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The vitamin and mineral contents of "OKPA" prepared with fluted pumpkin and scent leaves

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Abstract

The inhabitants of the eastern part of Nigeria often process the Bambara nut flour into "Okpa". The "Okpa" is a well-cherished food, especially among the inhabitants of the eastern part of Nigeria. The vitamin and mineral contents (mg/100g) 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 $P \leq 0.05$. Nevertheless, 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 "0kpa" 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".

Keywords: Okpa, Bambara nut, Fluted pumpkin, Scent leaves

Introduction

"Okpa" is a well-cherish food, especially among the inhabitants of the Eastern part of Nigeria. However, consumers often complain that the "Okpa" bought from the local markets is hard, dry and heavy to the palate. It is obtained from the flour of bambara nut.

Bambara nut (*Voandzeia subterranean* (L.) *thouars*) is a seed of Africa origin used locally as a vegetable. It was first found in West Africa (http://wapedia.mobi/en/bambara). The plant is leguminous and has numerous nitrogen fixing nodules on the root. Evidence has shown that based on the root nodules, the plant supports land care provision in Africa (National Research Council, 2006). The quest for plant with nutritional properties continues to receive attention. Bambara nut, which constitutes complete foodstuff, is reported to contain protein, carbohydrate and lipid and can be consumed at different stages of maturation (National Research Council, 2006). The plant has a potential to improve malnutrition and boost food availability.

The botanical name of Bambara nut is *Voandzeia subterranean* (L.) *thouars*, synonyms of *Vigna subterranean* and belongs

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to the plantea of the family of fabaceae and sub family of Faboidea. The common names of Bambara nut are okpa (Nigeria Igbo), Gurujia (Nigeria, Hausa), congo groundnut (Cong), Njugo, bean (South Africa) Nzama (Malawi) Ntoyo (Ci Bemba) or Katoyo (K, Kanod) (Zambia) (http://wapedia.mobi/en/bambara). The plants are distributed in Africa and grow best under bright sunshine, high temperature and at least 4 months free frost and frequent rain. However, it is highly adaptable and tolerates harsh weather conditions better than most crops. Bambara nuts are used locally as foodstuff for preparing "Okpa" (moi-moi) (Nigeria, Igbo). It can be boiled and eaten as nut and can be grounded into flour for preparing fufu maize for (Nigeria, Middle Belt). Bambara is used to fortify maize for pap (Nigeria, Anambra state). The dry seeds can last for very long time and serves as famine food boosting food availability (National Research Council, 2006).

Bambara plant is also used to sustain the plant habitat as it increases the fertility of the soil and brings about the high yields of other crops cultivated around it without the application of fertilizer (http://wapedia.mobi/en/bambara). The plant also serves as a natural For Florida garden. The nut can be eaten raw when immature because it is soft and pleasant. The extract from the nut of *Voandzeia subterranean* particularly the protein extracts can be used directly in cosmetic formulations and provides specific properties and notable particular effects. The nut can be used quite freely to replace the high-prized lumps of meat without sacrificing adequate nutrition. The fatty acid present in the nut oil is among the essential fatty acids needed in the body. These fatty acids are primarily used to produce hormone like substance that regulates the wide range of functions. The nut also contains tannin, which is one of the anti nutritional factors (Obizoba and Egbuna, 1992). The unique properties and composition of Bambara nut make it serve as a balanced food that contains almost all the vital nutrients that promotes good health for people living in Africa.

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 200grams was used. The seeds were stepped in cold water at room temperature 25^0C for 8hrs. The seeds were later dried in air draught drier at 65^0C for 48hrs to moisture content of about 10%. The seeds were separately dehulled using plate milled with clearance of 6mm between the plates. The cotyledons were hammer mill to pass through 0.8mm screen size.

Preparation of the "OKPA" samples

Fresh paste was prepared from Bambara flour. Flour of 200g was hydrated with 300ml of warm water (60^0C) 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 45mins at ambient temperature.

Sample coding

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

Analysis

Five grams (5gms) 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 Association of Official Analytical Chemist 1984.

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Results and discussion

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 $P \leq 0.05$. However, that of the vitamin C levels was not affected at $P \leq 0.05$.

Table 1. The vitamin contents (mg/100g) 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≤ 0.05. * =Significant, ** = highly significant, *** = Much more highly significant

The highest vitamin B_1 contents was seen in sample B (0.167± 0.009), followed by the 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), sample C (1.053 ± 0.005), sample B (1.103± 0.009) and sample 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 that 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, 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 $P \leq 0.05$.

Table 2.The vitamin contents (mg/100g) 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≤ 0.05. *=Significant, **= highly significant, ***= Much more highly significant

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). In addition, 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) as presented in Table.3.

Table 3.The mineral contents (mg/100g) of the samples

Samples	Calcium	Magnesium	sodium	Potassium	Phosphorus
A	78.823±1.890*	11.200±1.131**	6.413±0.019	70.133±0.377***	22.533±0.448****
B	82.833±1.890*	18.400±1.131**	6.347±0.019	165.867±0.377***	136.623±0.372****
C	85.507±1.890*	12.800±2.263**	6.413±0.038	153.600±0.653***	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≤ 0.05
* =Significant, ** = highly significant, *** = more highly significant, * * * * = Much more highly significant

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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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