SENSORY EVALUATION OF CHIN-CHIN PRODUCED FROM FOUR FLOUR VARIETIES

Fadilat Aneke & Adeola Folalu
(Department of Hospitality Management, Federal Polytechnic, Ilaro, Ogun State, Nigeria)
aneke.fhmt@gmail.com;omobolanle202@gmail.com

Abstract

The sensory evaluation of chin-chin using different types of flour (Maize, Wheat, cassava and Millet Flour) was carried out among staff and students of Hospitality Management as subject to it is an empirical study whose data was base on primary source obtains in a cross-sectional survey of 50 panelists. The study employed usage of descriptive statistics to analyse the data generated through the sensory evaluation sheet. the performance of chin-chin using different types of flour were carried out by evaluating the colour, appearance, flavor, taste, texture and overall acceptability. The samples were served to semi-trained panelists. Analysis of variances was employed in order to determine the significant differences in treatment means and least significant differences (LSD) analysis (P<0.005) to separate means. The findings showed that there was a significant difference in the treatments measured for each of the parameters considered in this study (P < 0.05). This led to the rejection of the null hypothesis that treatments for each of the parameters studied were the same and conclusion were made that on average the treatment for each of the parameters (colour, appearance, texture, flavor, taste, and overall acceptability) were significantly different from each other. It was concluded that the use of millet flour in chin-chin production has the potentials to improve the nutritional value of the food product and thus, enhancing the economic value of the crop. it was recommended that production of snacks with millet flour should be encouraged for the nutritional benefit of consumers.

Keywords: Cassava, chin-chin, *Maize, Millet, Sensory Evaluation and Wheat*

Introduction

Snacks are important foods which come in a variety of forms including packaged snack foods and other processed food as well as items made from fresh ingredients at home, the consumption of which is steady and increasing in Nigeria. It is a portion of food, smaller than a regular meal, generally eaten between meals. It has been hitherto produced from wheat as a major raw material. In Nigeria, wheat production is limited and wheat flour is imported to meet local flour needs for bakery products as such huge amount of hard-earned foreign exchange is used every year for importation of wheat (Olaoye et al., 2006).

Chin-chin is a fried snack popular in Nigeria and West Africa. It is sweet, hard, donut-like baked or fried dough of wheat flour. Chin-chin may also contain cowpeas. Many people bake it with ground nutmeg for flavour. It is usually kneaded and cut into small squares of one square inch or about a quarter of an inch thick before frying. This can be served as a side dish and make no ideal savory snack with drinks at parties or simply in between meals (Akbor, 2004; Mepba et al., 2007).

Maize (*Zeamays*) also known as maize is a cereal crop that grows across a range of agro-ecological zones in Nigeria, though it is grown slightly in the northern part of the country. Two types of maize are grown in Nigeria, the yellow and white variety. All parts of the crop can be used for food and non-food products. It is on record that more than 60% of Nigeria's production of maize is consumed by the industrial sector for the production of flour, beer, malt drink, maize flakes, starch, syrup, dextrose and animal feeds (Lemchi, Mbah and Obi-Anyanwu, 2016).

The rapid urbanization and increase in population in recent years have resulted in an increase in the consumption of wheat based product especially chin-chin in sub-Saharan Africa especially in Nigeria. This has spurred pragmatic research on compositing flour from locally cultivated cereals to reduce wheat importation. Millets, like sorghum, are predominantly starchy. The protein content in millet is very close to that of wheat, both provide about 11% protein by weight, on a dry matter basis (USDA, 2012). Millets are also rich in B vitamins (especially niacin, B6 and folic acid), calcium, iron, potassium, magnesium, and zinc (USDA, 2012). Millets contain no gluten, as none of the millets are closely related to wheat; they are therefore appropriate foods for those with celiac disease or other forms of allergies /intolerance of wheat.

