Journal of Culinary Science & Technology

ISSN: 1542-8052 (Print) 1542-8044 (Online) Journal homepage: http://www.tandfonline.com/loi/wcsc20

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JOURNAL OF CULINARY SCIENCE & TECHNOLOGY
2018, VOL. 16, NO. 1, 40–51
http://dx.doi.org/10.1080/15428052.2017.1315322

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ABSTRACT
This study was carried out to evaluate the effect of supplementing defatted coconut paste on the proximate composition, physical, and sensory qualities of a maize-based snack (*kokoro*). Maize was supplemented with defatted coconut paste at 100:0, 90:10, 80:20, 70:30, 60:40, and 50:50. The hot paste blends were shaped into ring-like dough and deep-fried in vegetable oil (150 ± 5°C) for 5 minutes to have golden yellow, hard, and dried snacks. There is an increase in protein, fat, ash, fiber, and energy value of the snacks, ranging from 8.23 to 15.23%, 12.63 to 20.27%, 2.13 to 3.43%, 2.67 to 4.52%, and 408.67 to 438.07kcal/100 g respectively, while moisture and carbohydrate contents decreased. The thickness, width, and sensory attributes showed no significant differences ($p < 0.05$) but there was a significant difference in the energy (breaking force) to break the snacks. An acceptable *kokoro* can be produced from maize–defatted coconut blends with up to 30% defatted coconut paste addition in maize flour.

ARTICLE HISTORY
Received 24 July 2016;
Revised 20 March 2017
Accepted 31 March 2017

KEYWORDS
Defatted coconut; *kokoro* snack; physical qualities; sensory attributes

Introduction

Maize (*Zea mays*) is ranked the fourth most important cereal food after millet, sorghum, and rice in Nigeria (FAO, 2009). It is a good source of carbohydrate and it can be processed into a wide range of food items or dishes and snacks. Some of the maize-based snack foods in Nigeria include *kokoro* (maize cake or deep-fried ring-like maize dough), *aadun* (maize pudding), *donkwa* (maize-peanut ball), *egbo* (dehulled and cooked maize), *masa* (deep-fried maize pudding), *tuwo* (maize flour), *eko* (fermented and cooked maize starch), and *ogi* (fermented maize-starch slurry). However, of all these maize-based foods, *kokoro* may be said to be the most popular in the southwest Nigeria because of its patronage across the country's border in this region. Though, the snack (*kokoro*) originated from the *Egbado* people, southwest Nigeria, but the patronage and consumption of the snack have spread across the country's boarder to neighboring Francophone and

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Anglophone countries like Republic of Benin, Togo, Ghana, and Senegal. This is an indication that the snack has become a regional food product, hence the need to improve on its qualities. To date, major processors of the snack are based in towns like *Iboro, Imasayi* and *Joga* in southwest Nigeria, where it has become the tradition of some families to process and market the snack and thus earn their income. However, some processing centers have begun to spread beyond Nigeria into the neighboring countries that shared boundaries with the southwest region.

The processing method of *kokoro* has been traditional since time immemorial (Akoja, Adebowale, Makanjuola, & Salaam, 2016) and to date, processors have not made an improvement on the product modernization, be it nutritional or packaging aspects. The processing method spans over 3 days of an intensive process which involves partial cooking of the whole dried maize with water till it has a milky taste, allowing it to go through natural fermentation for 24 hours (Akoja et al., 2016; Oranusi & Dahunsi, 2015). It is then milled and mixed to form a thick paste and seasoned with common salt and wet onion. The dough formed is kneaded manually, cut with a sharp knife, and made into the ring-like structure. This is then deep-fried in vegetable oil for few minutes to produce a golden yellow, hard textured, low moisture product (Oranusi & Dahunsi, 2015).

