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Full Length Research Paper

Proximate and microbial analyses of burukutu and pito produced in Ilorin, Nigeria

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The organoleptic property of burukutu and pito was investigated. The pH ranged between 3.9 and 5.3, alcoholic content 0.0 and 1.8%, dry matter 1.7 and 5.3, and crude protein 0.8 and 3.2%. The Magnesium content of the samples range between 13 – 116 ppm, laboratory prepared burukutu was found to contain the highest calcium and the lowest was found in pito (unfermented). The calcium content of the samples were between 0.19 and 1.58 ppm. No iron was obtained in pito (unfermented), and pito and adoyo (unfermented). The Microorganisms, isolated from burukutu and pito were *Esherichia coli, Staphylococcus aureus, Bacillus subtillis, Streptococcus species, Rhizopus stolonifer, Aspergillus niger, Aspergillus flavus, Saccharomyce cerevisiae* and *Mucor species, Staphylococcus aureus, Bacillus subtillis* and *Proteus speicies* were isolated from pito (unfermented), and pito and adoyo.

Key words: Burukutu, pito, organoleptic properties.

INTRODUCTION

Burukutu and pito are some of the indigenous alcoholic beverages. Both are produced mainly from the grains of guinea corn (*Sorghum vulgare* and *Sorghum bicolor).* Sorghum is one of the cereals cultivated in the tropical regions of Africa and is about the largest cultivated crop in the Northern Guinea Savanna areas of Nigeria (Asiedu, 1987). Sorghum is a large variable genus with many cultivars (Ellasoe, 1972). It constitutes a major source of energy and protein for people in Asia and Africa and it serves as a staple food of many of the world's poorest and least privileged people (Hulse et al., 1980).

The process of production of burukutu involves malting, mashing, fermentation and maturation as described by Ekundayo (1969). The microorganisms associated with fermentation include *Saccharomyces cerevisiae, Saccharomyces chavelieria* and *Leuconostoc mesteroides.* The pH of the fermenting mixture fermentation (Faparusi et al., 1973). The process of pito production is similar to burukutu production except that increases from about 4.2 to 6.2 within 24 h of fermentation and it decreases further to 3.7 after 48 h of different types of grains are used to Brew it and adjunct is not added (Asiedu, 1989). *Geotrichum candidum* and *Lactobacillus species* have been described to be responsible for souring pito. Unfermented pito plus adoyo are indigenously produced in Ilorin mainly from plant extracts; the bark of mango tree (*Mangigera indica*), cashew tree bark (*Anacardium occidenttale*) and tea leaf (*Camelia species*). The process of production of unfermented pito involves steeping and boiling. Adoyo is produced from ripe pineapple juice and supernant derived form ogi (ogi is a fermented product, made from sorghum or maize). Unfermented pito plus adoyo serve as a drink, but more importantly they are used for medical purposes. Unfermented pito plus adoyo cannot be described as fermented alcoholic beverage because the process of production does not involve fermentation. This paper reports the nutritional composition and microbial analysis of some of the indigenous drinks produced in Ilorin metropolis (unfermented pito plus adoyo) and the fermented alcoholic beverages.

MATERIALS AND METHODS

Preparation of laboratory and commercially brewed burukutu

Sorghum grains were steeped in water overnight, washed and excess water was drained. The grains were spread on banana

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leaves and watered on alternate days, turned over at intervals. Germination occurred for five days. The malted grains were sun dried and grinded this was mixed with water and boiled for hours. The mixture was left to ferment for 48 h. A cloudy liquid with a vinegar taste and odour was produced as burukutu. This procedure was adapted from Ekundayo (1969).

Preparation of laboratory brewed pito

Sorghum grains were soaked in water for 48 h, washed and excess water was drained. The grains were allowed to sit for 5 days in a basket lined with banana leaves. The malted grains were grinded and mixed with water. The mixture was boiled and allowed to cool; it was filtered with a fine mesh. The filtrate obtained is left to stand overnight. The mixture is boiled and allowed to cool.

Preparation of unfermented pito

Bark of mango tree (*mangifera indica*) was steeped in water for seven hours. A small quantity of cashew bark (*A. occidentale*) was boiled wit tea leaf (*Cameia species*) for 2 h. Grinded roasted maize (*Zea mays*) was added. The mixture filtered and allowed to cool. Sugar was added to taste.

Preparation of adoyo

A ripe pineapple was peeled and cut into pieces; it was boiled with the supernant derived from ogi.

Collection of samples

Freshly prepared samples were collected with a sterile sample bottles and were analyzed immediately in the laboratory.

Alochol content

The samples were distilled using a glass distillation apparatus to recover the alcohol-water mixture. While an alcohol meter was used to determine the percentage alcohol content of the distillate obtained.

Dry matter content

Five grams of each of the samples was weighed into a pre weighed petri dish. It was dried in an oven at 100°C for 24 h. The dried sample was weighed after cooling in a dessicator (AOAC, 1980).

Ash content

Ten grams of each of the samples was weighed into a small dry crucible of known weight. The material in the crucible was charred on a low furnace. The charred material was ashed in a muffle furnace at 550°C for 2 h. The ashed material was removed from the furnace and cooled. It was kept in a dessicator and weighed (AOAC, 1980).

