

PRODUCTION AND NUTRITIONAL STUDIES OF GUINEA CORN SPICED DRINK AND CASSAVA FRIED BALLS

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ABSTRACT

Guinea corn is a grain in the grass family; it serves as food and drink. Cassava is of the spurge family, native to South America, it is used as food. Production and nutritional studies of cassava fried balls and guinea corn spiced drink were investigated, the result of the proximate analysis of guinea corn spiced drink revealed the moisture content, ash, fat, crude protein and total carbohydrate content to be (89.88%, 0.058%, 0.043%, 0.587%, and 9.332%) respectively. While the percentage composition for cassava fried balls were found to be (37.35%, 1.723%, 12.18%, 5.34% and 43.407%) respectively. Also these products were fed to albino rats at different percentages and blood sample collected for analysis of glucose concentration, total protein, total cholesterol, triglyceride and high density lipoprotein. The result showed that glucose values were (4.2, 5.05, 4.83, 5.2 and

4.5mmol/L); Total protein value were (7.66, 80.5, 75.0, 80.33 and 76.66 g/L); Triglyceride (0.033, 1.1, 1.73, 1.96 and 1.96mmol/L); High density lipoprotein (2.13, 2.05, 2.13, 2.2 and 2.2mmol/L) for group 1,2,3,4 and 5 respectively. Glucose, total protein, cholesterol and high density lipoprotein values of both the control and experimental groups were within the same range.

KEYWORDS: Guinea corn spiced drink, Cassava fried balls, Nutritional studies.

INTRODUCTION

Guinea corn also known as sorghum, is a cereal grain that originated in Africa and is eaten throughout the world, especially valuable terrain because of its resistance to drought

(www.livestrong.com). Guinea corn is a nutrient rich grain that is often ground into flour to make bread, porridge, pancakes and Kunun drink. This product offers a number of nutritional and therapeutic benefits (www.livestrong.com). Guinea corn contain about the same and some times more protein than many other grains. It is use for food, fodder, and the production of alcoholic beverages. It is drought tolerant and heat tolerant, and is especially important in arid regions. It is an important food crop in Africa, Central America, and South Asia, and is the fifth most important cereal crop grown in the world (Akinsoyinu and Mba, 1978; Odunfa and Adeyeye, 1985; Amusa and Odumbuka 2009). Guinea corn is one of the nutritional high light, its mineral content in ¼ cup serving contains 13mg calcium 2.1mg iron 13.8mg phosphorus, these are essential minerals needed for bone health and strength (www.livestrong.com Lichtenwalner *et al.*, 1979; Adenyemi and Umar, 1994; Van der walt, 1956) Cassava (*Manihot esculenta*) also called manioc, yucca, balinghoy, mogo tapioca – root is of (spunge) family. Native to South America is extensively cultivated as an annual crop in tropical and subtropical regions for its edible starchy tuberous root and as a major source of carbohydrate (Hudson and Ogunsina, 1974). Cassava is a major staple food in the developing world, providing a basic diet for over half a billion people. It is the most drought tolerant crops, capable of growing on marginal soils.

Cassava or yucca is a nutty flavored starchy of the spurge family, from the south – American origin, its sweet crunchy underground tuber is a popular edible root since centuries in many parts of Africa, Asia, and American indigenous people. Together with other tropical roots and starch-rich foods like yam, taro, plantains and potato, it is an indispensable part of carbohydrate diet of millions of inhabitants living in these regions (Tewe *et al.*, 1976). Cassava is the highest of any tropical starch-rich tubers and roots. 100g root provides 160 calories; this calorie mainly comes from sucrose forming the bulk of the sugars, accounting for more than 69% of the total sugars (Tewe *et al.*, 1976).

Cassava fried balls, is a traditional African dish. These balls are also known by other names of cassava; such as yucca balls or manioc balls. These balls are usually small in shape and are crispy from outside but soft and chewy from within. Cassava ball recipe is also quite popular in South America and other parts of Africa. The balls are served as an appetizer when prepared as savory taste. Cassava ball recipe is quite popular in part of Southern American where the cassava is first peeled and boiled and then rolled in cheese, bread crumbs are also used to make the balls crunchy and once fried. (www.food.tri/network/cassavaball).

