



COMPARATIVE STUDY ON THE PROXIMATE AND MINERAL PROPERTIES OF SOME LOCALLY SOLD AKAMU IN BIDA METROPOLIS

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ABSTRACT

Ogi is popular in Nigeria and in most parts of West Africa. It is a fermented cereal porridge made from maize (*Zea mays*), sorghum (*Sorghum vulgare*) which is also known as guinea corn or millet (*Pennisetum typordeum*). However, Ogi is consumed by adults and children as breakfast meals and it also serves as a

Introduction

Ogi is popular in Nigeria and in most parts of West Africa (Banigo and Muller, 1990). It is a fermented cereal porridge made from maize (*Zea mays*), sorghum (*Sorghum vulgare*) which is also known as guinea corn or millet (*Pennisetum typordeum*). The colour of Ogi depends on the colour of the cereal used and includes: cream colour for maize – ogi, reddish – brown colour for sorghum – ogi (Banigo, 1992; Onyekwere, 2000; Akinrele, 1997). The Ogi porridge is very smooth in texture and has a sour taste reminiscent of that of yoghurt (Banigo and Muller, 2002).



wearing diet. The objective was to evaluate proximate and mineral properties of locally sold akamu in the Bida market. From the result, moisture content shows that sample B ($48.613 \pm 0.19\%$) was significantly ($p > 0.05$) higher while lower in sample F ($44.272 \pm 0.11\%$). Also ash content revealed that sample C ($0.467 \pm 0.03\%$) was significantly ($p > 0.05$) higher than the value obtained in sample A ($0.141 \pm 0.01\%$). The result of crude fat shows that sample F ($1.674 \pm 0.02\%$) was significantly higher ($p > 0.05$) while sample A ($0.099 \pm 0.01\%$) is the lowest. The study also shows that crude protein was significantly higher in sample E ($4.967 \pm 0.01\%$) while lower in sample B ($1.663 \pm 0.04\%$). The result of crude fibre revealed that sample C ($0.308 \pm 0.02\%$) was significantly higher while sample D ($0.092 \pm 0.01\%$) had the lowest value. The result of carbohydrate content shows that sample C ($50.990 \pm 0.23\%$) was significantly higher while sample E ($46.959 \pm 0.11\%$) was the lowest. Also the result of energy revealed that sample F ($229.59 \pm 0.41\%$) was significantly higher while sample B ($203.379 \pm 0.80\%$) had the lowest. The result of mineral composition shows that sample A ($70.800 \pm 0.40\text{mg}/100\text{g}$) was significantly higher in sodium content while sample F ($37.960 \pm 0.16 \text{ mg}/100\text{g}$) has the lowest value, the result of potassium revealed that sample A ($156.650 \pm 0.05 \text{ mg}/100\text{g}$) was higher than the value obtained in sample E ($38.500 \pm 0.03 \text{ mg}/100\text{g}$). The study also revealed that the result obtained in calcium (Ca) shows that sample D ($384.000 \pm 4.00 \text{ mg}/100\text{g}$) was significantly high while. Sample F ($282.000 \pm 2.00 \text{ mg}/100\text{g}$) had the lowest value. The result of magnesium shows that sample E ($966.200 \pm 3.40 \text{ mg}/100\text{g}$) was significantly higher while sample C ($113.54 \pm 0.26 \text{ mg}/100\text{g}$) is the lowest. The result of phosphorus (p) revealed that sample A ($44.285 \pm 0.03 \text{ mg}/100\text{g}$) was significantly higher than the value obtained in sample F ($14.425 \pm 0.02 \text{ mg}/100\text{g}$).

Keywords: Comparative Study, Akamu, proximate Composition, Mineral Properties, Bida Metropolis



Ogi is consumed by adults and children as breakfast meals and it also serves as a weaning diet (Ashaye, Fasoyiro and Kehinde, 2000; Amusa et al., 2005). After 5-6 months, breast feeding is no longer sufficient to satisfy the nutritional requirement of the growing infant. Beginning from this period, the child needs solid foods to meet increasing nutritional needs (Onofiok and Nnanyelugo, 1998). The period is the weaning period and in Nigeria, Ogi (alternatively called pap or Akamu) is introduced gradually to the child's diet to supplement nutrition. Fermented maize is very widely utilized as food in African countries and in fact cereals account for as much as 77% of total caloric consumption (Osungbaro, 2009). Maize is rich in carbohydrates and minerals including potassium and magnesium. It contains trace amount of lysine and tryptophan, contributing to the low content of protein, and trace amounts of B – vitamins (USDA, 2012).

