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Ann Nkeiruka Kanu, Nwohu O.N & Good luck Obioma Okereke

ABSTRACT

Corn jellos (Agidi) is a gelatinous starchy food made by boiling a paste of fermented maize meal or flour. It can be substituted with legume, roots or seed at different constitution to boost its nutritional value. The maize and orange fleshed sweet potato (OFSP) were sourced from a local Market Ahia eke market Umuahia) and at National Root Crops Research Institute, Umudike. The maize was processed into maize paste (MP) while the OFSP was prepared into flour, by soaking for 24hrs, draining, sun drying for 48hrs, milling to obtain orange fleshed sweet potato flour (OFSPF). They were used to form blends at the following constitution: 1) at 100% maize, (2) 90% maize and 10% OFSP, (3) 80% maize and 20% OFSP, (4) 70% maize and 30% OFSP, and lastly (5) 50% maize and 50% OFSP to get the following samples MSC₁, MSC₂, MSC₃, MSC₄ and MSC₅ respectively. The results showed that the proximate ranged from 15.74% to 16.45%, 0.2% to 0.28%, 18.40 to 22.13%, 0.24% to 0.31%, 3.89% to 4.90% and 56.10% to 60.92% for moisture, ash, fat, fiber, protein and carbohydrate respectively. Organoleptic evaluation of the samples with parameters; appearance, taste, flavor, texture and general acceptability ranged from 6.00 to 8.75, 4.92 to 7.50, 5.42 to 8.00, 4.00 to 7.50, and 6.16 to 8.00 respectively.

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ABSTRACT

Corn jellos (Agidi) is a gelatinous starchy food made by boiling a paste of fermented maize meal or flour. It can be substituted with legume, roots or seed at different constitution to boost its nutritional value. The maize and orange fleshed sweet potato (OFSP) were sourced from a local Market Ahia eke market Umuahia) and at National Root Crops Research Institute, Umudike. The maize was processed into maize paste (MP) while the OFSP was prepared into flour, by soaking for 24hrs, draining, sun drying for 48hrs, milling to obtain orange fleshed sweet potato flour (OFSPF). They were used to form blends at the following constitution: 1) at 100% maize, (2) 90% maize and 10% OFSP, (3) 80% maize and 20% OFSP, (4) 70% maize and 30% OFSP, and lastly (5) 50% maize and 50% OFSP to get the following samples MSC₁, MSC₂, MSC₃, MSC₄ and MSC₅ respectively. The results showed that the proximate ranged from 15.74% to 16.45%, 0.2% to 0.28%, 18.40 to 22.13%, 0.24% to 0.31%, 3.89% to 4.90% and 56.10% to 60.92% for moisture, ash, fat, fiber, protein and carbohydrate respectively. Organoleptic evaluation of the samples with parameters; appearance, taste, flavor, texture and general acceptability ranged from 6.00 to 8.75, 4.92 to 7.50, 5.42 to 8.00, 4.00 to 7.50, and 6.16 to 8.00 respectively. The vitamin A ranged from 151.10 μ/100g to 193.50 μ/100g. Substitution of maize with orange fleshed sweet potato gave a better organoleptic properties in terms of appearance, flavor and general acceptability, while there was a progressive increase in all the vitamins evaluated across the samples. The inclusion of OFSP for the preparation of corn jellos is recommended to boost the nutritional content and the sensory qualities.

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I. INTRODUCTION

Breast milk is a bio fluid which is highly variable that is needed by an infant for nourishment, reduces infantile mortality by tenfold (Hennet and Borsig 2016) and protection against infectious diseases within a specific period while the infant gets matured (Andreas *et al.*, 2015). At birth a baby needs breast milk for his growth, breast milk are known to be rich in protein, micronutrients and which fight against disease in the infant body. As an infant grows and increases in weight he becomes more active, at this stage breast milk can't sustain him to maintain his body functions, and such need extra food. To supplement breast milk he needs semi solid food made from cereal, grain and enriched with other things. Weaning is the process of introducing a baby to other nutrient other than breast milk with the intention to boost their intake of wholesome nutrient needed for their growth and development. Adequate weaning food should comprise of high balanced-protein content, high caloric value per unit of food volume, soft texture with low fiber content, adequate vitamin and mineral contents, and absence of ant nutritional factors. In the developed world mothers utilize commercial weaning food stored in cans, tins or packaged food which are convenient however, they are relatively expensive (Sant'Anna, and Keszler 2012).