Wheat (*Triticum spp.)* is one of the major grains in the diet of a vast proportion of the world's population. It has therefore been a great impact on the nutritional quality of the meals consumed by a large number of people and

consequently on their health. Although wheat's ability to produce high yields under a wide range of conditions is one reason for its popularity compared to other cereals, the most important factor is the capability of wheat gluten proteins to form viscoelastic dough, which is required to bake leavened bread in particular. These gluten proteins are necessary for 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 tonnes (FAO/WHO, 2016).

Cassava (*Manihot esculenta Crantz.)* is a tuberous root of the *Euphorbiaceae*family that originated directly from the extinct wild species *M. esculenta* subsp.*flabelliofolia*. It is a starchy crop grown in tropical and subtropical climates and the primary staple for over 800 million people worldwide (Lebot, 2010). Native to the Neotropics (Allem, Roa, Mendes, Salamao & Burle, 2012), cassava is now cultivated in Asia, Latin America and Africa. Cassava was introduced into Central Africa from Southern America in the sixteenth century by the early Portuguese explorers.
Therefore, processing into flour or use as composite will help accruing this benefit for human use. Deep fried foods have a satisfying crunchy texture and a distinctive taste which are widely enjoyed. Many dishes cooked by this method are quite inexpensive and so popular in low budget outlet. Also, most snacks are products from deep frying process. In Nigeria and throughout the world, snacks foods are widely spread and eaten among kids and adults because of their convenience both in preparation and circulation and also because of their distinctive taste. Matz (1993) defined snack foods as being something consumed primarily for pleasure rather than for social or nutritive purpose and not ordinarily used in a regular meal.

Materials and Methods

Recipes for each chin-chin samples (Maize, Wheat, Cassava and Millet) prepared

Recipes and method for maize flour

RECIPE	**QUANTITY**
Maize flour	500g
Sugar	125g
Butter	113g
Baking powder	¼ teaspoon
Egg	2large
Nut meg	1 teaspoon
Vegetable oil	1 bottle
Whole milk	2/4cups

Method of preparation of maize flour

In one bowl, I mix the entire dry ingredient: maize flour, baking powder and the nutmeg and stir thoroughly. I add the butter. (it should be cold and solid) and Combine the dry ingredient and the butter. In a separate bowl, I mix and whisk the milk and egg together. I use my hand to combine the mixed ingredients butter, egg, milk which has been mixed. Once the dough is formed, I flour the pastry board and roll out the dough until it is flat. I now use a knife covered in a flour, cut the dough horizontally and vertically to form little squares, while I ensure that both sides of the rolled dough is flour to prevent the square from sticking together. I Deep fry in a hot oil till golden brown.

Recipes and method for wheat flour

RECIPE	**QUANTITY**
Wheat flour	500g
Sugar	125g
Butter	113g
Baking powder	¼ teaspoon
Egg	2large
Nut meg	1 teaspoon
Vegetable oil	1 bottle
Whole milk	2/4cups

Method of preparation of wheat flour

In one bowl, I mix the entire dry ingredient: wheat flour, baking powder and the nutmeg and stir thoroughly. I add the butter. (It should be cold and solid) and Combine the dry ingredient and the butter. In a separate bowl, I mix and whisk the milk and egg together. I use my hand to combine the mixed ingredients butter, egg, milk which has been mixed. Once the dough is formed, I flour the pastry board and roll out the dough until it is flat. I now use a knife covered in a flour, cut the dough horizontally and vertically to form little squares, while I ensure that both sides of the rolled dough is flour to prevent the square from sticking together. I Deep fry in a hot oil till golden brown.

Recipes and method for millet flour

RECIPE	**QUANTITY**
Millet flour	500g
Sugar	125g
Butter	113g
Baking powder	¼ teaspoon
Egg	2large
Nut meg	1 teaspoon
Vegetable oil	1 bottle
Whole milk	2/4cups

Method of preparation of millet flour

In one bowl, I mix all the dry ingredient: millet flour, baking powder and the nutmeg and stir thoroughly. I add the butter. (it should be cold and solid) and Combine the dry ingredient and the butter. In a separate bowl, I mix and whisk the milk and egg together. I use my hand to combine the mixed ingredients butter, egg, milk which has been mixed. Once the dough is formed, I flour the pastry board and roll out the dough until it is flat. I now use a knife covered in a flour, cut the dough horizontally and vertically to form little squares, while I ensure that both sides of the rolled dough is flour to prevent the square from sticking together. I Deep fry in a hot oil till golden brown.