In Nigeria, First weaning food is called PAP, Akamu, Ogi or Koko and is made from maize (*zea mays*), millet (*Pennisetum americanum*), or guinea corn (*Sorghum spp*). (King and Ashworth 1990; Longhurst 1998; Cherian 1991). In Anambra State most mothers introduce the thin gruel at three to six months of age (King and Ashworth 1997). The baby is fed on demand with a spoon or a cup, although in certain parts of the country, a few mothers use the traditional forced hand feeding method (Osuhor 1980). Also example of popular weaning food is Ogi which could be made from maize, millet or sorghum depending on the mostly available in the community. Investigations showed these weaning foods to provide mostly calories but are grossly inadequate, in protein (Fashakin and Ogunsoola 1999). In addition these foods should be able to supply vitamin A and C and Iron which mother's milk may not adequately supply (Okaka et al., 2002). The traditional preparation of Ogi involves soaking of the corn kernels in water for 1- 3 days followed by wet milling and sieving to remove bran, hulls and germ (Odufa and Adeyele 2004).



Materials

Sources of Materials

The commonly sold Akamu including maize, millet and sorghum were purchased from Bida market.

Proximate Analysis

The sample was analyzed for proximate composition such as carbohydrates, crude fat content, crude fiber, crude protein, ash content and moisture content using the method of (AOAC 2010).

Mineral Analysis

Zinc (Zn), Iron (Fe), Calcium (Ca), Sodium (Na), Potassium (K) and Magnesium (Mg) were determined by Atomic Absorption Spectrophotometers (AAS); according to the method of AOAC (2003).

Statistical Analysis

Data was analyzed using analysis of variance ANOVA and Duncan multiple range test to test significant differences between means $p > 0.05$. Data analysis was done using statistical package for social sciences SPSS version 20.0.

Results and Discussion

The result of proximate composition of moisture content shows that sample B ($48.813 \pm 0.19\%$) was significantly $p < 0.05$) higher than other values. Moisture in food determines the shelf life and microbial susceptibility of food (Adebayo *et al.*, 2001). The ash content ranges from 0.141 ± 0.01 to $0.467 \pm 0.03\%$) where sample C ($0.467 \pm 0.03\%$) was significantly high while sample A ($0.141 \pm 0.01\%$) is the lowest. The high ash content in sample C ($0.467 \pm 0.03\%$) makes it richer in mineral and also the ash content in food stuff is the inorganic residue remaining after the organic matter has been burn away (Frank *et al.*, 2005). The fat content was found



to be higher in sample F ($1.674 \pm 0.02\%$) and lower in sample A ($0.099 \pm 0.01\%$). Low fat content in sample A could be linked to processing since most legumes such as pigeon pea, soybeans, and cowpea contains lower fat. The high crude fat in sample F ($1.674 \pm 0.02\%$). Makes it an ideal diet food for patient suffering from heart diseases. (Kurashin, 2007) while lower in sample A (0.099 ± 0.01). And also the result of crude protein shows that sample E ($4.967 \pm 0.01\%$) was significantly higher while sample B ($1.663 \pm 0.01\%$) had the lowest value the higher protein content of sample E makes it rich because protein is an essential nutrient for human body, protein are building blocks for the human body and can also promote growth (Visser and Thomas, 2000). Protein helps in the treatment of bladder and prostrated cancer (Kurashashin, 2007).

The result of crude fibre revealed that sample C ($0.308 \pm 0.02\%$) was higher than sample A ($0.093 \pm 0.01\%$) the high crude fibre contain sample C is thought to help with such problems such as diabetics and high level of cholesterol but fibre is characterized by nutritional values according to British standard. However the result of carbohydrate shows that sample C ($50.990 \pm 0.23\%$) which could be linked to raw materials that were not affected by processing. The high carbohydrate in sample C can lead to digestive importance which can create various problems in many system of the body while some carbohydrate create more of a glycemic spike than others or cause more health problem like Kwashiorkor (Frank *et al.*, 2005). The low carbohydrate content in sample E ($46.959 \pm 0.11\%$) can be use for the treatment of obesity or diabetes.

Also the result of energy value revealed that sample F ($229.59 \pm 0.41\%$) was significantly higher while sample B ($203.379 \pm 0.80\%$) had the lowest value.