Maize is the major raw material for processing *kokoro* snacks. It has low protein content ranging from 9 to 12%, depending on the cultivar when compared with some common legumes and oil seeds. Also, maize is rich in methionine and cysteine but lacking essential amino acids such as lysine and tryptophan (Akoja et al., 2016). So, the essential amino acids (lysine and tryptophan) lacking in the snack can be introduced into it by supplementing the maize with oilseed like coconut, groundnut, or soybean, which could be better sources of the lacking essential amino acids. In view of the above, consumption in large quantities of *kokoro* snack may lead to large intakes of carbohydrates and insufficient protein, and consumers may be faced with shortage of lysine and tryptophan (Otunola, Adelakun, Adejuyitan, Olajide, & Alabi, 2012) in the snack.

Coconut is rich in fiber (4.22%), vitamins, and minerals. It is believed as a "functional food" because it provides many health benefits beyond its nutritional content. Coconut is naturally low in digestible carbohydrates, contains no gluten, and is loaded with health promoting fiber and important nutrients (Lalitha, 2014). Coconut flour is soft, flour-like product made from the pulp of a coconut. Coconut flour is extremely high in fiber with almost double the amount found in wheat bran. It contains more calorie-free fiber than other wheat alternatives and provides a good source of protein (Trinidad et al., 2001). Literature has it that coconut provides many health benefits: It can improve digestion, help regulate blood sugar, protect against diabetes, help prevent heart disease and cancer, and aid in weight loss (Lalitha, 2014). Coconut is rich in energy-yielding fat (47.2%) and minerals (mg/kg) like phosphorus (184.2 mg/kg), potassium (224.8 mg/kg), zinc (43.5 mg/kg), iron (37.9 mg/kg), magnesium (178.1 mg/kg), and 50.0 mg/kg manganese (Amoo, 2004).

The utilization of defatted coconut flour as a high protein and fiber ingredient in food formulations have been clearly reported (Trinidad et al., 2001; Usman, Ameh, Alifa, & Babatunde, 2015; Yalegama & Chavan, 2006). Protein content of defatted coconut flour was in the range of 17.2–20.0%, on dry weight basis (Kwon, Park, & Rhee, 1996). Coconut protein fractions contain substantial amount of glutamic acid, argentine, aspartic acid, and lysine with values ranging as 17.0–24.9, 12.3–17.9, 5.6–9.3, and 3.5–4.1 g/100 g of protein, respectively (Kwon et al., 1996). Thus, coconut may provide a potential source of protein with good nutritional value and a relatively well-balanced amino acid profile. Protein can be introduced to cereal food products through supplementation with legumes and oilseeds, which are better plant sources of digestible proteins with good arrays of essential amino acids and minerals. Supplementation of *kokoro* with defatted soyabean and groundnut (Uzor-Peters, Arisa, Lawrence, Osondu, & Adelaja, 2008), treated distillers' spent grain (Awoyale, Maziya-Dixon, Sanni, & Shittu, 2011), beniseed (Ayinde, Bolaji, Abdus-Salaam, & Osidipe, 2012); soyabean and pigeon peas (Adegunwa, Adeniyi, Adebowale, & Bakare, 2015), African yam bean (Idowu, 2015), and protein hydrolysate (Akoja et al., 2016) have been documented. However, information is scarce on the supplementation of maize with defatted coconut meal for the production of *kokoro* snack. Therefore, the possibility of producing an acceptable maize-based snack (*kokoro*) supplemented with defatted coconut flour to enhance its nutritional quality was conducted.

Materials and methods

Materials

Dried yellow maize grain, coconut, refined vegetable oil (Devon King's brand, Lagos, Nigeria), onion, and common salt were bought from a retail market in Ilaro, Ogun state, Nigeria.

Production of maize flour

Dried maize grains were manually sorted, cleaned to remove stones, winnowed to blow away the chaff and damaged grains, and then decorticated. The cleaned and decorticated maize grains were dry-milled in an attrition mill to produce the maize flour, which was allowed to cool before it was sieved to obtain a particle size of 750 μm (Otunola et al., 2012).

