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Organoleptic and Nutritional Properties of Chin Chin Fortified with Doum Palm Fruit (Hyphaene Thebaica) Composite Flour

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ABSTRACT

Chin-chin is a snacks commonly consumed among all age group for refreshment and conveniences. It is made from plain flour, sugar and oil where as too much consumption of these materials are proven to be nutritionally unfavorable to health. Doum palm fruit is one of the nutrients dense underutilized dried fruit abundant in Kano state Nigeria all year round. Its hard texture involves prolong play like activity in the consumption process and consequently encourages children to be its popular gnawers, causing it to be abandoned by adults except for traditional therapy. This study titled organoleptic and nutritional properties of chin-chin fortified with doum palm composite flour is a product development research. The aim of the research is to assess the organoleptic and nutritional properties of the research product using ten panelists through 1 to 9 points hedonic scale in terms of taste, appearance, and texture. The product was evaluated both before and after storage for four weeks at room temperature. The results showed that chin-chin fortified with doum palm fruit composite flour was accepted having moderate sweet taste, pleasing appearance and crunchy texture. The overall acceptance of the product was rated above 5 mean points scored in all the parameters tested. The results revealed that the doum palm fruit composite flour maintained its nutritive values, palatability and organoleptic qualities after four weeks of storage. The study concluded that fortifying chin-chin with doum palm fruit composite flour has the potential to improve nutritional value while still maintaining its organoleptic qualities and shell life. The recommendations suggested among others that the products of the research should be registered and commercialized across Nigeria and also for exported to other African countries and beyond.

Keywords; Doum Palm, Chin-Chin, Composite Flour, food fortification

Introduction

Doum palm is a fruit obtained from doum palm tree native to hot regions like Kano state Nigeria. It is scientifically named Hyphaene thebaica; colloquially Doum palm or Gingerbread (Shamble 2015) and Hausa name is (Goruba). It is a very hard oval shaped woody textured fruit with a mildly sweet taste, it is a snack fruit consumed popularly among children by gnawing. Doum palm fruit comprises three parts namely, the outer layer with varying colours ranging from brown, red brown to maroon colour in lighter or darker hues; the middle light brown woody textured fiber and a large hairy seed at the center. On the bases of hardness and time consumption, doum palm fruit is considerably popular among children as the consumption involve prolong play-like activities. It starts from beating up the fruit with stone to remove outer layer and gnawing the middle fiber. Adult, on the other hand, abandoned its consumption except for traditional therapeutic purposes like cases of headache and dizziness. The Doum palm fruit powder is available at markets of the study area to ease consumption but found to be filthy and improperly separated with the outer layer which taste differs from the middle fiber.

Several studies confirmed that fruit of Doum palm is nutrient dense hence complement with adult nutritional need. According to Islam, Saeed, Afzaal, Hussain, Al Jbawi, Armghan, (2022) Doum palm fruit has antimicrobial ability, antioxidant, antitumor and anti-inflammatory ability. Doum palm fruit also contains dry matter (96.69 %), per 100g, total carbohydrates (84.87 %), total sugars (29.39 %) crude fiber (22.36%), Protein (3.44%), Fat (1.14 %), Potassium (171.60 mg), calcium (336.40 mg) Magnesium (131.35 mg), sodium (153.92 mg) and iron (168.87 mg) (Hisham and Mahmoud 2013). Additionally, In a 3 months research Gendy, El-Mileegy, Ghyaty, Malek, El-Hamid (2015) stated that consumption doum palm fruit lowers blood pressure in hypertensive patients and changes blood lipids and lipoproteins that decrease the risk of cardiovascular system, therefore suggested that doum palm fruit might be advantageous in the creation of functional foods with potential applications. Despite the abundant nutritional value and availability of Doum palm fruit in kano state, it is unfortunately considered to be one of the underutilized crops in the study area, because, apart from raw consumption of doum palm fruit by gnawing and used as additive to beverage, there is no any other food prepared using doum palm fruit in the study area.

