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Evaluation of the nutritional quality of Kuli-kuli (Peanut cake) produced from Melon seeds and Groundnut.

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***Abstract*— In order to improve human health and safeguard food safety and public health awareness of food, there is a need to assess the Nutritional quality of Kuli-kuli from melon seeds. Kuli-kuli which is majorly produced from groundnut is one of the major snacks consumed by most Nigerians especially in the North.The use of melon seeds in the production of Kuli-kuli is not known. Therefore, this research work was carriedout to produce and evaluate the nutrient of Kuli-kuli produced from Melon seeds. Sensory evaluation showed that the Kuli-kuli produced from melon seeds varied in appearance, aroma, texture, taste, and acceptability.**

***Keywords*— Kulikuli, Melon seed, Quality,**

I. Introduction

Kuli-kuli (Peanutcake) is the byproduct of oil extraction from groundnut, It is also used as a groundnut-based snack native to the coasts of West Africa {1}. Kuli-kuli Just like its parent material, groundnut, it is rich in protein and crude fat {3,15}. Peanuts and their derivatives are often categorized as street food that, by being cheap and accessible, meets the basic needs of the urban population {20}.

Melon seeds has an increasing demand since they contribute greatly towards achieving a balanced diet {6}. They have healthy concentrations of sulphur, calcium, potassium , phosphorus , magnesium, and manganese. They are necessary in the diets as they have high nutritive and caloric values. {13} reported that melon seeds contains 9.30% moisture, 3.33% ash, 42.89% fat, 25.36% protein, 3.83% fibre and 15.31% carbohydrate. Melon seeds have known therapeutic benefits such as antioxidant, analgesic and anti-inflammatory benefits in the human body {10}.In Nigeria and other parts of the world, they are used for the preparation of food condiments with a distinctive fragrance. They can also be used as flavouring and thickening agents in stews, soups and sauces {7}. "Ogiri" is a locally fermented melon popularly used among the Igbo part of Nigerian tribe as a food condiment for seasoning or flavoring {2}. However, the suitability ofmelon seedsfor use in the production of kuli-kuli is not ascertained. Although Kuli-kuli is mostly made from groundnut,this research work aims to produce kulikuli from melon seeds and kulikuli produced from groundnut containing ginger.

II. Material and Methods

Material

The raw materials which are groundnut seeds, melon seeds, ground chili pepper, ground ginger and Salt, were bought at the Anyigba Central Market in Kogi state, Nigeria. 50g of commercially produced kuli -kuli was obtained from the market and used as a control sample.

Methods

Preparation of Kuli-kuli using groundnut seeds

Groundnut seeds were manually washed by hand to remove foreign materials, such as dust, dirt, piece of stones. The groundnut seeds were roasted followed by grinding to produce paste. The process followed the flow chart as seen in figure 1. 250g of the groundnut paste was mixed with 8g of grounded chili pepper, 10.5g of grounded ginger and 9g of salt. 80ml of water was added to the mixture before it was further pressed, molded and fried. It was then cooled and packaged for further analysis.

Preparation of kuli-kuli using melon seeds

The melon seeds were sorted to remove damage seeds and dirt particles followed by roasting, milling to produce melon seeds flour. The process followed the flow chart as seen in figure 2. 250g of melon seed flour was mixed with 8g of grounded chili pepper, 10.5g of grounded ginger and 9g of salt. 80ml of water was added to the mixture before

it was further pressed, molded and fried. It was then cooled and packaged for further analysis.

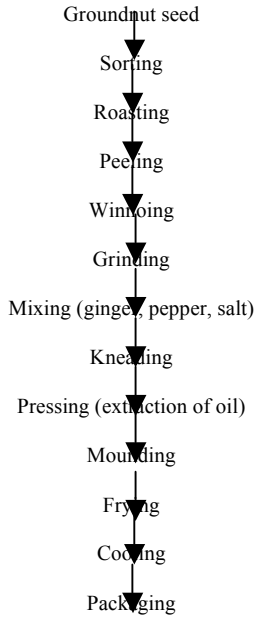

Fig 1: Flow diagram for the production of kuli-kuli using groundnut seeds

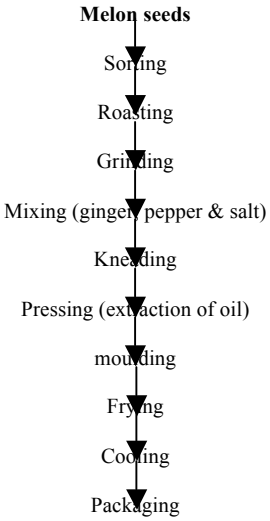

Fig. 2: Flow diagram for the production of kuli-kuli using melon seeds

Sample Analysis.

