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Short Communication

Iodine contents of some selected roots/tubers, cereals and legumes consumed in Nigeria

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Some selected staple foods: tubers, cereals, and legumes, grown, sold and consumed in Ijebu-North Local Government area, Nigeria were evaluated for their iodine content using standard methods. Among the tubers, *Ipomea batata* (sweet potatoe, red species) was observed to have the highest iodine content (311.33±8.52 μgl) while the least iodine value of 88.97±1.31 μgl was recorded in *Discovea avenmensis* (cocoyam). Among the cereals, maize was observed to have the highest iodine content (100.96±3.50 μgl). When the iodine content of the legumes was compared, the highest was observed in *Glycine soja* (soybean; 179.56±4.66 μgl) while the least was in *Cucus melo* (mellon; 29.84±1.21 μgl). Result from our findings indicated that most of the staple foods contain high level of iodine.

Key words: Iodine, cereals, tubers, legumes.

INTRODUCTION

Iodine deficiency disorders (IDD) is a public problem affecting more than 740 million people throughout the world. Previous reports indicated that almost two billion people have insufficient iodine intake as measured by urinary excretion below 100 μg/L (WHO, 2003; Anderson et al., 2005). It has been reported that 141 millions of people in Europe were at risk of IDD, 97 millions were affected by goiter and 0.9 millions had an impaired mental development due to iodine deficiency (Vitti et al., 2001). Salt iodization has been proven to be effective in the treatment and prevention of IDD (Lamberg, 1985; WHO/NUT, 1994). Almost 70% of households in the world use iodized salt (UNICEF, 2007) but not without its attendant problems of recurrent cost delivery network, storage ability (Babikir, 1994) and some health implications (Feid-Ramussen, 2001). Studies have shown the possibilities of adverse effects of salt iodization in some communities that were previously living in iodine deficient area (Delange et al., 1999) and consumption above tolerable upper intake level of iodine in individuall living in iodine sufficient area (Laurberg et al., 2001). In such situations, alternative methods of IDD prevention such as iodization of water for irrigation (Xue-Yi et al., 1994) and selection of iodine dense plants for breeding and consumption may be necessary for this category of people who may not benefit from iodized salt either for health or other reasons.

Plants such as roots, tubers, cereals and legumes are staple foods of many communities, particularly in Nigeria. Some of these plants are able to fortify themselves with micronutrients, thereby developing higher doses of such nutrients in their tissues (Howarth, 1999). The knowledge of such plants would enable careful selection for consumption and breeding where there is problem with salt iodization. One of the steps in achieving this goal is to screen those plants that are grown and consumed in a particular geographical location for their iodine content so as to establish those plants that can concentrate sufficient amount of iodine and that can be recommended for consumption in order to prevent the symptoms of iodine deficiency disorder in such locality.

In view of the above, we set to investigate iodine con-

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Table 1. Iodine and moisture content of roots and tubers grown and consumed in Ijebu- North Local Government Area.

Botanical name of plant	English name or local name	Iodine content (µgI/100 g edible portion)	Moisture content (%)
Ipomea batata	Sweet potatoe (white variety)	311.33±8.52[a]	59.18±3.21
Manihot esculenta	Cassava tuber	247.07±4.32[b]	58.53±2.52
Discorea rotundata	White yam	207.42±4.81[b]	68.55±3.62
Ipomea batata	Sweet potatoe (red variety)	169.70±3.67[b]	63.52±2.81
Discorea alata	Water yam tuber	119.07±4.53[c]	72.55±4.43
Xanthasoma spp.	Cocoyam	88.97±1.31[d]	71.00±0.60

Values are mean of six determination ± SD.
Values in the same column with different superscript are significantly deferent ($p<0.05$).

Table 2. Iodine and moisture content of cereals and legumes grown and consumed in Ijebu- North Local Government Area.

Botanical name of plant	English name or local name	Iodine content (µgI/100 g edible portion)	Moisture content (%)
Glycine soja	Soybean	179.56±4.66[a]	11.38±1.21
Zea mays	Maize (yellow)	100.96±3.50[b]	10.05±0.88
Vigna unguiculata	Cowpea	98.71±3.45[b]	11.15±1.33
Arachis hypogea	Groundnut	94.36±2.40[b]	21.12±1.30
Oryza sativa	Rice	35.38±1.20[c]	19.40±1.00
Cucumis melo	Melon	29.84±1.21[d]	31.28±1.26

Values are mean of six determination ± SD.
Values in the same column with different superscript are significantly deferent ($p<0.05$).

tent of some selected roots, tubers, cereals and legumes grown, sold and consumed in Ijebu North Local Government area of Nigeria.

MATERIAL AND METHODS

Plant samples used in the study were bought from two major markets in the local government area. Three samples were randomly selected from each market. The weight of the samples ranges from 0.5 to 1 Kg. The samples were identified at the Herbarium of the Plant Science and Zoology Department, Olabisi Onabanjo University Ago- Iwoye. Edible portions were prepared from the samples. Each sample was thoroughly mixed and divided into six parts.

Thirty (30 g) of sample were taken into a 200 ml crucible dried in oven at temperature of 105°C for twenty four hours and the moisture content was determined. Six replicate of each sample was analyzed. The iodine content was analyzed by Elmshie Coldwell's method as modified by Diosandy and Fitzgerald (1983).

The experimental design was completely randomized. Data were analyzed using the SPSS. Significant difference between the data was determined at $p<0.05$ using Duncan multiple range test.

