



Production and Nutritional Studies of Cookies and Spiced Millet Drink

Nwachoko, Ndidi^{1*} --- Jack, Ibiba Reuben²

^{1,2}Department Of Chemistry, Rivers State University of Science and Technology, Nkpolu-Oroworukwo, Port Harcourt, Rivers State, Nigeria

Abstract

Nutritional studies of cookies produced from wheat (*Triticumaestivum*) flour and spiced millet drink produced from millet (*Pinnesetumnigritarum*) spiced with *Aframomumchrysanthum* were investigated. The result of the proximate composition of cookies showed the moisture content to be 3.54%, crude protein 7.57%, fat 27.61%, ash 1.718% and total carbohydrate 59.562%. The spiced millet drink proximate values were moisture content 78.29%, crude protein 1.18%, fat 0.249%, ash 0.108% and total carbohydrate 20.173%. Also the result of the nutritional studies carried out on the Albino rat blood sample fed with these products at different percentages showed that the blood glucose values were (3.2, 2.90, 2.85, 3.33 and 3.63mmol/L), total protein (73.00, 69.67, 78.50, 86.00 and 83.33g/L) and total cholesterol (2.40, 3.03, 2.35, 3.20 and 3.53mmol/L) for group 1,2,3,4 and 5 respectively. Comparing the result of the experimental groups with the control group, the obtained values for glucose, total protein and cholesterol were within the same range, whereas the blood triglyceride values (1.80, 2.50, 2.65, 2.27, and 2.07mmol/L) and high density lipoprotein (HDL) values (1.65, 2.07, 1.85, 2.67 and 1.83mmol/L) for group 1,2,3,4 and 5 respectively of the experimental groups were insignificantly above values of the control group.

Keywords: Cookies, Millet drink, *Aframomumchrysanthum*, Spiced, Nutritional production.



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1. Introduction

In each passing day, humans either complain of hunger or food shortage. Cookies are flat dry sweet biscuits that are made from wheat flour (composite form) and other natural food stuff such as yam, cocoyam and soybean, [1]. The word biscuit comes from the French word “biscuit”, meaning twice cooked and is a literal description of what happened in the early days of biscuit production. Cookies are known to be of high nutritional value that could take care of almost all the classes of nutrients (carbohydrate, protein, fats and oil, minerals and vitamins). In most part of the world, baked foods based on wheat flour are popular food stuffs [1].

Spiced millet drink had become one of the basic necessities of homes for sustenance of life. This is because of the enormous energy generated by food drink consumed at certain intervals of the day. It serves for carbohydrate, water and some other nutrients [2, 3]. The production of spiced millet drink assumes different forms in Nigeria including Kununzaki, Kunungyada, Kununakamu, Kununjiko. However, kununzaki is the most commonly consumed type and has gained wider acceptability with some Nigerian community. Its preparation and processing is dependent on indigenous technology. This food drink is found to be one of the traditional non-alcoholic fermented beverage drink [4, 5]. Cereal grains used for its preparation are sorghum maize, millet, guinea corn, or rice. The produced kunun is usually packed in plastic bottle under ambient temperature or cooled in refrigerator [6, 7].

2. Materials and Methods

2.1. Materials

Wheat flour, Margarine, Baking powder, Coconut, Egg, Sugar, Orange rind, Sieve garri. Millet, Sweet potato, *Aframomumchrysanthum*, Water and Sugar.

3. Source Materials

Wheat flour used for this study was purchased from Rumuokuta Market, Port Harcourt, and all other baking ingredients such as garri, baking powder, margarine, coconut, egg, sugar, orange rind.

Millet was purchased from a retail outlet in Mile One Market, Port Harcourt and the ingredient such as sweet potatoes, *Aframomumchrysanthum* were also obtained from the same source.

4. Animal Collection

Fifteen (15) albino rats were collected from the Department of Biochemistry, University of Port Harcourt Animal House.

5. Preparation of Cookies

200g of margarine and 125g of sugar were mixed until fluffy. 2 whole eggs, 1.5g coconut and 1.5g of orange rind were added while mixing continued for about 20 minutes. 300g of wheat flour, 5g of baking powder, and 50g of sieved garri were slowly introduced into the mixture. The dough was rolled and cut to various shapes with a cutter. Place in a greased baking sheet and baked in the gas oven until golden brown and cooled.

6. Preparation of Spiced Millet Drink

200g of millet were steeped in water for 24hours, washed, ground with 0.5g of spices (*Aframomumchrysanthum*) and 15g of sweet potato. Hot water were pour into mixture then allowed to stand over night and strained the following morning, it was sweetened with 10g of sugar to taste and cooled in the refrigerator.

7. Sensory Evaluation

The sensory properties of cookies and spiced millet drink were determined using a fifteen member panelists consisting of students from different Departments of Rivers State University of Science and Technology, cookies and spiced drink samples were subjected to sensory evaluation. The following attributes namely; taste, aroma, texture, appearance and over all acceptability were assessed on cookies and spiced millet drink samples.

8. Proximate Composition

AOAC [8] 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).