Production of partially defatted coconut flour

The defatted coconut flour was prepared using the method described by Okafor and Usman (2013). The coconut was manually cracked and detached from the pericarp using a sharp kitchen knife. The endocarp was manually scraped to remove dark covering and then milled to a smooth paste using a roller hammer mill. The liquid component of the endocarp was extracted, and the residue was rinsed thoroughly with hot water several times using a muslin cloth so as to reduce the fat content. The obtained residue was dried in a cabinet dryer at 80–90°C for 5 min. The dried coconut residue was re-milled to remove lumps and then packed in an airtight plastic container at room temperature until used.

Recipe formulation of kokoro

Kokoro snack samples were produced as described by Adelakun, Adejuyitan, Olajide, and Alabi (2004) with a slight modification in the recipe used, as salt were used in place of sugar. Blends of maize flour substituted with defatted coconut flour were prepared at different proportions varying from 10, 20, 30, 40, and 50% defatted coconut flour. The ingredients recipe (on dry weight basis) used were 100 g flour, 8 g blended onion, 1.5 g salt, and 15 mL water.

Preparation of kokoro

The traditional method was used with some modification in the hygiene practice and using standard metric units and temperature control. In each case, the flour blends of maize and defatted coconut were mixed and stirred in boiled water (100°C) to make a paste. Salt and blended onions were then added to the paste with continuous stirring for about 3 min to form homogeneous dough. The dough was allowed to cool to about 40°C, kneaded manually for 5 min, cut out into pieces, and rolled into a ring shape on a chopping board. The shaped pieces were then deep fried in 1,000 cm^3 vegetable oil at 105 ± 5°C for about 5 min, drained overnight, left to cool, and then transferred into a basket lined with paper and later given a second frying for yellow color development. The *kokoro* pieces were then packed in low-density sealed polythene bags and stored at ambient (27 ± 2°C) conditions (Uzor-Peters et al., 2008) for further analyses.

Determination of proximate composition of kokoro *samples*

Moisture, ash, fat, protein, and fiber contents were determined using the official methods (A.O.A.C., 2005). Carbohydrate was determined by difference (100—[sum of moisture, ash, fat, protein and fiber contents]). Atwater factor was used to estimate the energy values (% carbohydrate + % protein + % fat) in kcal/100 g.

Physical quality evaluation of kokoro *samples*

Widths and thickness were determined as the average value of three individual *kokoro* samples with slide calipers. The breaking strength was determined by adapting the procedure described by Ayo et al. (2010). *Kokoro* sample of known thickness was placed centrally between two parallel metal bars (3 cm apart). Weights were added to the *kokoro* sample until the sample snapped. The least weight that caused the breaking of the snack sample was regarded as the break strength of the *kokoro* snack samples.

Consumer sensory evaluation of kokoro *snack samples*

Panelists were drawn from the Federal Polytechnic Ilaro, Nigeria who were eager to consume *kokoro* snack, did not have any food allergies, had prior experience of food sensory evaluation, and were screened for sensory acuity. The six *kokoro* snack samples were prepared and presented to consumers (n = 60), 38 males and 22 females, who claimed to eat *kokoro* snack at least twice a week, reported no food allergies, and were invited to participate in the exercise. Samples were blind-coded with three-digit random numbers. Panelists were to express their liking of color, taste, aroma, shape, crispiness, and overall acceptability on a nine-point hedonic scale, consisting of structural levels ranged from 9 "like extremely," through 5 "like nor dislike," to 1 "dislike extremely." Water was provided for the panelists at room temperature to clean their mouth between samples.

Statistical analysis

Data obtained (in triplicates) from proximate composition and sensory evaluations were subjected to one-way analysis of variance using the Statistical Package for Social Sciences (SPSS version 16.0, SPSS Inc., Chicago, IL, USA). Means obtained from raw data were compared at $p \leq 0.05$ using Duncan Multiple Range Test. Pearson's correlation matrix was determined by the result of proximate composition with the same statistical package.