RESULTS AND DISCUSSION

The results for iodine and moisture content of selected roots and tubers analyzed are shown in Table 1. The results indicate that significant difference ($p<0.05$) exists in the iodine contents of roots and tubers commonly consumed in the locality. The iodine value of 311.33±8.52 µgI/100 g observed in *Ipomea batata* was the highest among the root and tubers consumed as analyzed in this study, whereas *Xanthasoma* spp. was observed to have the least iodine content (88.97±1.31 µgI/100 g). The iodine content observed in the white variety of sweet potatoes was significantly higher than that observed in the red species. Similarly, *Discorea rotundata* (white yam) was observed in this study to concentrate higher iodine content (207.42±4.81) compared with the water yam (119.07±4.53). When the results of the iodine and moisture contents of selected cereals and legumes were compared, no significant difference was observed in the iodine content of *Zea mays*, *Vigna unguiculata* and *Arachis hypogea* (Table 2). Among the legumes, the highest iodine content was observed in *Glycine soja* (179.56±4.46 µgI/100 g^{-1}). Consumption of 200 g edible portion of *G. soja* or any of these roots/tubers except *Xanthasoma* spp. would yield more than 200 µg iodine, which is the required dietary allowance (Committee on Dietary Allowance, 1980) of an adult.

The difference in concentration of iodine measured in these plants shows the ability of different plant to concentrate micronutrient at different levels (Howarth, 1999) given the same geographical condition. Careful selection of these plants with high concentration of iodine could be beneficial for those whose salts intake is low either due to health reasons such as hypertension (Stephen and Hoptron, 2006). Those plants with low iodine content are not without benefit. In iodine deficient areas, where introduction of iodine salt may trigger hyperthyroidism (Barbara, 1994), careful selection of plants low in iodine content such as *Xanthasoma* spp., *Oryza sativa* and *Cucumis melo* could be beneficial. The iodine content of the food could not be taken as absolute because the iodine content of plant is also a function of the soil content (Matovinovic, 1983, Kontras et al, 1985, Babara, 1994) and the availability of the iodine is dependent on other inherent constituents of the plants such as goitrogen in *Manihot esculenta* (Benmiloud et al., 1983), Glycine soja (Onabolu et al, 1992) as well as processing method (Vitti et a, 2001) which may affect iodine content.

Conclusion

We have provided information on the iodine content of some selected roots, tubers, cereals and legumes generally consumed in Ijebu North Local Government Area. Individuals living in this community will be properly guided in the selection of plants to be consumed based on his/her iodine status.

REFERENCES

Anderson M, Takkouche B, Egli I, Alen HE, de Benoistn B (2005). Current global iodine status and progress over the last decade towards the elimination of iodine deficiency. Bull. World Health Organ. 83: 518-525.

Babikir E (2004). Prevention and treatment of iodine deficiency. NU News on Health Care In Developing Countries" 3194, 8: 18-22.

Barbara U (1994). Current status of iodine deficiency disorders. A global perspective; NU News On Health Care In Developing Countries. 3/94(8): 4-7.

Benmiloud M, Bachtarazat H, Chaoki MB (1983). Public health and nutritional aspect of goiter and cretinism in Africa. In: Delange F, Ahluwalia R (eds) Cassava toxicity and thyroid. Research and public health issue. IDRC, p. 50.

Committee on Dietary allowance, Food and Nutrition Board (1980). Recommended dietary allowance 8th revised ed. National academy of Sciences. Washington DC, pp. 53-56.

Delange F, de Benoist B, Aluwick D (1999). Risk of iodine induced hyperthyroidism after correction of iodine deficiency by iodized salt. Tyroid. 9: 545-556.

Diosandy LL, Fitzgerald A (1983). A sensitive kinetic assay of determination of iodine in cereals. Food Biochem. 72: 248-254.

Feid-Ramussen U (2001). Iodine and cancer. Thyroid. 11: 483-486.

Howarth B (1999). Breeding staple food crop that are more nutritious. International Food Policy Research Institute (IFPRI), Res. Perspect. 21: 3.

Kontras DA, Matovinovic J, Vought R (1985). The ecology of iodine In: Stanbury; JB Hetzel BS (eds). Endemic goiter and endemic cretinism. New York John Wiley publiasher, pp.185-195.

Lamberg BA (1985). Effectiveness of iodized salt in various part of the world In: Hall R, Kobberling J (eds.) Thyroid disorders associated with iodine deficiency and excess. Sereno Symposia; New York, Raven Press. 22(1): 81-94.

Laurberg P, Bulow PI, Knudsen N, Ovesen L, Andersen S (2001). Iodine excess. Thyroid. 11: 457-469

Matovinovic J (1983). Endemic goiter and cretinism at dawn of the third millennium. Ann. Rev. Nutr. 3: 341-412.

Onabolu AO, Essien GC, Akaha AA (1992). Antinutritional factors in soybeans. In "Soybeans food for everyone", Edpro prints, Marina, Lagos, p. 5.

Stephen A, Hoption C (2006). Hypothesis: Dietary iodine intake in the etiology of cardiovascular disease. J. Am. Coll. Nutr. 25: 1-11.

United Nations Children Fund (UNICEF) (2007). The state of the World children. UNICEF, New York, p. 109.

Vitti P, Rago T, Aghini-Lombardi F, Pinchera A (2001). Iodine deficiency disorder among the Hungarian Community. Pub. Health Nutr. 4: 529-535

WHO/NUT (1994). Iodine and health: Eliminating iodine deficiency disorders safely through salt iodization. A statement by World Health Organization. WHO/NUT/94.4.

WHO (2003). Eliminating iodine deficiency disorders. World Health Organization. http//www.HHO. int/idd.htm.

Xue-Yi I, Xin-Min J, Kareem A, Zhi-Hong D, Rakeman MA, Ming, Zhang L (1994). Irrigation of water as a method of supplying iodine to a severely iodine- deficient population in Xinjiang, China. The Lancet. 334: 107-110.