8.1. Sample Preparation

A total of (15) albino rats were divided into five (5) groups comprising of three (3) rats in each group. The groups were labeled 1-5. Group 1 was used as the control and fed with their normal food and water throughout the period of the experiment. Group 2 were fed with 20% of the product (cookies), 80% of the normal feed, group 3 were fed with 50% of the product, 50% of the normal feed, Group 4 were fed with 70% of the product, 30% of the normal feed and Group 5 were fed with 100% of the product (cookies). The experimental groups were given spiced millet drink only instead of water. On the fourteen day of feeding cookies and spiced millet drink to the experimental groups, the albino rats were sacrificed and blood sample were collected in Lithium heparin bottles to avoid coagulation and they were labeled appropriately and sent for analysis.

9. 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.

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

9.1. 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.

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

9.2. 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:

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

9.3. 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:

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

9.5. 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:

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

10. Results

The proximate composition of cookies and spiced millet drinks and nutritional studies of albino rats blood samples fed with these products are shown in the tables below.

Table-1. Proximate Composition of Cookies and Spiced Millet Drink

Sample	%Moisture Content	% Ash	% Fat	%Crude Protein	%Total carbohydrate
Cookies	3.54	1.718	27.61	7.57	59.562
Spiced millet drink	78.29	0.108	0.249	1.18	20.173

The above table showed the result of the proximate composition of cookies and spiced millet drink.

Table-2. Nutritional Studies of Cookies and Spiced Millet Drink using Albino Rat

Group	Fed Ratio	Glucose (mmol/L)	Total protein (g/L)	Total cholesterol (mmol/L)	Triglyceride (mmol/L)	High density lipoprotein (mmol/L)
1.	Control	3.20±0.57	73.00±4.24	2.40±0.28	1.80±0.14	1.65±0.21
2.	20% of the Product 80% of Normal feed	2.90±0.70	69.67±4.62	3.03±0.06	2.50±0.20	2.07±0.21
3.	50% of the Product 50% of the Normal feed	2.85±0.07	78.50±2.12	2.35±0.07	2.65±0.07	1.85±0.07
4.	70% of the Product 30% of the Normal feed	3.33±0.51	86.00±2.65	3.20±0.10	2.27±0.38	2.67±0.68
5.	100% of the Product	3.63±0.68	83.33±3.51	3.53±0.15	2.07±0.06	1.83±0.06

The above table showed the result of the nutritional studies of cookies and spiced millet drink. Values are expressed as mean ±SD.

Table-3.Sensory Evaluation of Cookies

	Appearance	Flavour	Aroma	Mouth feel	Taste
Excellent	1	-	-	3	3
V. Good	5	4	3	4	5
Good	10	12	13	9	8
Fair	-	-	-	-	-
Poor	-	-	-	-	-

The above table showed the result of sensory evaluation of cookies done by 16 Panelist.

Table-4.Sensory Evaluation of Spiced Millet Drink

	Appearance	Flavour	Aroma	Mouth feel	Taste
Excellent	-	-	-	-	-
V. Good	1	-	-	-	1
Good	15	6	5	4	4
Fair	-	10	11	9	10
Poor	-	-	-	3	1

The above table showed the result of sensory evaluation of spiced millet drink done by 16 Panelist.

11. Discussion

The result of the proximate composition of cookies in [table1](#) showed that cookies are rich in carbohydrate (59.562%) and fat (27.6%). This percentage is quite moderate for consumption. The moisture content of the cookies was 3.54%. This low moisture content implies long shelf life. The Ash and Crude proteins content of the cookies are 1.718% and 7.57% respectively.

The result of spiced millet drink revealed that spiced millet drink is high in moisture content (78.29%). This is good for all class of persons as water is essential for life. This high moisture content implies that the drink require a means of preservation such as refrigeration.

[Table 2](#) showed the result of the nutritional study of albino rat blood sample fed with cookies and spiced millet drink. The result showed that the blood glucose values, total protein values and total cholesterol values of the experimental groups and the values obtained from the control group were within the same range. The total triglyceride values and high density lipoprotein (HDL) values were insignificantly above the values of the control group.

[Table 3](#) and [4](#), showed the sensory evaluation of the cookies and spiced millet drink. The panelist noted that the products are quite good in appearance, flavour and aroma.

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References

- [1] H. Barbara, *From hardtack to home fries: An uncommon history of American cooks and meals*. UK: Free Press, 2002.
- [2] S. A. Odunfa, "Microbiological quality of yoghurt and milk drink samples in Ibadan, a Nigerian city," *Journal of Agriculture*, vol. 2, pp. 43-46, 1988.
- [3] J. Jango-Cohen, "The history of food. Twenty-first century books," pp. 4-8, CDB9267FR3Z6, 2005.
- [4] R. E. Lichtenwalner, G. I. Glover, and C. C. Shaw, "Protease activity of water and acid, reconstituted grain sorghum," *Journal of Agricultural Food Chemistry*, vol. 27, pp. 352-362, 1979.
- [5] T. Adenyemi and S. Umar, "Effect of method of manufacturing on quality characteristics of kunun zaki, a millet based beverage," *Nigerian Food Journal*, vol. 12, pp. 34-40, 1994.
- [6] N. A. Amusa and O. A. Odumbuka, "Microbiological and nutritional quality of hawked kunun (A Sorghum Based Non-Alcoholic Beverage) widely consumed in Nigeria," *Pakistan Journal of Nutrition*, vol. 8, pp. 20-25, 2009.
- [7] A. T. Ikekoronye and P. O. Ngoddy, *Integrated food science and technology for the tropics*. London: McMillian Publisher Limited, 1985.
- [8] AOAC, *Association of official analytical chemist*, 14th ed. Washington DC: Association of Official Chemist, 1990.