A snack is a portion of food enjoyed between main meals, they are portable, quick satisfying and convenience food. They include cookies, chips, popcorn, cake, dough nut, yogurt peanuts and even raw vegetables, fresh fruit, nuts packaged foods and other processed foods. Snacks often contain ample amounts of sweeteners, preservatives and appealing materials to bump up commercialization process. Chin-chin is a form of deep fried pastry, sweet, golden brown crunchy and crispy snack of popularity amongst different age range. It is available in various shapes and sizes. Chin chin is mainly

formulated from the mixture of cereal flours butter, sugar and found to be nutritionally unfavorable. According to Fox (2019) heavily processed foods often include unhealthy sugar, sodium and fat, too much of them lead to serious health issues like obesity, heart disease, high blood pressure and diabetes. Bongjo, Ahemen, Gbertyo, Guyih & Muyong (2023) states that there have been recent strides in the incorporation of other flours from legumes, tubers, vegetables or fruit-based in what the food processing industry terms composite flour technology, hence incorporating doum palm fruit in chin-chin will widen its utilization.

In view of the above reasons, incorporating doum palm fruit in the preparation of chin-chin will de-junk and facilitate its consumption for nutritional benefit, refreshment and conveniences, these will also constitute inexpensive high-quality and functional ingredients as well as an avenue for fulfillment of the four main dimensions of food security, physical availability, economic and physical access to food, utilization, stability and adequate access to food on a periodic basis (Peng Berry 2018).

Padulosi, Thompson and Rudebjer (2013) viewed that neglected food species have increased in importance due to the recognition of their potential contribution in preventing malnutrition, obesity and diet-related disorders and hidden hunger. Additionally it will fill up gap between the nutrients requirement and supply that can abridged fortification, supplementation and complementation and modification of diet since conventional snacks such as chin-chin available in the study area lack the nutrients found in doum palm fruits.

The above health concerns coupled with the need utilize the abundant natural indigenous crop like doum palm fruit as well as need to diversify Nigerian economic are some of the factors that motivated the present research with the aim to serve an avenue for solving the above problems and to assess the acceptability of the products among consumers.

Objective of the study

The main objective of this study is organoleptic and nutritional properties of chin-chin made with doum palm fruit composite flour. Specific objectives are to;

i. Produce chin-chin using Doum palm fruit composite flour

ii. To assess the organoleptic properties of the chin-chin made with doum palm fruit composite flour

iii. To assess the nutritional contents of the chin-chin made with doum palm fruit composite flour

Materials and method

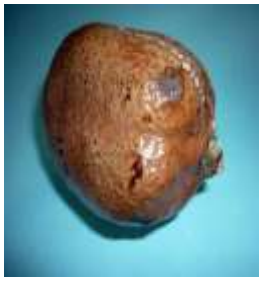
This research adopts product development research design. Tarver (2020) stated that product development is the entire process of researching, designing, creating new products to revamp old features or add new features so that product adds greater value to consumers. The target population of the research is 24 staff of Home Economics Department, School of Secondary Education (Vocational), Federal College of Education (Technical) Bichi. (Homec 2023) 10 staff equivalent to 42 % were randomly sampled for the study.

Production of Doum palm fruit flour

i. Scrap the outer layer of doum palm fruit using vegetable grater

ii. Scrap the middle layer of doum palm fruit using vegetable grater

iii. Grind and sieve the doum palm fruit fiber into fine powder using fine muslin fabric


Whole Doum palm fruit


Scraped Doum fruit


Doum fruit fiber


Doum palm seed

Formulation of Doum palm fruit composite flour

Blend plain flour to doum palm fruit powder in a Ratio 60:40%

The equipment used for the study are Grater, heavy duty blender, sieve, measuring cup spatula, mixing bowls, cutting board, pallet knife, Strainer etc

Ingredients required for Production of chin-chin

i.	Doum palm fruit composite flour	3 cups(measuring cup)
ii.	Baking powder	1½ tsp
iii.	Salt	½ tsp
iv.	Sugar	½ Cup
v.	Grated nutmeg	1 tsp
vi.	Milk	½ Cup
vii.	egg	1½
viii.	Melted butter	¼ Cup
ix.	Vegetable oil for frying	2 cups

Production of chin-chin

i. Mix all dried ingredients together: flour, baking powder, salt, sugar, and nutmeg.
i. Mix liquid ingredients milk, butter, egg etc in another container
ii. Pour liquid ingredients into the dried ingredients; mix it well to form dough.
iii. Knead the dough about 3 minutes on a surface until smooth.
iv. covered the dough for 10 minutes
v. heat up the oil moderate heat
vi. Roll the dough into desired sizes preferably about 1/6 to 1/5 inch thickness and start to cut the desired shape and moderate sizes.
vii. Fry in a moderate heat till it turns golden brown
viii. drained, cooled, and stored at room temperature

The result

Diamond shaped Chin-chin made with 60 to 40% plain and doum palm fruit composite flour