Orange fleshed sweet potato is easily digestible and is mainly required for children because of their immature digestive system. Formulation of complementary food are prepared using a mixture of cereals and legumes which guarantee a proper balance of amino acids to provide a complete protein (Wu and XU 2019). Corn jellies (Agidi) is a (cereal starch pudding) prepared from maize, millet or guinea corn by boiling the paste into a thick semi solid form, usually used as a weaning food. To complement the expensive baby food with readily available local resources with high nutritional content will be a better alternative and hence this research findings.

The Objectives of this study are evaluation the organoleptic attribute and vitamin A content of the corn jellies

II. MATERIAL AND METHODS

Umuspo 3 (mothers delight) was sourced from National Root Crops Research Institute Umudike while the maize and other ingredient were sourced from Ahia Eke Market in Umuahia. The maize was sorted, washed, boiled for 20 mins. The water was then drained and wet milled in a milling machine. The slurry gotten was sieved with a muslin cloth decanted and pressed using cheese cloth to obtain maize slurry.

2.1 Preparation of sweet potato flour

The experimental designed used for the analysis was the control design (CD). The orange sweet potato UMUSPO 3 was selected and peeled, washed, and chipped with a chipping machine. The chipped sweet potato was striped in water for 24 hours to remove the sweetness. After it was sun dried for 12 hours, it was then milled into flour and this was used to form a paste by adding water. This was used to form a blend with maize for the preparation of maize sweet potato corn jellies. The maize/ sweet potato corn jellies were used for determination of vitamin A,

2.2 Formulation of maize / sweet potato corn jellies

The maize and orange sweet potato paste was formed by mixing 400g of maize in 450mls of waters and 100g OFSP of OFSP flour in 110 ml of water separately. From the slurry formed the corn jellies (Agidi) was prepared in 5 different batches of maize / sweet potato paste blend in the following proportions of 100%, 90%/10%, 80%/20% . 70%/30% and 50%/50%. Each of the maize / OFSP slurry were poured in 200ml boiling water containing other ingredients to obtain sample MSC1, MSC2, MSC3, MSC4 and MSC5. It was stirred constantly until a thick paste was formed. The resultant paste were wrapped in leaf and allowed to cool which was used for organoleptic test and vitamin analysis.

III. MAIZE / SWEET POTATO BLEND

Table: 1: Maize /Orange Fleshed Sweet Potato Blends

SAMPLES	Maize paste	Orange fleshed sweet potato paste
MSC1	100%	0%
MSC2	90%	10%
MSC3	80%	20%
MSC4	70%	30%
MSC5	50%	50%

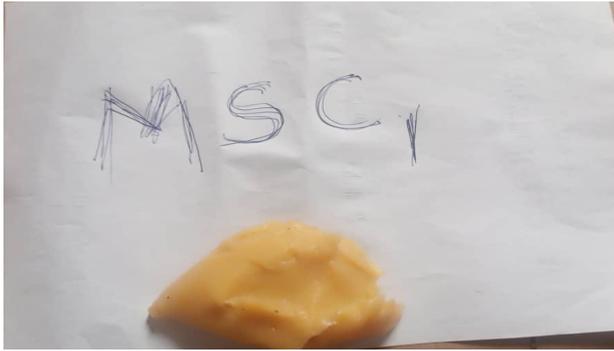


PLATE1 (100maize&0% OFSP)

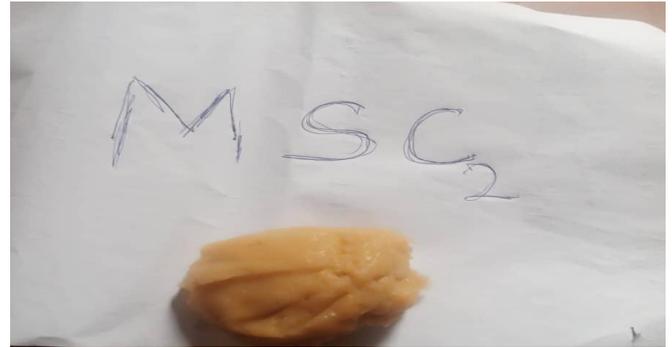


PLATE 2 (90%maize&10% OFSP)

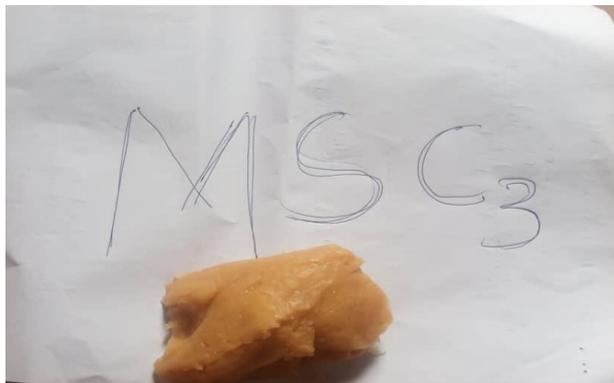


PLATE 3(80% maize &20% OFSP)



PLATE 4 70% maize &30% OFSP



PLATE 5 (0% maize 50% OFSP)

3.1 Determination of Proximate Analysis

Proximate composition: moisture, ash, crude fiber, protein and carbohydrate was determined as described by Association of Official Analytical Chemist (2012).