For the analysis, commercially produced kuli-kuli was used as a control sample and this was evaluated together with melon seed kuli-kuli and the groundnut kili-kuli made with ginger.

A = Egusi (Melon) Kuli-kuli

B = Groundnut Kuli-kuli with ginger

C = Control (Market Sample) Groundnut Kuli-kuli

The Proximate composition of the samples was determined as prescribed by Association of Official Analytical Chemist (AOAC). Some selected mineral constituents were investigated using Atomic Absorption Spectrometry method as prescribed by {17}. Using Analysis of variance (ANOVA), all the data collected was subject to statistical analysis and the means was separated using Turkey's test at 5% significance level (SPSS version 20.0 computer software was used).

Sensory Evaluation

Sensory assessment was carried out on the kuli-kuli samples.The samples were encoded in identical containers and displayed. A hedonic scale of seven-points was used.The scale ranged from severe like (7) to extreme dislike (1). Each of the samples was rated for Taste, Flavour, Texture, Colour, Mouth feel and Acceptance. During the sensory test, after each assessment, panellists were told to drink water or rinse their mouths to clear the palate.

III. Result and Discussion

TABLE 1: Result of Proximate Analysis of Kuli-kuli made from Melon and Groundnut

	Samples			
Compositions(%)	A	B	C	Means
Moisture	2.98^{b}±0.00	7.55^{a}±0.07	7.75^{a}±0.07	6.09±2.41
Ash	4.03^{b}±0.04	4.53^{a}±0.04	4.80^{a}±0.14	4.45±0.36
Crude Fiber	3.78^{c}±0.04	3.94^{b}±0.01	4.41^{a}±0.01	4.04±0.30
Protein	27.83^{c}±0.06	46.18^{a}±0.03	44.70^{b}±0.09	39.57±9.12
Fat	19.40^{a}±0.71	10.16^{b}±0.03	8.93^{b}±0.04	22.83±20.59
Carbohydrate	41.84a±0.21	26.41c±0.26	27.49b±0.04	35.08±12.9

Values are the means of replicated measurements ±SD. Values in the same column with different superscripts were substantially different ($p<0.05$)

Where A = Egusi (Melon) Kuli-kuli,
B = Groundnut Kuli-kuli, 'with ginger
C = Control

The proximate composition of the samples shown in Table 1 reveals significance ($p < 0.05$) difference in sample A and B. The moisture content which influences the shelf-life of food ranged from 2.93% for sample A to 7.75% for sample C which is the control. Sample A, which is 100 percent melon, and sample B, which is 100 percent groundnut, differed significantly($p > 0.05$). This is similar to that of {6} who reported a moisture content that ranged from 4.33 to 7.26% for five different melon seeds. {17,5} also reported moisture content of melon seeds to be in the range of 4.27 to 5.63%. These values are within the range observed in this study. Hence, these values are low, meaning that it is possible to store these melon seed kulikuli for a long period of time.

The ash content ranged from 4.03% for sample A to 4.80% for sample C which is the control. The difference between sample A, which is 100 percent melon, and sample B, which is 100 percent groundnut, was significant (p>0.05). {17,14} found ash content of melon seeds to range from 2.40 to 4.33% while {13} reported 3.33%. The results showed that the melon varieties in the present study have significant amount of ash which are important sources of minerals.

Crude fibre content ranged from 3.78% for sample A to 4.41% for sample C which is the control. There was significant (p > 0.05) difference between sample A which is 100% melon and sample B which is 100% groundnut. The lowest value was observed in 100% melon, while the highest value was detected in sample B which is 100% groundnut. This finding is in contrast with that of {6} who reported crude fibre contents of 0.90 to 1.63%. Similarly, {4} reported 2.30 to 2.94 percent crude fibre.These values are low compared to the value observed in this study. This difference could be attributed to the level of drying temperature applied and the season at which the study was conducted. There is a natural phenomenon that food materials are moister during rainy season than in dry season.

The protein being the body building nutrient ranged from 27.83% for sample A to 46.18% for sample B which is 100% groundnut. There was significant (p > 0.05) difference between the sample tested. The variation in these results can be attributed to their original raw materials. The highest value was observed in B which is 100% groundnut, while the lowest value was observed in sample A which is 100% melon. This finding is similar to that of {4} who reported a range of 24.30 to 41.60% for five melon seeds while {12,17} reported 11.67 to 35.0%. These melon seed varieties are rich in crude protein content and could be used to enrich food products.

The fat contents ranged from 8.93% for sample C which is the control to 19.40% for sample A which is 100% melon. There was significant (p > 0.05) difference between the samples tested. Similar findings were reported by {5,9}. There was a high fat content in the melon seed variety tested. The seeds are therefore categorized as excellent dietary oil sources {11}.

