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The Vitamin and Mineral Contents of Okpa Prepared with Fluted Pumpkin and Scent Leaves

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Abstract: The Bambara nut flour is often processed into Okpa by the inhabitants of the Eastern part of Nigeria. The Okpa is a well cherished food, especially among the inhabitants of the Eastern part of Nigeria. The vitamin and mineral contents of Okpa prepared with fluted pumpkin and scent leaves were determined. The result shows that the addition of the vegetables increased the Vitamin B_1, B_2 and B_3 contents of Okpa compared with the control at $p \leq 0.05$. But it did not alter that of Vitamin C levels at $p \leq 0.05$. The order of increase in Vitamin B_1 levels were Sample B>D>C>A. While that of Vitamin B_2 levels were Sample C>D>B>A and that of B_3 contents were D>C>B>A. This points that the presence of these vegetables could serve as a booster to the vitamin contents of Okpa. Also the mineral contents, especially phosphorus, magnesium and calcium ions were significantly change compared with the control at $p \leq 0.05$. The Okpa with fluted pumpkin leaves had the highest phosphorus ion contents (136.623±0.372) followed by Okpa with fluted pumpkin and scent leaves combined (114.433±0.377) and then Okpa with scent leaf (92.783±0.377) compared with the control (22.533±0.448). The magnesium ion levels was highest in Okpa with fluted pumpkin (18.400±1.131) followed by Okpa with combined leaves (16.000±1.131) and then Okpa with scent leaf (12.800±2.263) compared with the control (11.200±1.131). The potassium contents was also highest in Okpa with fluted pumpkin leaf (165.860±0.377) followed by Okpa with scent leaf (153.600±0.653) and Okpa with the combined leaves (143.733±28.097) compared with the control (70.133±0.377). The levels of calcium ion was highest in Okpa with scent leaf and Okpa with the combined leaves (85.50±1.890), respectively followed by Okpa with fluted pumpkin leaf compared with the control (78.833±1.890). The sodium ion levels was not affected significantly at $p \leq 0.05$ compared with the control. These results suggest that the vegetables, especially fluted pumpkin leaves could serve as a booster to the mineral and vitamin contents of Okpa.

Key words: Okpa, bambara nut, fluted pumpkin, scent leaves, booster, mineral, vitamin

INTRODUCTION

Okpa is a well-cherished food, especially among the inhabitants of the Eastern part of Nigeria. However, it is derived from Bambara nuts. Bambara nut (*Voandzeia Subterranean* (L.) thouars) which is the botanical name synonyms of vigna subterranean and belongs to the plantea of the family of fabaceae and subfamily of fabiodea. It is a legume, an indigenous to the tropical Africa (Kay, 1979). Bambara is grown extensively in Nigeria (Oguntunde, 1985; Enwere, 1998) but it is one of the lesser utilized legume in Nigeria.

In Nigeria, the freshly harvested pods are cooked, shelled and eaten as a vegetable snack while dry seeds are either roasted and eaten as a snack (Kay, 1979; Alobo, 1999) or milled into flour and used in preparation of moi-moi (Olapade *et al*., 2005) analogy called okpa among the Igbo tribe of Nigeria (Enwere, 1998). For most food uses, the seed coats of legumes including Bambara are removed to reduce the anti-physiological factors and fiber content and this result in better appearance, texture, cooking quality, palatability and digestibility of the products (Akinjayeju and Enude, 2002).

Dehulling can be accomplished manually or mechanically depending on the type of legume and/or quantity involved (Ehiwe and Relchert, 1987). Dehulling has been a limitation factor in the preparation of flour from Bambara that could produce acceptable moi-moi substitute most, especially with respect to the texture and flavour. The conventional method used always result into a product with a very hard texture and strong beans flavour (Alobo, 1999). Lack of knowledge of the functional, chemical and nutritional properties of some legumes grown in developing countries is responsible for

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their less utilization in food formulations. Bambara nut is a complete food eaten in various forms either in mature or fully ripe. The seed is hard, smooth usually round and varying in size up to about 1.5 cm in diameter (Kay, 1979). It can also vary in colour from white, cream, dark brown, red or black and may be speckled or patterned with combination of these colours.

The extract from the nut of *Voandzeia subterranean* particularly the protein extracts can be used directly in cosmetic formulation and provides specific properties and notable particular effects. The nut can be used quite freely to replace the high prized lumps of meat for adequate nutrition. The unique properties of bambara nut which Okpa is been made from, make it serve as balanced food which contain almost all the vital nutrients that promotes good health for living in Africa (Obizoba and Egbuna, 1992).

MATERIALS AND METHODS

Fluted pumpkin, scent leaves and cream coloured variety of Bambara nut were procured from Ekeonunwa market, Owerri, Imo State, Nigeria.

Preparation of bambara flour: The seeds were thoroughly cleaned and sorted to remove extraneous matters. The clean seeds weighing 200 g was used. The seeds were stepped in cold water at room temperature 25°C for 8 h. The seeds were later dried in air draught drier at 65°C for 48 h to moisture content of about 10%. The seeds were separately dehulled using plate milled with clearance of 6 mm between the plates. The cotyledons were hammer mill to pass through 0.8 mm screen size.