Table 1: proximate composition (%) of Locally sold akamu in bida market

Sampl es	Moisture	Ash	Crude Fat	Crude protein	Crude fibre	Carbohydrate	Energy value
A	$46.322^{b} \pm 0.19$	$0.141^{e} \pm 0.01$	$0.099^{e} \pm 0.01$	$2.719^{d} \pm 0.00$	$0.093^{e} \pm 0.01$	$50.626^{ab} \pm 0.18$	$214.278^{bc} \pm 0.08$
B	$48.613^{a} \pm 0.19$	$0.316^{b} \pm 0.01$	$0.145^{d} \pm 0.01$	$1.663^{f} \pm 0.04$	$0.208^{b} \pm 0.00$	$48.849^{c} \pm 0.20$	$203.379^{d} \pm 0.80$



C	46.249 ^b ±0.1 8	0.467 ^a ±0.0 03	0.148 ^d ±0.0 1	1.838 ^e ±0.0 03	0.308 ^a ±0.0 02	50.990 ^a ±0.0 23	212.642 ^c ±0.9 2
D	46.270 ^b ±0.0 50	0.147 ^e ±0.0 1	0.645 ^c ±0.0 04	3.017 ^c ±0.0 03	0.092 ^e ±0.0 01	49.823 ^b ±0.0 49	217.171 ^b ±0.20
E	46.879 ^b ±0.0 13	0.214 ^d ±0.0 4	0.849 ^b ±0.0 02	4.967 ^a ±0.0 01	0.142 ^d ±0.0 2	46.959 ^d ±0.1 1	215.250 ^{bc} ±0.0 5
F	44.272 ^c ±0.1 1	0.215 ^c ±0.0 3	1.674 ^a ±0.0 2	3.716 ^b ±0.0 02	0.168 ^c ±0.0 3	49.914 ^b ±0.11	229.593 ^a ±0.0 41

The mean value of the sample superscript show no significant different ($p \leq 0.05$)

KEY:

- A Sorghum Akamu Sold in Market
- B maize Akamu Sold in Market
- C Millet Akamu Sold in Market
- D Sorghum Akamu Produced at Home
- E Maize Akamu Produced at Home
- F Millet Akamu Produced at Home

The result of mineral composition of akamu sold in Bida market shows that sodium revealed that sample A (70.800 ± 0.40) which is the high level of sodium can cause high blood pressure by consuming too much sodium and not enough potassium. The result of potassium shows that sample A (156.650 ± 0.05) was higher potassium the body to function normally and help to maintain fluid and blood volume in the body. The result of calcium revealed that sample D (384.00 ± 4.00) was high than the other value. Calcium helps to build strong bones and teeth and also play a role in cell and nerve functions.

The result of magnesium shows that sample E (966.200 ± 3.40) was significantly higher. And also the result of phosphorous revealed that sample A (44.285 ± 0.03) was higher. However phosphorous helps in the formation of bones and teeth. It is also needed for the body to make protein for the growth, maintenance and repair of cell and tissues.



Table 2 Mineral Composition (Mg/100g) of Locally sold Akamu in Bida Market

Sampl es	Sodium	Potassium	Calcium	Magnesium	Phosphor ous
A	70.800 ^a ±0 .40	156.650 ^a ±0 .05	353.500 ^{bc} ±1 .50	145.500 ^c ±0. 40	44.385 ^a ±0 .03
B	48.890 ^c ±0 .91	43.500 ^d ±0. 70	340.00 ^{cd} ±0. 00	141.65 ^c ±0.5 4	20.848 ^d ±0 .16
C	42.660 ^d ±0 .46	53.530 ^b ±1.5 0	365.000 ^b ±5 .00	113.54 ^d ±0.2 6	21.737 ^c ±0. 02
D	57.705 ^b ±0. 30	57.350 ^c ±0. 45	384.000 ^a ±4 .00	117.170 ^d ±0.0 5	23.602 ^b ±0. 19
E	42.480 ^d ±0 .08	38.500 ^f ±0. 03	330.00 ^d ±10. 0	966.2.00 ^a ±3 .40	16.573 ^e ±0. 01
F	37.960 ^e ±0. 16	41.500 ^e ±0. 30	282.000 ^e ±2. 00	901.650 ^b ±0. 75	14.425 ^f ±0. 02

The mean value of sample superscript show no significant different (p ≤ 0.05)

KEY:

Sample

- A Sorghum Akamu Sold in Market
- B maize Akamu Sold in Market
- C Millet Akamu Sold in Market
- D Sorghum Akamu Produced at Home
- E Maize Akamu Produced at Home
- F Millet Akamu Produced at Home

Conclusion

This study has shown that nutritional quality of akamu can be produced from maize, millet and sorghum, increase of fat, energy value and protein



content which are all desirable for good health and well being and the low carbohydrate content can be use in the treatment of obesity and diabetes.

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