Results and discussion

Proximate composition of kokoro *snack samples produced from maize and defatted coconut flour blends*

The results of proximate composition and energy values of *kokoro* snack samples produced from flour blends of maize-defatted coconut are shown in Table 1. The results showed that there were significant differences ($p \leq 0.05$) in the proximate composition of the *kokoro* samples. Moisture content in food is a very crucial parameter in the food processing and food testing

Table 1. Proximate composition of *kokoro* snacks produced from maize–defatted coconut flour blends.

Properties (%)	100:0	90:10	80:20	70:30	60:40	50:50
Moisture	$8.77^{a} \pm 0.1$	$8.70^{a} \pm 0.3$	$8.53^{a} \pm 0.4$	$8.37^{b} \pm 0.1$	$8.23^{b} \pm 0.2$	$7.87^{c} \pm 0.1$
Ash	$2.13^{c} \pm 0.2$	$2.32^{b} \pm 0.1$	$2.46^{b0} \pm 0.2$	$2.63^{b} \pm 0.1$	$2.67^{b} \pm 0.0$	$4.43^{a} \pm 0.1$
Protein	$8.23^{e} \pm 0.1$	$9.20^{d} \pm 0.0$	$9.47^{d} \pm 0.0$	$11.50^{c} \pm 0.1$	$13.53^{b} \pm 0.1$	15.23a ± 0.2
Crude Fat	$12.63^{e} \pm 0.0$	$14.24^{d} \pm 0.2$	$14.80^{d} \pm 0.3$	$16.83^{c} \pm 0.2$	$18.73^{b} \pm 0.2$	$20.27^{a} \pm 0.2$
Crude Fibre	$2.67^{c} \pm 0.2$	$3.00^{bc} \pm 0.1$	$3.43^{b} \pm 0.1$	$3.95^{b} \pm 0.2$	$4.26^{a} \pm 0.2$	$4.52^{a} \pm 0.2$
CHO	$65.52^{a} \pm 0.1$	$62.54^{a} \pm 0.2$	$61.31^{a} \pm 0.3$	$56.72^{b} \pm 0.2$	$52.58^{b} \pm 0.3$	$48.68^{d} \pm 0.2$
*Energy value	408.67^{e}	415.12^{d}	416.32^{d}	424.35^{c}	433.01^{b}	438.07^{a}

CHO = Carbohydrate; *Determined in Kcal/100 g.

Values are means of three replicates. Means in the same row with different superscripts are significantly different ($p \leq 0.05$).

qualities. It provides a measure of the water content and also serves as an indication of food sample storage stability. The moisture contents of the snack samples was low, ranging from 7.87 to 8.77%, such that sample (100:0) recorded the highest moisture content of 8.77% and the blend with 50% defatted coconut had least of 7.87%. These values were in agreement with some previously reported moisture contents for *kokoro* snacks made from maize with different flour blends of soybean (Adelakun et al., 2004), defatted groundnut (Uzor-Peters et al., 2008), distiller's spent grain (Awoyale et al., 2011), and beniseed (Ayinde et al., 2012). High moisture (> 12%) food products are known to usually experience shorter shelf stability compared with lower moisture (< 12%) food products. Therefore, the snack samples under evaluation may not experience such short shelf stability and may store longer because the moisture contents of all the samples are less than 12%, classified as high moisture content.

The ash contents of the samples increased marginally with increasing addition of defatted coconut flour. The ash content is an indication of the mineral content of the blends. The ash contents ranged from 2.13 to 4.43%. Sample (50:50) had the highest value of ash (4.43%) while 100% sample had the least (2.13%), suggesting that defatted coconut may have more ash content than maize. This however is an indication that incorporation of defatted coconut flour may boost the amount of mineral in food products like *kokoro* snack. The ash content of the *kokoro* snack samples was in agreement with the values reported by Adelakun et al. (2004) for soy-maize *kokoro* but higher than the values reported by Uzor-Peters et al. (2008) for *kokoro* from a soya bean/groundnut cake-maize blend; Awoyale et al. (2011) for *kokoro* from maize-distiller spent grain blend and; Ayinde et al. (2012) for *kokoro* snack from maize–beniseed cake.

