0571	0.0417	0.0513	0.0286	0.0511	0.0532	0.058

Proximate Analysis of "Kunnu-Zaki".

NB means in the same row with different superscripts are significantly different (P>0.05).

KEYS

MC% = MOISTURE CONTENT

DM% = DRIED MATTER

ASH% = ASH CONTENT

CF% = CRUDE FIBRE

EE% = ETHER EXTRACTION

CP% = CRUDE PROTEIN

CHO% = CARBOHYDRATE

Table II: Micro-nutrient composition of different blends of Kunnu-zaki

MICRONUTRIENTS	A sorghum	B Rice and Tigernut	C Tigernut and Groundnut
Ca (mg/100g)	0.40 ± 0.09	0.93 ± 0.12	0.80 ± 0.10
Fe (mg/100g)	4.73 ± 0.06	6.38 ± 0.08	5.63 ± 0.09
Zn (mg/100g)	1.20 ± 0.06	1.70 ± 0.07	1.32 ± 0.05
I (µg/100g)	1.60 ± 0.06	1.67 ± 0.06	1.59 ± 0.09
B-carotene (µg/100g)	3.10 ± 0.00	7.32 ± 0.03	5.93 ± 0.01
Folic acid (µg/100g)	0.27 ± 0.10	0.28 ± 0.02	0.26 ± 0.04

Key: A = Sorghum, B = Rice and Tigernut
C = Tigernut and Groundnut

Means + SD of duplicate samples.

Table III: Sensory properties of different blends of Kunnu-zaki

Sample	Colour	Flavour	Consistency	Gen. Acceptability
A	6.55 ^{ab}	± 5.83 ^a ± 1.34	5.83 ^a ± 1.25	6.33 ^a ± 1.03
Sorghum	1.09			
B	7.17 ^b ± 0.86	5.83 ^a ± 1.51	6.05 ^a ± 1.39	7.33 ^b ± 0.77
Rice and Tigernut				
C	6.22 ^a ± 1.17	6.88 ^b ± 1.13	7.61 ^b ± 1.14	7.78 ^b ± 0.94
Tigernut and Groundnut				
LSD	0.69	0.83	0.89	0.57

N: B means in the same row with different superscript are significantly different (P<0.5), while means in the same row with the same superscript are not significantly different (P>0.05).

A = 100% sorghum, B = 50% : 50%

For rice and Tiger nut respectively;

C = 50% : 50% for Tiger nut and Groundnut respectively.

Conclusion

The new enriched blends of Kunnu-zaki produced from blends of Tigernut & Brown rice and Groundnut & Tigernut yielded better result in respect of their micronutrient and macronutrient values. The improved blends also recorded greater acceptability rate in relation to the commonly consumed Kunnu, made from Sorghum. This improved blend of Kunnu will bridge the gap in micronutrient deficiency. The use of other cereals, legumes and tubers in local drink production will bring about diet diversification. It could be added to the complementary meal of infants to improve the nutrient quality. The fortified blend is generally acceptable and could be used to reduce the spread of Pellagra and Beriberi.

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