Nutritional contents Chin-chin made from 60 to 40% doum palm fruit powder

Sample	**ASH (%)**	**MOISTURE (%)**	**FAT (%)**	**PROTEIN (%)**	**FIBRE (%)**	**CARBOHYDRATE (%)**
CHIN-CHIN	**3.51** **3.59** **3.67**	**6.74** **6.45** **5.96**	**5.34** **4.56** **5.28**	**11.68** **12.62** **12.23**	**4.53** **4.64** **4.77**	**68.20** **68.14** **67.09**

sample	**VIT. A (µmol/L)**	**VIT. C (mg/100g)**	**VIT. E (mg/100g)**	**VIT. B_1 (mg/100g)**	**VIT. B_2 (mg/100g)**	**VIT. B_3 (mg/100g)**	**VIT/ B_6 (mg/100g)**
Chin **Chin**	**36.10** **36.06** **36.09**	**7.80** **7.69** **7.65**	**14.11** **13.13** **13.22**	**1.14** **1.13** **1.14**	**0.94** **0.94** **0.95**	**0.84** **0.84** **0.84**	**0.09** **0.09** **0.09**

SAMPLE	**KmEq/L**	**Feumol/l**	**MgmEg/L**	**Ca2mdl/l**
Chin chin	**6.855**	**24.20`1**	**2.488**	**7.34**

Nutritional properties of chin-chin fortified with doum palm fruit

Nutritional properties indicated that chin-chin fortified with doum palm fruit accumulated nutrients, the result showed enhancement in the fibre content (4.53 to 4.77%) fat ranging from 4.56 to 5.34%. the total proteins ranged from 11.68 to 12.62, total carbohydrate ranged from 67.09 to 68.20 and the total moisture contents is 5.96 to 6.74 which indicated the shell life of the research product which stored for four consecutive weeks.

According to the result chin-chin fortified with doum palm fruit contains high amounts of vitamins A36.06-36.10umolL reasonable amount of Vitamin E 13-14.11mg/100g and vitamin C 7.6 -7.80mg and traces of vitamin B Group such as vitamin B 1, 2, 3 and 6

Chin-chin fortified with doum palm fruit contains high percentages of minerals matters, Fe 24.20umolL K 6.855 and Ca 7.34md/L where the mineral contents exceeded the daily requirement for adult and children, the product also contains meager amount of Mg 2,488gmEgL.

Organoleptic properties chin-chin fortified with doum palm fruit composite flour

The samples were presented to 10 panelists (Home Economics staff) who were trained for organoloptic assessment using 1-9 points hedonic scale in terms of taste, texture, appearance respectively, the overall acceptability were as follows:-

Parameter	E	VG	MG	FG	NGNB	FB	MB	VB	EB	TT	Mean	Rmks
Taste	5	5	0	0	0	0	0	0	0	10	8.5	Accepted
Taste	6	2	0	2	0	0	0	0	0	20	8.4	Accepted
Appearance	5	4	1	0	0	0	0	0	0	10	8.4	Accepted

N=10: Keys: Excellent 9 points, Very good 8 points, moderately good 7 points, slightly good 6 points, neither good nor bad 5 points, fairly bad 4 points, moderately bad 3 points, very bad2 points, extremely bad 1 point.**Tt** total, Rmk remarks

The result of properties of chin-chin showed that the product was accepted by the panelists as the scored of all the parameters of taste, texture and appearance of the products tested were above 5 points, this showed that the panelists accepted the products with qualities similarities to 100% plain flour.

Conclusion

Conclusively, doum palm fruit composite flour in the ration of 60:40% resulted in increase in fibre, protein, ash and vitamin A.E AND C, also Fe, K, and Ca contents in the products and decrease in moisture contents which determines the shell life of the product. These considerable increments are nutritionally significant in Nigeria where white plain flour became the essential ingredient for the production of chinchin. Organoleptic properties of the product revealed that ration 60 40 substitution of doum palm fruit composite flour yielded qualitative product similar to that of plain flour. Application doum palm fruit flour is useful in the production of chinchin and other snacks in Nigeria.

Recommendations

The following recommendations were made

1. Public sensitization on the utilization of doum palm fruit in food preparation should be organized and publicized in mass media and extension services
2. Financial support should be offered from government and other stake holders for food production using doum palm fruit
3. Registration and commercialized of the products of this research should be made across Nigeria and also for importation to foreign countries.

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