3.2 Determination of Vitamin A

Vitamin A was determined by the methods as described by Onwuka (2005) and they were performed in triplicate to give a wider exposure in order to minimize error.

3.3 Organoleptic Evaluation

Randomly selected 30 semi-trained panelists, drawn from breast finding mothers within Umudike, were used to assess the maize/sweet potato corn jellos for appearance, texture (hand feel) taste, flavour and general acceptability. All the selected assessors were familiar with *Agidi* and could discriminate between and describe different qualities of the food. The assessors were taught and requested to examine the samples and score according to their respective degree of likeness in a seven-point Hedonic scale as described by Iwe, (2002). The hedonic scale was 7 = 'like extremely', 6 = 'like very much', 5 = 'like much'; 4 = 'neither like nor dislike', 3 = 'dislike much', 2 = 'dislike very much' and 1 = 'dislike extremely'

3.4 Statistical Analyses

The data generated were subjected to statistical package IBM SPSS Programme version 20 to analyze the data. Results were expressed as mean \pm standard error of mean (SEM). One way analysis of variance (ANOVA) with Duncan post hoc test were used to evaluate the statistical difference between the different groups, the results were considered significance at ($P > 0.05$). Also the graph was drawn with the graph pad.

IV. RESULT AND DISCUSSION

Table 2: Proximate Composition of Maize/Orange Fleshed Sweet Potato Corn Jellos

Sample	MC	ASH	FAT	FIBER	PRO	CHN
MSC1	16.33 \pm 0.01c	0.23 \pm 0.01b	22.13 \pm 0.14a	0.31 \pm 0.01a	4.90 \pm 0.01a	56.10 \pm 0.18d
MSC2	15.97 \pm 0.01d	0.28 \pm 0.01a	20.90 \pm 0.14a	0.28 \pm 0.01b	4.88 \pm 0.02a	57.29 \pm 0.15c
MSC3	15.74 \pm 0.01e	0.28 \pm 0.02a	20.55 \pm 0.21b	0.24 \pm 0.01b	4.04 \pm 0.02b	59.38 \pm 0.01b
MSC4	16.37 \pm 0.03b	0.29 \pm 0.01a	19.75 \pm 0.35d	0.27 \pm 0.02b	3.68 \pm 0.04c	59.66 \pm 0.30b
MSC5	16.43 \pm 0.04a	0.28 \pm 0.01a	18.40 \pm 0.14e	0.26 \pm 0.02b	3.73 \pm 0.01c	60.92 \pm 0.15a

Values are mean \pm SD of 3 replications. Means within a column with the same superscripts were not significant difference ($P > 0.05$). Key: MSC1 (maize 100%), MSC2 (maize 90% and 10% sweet potato), MSC3 (maize 80% and sweet potato 20%), MSC4 (maize 70% and sweet potato 30%) and MSC5 (maize 50% and sweet potato 50)

Table 2 shows the proximate parameter of maize/ sweet potato corn jellos. The moisture content ranged from 15.74 % to 16.43% with sample MSC5 (50% maize /50% OFSP) having the highest value while sample MSC3 had the least value. The samples differed significantly at $P > 0.05$. There was a reduction in the moisture content from 10 % up to 20% inclusion of OFSP but at 30% to 50% inclusion the moisture content increased progressively. This is in line with the findings of Korese *et al.*, (2021) that as the Orange flesh sweet potato increases the moisture content increases. Also increase or decrease of moisture content in a food is attributed to increase or decrease of water activity (Cauvain, and Young, 2000). The samples are not storage stable and will not store for a longer time outside suitable storage condition.

The Ash content which reveals the total mineral content in a food sample ranged from 0.24% to 0.29%. Sample MSC3 had the least value while sample MSC4 had the highest value. The samples differed significantly at $P > 0.05$. Samples with OFSP inclusion showed no significant difference but scored higher values than the control samples. The increase in the ash content as evidenced in this research study can be attributed to the OFSP flour samples which has been reported to pose more ash content than maize.