MATERIALS AND METHODS

Materials: Cassava, Guinea corn, Sweet potato, Coconut

Reagents: Hydrochloric acid, Glucose reagent, Protein reagent, Cholesterol reagent

Equipment: Oven, UV. Spectrophotometer (Surdi field, SD 23, 2013)

Sample Collection

Cassava tubers and guinea corn were purchased from Mile 3 Market, in Port Harcourt, Rivers State, Nigeria.

Cassava Fried Balls Production: 1,250g of cassava was peeled and carefully washed with clean water, the washed cassava was cut into different segment and boiled for 15 minutes, after which it was meshed very well in a bowl and add fresh pepper, onion, steamed fish, squeeze out water from coconut and meshed very well add salt for taste. Roll in small round shape and fry in hot groundnut oil until golden brown.

Production of Guinea Corn Spiced Drink: 200g of guinea corn was soaked in a big bowl for two days in water for fermentation, washed very well, add a medium size peeled potato, *Aframomum chrysanthum* grind together, sieve, add hot water to make a paste a thin consistency in a bowl, add sugar to taste and mixed very well, sieve again to remove some particles then you bottle and serve cold.

Proximate Composition

AOAC (1990) method was used for proximate analysis of cookies and spiced millet drink, and carbohydrate was determine by difference (Carbohydrate = 100% - (% moisture +% protein + fat/Lipid + % ash).

Experimental Animals (Albino rats)

Animal Collection: Fifteen (15) albino rats were brought from the animal farm in the Department of Biochemistry, University of Port Harcourt, Choba, Nigeria.

Animal Preparation: The rats were grouped into 5 in metabolic cage, 3 in each of the group. The groups were labeled as group 1, 2, 3, 4 and 5. Group 1 serve as control fed with 100% of rat feed and water only, group 2 fed with 20% of product, and 80% of rat feed, group 3 fed with 50% of product and 50% of rat feed, group 4 fed with 70% of product 30% of rat feed while group 5 fed with 100% of product only for 2 weeks. Blood sample was collected from the rat for further nutritional studies.

Determination of Glucose

The test tubes were labeled as test standard and blank, 1.0ml of glucose reagent was pipette into all the test tubes. 0.01ml of the albino rat blood samples were added into the appropriate tubes mixed and incubated at 37°C for 10mins. The instrument was zeroed with the blank and the absorbance was read at 520nm.

$$\text{Glucose} = \frac{\text{Absorbance of test}}{\text{Absorbance of Standard}} \times \text{concentration of standard}$$

Protein

The test tubes were labeled as test, standard and blank 1.0ml of the protein reagent was pipette into all the test tubes then 0.02ml of the sample was added into the appropriate tubes, mixed and incubated at 25°C for 10mins, the instrument was zeroed with the blank and the absorbance was read.

$$\text{Protein} = \frac{\text{Absorbance of test}}{\text{Absorbance of Standard}} \times \text{concentration of standard}$$

High Density Lipoprotein (HDL)

The test tubes were labeled as test, standard and blank, 0.5ml of high density liquid (HDL) reagent was pipette into the appropriate tubes, the test tubes were labeled as test, standard and blank 0.1ml of the supernatant were added into the appropriate tubes and allowed to stand for 10mins at 25°C. The instrument was zeroed with the blank and the absorbance were read at 540nm and calculated as:

$$\text{HDL} = \frac{\text{Absorbance of test}}{\text{Absorbance of Standard}} \times \text{concentration of standard}$$

Total Cholesterol

The test tubes were labeled as test standard, and blank, 1.0ml of cholesterol reagent was pipette into all the tubes, then 0.01ml of the albino rat blood sample was added into the appropriate tubes, and water (H₂O) to the tube labeled blank and allowed to stand for 10mins at room temperature, then the absorbance was read, at 540nm and calculated as:

$$\text{Total cholesterol} = \frac{\text{Absorbance of test}}{\text{Absorbance of Standard}} \times \text{concentration of standard}$$

Total Triglyceride

The test tubes were labeled as test, standard and blank 1.0ml of triglyceride reagent were pipetted into all the tubes, then 0.01ml of the albino rat blood sample were added into the

appropriate tubes and water (H₂O) to the tube labeled blank and allowed to stand for 10 mins at room temperature, then the absorbance were read at 540nm and calculated as:

$$\text{Triglyceride A} = \frac{\text{Absorbance of test}}{\text{Absorbance of standard}} \times \text{concentration of standard}$$

RESULTS

The proximate composition of guinea corn spiced drink and cassava fried balls and nutritional studies of albino rat fed with these products are shown in the tables below.