Recipes and method for cassava flour

RECIPE	**QUANTITY**
Cassava flour	500g
Sugar	125g
Butter	113g
Baking powder	¼ teaspoon
Egg	2large
Nut meg	1 teaspoon
Vegetable oil	1 bottle
Whole milk	2/4cups

Method of preparation of cassava flour

In one bowl, I mix the entire dry ingredient: maize flour, baking powder and the nutmeg and stir thoroughly. I add the butter. (It should be cold and solid) and Combine the dry ingredient and the butter. In a separate bowl, I mix and whisk the milk and egg together. I use my hand to combine the mixed ingredients butter, egg, milk which has been mixed. Once the dough is formed, I flour the pastry board and roll out the dough until it is flat. I now use a knife covered in a flour, cut the dough horizontally and vertically to form little squares, while I ensure that both sides of the rolled dough is flour to prevent the square from sticking together. I Deep fry in a hot oil till golden brown.

Study Area

This study was carried out at hospitality management laboratory of federal polytechnic Ilaro, Ogun State. The data were obtained from the selected staff and students of hospitality management department and analyses were conducted in the departmental laboratory.

Research Population

The population of this study consisted of 50 panelists which comprised of staff and students of Hospitality Management of Federal Polytechnic, Ilaro.

Study design

The study was cross sectional and descriptive in nature and involved students and staff of Hospitality Management Department, Federal Polytechnic Ilaro.

Data Collection

Data were obtained through the use of sensory evaluation sheet to gather necessary details about chin-chin produced using different flours in the study area. 50 panelists were used for the sensory evaluation and their views recorded on the sensory evaluation sheet provided by the researcher.

Data Analysis

The method used in interpreting all the details obtained including tables correlation analysis. Correlation analysis was used to analyze the primary and secondary data obtained which focused on the different types of flours used in the preparation of chin-chin.

Result

Sensory Evaluation ANALYSIS

Table 1. Sensory Evaluation

Treatment	Colour	Appearance	Texture	Flavor	Taste	Overall acceptability
T1	7.18±1.17^{a}	6.74±1.17^{a}	7.38±0.96^{b}	7.32±1.38^{a}	7.38±0.85^{a}	7.48±2.93^{a}
T2	7.84±1.29^{b}	7.66±1.43^{b}	7.60±1.29^{ab}	7.76±1.53^{ab}	7.92±1.45^{ab}	8.12±2.27^{b}
T3	8.12±1.62^{b}	7.86±1.77^{b}	8.02±1.58^{b}	8.14±1.34^{b}	8.20±1.70^{b}	8.50±2.09^{b}
T4	6.84±1.16^{ab}	5.52±1.20^{a}	7.58±0.49^{ab}	7.28±1.01^{b}	7.04±0.46^{a}	6.71±0.24^{a}

Source: Researchers Computation from SPSS 20

T1=Maize flour, T2=Millet flour, T3=Wheat, T4=Cassava flour

Note: Mean values with the same superscript in each column are not significantly different from each other (P > 0.05)

Discussion

The result of the analysis of variance (ANOVA) conducted showed that there was a significant difference in the treatments measured for each of the parameters considered in this study (*i.e. P < 0.05)*. This leads to the rejection of the null hypothesis that treatments for each of the parameters studied are the same and a conclusion were made that on average the treatment for each of the parameters (colour, appearance, texture, flavor, taste and overall acceptability) are significantly different from each other.

Colour

All values were significantly different across all treatment (*P < 0.05)*. T_3 recorded the highest value (8.12±1.62) followed by T_2 (7.84±1.29) (*P > 0.05)* with T_1 recorded the lowest value (6.84±1.16).

Appearance

All values were significantly different across all treatment (*P < 0.05)*. T_3 recorded the highest value (7.86±1.77), however T_2 (7.66±1.43)compare favorably (*P > 0.05)* with T_3. T_4 recorded the lowest value (5.52±1.20).