The fat content ranged from 18.40% to 22.13% values recorded in this study is higher than the fat content reported by Nwanagba *et al.*, 2021 in their study evaluation of the Chemical Composition and Sensory Properties of Soy-agidi Fortified with *Alternanthera brasiliana* Powder. The high value recorded in this study can be attributed the oil used in preparing the maize/ OFSP corn jellos. The high level of fat reported in this study is well needed and in line with the recommendations of FAO/WHO (1998) that vegetable oils be included in foods meant for infants and children, which will not only increase the energy density, but also be a transport vehicle for fat soluble vitamins. As the amounts of OFSP flour substitution in the blend increases, the amount of fat in the maize/ OFSP corn jellos decrease. The reason may be due to the presence of high fat in maize flour which has been reported to contain more fat than orange fleshed sweet potato as indicated by Idolo (2012).

The protein content range from 3.73 % to 4.90 % with MSC1 having the highest value while MSC4 and MSC5 recorded the least. There was significant difference in the protein content with a progressive decrease in protein content as the orange fleshed sweet potato inclusion increases. The protein content reported here is similar to the protein content of 3.25 % to 4, 75 % as reported by Kweku and Coad (2014). There was a progressive decrease in the protein content as the OFSP inclusion increase this was in line with the finding of Tadesse *et al.* (2015) who reported a decrease in protein content from 8.94% to 7.57% in orange fleshed sweet potato /maize blend flat bread.

The carbohydrate content ranged from 56.10% to 60.93%, the carbohydrate showed significant difference at $P > 0.05$ with sample MSC1 having the least while sample MSC5 had the highest value. There was a progressive increase in the orange fleshed sweet potato substituted samples this increase can be linked to the OFSP flour.

Table 3: Organoleptic Evaluation of Maize/ Sweet Potato Corn Jellos (*Agidi*)

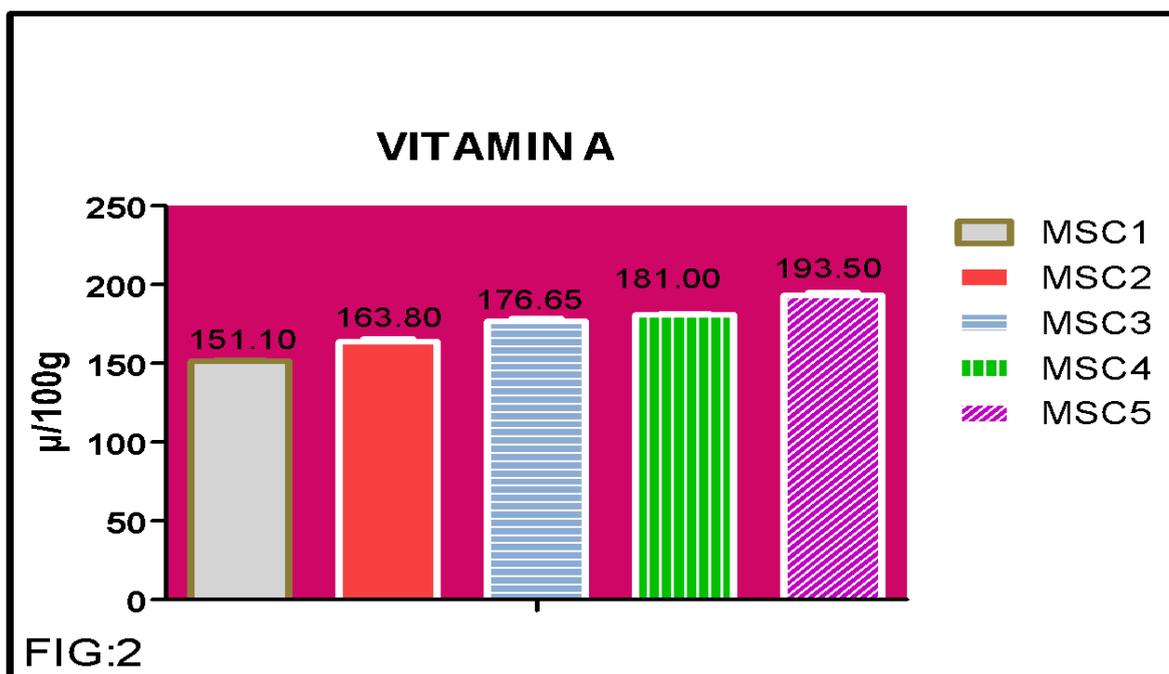
Sample	Appearance	Taste	Flavor	Texture	General acceptability
MSC1	6.00±2.45c	7.75±1.14a	8.00±1.28a	7.50±0.90a	8.00±1.28a
MSC2	7.25±0.87b	7.25±1.54a	7.25±1.14ab	7.00±0.74ab	7.75±0.87a
MSC3	7.50±1.17b	7.50±1.17a	7.00±1.28ab	6.50±1.73bc	8.00±0.74a
MSC4	8.75±0.45a	7.25±1.36a	6.25±1.36bc	6.25±0.87b	7.50±0.52a
MSC5	8.75±0.45a	4.92±1.08b	5.42±1.38c	4.00±2.17c	6.17±0.83b