The crude protein increased with increase in the proportion of the defatted coconut flour level in the samples. This increase in the protein contents of the *kokoro* snack samples may be as a result of higher protein content (17–20%) of defatted coconut flour earlier reported (Poonam, 2013; Trinidad et al., 2001; Usman et al., 2015; Yalegama & Chavan, 2006). *Kokoro* snack sample (50:50) had the highest protein content of 15.23%, while 100% maize sample had the least crude protein content (8.23%). This is however anticipated due to the fact that the crude protein content of defatted coconut flour (17–20%) is higher than that of maize flour (9–12%). Similar trends have been documented for *kokoro* snacks produced from flour blends of maize with varying proportions of beniseed cake (Ayinde et al., 2012), defatted groundnut paste (Otunola et al., 2012), pigeon pea (Adegunwa et al., 2015), African yam bean (Idowu, 2015), and protein hydrolysate of pigeon pea (Akoja et al., 2016).

The crude fat content of *kokoro* samples ranged from 12.63 to 20.27%. The increase in values obtained for fat contents of samples with increasing proportion of defatted coconut flour may be attributed to the fact that raw coconut kernel contains higher level of crude fat content ranging up to 47.2% (Amoo, 2004). This value reported for raw coconut flour is about (47.2%) higher than that of defatted coconut, ranging between 4 and 7% (Trinidad et al., 2001) flour and than that in whole-maize meal of 4.15% (Otunola et al., 2012). The values of fat content obtained were similar to those reported for *kokoro* snacks produced from maize flour blends supplemented at varying levels with beniseed cake (Ayinde et al., 2012), defatted groundnut paste (Otunola et al., 2012), pigeon pea (Adegunwa et al., 2015), African yam bean (Idowu, 2015), and protein hydrolysate obtained from pigeon pea (Akoja et al., 2016). The increased fat content observed in the present study may be associated with the fact that the residual fat in defatted-coconut meal (4–7%) may have added more into the maize's naturally contained fat and the oil used for frying. Therefore, the storage life of the composited *kokoro* snack samples may be affected due to high fat content (12.63–20.27%), especially samples with larger proportion of defatted coconut flour blends. This is because high fatty foods are liable to oxidative rancidity resulting to the production of off flavor and off color.

The crude fiber contents ranged from 2.67 to 4.52%, which increased with increasing addition of defatted coconut such that sample (50:50) had the highest value (4.52%) while *kokoro* sample (100% maize) had the least (2.67%). This suggests that coconut flour has more crude fiber (Poonam, 2013; Trinidad et al., 2001; Yalegama & Chavan, 2006) than maize flour. Fiber content of about 4.22% has been reported for raw coconut flour by Amoo (2004). Coconut flour contains more calorie-free fiber than other wheat alternatives and provides a potential source of protein and fiber with good nutritional value (Trinidad et al., 2001).

The carbohydrate contents decreased from 65.52 to 48.68% as the proportion of the defatted coconut flour is increased for 0 to 50%. This may be connected with the fact that defatted coconut flour has relatively low carbohydrate content. This observation is in agreement with findings earlier reported with the inclusion of soybean (Adelakun et al., 2004), beniseed cake (Ayinde et al., 2012), partially defatted groundnut paste (Uzor-Peters et al., 2008), African yam bean (Idowu, 2015), pigeon-pea (Adegunwa et al., 2015), and protein hydrolysate (Akoja et al., 2016).

The energy contents increased with increase addition of defatted coconut in the blends. The value ranged from 408.67 to 438.07 kcal/100 g. The energy values showed that there was a significant difference ($p \leq 0.05$) between the samples in that, sample (50:50) had the highest value (438.07 kcal/100 g) and 408.67 kcal/100 g was the least value for sample 100:0. This may be attributed to higher values recorded for fat and carbohydrate contents (Table 1) of the snack samples.