Texture

All values were significantly different across all treatment (*P < 0.05)*. In this study, T_3 recorded the highest value (8.02±1.58), however there is little differences between the values of T_2 7.60±1.29and T_3 8.02±1.58 respectively T_1 recorded the lowest value 7.38±0.96 and compared favorably (*P > 0.05)*

Flavor

All values were significantly different across all treatment (*P < 0.05)*. From this result, T_3 recorded the highest value 8.14±1.34 and compare favorably (*P > 0.05)* with T_2 7.76. However, T_4 recorded the lowest value of 7.28±1.01

Taste

All values were significantly different across all treatment (*P < 0.05)*. T_3 recorded the highest value 8.20±1.70 while T_4 recorded the lowest value of 7.04±0.46.

Overall acceptability

All values were significantly different across all treatment (*P < 0.05)*. T_3 (8.50±2.09) compare favorably with T_2 (8.12±2.27). T_1 recorded the lowest value 6.71±0.24[a]

Summary

The study evaluated the effect of sensory evaluation on chin-chin using different types of flour (maize, wheat, millet and cassava flour).

Data were analyzed using Descriptive such as mean and standard error. In addition, one-way analysis of Variance (ANOVA) otherwise known as Completely Randomized Design (CRD) was used to test if there was significant difference in the treatments for each of the parameters at 5% level of significance. Hence, the statistical package that aid in analyzing the data was Statistical Package for Social Science (SPSS 20).

The result of the analysis of variance (ANOVA) conducted for the sensory evaluation showed that there was a significant difference in the treatments measured for each of the parameters considered in this study (*P < 0.05)*. This led to the rejection of the null hypothesis that treatments for each of the parameters studied were the same and a conclusion was made that on average the treatment for each of the parameters (colour, appearance, texture, flavor, taste, and overall acceptability) are significantly different from each other.

Conclusion and Recommendation

In conclusion, chin-chin made from millet flour has the highest sensory evaluation in terms of colour, appearance, texture, flavor, taste and overall acceptability. This implies that the use of millet flour in *chin-chin* production has the potentials to improve the nutritional value of the food product and thus, enhance the economic value of the crop.

Recommendations

The following are the recommendations from the study:

- Production of snacks with millet flour should be encouraged for the nutritional benefit of consumers.
- The use of millet in chinchin making should be encouraged as this would greatly enhance the utilization of this crop in many millet cultivating developing countries where the crops has not been optimally utilized.
- There should be substitution of millet in wheat flour to reduce cost in terms of production as millet is far cheaper and available than wheat.
- Furthermore, efforts should be made to study different perforations that could possibly improve the storage of the millet flour.

References

Adegunwa, M. O., Ganiyu, A. A., Bakare, H. A and Adebowale, A. A. (2014). Quality evaluation of composite millet-wheat Chinchin. Agriculture and Biology Journal of North America; 2151-7525, doi:10.5251/abjna.2014.5.1.33.39.

Adriana Ortega, H. A., Nobaya Ahmad and Rahimah Ibrahim. (2013). Stress Indicators and Eating Habits among Working Malaysian Women. Canadian Center of Science and Education.

Akinyele I. O. (2013). Street Foods & their contribution to the Food Security & Nutritional status of Nigerians. *Journal of Food &Nutrition* I (1): pg 6-20.

Akinyele I. O. (2008). "Give us this day our Daily Bread". Street food as a solution to hunger. Pg. 15-18, *W. Girardet Press (W.A) Co.*

Akinyemi, O and Ibraheem A.G, (2009). Assessment of nutritional status of Queen's college students of Lagos State, Nigeria. Pak. J. Nutrition.

Ashakiran, D. R. (2012). Fast foods and their Impact on Health. *Journal of Krishna Institute of Medical Sciences University.*

Basedevant B, Craplet. C , and Guy-Grand. B (2013). Effects of Snacking on Energy intake, British Nutrition Foundation, Bulletin 78 Vol.21, pg 103-107.