Table.1 Proximate Composition of Guinea Corn Spiced Drink and Cassava Fried Balls.

Sample	% Moisture Content	% Ash	% Fat	% Crude Protein	% Total carbohydrate
Cassava fried balls	37.35	1.723	12.18	5.34	43.407
Guinea corn spiced drink	89.88	0.058	0.043	0.587	9.332

The above table showed the result of the proximate composition of guinea corn spiced drink and cassava fried balls.

Table.2 Quantitative Analysis of Guinea Spiced Drink And Cassava Fried Balls.

Group	Fed Ratio	Glucose (mmol/L)	Total protein (g/L)	Total cholesterol (mmol/L)	Triglyceride (mmol/L)	High density lipoprotein (mmol/L)
1.	Control	4.2±0.53	70.66±12.89	2.36±2.23	0.033±0.15	2.13±0.67
2.	20% of the Product 80% of Normal feed	5.05±0.20	80.5±3.54	2.35±0.48	1.1±0.57	2.05±0.21
3.	50% of the Product 50% of the Normal feed	4.83±0.40	75.0±3.46	2.73±0.79	1.73±0.32	2.13±0.55
4.	70% of the Product 30% of the Normal feed	5.2±0.70	80.33±2.31	2.26±0.18	1.96±0.25	2.2±0.48
5.	100% of the Product	4.5±0.26	76.66±2.52	2.66±0.39	1.96±0.23	2.2±0.35

The above table showed the result of the nutritional studies of guinea corn spiced drink and cassava fried balls. The values are expressed as means ± S.D.

Table.3 Sensory Evaluation of Cassava Fried Balls.

	Appearance	Flavour	Aroma	Mouth-feel	Taste
Excellent	-	-	-	-	-
Very good	2	1	2	1	1
Good	5	4	4	4	6
Fair	8	10	9	10	8
Poor	-	-	-	-	-

The above table showed the result of sensory evaluation of cassava fried balls by 15 panelists.

Table.4 Sensory Evaluation of Guinea Corn Spiced Drink.

	Appearance	Flavour	Aroma	Mouth-feel	Taste
Excellent	2	2	2	4	3
Very good	3	5	5	4	5
Good	9	5	6	6	5
Fair	1	3	1	1	2
Poor	-	-	-	-	-

The table showed the result of sensory evaluation of guinea corn spiced drink by 15 panelists.

DISCUSSION

Guinea corn is the fifth most important cereal crop in the world and third most important cereal crop grown in the United States. It is the principal food grain for more than 750 million people in the semi-arid areas. Cassava is a major staple food in the developing world, providing a basic diet for over half a billion people. It is the most drought tolerant crops, capable of growing on marginal soils. The proximate composition of guinea corn spiced drink and cassava fried ball are shown in table 1. The result showed the percentage composition of moisture content, ash, fat, crude protein and total carbohydrate content, it was observed that in guinea corn spiced drink moisture content had the highest percentage composition of (89.88) followed by total carbohydrate content which is (9.33), crude protein (0.58), ash (0.05) and fat which is (0.04). While cassava fried balls total carbohydrate had the highest percentage composition of 43.407 followed by moisture content of 37.35, fat content 12.18, crude protein 5.34 and ash content 1.723. Studies with experimental animals on the nutritional impact of these products showed that total protein had the highest value, followed by glucose, total cholesterol, high density lipoprotein and triglyceride. It was observed that glucose, total protein, cholesterol and high density lipoprotein values of both the control and experimental groups were within the same range.

The sensory evaluation of cassava fried balls reveals that the appearance, flavour, aroma, mouth feel and taste of cassava fried balls were fair. Although Panelist suggests that effort should be put in place to enhance better product. The sensory evaluation of guinea spiced drink revealed that the appearance flavour, aroma, mouth feel and taste of the guinea corn spiced drink was very good and should be taken as food drink in our daily life.

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