Correlation matrix of chemical composition of the kokoro snack samples

Table 2 shows the Pearson's correlation matrix of proximate composition of *kokoro* produced from flour blends made by compositing maize and defatted coconut. The result indicates that moisture, fat, and protein contents respectively correlate inversely with the carbohydrate content of *kokoro* samples. Conversely, the carbohydrate content correlates directly with the fiber content at $p < 0.05$ significance level. The energy value does not correlate with proximate composition at any levels. These findings are in agreement with the report put forward on wheat flour-modified starch from African breadfruit flour blends (Adebowale, Salaam, Komolafe, Adebiyi, & Ilesanmi, 2017).

Physical attributes of kokoro produced from maize–defatted coconut flour blends

The results shown in Table 3 indicated that there was no significant difference ($p \leq 0.05$) in the entire *kokoro* samples in terms of the thickness and width but there was a significant difference in terms of the breaking strength. Samples have the thickness and width values that were not significantly different from one another, ranging from 6.40 to 6.45 mm and 10.10 to 10.15 mm, respectively. However, the breaking strength of the samples

Table 2. Pearson's correlation matrix of proximate composition of *kokoro* snacks produced from maize–defatted coconut flour blends.

	Moisture	Ash	Fat	Fiber	Protein	CHO	Energy value
Moisture	1.000						
Ash	−0.332	1.000					
Fat	−0.531*	−0.534*	1.000				
Fibre	−0.266	−0.323	−0.832*	1.000			
Protein	−0.273	−0.201	−0.753*	−0.882*	1.000		
CHO	−0.542*	−0.403	−0.974*	−0.075	−0.027	1.000	
Energy value	−0.157	−0.225	−0.056	−0.425	−0.0573	−0.116	1.000

CHO = Carbohydrate; *significant at $p < 0.05$.

Table 3. Mean physical attributes of *kokoro* snacks produced from maize–defatted coconut flour blends.

	Maize–Defatted flour blends					
Attributes	100:0	90:10	80:20	70:30	60:40	50:50
Thickness (mm)	$6.45^{a} \pm 0.1$	$6.40^{a} \pm 0.1$	$6.40^{a} \pm 0.2$	$6.40^{a} \pm 0.1$	$6.45^{a} \pm 0.0$	$6.45^{a} \pm 0.1$
Width (mm)	$10.10^{a} \pm 0.1$	$10.15^{a} \pm 0.1$	$10.15^{a} \pm 0.2$	$10.15^{a} \pm 0.1$	$10.15^{a} \pm 0.2$	$10.15^{a} \pm 0.1$
Breaking strength (g)	$250^{b} \pm 0.1$	$320^{a} \pm 0.1$	$330^{a} \pm 0.1$	$340^{a} \pm 0.1$	$345^{a} \pm 0.1$	$350^{a} \pm 0.1$

Values are means of two replicates. Means in the same row with the same superscripts are not significantly different ($p \leq 0.05$).

increased with increase in defatted coconut flour inclusion from 250 to 350 g, with sample 100:0 significantly different from all the composited flour blend snacks. The energy required to break the *kokoro* samples, therefore, increased as the level of inclusion of defatted coconut increases, indicating that this is in agreement with the findings of Adegunwa et al. (2015) on *kokoro* produced from maize–pigeon pea flour blends.

