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# Assessment of Nutritional Qualities of *Chinchin* Produced From Blends *Of Cyperus Esculentus* and *Triticum Aestivum* Flours

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ABSTRACT

In this study, tigernut flour was formulated with wheat flour at different formulation ratios of 0%, 10%, 20% and 40% to blends, these blends were used to produce chinchin, a traditional snack. The nutritional qualities revealed that moisture was detected higher in sample A (4.9%) and least in sample B (3.1%) than other samples C and D, the moisture of samples C and D was 4.4%, moisture was generally low in all the blends. Ash was generally low in the samples and within the range 1.0% to 1.2%; crude fat and fibre were in the range of 3.1% to 4.7% and 3.5% to 4.9% respectively. The ranges of crude protein, energy value and carbohydrate by difference of the samples were 10.6% to 11.9%; 73.9% to 75.5% and 360.1kcal to 384.6kcal respectively. Samples A and C scored higher than other samples in taste and appearance respectively while sample D scored higher in flavor, texture and overall acceptability. Sample A was fairly like in terms of flavor, appearance, texture and general acceptability. Sample B taste and texture were scored like and fairly like respectively, the flavor, appearance and general acceptability were much like. 80% of sample C sensory attributes (taste, appearance, texture and general acceptability) were scored 'much like' while flavor was scored 'fairly like'. 60% of sample D sensory attributes (taste, appearance, and texture) was scored higher than other samples. Flavor and general acceptability were 'extremely like' appearance and texture were 'much like' and taste was 'fairly like'. In conclusion, chinchin produced from wheat and tigernut blends, particularly sample D (60% : 40%) mixture of wheat and tigernut flours respectively showed higher nutritional quality and acceptability than other samples. The use of wheat flour and tigernut formulation for cost reduction and optimal utilization of tigernut is hereby recommended.

## 1 INTRODUCTION

Wheat flour is one of the grains in the diet of a vast proportion of the world's population. It has a great impact on the nutritional quality of the meal consumed by a large number of people and consequently on their health, wheat has the ability to produce high yields under a wide range of condition, this thus accounts for its popularity among other cereals, the most important factor is the capacity of wheat gluten protein in the production of the great variety of foods associated with wheat around the world. The total annual production of wheat for year 2016 as at June is put at 724 million metric tons.
Wheat is one of the oldest and most important of the cereal crops, there are different varieties known, but the most important ones and their uses include wheat that is used to make bread; spaghetti and macaroni commonly consumed pasta in Africa and Asia are made from drum wheat and cake, crackers, cookies, pastries, and flours can be made from another variety of wheat known as club wheat.
Wheat is also a good source of carbohydrates, protein, antioxidants, fiber, some vitamins and minerals. It is used by industry for the production of starch, paste, malt, dextrose, gluten, alcohol and other products (Britannica encyclopedia, 2016).
Chinchin is a fried snack popular in West Africa. It is sweet, cookies like product made from wheat flour and egg. It is kneaded and cut into small sizes prior to frying. Wheat flour is the main raw material and therefore there is need to enrich it with adequate protein and fibre sources. Snack can be used to increase nutritional status of consumer by incorporating nutrient such as protein and fibre (Abioye *et al.,* 2020).
Chinchin is a traditional Nigerian snack prepared using wheat flour, butter, milk and eggs from which a stiff paste is made which is then deep fried until golden brown and crisp. It is sweet to taste, slightly hard and may be equated to a harder tension of a doughnut. Occasionally, the chinchin may be produced by baking rather than frying (Abaejoh, 2016). It is an important local snack in Nigeria, its richness is attributed to wheat from which it is made and can be enriched with many enrichers such as butter, egg etc. the high cost of wheatb being a non – tropical grain made the production expensive thus a dire need to source for an alternative complementary tropical crop or grain.
Therefore, the objective of this study was to assess the nutritional and sensory qualities of chinchin produced from tigernut and wheat flours blends.

## MATERIALS AND METHODS

### MATERIALS

**Collection of materials**

Tigernut (*Cyperusesculentus*) seed and Wheat flour were purchased from Modern market in Bida - Nigeria. Other materials used were sugar, salt, milk, baking powder, margarine, egg and vanilla flavor were purchased from Modern market in Bida - Nigeria.

**Other materials**

All equipments used such as mixing bowl, frypan, cutting table, spoon, knife, tray and other tools were obtained from Department of Hospitality, Leisture & Tourism, the Federal Polytechnic Bida - Nigeria.

### METHODS

**Production of Tigernut Flour**

Tigernut flour was prepared using the method described by Adejuyitan (2011). The nut was sorted in order to remove unwanted materials like pebbles, stones and foreign seeds before washing with water, the cleaned nuts were oven dried at 180$^{o}$C temperature for 3 hours, milled, sieved through 100µm aperture size sieve and the resultant flour was packaged in a cellophane until ready to used.