Blundell. A, Mary L. Gavin, and Date M .D. (2008). Lawton Intake: Evaluating the effects of fat on meal size & post meal satiety. *American Journal clinical nutrition society*: 57. British Nutrition Foundation (BNF): Nutrition Bulletin 2001, Vol. 23

Buthrie J.F, Lazarus. R, Baur. L, Webb. K, and Blyth. F (2002). Role of food prepared away from home. *Journal of Nutrition*. Vol 34:140-150.

Choi J.H (2005). An ecological study of eating behaviours of middle school students in Seoul. Yonsei University of Korea.

Chu, Michael (2004-10-20). "Wheat Flour". Cooking for Engineers. Retrieved 2009-08-14.

Drummond S.E, Crombie N.E, Cursiter M.C, and Kirk I.R. (2008). Evidence that eating frequency is inversely related to body weight status in male, but not female, non-obese adults reporting valid dietary intakes. International Journal on Obesity 2008; 22:105-121.

Evelyn N. B. (2015). A study of the variation in the composition of 'chinchin' and its acceptability among consumers. African Journal of Food Science Research; 2375-0723: 3 (3), 167-170.

FAO, (1994). Technical Report Series 452; Geneva, WHO.

Flegal K.M, Carroll M.D, Ogden C.L, and Johnson C.L (2004). Overweight and obesity in the United States: Prevalence and trends.

Folorunso, A. A., Habeeb, A. S. and Ajayi, O. T. (2019). Sensory Evaluation of Snacks Produced From Wheat-Breadfruit Flour and Nutritional Composition of the Flour Blends. Agriculture and Food Sciences Research, 2019, 6 (1): 89-97.

Food Nutrition and Agriculture (2006). Street Foods 17/18: 4-6. Food and Agriculture Organisation.

Foskett T.A, Barrett-Connor E.L, and Wingard D.L (2004). Practical Cookery. Snacks, light meals, Savories and Convenience Foods.15:616-632.

Green S.D Burley J.K (2008). The effects of snacking on energy intake and body weight BNF, Nutrition Bulletin 21: 103.

Hedley A.A, Briefel R.R, and Carroll M.D (2004). Prevalence of overweight and obesity among adolescents and adults.

James A.S, (2005). The role of breakfast in the treatment of obesity: a randomized clinical trial. American Journal of Clinical Nutrition 1992; 55:645-51

Jang Y. A, Kim. H.Y, Oh S.Y,Han S.S, Lee H.S, Won H.S, Kim S.H, Kim W.K, and Choo S.S (2000). A study for dietary attitudes & Food behaviours of elementary, middle and high school students of Korea. Journal of Korean Home Economics Association. Vol. 38:85-97.

Johanna Hignett (2007). Snacks in Nutritional Nigeria, Nestle Worldview 6(2):10.

Khor, G.L (2002). Micronutrient deficiency and its alleviation: The case of Malaysia Asia Pacific J. Cln. Nutrition.

Koo J.O, Lee J.W, Choi Y.S, Kim J.H, and Lee J.H (2006). Nutrition throughout the life cycle. Seoul. Republic of Korea: Hyoil Publishing Co.

Lauden (2000). Environmental influences on eating and physical activity. Annual Revised Public Health 2000, 22:309-335.

Lemchi, S.N; Mbah, C. A. and Obi-Anyanwu, J.N. (2016). Sensory Evaluation of use of Maize and Yam Flour in Composition with Wheat Flour for the Production of Selected Snacks. International Journal of Advanced Academic Research. 2, (2).

Lee, J. S (2007). "A comparative study on fast food consumption patterns classified by age in Busan," Korean Journal of Community Nutrition, 12, 534-544.

Lobstein .T, Baur L.A, and Uauy .R: Obesity in children and young people:a crisis in public health.

Ma J.O, Lee J.W, Choi Y.S, Kim J.H, and Lee J.H (2003). Nutrition throughout the life cycle. Seoul. Republic of Korea: Hyoil Publishing Co.

Marmonier. B (2009).Metabolic and behavioral consequence of a snack consumed in satiety state. American Journal of clinical nutrition 2009; 70:856-6161.