Preparation of the okpa samples: Fresh paste was prepared from Bambara flour. Flour of 200 g was hydrated with 300 mL of warm water (60°C) and mix thoroughly. The paste was divided into four equal parts. To the first portion, plain paste was dispensed into a clean banana leaf. To the second portion, paste mixed with sliced fluted pumpkin leaves was dispensed into another clean banana leaf. To the third portion, paste mixed with sliced scent leaves was also dispensed into a clean banana leaf. To the fourth portion, paste with fluted pumpkin leaves mixed with scent leaves was also dispensed into a clean banana leaf. Then, steam for 45 min at ambient temperature.

Sample coding: Sample A: plain Okpa (control), Sample B: Okpa with fluted pumpkin leaf, Sample C: Okpa with scent leaf and Sample D: Okpa with fluted pumpkin and scent leaf combined.

Analysis: About 5 g of each sample was taken and were carefully coded as shown above. The Mineral and water soluble vitamins of the samples were determined using the standard method as described by AOAC (1984).

RESULTS AND DISCUSSION

The result of the water soluble vitamin contents of the samples

The result of the mineral contents of the samples: The result as shown in Table 1 shows that the addition of the vegetables significantly altered the Vitamin B_1 (thiamin), Vitamin B_2 (riboflavin) and Vitamin B_3 (niacin) contents of the samples compared with the control at $p \leq 0.05$. But that of the Vitamin C levels was not affected at $p \leq 0.05$. The highest Vitamin B_1 contents was seen in Sample B (0.167±0.009) followed by t Sample D (0.151±0.005) and then by Sample C (0.147±0.005) when compared with the control Sample A (0.131±0.009). Sample C (0.446±0.007) had the highest riboflavin (Vitamin B_2) levels followed by Sample D (0.443±0.002) and then Sample B (0.429±0.002) compared with the control Sample A (0.320±0.002). While the other of increase in niacin (Vitamin B_3) levels were Sample D (1.073±0.005), C (1.053±0.005), B (1.103±0.009) and A (0.883±0.009), i.e., D>C>B>A. The Vitamin C contents were not altered significantly at $p \leq 0.05$. These show that the presence of the vegetables which are rich in vitamins boosted the vitamin contents of the Okpa compared with the control. The result in Table 2 shows that the mineral contents, especially phosphorous,

Table 1: The vitamin contents (mg/100 g) of the samples

Samples	Vitamin B_1 Thiamin	Vitamin B_2 Riboflavin	Vitamin B_3 Niacin	Vitamin C Ascorbic acid
A	0.131±0.009*	0.320±0.002**	0.883±0.009***	2.933±0.415
B	0.167±0.009*	0.429±0.002**	1.103±0.009***	13.787±0.415
C	0.147±0.005*	0.446±0.007**	1.053±0.009***	11.100±0.424
D	0.151±0.005*	0.443±0.002**	1.073±0.005***	1.613±0.414

Values = means±standard deviation. Values with asterisks (*) are significant at $p \leq 0.05$; *Significant, **Highly significant, ***Much more highly significant

Table 2: The mineral contents (mg/100 g) of the samples

Samples	Calcium	Magnesium	Sodium	Potassium	Phosphorus
A	78.823±1.890*	11.200±1.131**	6.413±0.019	70.133±0.3770***	22.533±0.448****
B	82.833±1.890*	18.400±1.131**	6.347±0.019	165.867±0.3770***	136.623±0.372****
C	85.507±1.890*	12.800±2.263**	6.413±0.038	153.600±0.6530***	92.783±0.377
D	85.507±1.890*	16.000±1.131**	6.393±0.009	143.733±28.097***	114.433±0.377****

Values = Means±standard deviation. Values with asterisks (*) are significant at $p \leq 0.05$; *Significant, **Highly significant, ***More highly significant, ****Much more highly significant

magnesium potassium and calcium ions were significantly changed at $p \leq 0.05$. The change was noticed more in phosphorus followed by potassium, magnesium and calcium ion levels. Sodium ion levels were not affected significantly at $p \leq 0.05$. Sample B had the highest levels of phosphorus ion (136.623±0.372) followed by Sample D (114.433±0.377) and then Sample C (92.783±0.377) compared with the control Sample A (22. 533±0.448). Also Sample B had the highest magnesium ion contents (18.400±1.131) follow by Sample D (16.000±1.131) then by Sample C (12.800±2.263) compared with the control Sample A (11. 200±1.131).

The potassium ion contents was also highest in Sample B (165.867±0.377) followed by Sample C (153.600±0.653) and Sample D (143.733±28.097) compared with the control Sample A (70.133±0.377). The levels of calcium ion was highest in Sample C and D (85.507±1.890) followed by Sample B (82.833±1.890) compared with the control Sample A (78.823±1.890).

CONCLUSION

These results suggest that the vegetables especially fluted pumpkin could serve as a booster to the mineral and vitamin contents of Okpa therefore their addition will enhance its nutritional values.

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