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Comparative Analysis of Antioxidant Vitamins in Extracts of Three Vegetables among the Commonly Consumed in South-Eastern Nigeria

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ABSTRACT

This work compares the quantity of anti-oxidant vitamins in extracts of three commonly consumed vegetables in South-Eastern Nigeria. The vegetables are fluted pumpkin (Telfairia occidentalis), eggplant fruits (Solanum melogena) and eggplant leaves (Solanum nigrum). They were purchased from Ogige market in Nsukka, Enugu State, Nigeria. Approved scientific methods were employed in the determination of the levels of the vitamins. Statistical tools used to analyze the data generated were means, ANOVA and Duncan's studentized New Multiple Range Test. The provitamin A (β-carotene) values of the samples were comparable (270 – 300µg/100ml, p > 0.05). Extracts from leaves of fluted pumpkin and eggplant had vitamin E values 4.15 and 4.55mg/100ml, respectively (p > 0.05) but differed significantly from lower levels observed in eggplant fruit (1.8mg/100ml p <0.05). The vitamin C values in the three samples differed significantly (p < 0.05). Eggplant leaf extract had the highest value of 75.66mg/100ml while the eggplant fruit recorded the least (16.50mg/100ml).

KEYWORDS: antioxidant vitamins, comparative analysis, vegetables

INTRODUCTION

Telfeira occidentalis (fluted pumpkin), *Solanum melongena* (eggplant fruit) and *Solanium nigrum* (eggplant leaves) are herbaceous plants that have found large applications in food and medicinal industries. In Nigeria and other parts of Africa, the vegetables are used to prepare soup, salad or eaten raw. Vegetables are indispensable constituents of human diet. They supply minerals, vitamins and certain hormone precursors as well as protein and energy in the body (Oyenuga and Fetagu, 1975). Green leafy vegetables are particularly important in promoting health. This is because they are rich sources of nutrients. Oxidative stress *in vivo* can trigger abnormal cell proliferation which has adverse health consequence. Diets rich in fruits and vegetables have high anti-oxidants, promote health and reduce the effect of aging (Thomas, 2004). Certain vitamins which include vitamin A, E and C, have anti-oxidative benefits.

Vegetables are crucial component of Nigerian diet, but in recent time Western food habit is creeping into the Nigerian food habit. This new development has led to increased incidence of diet related chronic diseases among the Nigerian populace. There is urgent need for dissemination of information on the nutritional and health benefits of vegetables to the general public. This work therefore, determined the anti-oxidant vitamins (A, C and E) in three vegetables among the commonly consumed in South-Eastern Nigeria.

MATERIALS AND METHODS

Sample procurement:

Fresh samples of local *Solanum melongena* (eggplant fruit) *Solanium nigrum* (eggplant leaves) and *Telfeira occidentalis* (fluted pumpkin) were purchased from Ogige market in Nsukka, Enugu State, Nigeria.

Sample preparation:

Eggplant fruit (500g) and leaves (250g) and fluted pumpkin (250g) were each washed and household kitchen juice extractor was used to separate extract sap (juice) from them. The extracts were bottle sealed, labeled and taken immediately for chemical analysis.

Chemical analysis

Beta-carotene was determined spectrophometrically using the method adopted from IVACG (1992).

Ascorbic acid was determined using the procedure of AOAC (2005)
Vitamin E was determined using method of Pearson (1976).
All determination was done in triplicates.

Statistical analysis

Data generated from the chemical analysis were subjected to means and one-way analysis of variance (ANOVA). Duncan studentized New Multiple Range Test was used to separate and compare means (Sokahl and Rholt, 1969).