Matitiya, B.K (2004). Local Cereal Recipes from Northern States in Nigeria. Extension Bulletin 38 (4): 2-5.

McCarthy .T, (2008). Snack Food Association News 2008: Safety Regulation & requirement in snack food industry.

Memis, E. and N. Sanlier, (2010), Analysis if nutrition habits of the teachers and nurses. Pak.J. Nutrition.

Miesenbock.G (2000). Encyclopedia of food science and technology Vol. 4

Morgan K.J, Zabik M.E, and Stampley G.L(2001). The role of breakfast in the diet adequacy of the U.S. adult population. *Journal of American College of Nutrition*;5:551-63 21.

Nielsen S.J, Pinelli .L, and Schutz .Y (2002). Trends in food location and sources among adolescents. Vol. 35: 107-113.

Obesity Reviews 2004, 5(Suppl1):4-85.

Ojofeitimi E.O (2007). Principles and practice of nutrition for community health workers.

Okaka, J.C (2005). Basic Processing of Grain Cereals and Legumes in Handling, Storage and Processing of Plant Foods. OCJ Academic Publishers, Enugu, Nigeria. pp. 30-60.

Olaoye, O., Onilude, A. and Idowu, O. (2006). "Quality characteristics of bread produced from composite flours of wheat, plantain and soybeans,"African Journal of Biotechnology, 5, 1102-1106.

Olumakaiye M. F, Ajayi O.A (2008). Food Consumption Patterns of Nigerian Adolescents and effect on body weight.

Omueti .O, Morton I.D (2006). Development by Extrusion of Soybean Snack sticks a Nutritionally Improved Soya-maize Products based on the Nigeria Snack (Kokoro). International Journal of Food Science Nutrition 47: 5-13.

Parsons T.J (2008). Centre for Young Women's Health, Children's Hospital Boston

Peter E.I (2018). Acute appetite reduction associated with an increased frequency of eating in obese males. International Journal on Obesity 2008; 23:1151-9

Pierce Hollingsworth (2005). Healthier products breathe new life into languishing category. IFTJ. 49: 58-60.

Reilly J.J (2008) Euro monitor International.

Rosa .N, Chávez-Jáuregui R.A.C, Maria E.M Pinto E.S, Jose A.G.A (2003). Acceptability of Snacks Produced by the Extrusion of Amaranth and Blends of Chickpea and Bovine lung. International Journal of Food Science. Technol. 38(7): 795-798.

Rugg-Gun.B, Kennedy-Stephenson. J, Wang C.Y, McDowell M.A, Johnson C.L (2006). The contribution of specific dietary pattern to energy and nutrient intakes. Snacking Habits, Journal of Human Nutrition and Dietetics9: 5-14.

Ruxton C.H, Reilly J.J, Kirk T.R (2009). Body composition of healthy 7 and 8-year-old children and a comparison with the 'reference child'. International Journal of Obesity 2009, 23**:**1276-1281.

Sebastian. R, Fraze. E, Donner C.C 2008). Effects of Snacking Frequency on Adolescents Dietary Intake.

Song,W.O., O.K. Chun, S. Obayashi, S. Cho and C.E. Chung, (2005).Is consumption of breakfast associated with body mass index in US adult? J. Am. Dietetic Assoc.

Tettweiller (1997). Snacking patterns among adolescents: a comparison of type, frequency and portion size British Journal of Nutrition.

Uzor-Peters. P.I, N. U. Arisa, C. O. Lawrence, N. S. Osondu, and A. Adelaja (2008). Effect of partially defatted soybeans or groundnut cake flours on proximate and sensory characteristics of kokoro.

Warwick, S (2007) The role of breakfast in the treatment of obesity: a randomized clinical trial. American Journal on Clinical Nutrition 1997; 55:645-51.

Wordu, G. O. and Akusu, M. O. (2018). Chemical nutrient some essential minerals and sensory evaluation of chin-chi produced from wheat-fluted pumpkin flour blends; International Journal of Food Science and Nutrition. 2 (4), 141-144