**Formulation of Blends**

Wheat and tigernut flours were mixed at different proportion of 100%:0%; 90%:10%; 80%:20% and 60%:40% respectively, the samples were mixed together using a hand mixer (Kenwood HM 430, South Africa) to achieve uniform blends of tiger nut and wheat flour.

Determination of moisture contents of wheat and tigernut flour

The moisture content of the sample was carried out according to AOAC procedure (2006). An empty moisture dish was washed and dried in an oven at 80 $^{0}$C and cooled in desiccators. The dishes were weighingalong with covers (W1), 2g of samples were weighed into the dish and reweighed again (W2). The samples with the content was placed in hot air oven at 102+8$^{0}$C and dried for 5 hours till a constant weight was obtained. Dishes were then transferred into desiccators and cooled and then reweigh (W3). The % moisture content was calculated as shown below.

$$\% \text{ moisture} = \frac{W_2 - W_3}{W_2 - W_1} x\ 100$$

Where;

$W_1$ = Initial weight of employ crucible

$W_2$= weight of crucible+ food before drying

$W_3$= final weight of crucible + crucible + food after drying

**Determination of fat content (oil extraction)**

The fat content of the sample was carried out according to AOAC (2006) 2g sample was weighted into the thimbles and plugged lightly with cotton wool. The thimble was inserted into a refracted extractor holder. A 100ml flat bottom flask of known weight containing 25ml petroleum ether (bpt 40 – 60$^{0}$C) was fitted into extractors. The apparatus was heated gradually b hot plate at 80 – 100$^{0}$C for about 4 – 6 hours. At the end of extraction, the solvent was removed from oil by heating in a hot air oven at 105$^{0}$C for 30 minutes. The flask was allowed to cool inside a dissector and reweighed. % oil content was calculated as shown below:

$$\% \text{ Oil} = \frac{\text{Weight gain by flask}}{\text{Weight of sample}} x\ 100$$

**Determination of Crude fibre**

The crude fibre content of the sample was carried out according to AOAC (2006) about 2g of defatted material with petroleum ether was boiled under reflux for 30 minutes and filtered through filter paper washed with boiling water until no longer acidic. The residue was transferred to beaker and again boiled for another 30 minutes with 200ml of 1.25NaOH and again flittered through another filter paper with washing until no longer NaOH. The final residue was then transferred to a crucible and dried in an oven and the dry weight taken and transferred to a furnace and incinerated, cooled and weighed.

The crude fibre was then calculated as shown below:

$$\% \text{ Crude fibre} = \frac{\text{dry weight} - \text{ash weight}}{\text{Weight of sample}} x\ 100$$

**Determination of Crude Protein**

0.2g of samples was weighed into kjedhal digestion flask and a tablet catalyst was added. 5ml of concentrated $H_2SO_4$ (sulphuric acid) was added into flask. The content of kjedhal digestion flask was heated in a digestion chamber contained in a fume cupboard for about 4 hours until a clear digest was obtained. The sample was allowed to cool and the content was added with distilled water (100ml) for distillation process. The digest was then transferred into 10ml of boric acid containing 5 drops of bromocresol green methyl red indicator until 50ml of distillated. The distillate was standardized/titrated with 0.1 NaCl until pink colour was observed. The % crude protein was then calculated using

$$\% \text{ N} = \frac{(\text{S} - \text{B}) x\ 0.1N\ x\ 14.01}{\text{Weight of sample}} x\ 100$$

% crude protein = %N* 6.25

S = sample titre value

B = Blank titre value

**Determination of Ash Content in food sample**

Weigh crucible and record the weight, then weight 2g of sample into crucible of known weight. The crucible and sample were then placed in a muffle furnace at $550^0$C for 4-6 hours until a whitish grey was obtained. The crucible was then removed and placed in desiccators to cool to room temperature before weighting, each sample was determined in triplicate and % ash was calculated as shown below:

$$\% \text{ ash} = \frac{\text{Weight of ash}}{\text{Weight of sample}} \ x\ 100$$

Determination of carbohydrate

The % CHO was calculated by difference according to AOAC (2006). The summation of the proximate valves was subtracted from 100% as thus:

% carbohydrate=(100-100%-%crudeprotein +%ash content +%fat +%crude fibre+%moisture.

## PRODUCTION OF CHINCHIN

First the blended flour was put in a bowl by the addition of one tea spoon of salt and one sachet of ground nutmeg. After this, margarine was added together with it evenly. Eggs, sugar and other ingredients were also added to make firm stiff dough. The thick dough was rolled, cut into cubes on a board, followed by frying in deep hot vegetable oil until it was baked into golden brown colour. The oil was allowed to drain, the chinchin was allowed to cool followed by packaging in high density polyethylene bags for storage and this was repeated for all the flour blends samples.