RESULTS

Table 1: Anti-oxidant vitamin composition of fluted pumpkin leaves (*Telfaira occidentalis*), eggplant leaves (*Solanum nigrum*) and eggplant fruits (*Solanum melongena*) per 100ml extracts

Sample	β-Carotene (µg)	Vitamin E (mg)	Vitamin C (mg)
Fluted pumpkin leaves	300±0.02	4.15±0.86	43.76±7.82
Eggplant leaf	270±0.11	4.58±0.76	75.66±2.90
Eggplant fruit	270±0.13	1.84±0.54	16.50±4.06

Mean ± SD of triplicate determination

Table 1 presents the antioxidant composition of extracts of fluted pumpkin leaves, eggplant leaves and fruits. The β-carotene content of the three samples varied. The variation was from 270 to 300µg/100ml. The fluted pumpkin leaf extract had the highest β-carotene (300µg/100ml). The values for eggplant leaves and fruits extracts were slightly lower than that of the fluted pumpkin leaves (270µg/100ml). Although the β-carotene content of the three samples differed, the variation was insignificant (P > 0.05).

The vitamin E content of the extracts of the three vegetables differed. It ranges from 1.84 to 4.58mg/100ml. The eggplant fruits had the least (1.84mg/100ml) amount of vitamin E. This value was different from those of the fluted pumpkin and eggplant leaf extracts (1.84 vs. 4.15 and 4.58mg/100ml, respectively P < 0.05). The vitamin E content of the extracts from the leaves of fluted pumpkin and eggplant were high and comparable (4.15 and 4.58/100ml, respectively (P > 0.05).

The vitamin C content of the extracts from the three vegetables followed the same trend as that of vitamins E. The eggplant fruit extract had the least ascorbate (16.50mg/100ml). However, its leaves extract had the highest ascorbate (75.66mg/100ml) followed by the fluted pumpkin leaf extract (43.76mg/100ml). The eggplant leaf extract had an edge in ascorbate over the others (75.66 vs. 43.76 and 16.50mg/100ml) (P < 0.05). The ascorbate content of the fluted pumpkin leaf extract was different from that of the eggplant fruit (43.76 vs. 16.50mg/100) (P < 0.05).

DISCUSSION

The results showed that the pro-vitamin A (β-carotene) content of the vegetables ranges from 270µg to 300µg/100ml of the extract. β-carotene is a precursor of vitamin A and a powerful antioxidant. Consumption of these vegetables in large amount could provide health benefits to the body. β-carotene plays numerous roles in the body system; it fights free radicals, boosts immune function, enhances vision and prevents cancer. Stahl (2005) reported that β-carotene lowers the incidence of age-related muscular degeneration, the leading cause of blindness in older people.

Vitamin E content of the vegetables ranges from 1.84 to 4.58mg/100ml. Vitamin E functions as a chain breaking antioxidant that prevents the propagation of free radicals (Traber, 1999). Vitamin E is needed for iron metabolism in the cell and for the maintenance of nervous tissues and immune function. Studies have been carried out in the past decade that directly or indirectly address the relationship between vitamin E intake and chronic diseases (Wardlaw and Kessel, 2002).

The three vegetables contain very high amount of vitamin C especially the eggplant leaf (75.66mg/100ml). Consuming these vegetables will no doubt contribute appreciably to the vitamin C status of all age group. Vitamin C performs a variety of important cell functions. Vitamin C acts as a potent antioxidant by scavenging physiologically relevant reactive oxygen, chlorine and nitrogen species (Halliwel, 1996). It works with vitamin E as a pair of free radical scavengers. Vitamin C in the eye protects it against photolytically generated free radicals. Research has shown a reduced risk of coronary heart disease with vitamin C supplementation (Knekt *et al*., 2004). Vitamin C facilitates the intestinal absorption of non-haem iron, which is not readily absorbed. It also counters the action of certain food components that inhibit iron absorption (Wardlaw and Kessel, 2002). Hence, inclusion of these vegetables in diets will go a long way in improving iron status.

The presence of these antioxidant vitamins in the vegetables will help protect the body against nutrition related diseases. This study has revealed the medicinal properties and health benefits of these vegetables. We therefore, recommend increased consumption of the vegetables in order to maintain good health.

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