The results for total carbohydrate were between 27.49% for sample C which is the control and 41.84% for sample A which is 100% melon. Sample C which is the control had the lowest value and for sample A which is 100% melon had the highest value. {16} reported 31.4% for melon seeds which is lower than 41.84% obtained from this study. Therefore, these melon seed varieties can be regarded as possible carbohydrate sources.

TABLE 2: Mineral Element Content of Kuli-kuli made from Melon seeds and Groundnut seeds

Minerals	Samples		
(Mg)	A	B	C
Na	120.55^{a}±0.35	96.20^{c}±0.14	115.90^{b}±0.14
Ca	2840.00^{a}±0.00	2470.25^{c}±0.35	2560.25^{b}±0.35
Fe	42.45^{a}±0.21	31.92^{c}±0.07	36.42^{b}±0.07
K	180.60^{a}±0.14	135.55^{c}±0.78	150.50^{b}±0.14
Mg	270.15^{a}±0.07	241.55^{c}±0.21	245.45^{b}±0.49

Values are the means of duplicate measurements ±SD. Values in the same column with different superscripts were substantially different (p<0.05)

A = Egusi (Melon) Kuli-kuli,
B = Groundnut Kuli-kuli, 'with ginger
C = Control

The mineral element of the samples in Table 2 revealed significance (p < 0.05) differencein sample A and B. The sodium contents of the three samples ranged from 96.20mg/100g which is 100% groundnut to 120.55mg/100g which was 100% melon. There is significant difference in sodium contents of the samples (P<0.05). The sodium content of sample B (96.20mg) was significantly lower than the sample A.

The calcium contents of the samples ranged from 2470.25 which was 100% groundnut to 2840.00 mg which is 100% melon. There were significant differences in calcium contents of the samples (P<0.05). The calcium content of 100% groundnut (2470.25mg) was significantly lower than the than the sample A (2840.00mg).

The potassium contents of the samples ranged from 135.55 which was 100% groundnut to 180.60 mg which was 100% melon. There was significant difference in potassium contents of the samples (P<0.05). The potassium content of 100% groundnut (135.55mg) was significantly lower than the sample A (180.60mg). Potassium was relatively high, especially in sample A and In line with previous observations by {4}, potassium in Nigerian agricultural products is an abundant mineral.

The magnesium contents of the samples ranged from 241.55 which is 100% groundnut to 270.15 mg which is 100% melon. There is significant difference in magnesium contents of the samples (P<0.05). The magnesium content of 100% groundnut (241.55mg) is significantly lower than the than the sample A (270.15mg). {13} reported that Bambara groundnut is rich in mineral element. This result is in accordance with the report of {14}. {14} reported that mineral are essential nutrients that are needed in the body to facilitate proper functioning of certain organs.

The Iron contents of the samples ranged from 31.92 which is 100% groundnut to 42.45mg which is 100% melon. There is significant difference in iron contents of the samples ($P<0.05$). The iron content of 100% groundnut (31.92mg) is significantly lower than the than the sample A (42.45mg).

TABLE 3: Sensory Analysis of Kuli-kuli made from Melon and Groundnut

Sensory Parameters	Samples A	B	C
Appearance	$7.10^{c}\pm0.85$	$7.75^{b}\pm0.79$	$8.55^{a}\pm0.76$
Aroma	$7.10^{c}\pm0.97$	$7.50^{b}\pm0.88$	$8.30^{a}\pm0.87$
Texture	$7.80^{b}\pm1.11$	$7.70^{c}\pm0.98$	$8.35^{a}\pm0.75$
Taste	$7.65^{c}\pm1.18$	$8.25^{b}\pm0.79$	$8.65^{a}\pm0.49$
Overall acceptability	$7.40^{c}\pm0.82$	$8.10^{b}\pm0.79$	$8.65^{a}\pm0.49$

Where A = Egusi (Melon) Kuli-kuli, B = Groundnut Kuli-kuli, 'with ginger C = Control

The result in Table 3 shows the sensory analysis of Kuli-kuli made from melon and groundnut. The results revealed that Kuli-kuli from groundnut was rated high in terms of appearance, aroma, taste and overall acceptability. Appearance of the sample ranged from 7.10 to 8.55. Values for crispness (texture) were between 7.80 and 8.35. And the overall acceptability was in the range of 7.40-8.65. However, sample B which is Kuli-kuli from melon was rated high in term of texture. Textural characteristics play an important role in assessing the consistency and acceptability of finished goods {19}. The textural property may reflect the crispness of the product. This is expressed in the significant difference ($p<0.05$) observed in the sensory quality variables for all the samples.

IV. CONCLUSION

The research finding revealed that melon could be a possible raw material substitute for Kulikuli production in regions where groundnut is under cultivate or unavailable.

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