**SENSORY EVALUATION**

The sensory attributes of the chinchin were determined using a 9 - point hedonic scale as described by Larmond (1977). This was done by 25 untrained panelists comprising of Students of Department of Nutrition and Dietetics Federal Polytechnic Bida, Nigeria. Where 1 represents dislike extremely and 5 represents like extremely.

## STATISTICAL ANALYSIS

Data collected was subjected to analysis of variance using SPSS (version 15), and was presented as Mean±SEM .

## RESULTS AND DISCUSSION

The results of proximate composition of tigernut and wheat flour blends were presented in Table 1. Moisture was detected higher in sample A (4.9%) and least in sample B (3.1%) than other samples C and D, the moisture content of samples C and D was 4.4%, moisture was generally low in all the blends.

Ash was generally low in the samples and within the range 1.0% to 1.2%, crude fat and fibre were in the range of 3.1% to 4.7% and 3.5% to 4.9% respectively. The ranges of crude protein, energy value and carbohydrate by difference of the samples were 10.6% to 11.9%, 73.9% to 75.5% and 360.1kcal to 384.6kcal respectively.

Moisture content is the amount of water present in the sample which may determine the shelf life of the product. Sample b moisture content is within the range reported in a similar study of Oladele and Aina (2017). Crude fiber is measure of the quantity of indigestible cellulose, pentosan, lignin and other component of this type present in the food for food bulking and colon disease prevention. Ash content is the amount of mineral present in the food component.

The results of sensory quality of tigernut and wheat flour blends were presented in Table 2. Samples A and C scored higher than other samples in taste and appearance respectively while sample D scored higher in flavor, texture and overall acceptability. Sample A was 'fairly like' in terms of flavor, appearance, texture and general acceptability. Sample B taste and texture were scored 'like' and 'fairly like' respectively, the flavor, appearance and general acceptability were 'much like'. 80% of sample C sensory attributes (taste, appearance, texture and general acceptability) were scored 'much like' while flavor was scored 'fairly like'. 60% of sample D sensory attributes (taste, appearance, and texture) was scored higher than other samples. Flavor and general acceptability were 'extremely like' appearance and texture were 'much like' and taste was 'fairly like'. The panelists adjudged sample D produced from 60%:40% mixture of wheat and tigernut flours respectively as the most preferable sample.

Table 1: Proximate composition of tigernut and wheat flours blends %

| Sample | Moisture | Ash | Crude Fat | Crude protein | Crude fiber | CHO | Energy value(kcal) |
|---|---|---|---|---|---|---|---|
| A | 4.9±0.8 | 1.0±0.9 | 4.5±0.5 | 10.6±0.1 | 3.5±0.5 | 75.5±0.8 | 384.6±0.3 |
| B | 3.1±0.0 | 1.0±0.9 | 3.3±0.3 | 11.9±0.2 | 4.7±0.3 | 75.9±0.5 | 381.1±0.1 |
| C | 4.4±0.4 | 1.1±0.1 | 4.7±0.3 | 11.0±0.9 | 4.8±0.3 | 73.9±0.2 | 382.4±0.1 |
| D | 4.4±0.8 | 1.2±0.4 | 3.1±0.0 | 10.9±0.6 | 4.9±0.0 | 75.3±0.1 | 360.1+0.1 |

Results are mean values of triplicate determinations and are presented in Mean±SEM

A=100% Wheat: 0% tigernut blend; B= 90% Wheat: 10% tigernut blend; C= 80% Wheat: 20% tigernut blend; D= 60% Wheat: 40% tigernut blend.

Table 2: Sensory quality of tigernut and wheat flour blends

| Sample | Taste | Flavor | Appearance | Texture | General acceptability |
|---|---|---|---|---|---|
| A | 9.0±0.0 | 7.0±0.0 | 7.5±0.7 | 7.5±0.7 | 7.5±0.7 |
| B | 6.5±0.7 | 8.5±0.7 | 8.0±1.4 | 7.0±0.0 | 8.5±0.7 |
| C | 8.5±0.7 | 9.0±0.0 | 8.5±0.7 | 8.0±1.4 | 8.0±1.4 |
| D | 7.0±0.0 | 7.5±0.7 | 8.0±0.0 | 8.5±0.7 | 9.0±0.0 |

Results are mean values of triplicate determinations and are presented in Mean±SEM

A=100% Wheat: 0% tigernut blend; B= 90% Wheat: 10% tigernut blend; C= 80% Wheat: 20% tigernut blend; D= 60% Wheat: 40% tigernut blend.

## CONCLUSION

The proximate composition and sensory evaluation carried out on the products showed the nutritional richness of Chinchin produced from wheat and tigernut blends, mostly sample d that was produced from 60%:40% mixture of wheat and tigernut flours respectively.

### RECOMMENDATION

From the research carried out, the use of wheat flour and tigernut formulation for cost reduction and optimal utilization of tigernut is hereby recommended.

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