Values are mean± SD of 3 replications .Means within a column with the same superscripts were not significant difference ($P > 0.05$).Key: MSC1 (maize 100%), MSC2 (maize 90% and 10% sweet potato), MSC3 (maize 80% and sweet potato 20%), MSC4 (maize 70% and sweet potato 30%) and MSC5 (maize 50% and sweet potato 50)

Table 3 shows the sensory evaluation of maize sweet potato corn jellos blend. The appearance ranged from 6.00 to 8.75. The result showed that there was significant difference in the appearance content across the samples however, there was no significant difference between sample MSC4 and sample MSC5 , also sample MSC2 and MSC3 showed no significant difference. Sample MSC4, MSC5 and MSC3 and MSC2 being samples with inclusion of sweet potato recorded the highest value, this indicates that

the values increases as the sweet potato inclusion increased. This can be attributed to the beta-carotene content of orange sweet potato which give vegetable their bright colour Faber *et al.*, 2013. The appearance of the sample blend was brighter than that of the control sample. The value for the taste ranged from 4.92 to 7.50, showing that there was no significant difference across the samples except in sample MSC5 which has the least value .This indicate that inclusion of sweet potato at 10%, 20% 30% and 50% caused a decrease in the taste of the samples. However, sample MSC3 was more preferred across all samples substituted with sweet potato while sample MSC5 had the least value. The high concentration of the sweet potato must have affected the taste of the corn jellos.

The flavor ranged from 5.42 to 8.00, with the control sample MSC1 having the highest score while sample MSC5 had the least values. The sweet potato inclusion caused a decrease in the flavor. Among the sweet potato substituted samples, sample MSC2 had the highest while sample MSC5 had the least in terms of flavor



Key: MSC1 (maize 100%), MSC2 (maize 90% and 10% sweet potato), MSC3 (maize 80% and sweet potato 20%), MSC4 (maize 70% and sweet potato 30%) and MSC5 (maize 50% and sweet potato 50)

The vitamin A of the samples (maize sweet potato corn jellos (*Agidi*) are shown in Figure 2. The vitamin A content ranged from 151.10μ/100g to 193.50 μ/100g. The control sample had the least value of 151.10 μ/100g while sample MSC5 (50% maize and 50% OFSP) had the highest values of 193.50 μ/100g. As the orange fleshed sweet potato flour inclusion increase there was a progressive increase in the vitamin A content this is probably that OFSP has a higher vitamin A content. This can be supported by the finding of Faber and Laurie 2011 who reported that orange sweet potato increased the dietary intake and status of vitamin A. This can interprets the progressive increase of vitamin A across the OFSP substituted samples as reported in this research findings. Orange sweet potato is rich in beta carotene which is a precursor of vitamin A that has the ability of eliminating vitamin A deficiency to prevent night blindness in developing Countries Haskell *et al.*, 2016. The value of Vitamin A recorded in the samples substituted with OFSP is higher than the recommended daily allowance of 178 μ/100g to 185 μ/100g and 127 to 132 which are required for a child between 7 to 12 months of age and for adult females respectively as reported by (Faber and luarie 2013). So the use of the maize / sweet potato corn jallous is recommended as a weaning food to boost the vitamin A requirement of an infant, which is

turn needed for functioning of the visual system, the maintenance of cell function for growth, epithelial cellular integrity, and immune function.

V. CONCLUSION

Based on the results generated from this study, it is therefore, concluded that there are significant changes in the organoleptic parameters of the maize/ sweet potato corn jellos evaluated. The sensory Panelists preferred the appearance of the sweet potato substituted samples than the control sample which is 100% maize. There was no significant difference on the taste across all samples evaluated. The general acceptability were rated high by the sensory panelists across all samples except sample MSC5. The vitamin A content of the samples had a progressive increased as the OFSP inclusion increased with the control sample having least value. This making the product a good source of vitamin A thereby, complementing vitamin A from other sources for a weaning infant.

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