Sensory evaluation of kokoro *snacks produced from maize–defatted coconut flour blends*

The results of the mean sensory scores obtained for multiple comparison tests is as presented in Table 4. There were no significant differences ($p < 0.05$) between the color, taste, shape, crispiness, and overall acceptability of the control (100% maize *kokoro*) and the sample containing 5% protein hydrolysate, whereas the two samples (control and 90:5 sample) were significantly different to little extent in terms of aroma. The color of the control and 90:5 samples formulation were most preferred by the panelists, having the highest mean sensory scores of 7.80 each, followed by 70:30 formulation (6.70), while formulation 50:50 was the least preferred with the mean score 4.15. Sample containing 50% maize flour and 50% protein hydrolysate was the least preferred in terms taste, aroma, shape, crispiness, and overall acceptability, with mean scores of 4.75, 4.75, 5.45, 5.70, and 5.60, respectively. In terms of taste and crispiness, a sample containing 90% maize flour and 10% protein hydrolysate was the most preferred. The results indicated that

Table 4. Sensory properties of *kokoro* snacks produced from maize–defatted coconut flour blends.

Properties	100:0	90:10	80:20	70:30	60:40	50:50
Colour	7.80^{a}	7.80^{a}	6.30^{b}	6.70^{b}	5.25^{c}	4.15^{d}
Taste	7.40^{a}	7.80^{a}	6.60^{b}	6.20^{b}	4.80^{c}	4.75^{c}
Aroma	7.80^{a}	7.25^{ab}	6.85^{b}	6.75^{b}	4.85^{c}	4.75^{c}
Shape	7.95^{a}	7.75^{a}	7.15^{ab}	6.45^{c}	5.50^{d}	5.45^{b}
Crispiness	7.75^{a}	7.80^{a}	7.07^{ab}	6.40^{c}	5.75^{d}	5.70
Overall accptability	8.40^{a}	8.20^{a}	7.15^{ab}	7.50^{ab}	6.00^{c}	5.60^{c}

Values are means of two replicates. Means in the same row with different superscripts are significantly different ($p \leq 0.05$).

increase in defatted coconut flour had a slight influence in the panelists rating of the sensory attributes evaluated in terms of color, taste, aroma and overall acceptability. Though, all the *kokoro* samples were generally acceptable for all the sensory attributes evaluated because none of the samples scored less than the minimum acceptable rating of 5 on the 9-point hedonic scale previously documented (Ayinde et al., 2012; Idowu, 2015), except for sample containing 50:50 blends in terms of its color, taste, and aroma with scores 4.15, 4.75, and 4.75, respectively.

Also, the closeness of values obtained for all the maize–defatted coconut flour blend samples to the control sample indicate a high level of acceptance of the composited *kokoro* samples. This is manifested with the sensory scores obtained in terms of the taste, aroma, crispiness, and general acceptability. It can therefore be inferred that, 10, 20, and 30% substitution of defatted coconut flour were not significantly different ($p < 0.05$) form 100% maize *kokoro* (control).

Conclusion

This study has shown that *kokoro* with more nutritional value can be developed from the addition of defatted coconut flour to maize flour. Supplementation of maize with defatted coconut meal improved the nutritional qualities of the *kokoro* snacks in terms of ash, protein, and crude fiber contents than whole maize snack as evident in the data (Table 1). Although, the physical attributes of the snacks are not significantly different except the breaking strength but the consumers' perception showed that supplemented maize snacks were not significantly different whole maize snack. This is evidenced with the scoring values for attributes considered during the consumers' sensory evaluation in terms of the taste, aroma, shape, crispiness, and overall acceptability. Consequently, supplementation with defatted coconut for snack (*kokoro*) production up to 30% addition remained acceptable to the consumers when compared with 100% maize snack (*kokoro*) in terms of taste, aroma, shape, and overall acceptability; as numerical scores were not significantly different from that of 100% maize snack (*kokoro*).

Though the snack is more of regional snack than a staple food, still the findings could be used as a baseline for the snack fortification using available plant protein sources and for addressing the deficiency of lysine in snacks made primarily from 100% maize flour. Also, this may be a way of increasing the utilization and value addition of coconut, as well as in food formulation to increasing the nutritional content food products containing defatted coconut meal. Also, more small and medium scale processors of the coconut flour may emerge and more income generation; this could create an employed opportunity for the youth.

Acknowledgments

The assistance of Miss Akinleye Rofiat towards the production of the snacks is highly appreciated by the authors.

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