Crude protein

The samples were digested with concentrated H_2SO_4, concentrated NaOH (40%), K_2SO_4 and $CuSO_4$. 5 ml of the digest was placed into a micro-kjeldahl distillation apparatus and excess concentrated NaOH was added to make the solution strongly alkaline. Ammonia was distilled into 5 ml of boric acid indicator in a titrating flask. Above 45 ml of the distillate was collected. Titration was done with 0.01 M HCL. The end point of titration was light green (AOAC, 1980).

pH

The pH was determined with pH meter (corning 35).

Mineral analysis of the samples

The mineral analysis of the samples was carried out using standard methods (AOAC, 1980),

Microbial analysis of the samples

Serial dilution of the samples (10^{-3}) was inoculated into a nutrient agar (oxoid) and potato dextrose agar plates to identify the bacterial and fungal isolates respectively. Bacterial identification was carried out using various biochemical tests Buchanan and Gibbons (1974). Fungal identification was carried out using mycological atlas (Alexopolous and Mims, 1979).

RESULTS AND DISCUSSION

The result of the proximate, mineral and microbial analysis of burukutu and pito produced in Ilorin metropolis are represented in Tables 1, 2 and 3. The differences in the proximate analysis of the samples may be due to the quality of grains used and the processing methods. The total ash and the dry matter content of burukutu and fermented pito are higher than unfermented pito and pito plus adoyo. This may be as result of higher concentration of sorghum in the fermented drinks which might be responsible for high values of minerals analysed. The pH value of the fermented alcoholic beverage may have favoured the growth of fungi and this could be responsible for the species of organisms isolated. The main components of whole grain sorghum are carbohydrate, proteins and lipids. Sorghum contains lesser quantities of fibre, vitamins and minerals. The nutrient composition of sorghum is influenced by both the environmental factors and genetic factors (Asiedu, 1989). The most common source of variation is soil fertility, soil moisture and cultural practices. All these factors may influence the nutriational constituents of the samples.

In this study the nutritional (magnesium, calcium and iron) composition of the local beverages were obtained (Table 2). Mineral elements are important because they are essential for regulating and building the living and and aids in fighting depression. Calcium is essential for building the living cells that make up the human body balanced; it promotes a healthier cardiovascular system they help in maintaining the volume of water necessary for life processes maintaining (Harold and Hubert, 1970). Magnesium helps in keeping the muscle relaxed and the formation of strong bones and teeth. It helps to control

Table 1. Proximate analysis of burukutu and pito.

Sample	Ash content (%)	Dry matter (%)	Alcohol (%)	Crude protein (%)	pH
Laboratory brewed burukutu	4.4	5.3	1.7	3.2	3.9
Commercially brewed burukutu	4.8	5.3	1.8	3.1	3.8
Fermented pito	4.0	3.4	3.0	2.5	4.2
Unfermented pito	1.2	1.8	0.0	-	5.0
Unfermented pito plus adoyo	1.3	1.7	0.0	0.8	5.3

-: - Absent.

Table 2. Mineral analysis of burukutu and pito.

Samples	Elements (ppm)		
	Magnesium	Calcium	Iron
Laboratory brewed burukutu	116.00	1.58	11.90
Commercially brewed burukutu	114.00	1.58	21.10
Fermented pito	110.00	1.11	5.30
Unfermented pito	13.00	0.19	-
Unfermented pito plus adoyo	112.00	1.40	-

-: - Absent

Table 3. Frequency of distribution of the isolates in burukutu and pito.

Isolates	Laboratory brewed burukutu	Commercially brewed burukutu	Fermented pito	Unfermented pito	Unfermented pito plus adoyo
Staphylococcus aureus	+	+	+	+	+
Escherichia coli	-	+	+	-	-
Bacillus subtilis	+	+	+	-	-
Streptococcus species	+	-	-	+	+
Rhizopus stolonifer	+	+	+	-	-
Aspergillus niger	-	+	-	-	-
Aspergillus flavus	+	+	-	-	-
Saccharomyces cerevisiae	+	+	+	-	-
Proteus species	-	-	+	+	+
Mucor species	+	+	+	-	-

+: - Present.
Absent.

the blood pressure and nerve transmitter. Iron is an important element that is necessary in the heamoglobin of the red blood cells and myoglobin in the muscle (Thomas, 2002). The finding from this study reveals that unfermented pito and pito plus adoyo do not contain any iron constituents.

Traditional medicine practitioners in Ilorin use unfermented pito plus adoyo to treat different kinds of aliments including typhoid and paratyphoid fever, dysentery, malaria and diarrhea. Herbal medicine has been shown to be effective and over 60% of the Nigerian population depend on traditional medicine for their health care needs (Ghani et al., 1989).

The microorganisms isolated from the samples were *Staphylococcus aureus, Esherichia coli, Bacillus subtilis, Streptococcus species, Proteus species, Rhizopus stolonifer, Aspergillus flavus, Aspergillus niger, Saccharomyce cerevisiae and Mucor species.* The presence of *S. aureus* in the samples may be attributed to handling during production. *S. aureus* is a normal flora of the skin and

mucus membrane and a common etiological agent of septic arthritis (Ellen and Sydney, 1990). *E. coli* are important member of the coliform group. It is part of the normal flora of the intestine of human and vertebrates. Some strains of *E. coli* can cause gastroenteritis and urinary tract infection (Pelczar et al., 1993) as well as diarrhea in infant (Alice, 1976). *S. cerevisiae* and some of other fungi isolated are associated with fermentation.

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