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Research Article

Comparative Vitamin Analysis of Some Selected Nigerian Green Leafy Vegetables from Two Different Zones

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Abstract

The vitamin analysis of four selected green leafy vegetables (*Talinum triangulare, Vernonia amygdalina, Telfairia occidentalis* and *Gnetum africanum*) from two different zones (Awka in Southeast and Ado-Ekiti Southwest) were investigated. The result of the experiment showed that the vitamin content of the investigated vegetables are not significantly different by ($p<0.05$). Generally, all the researched vegetables were rich source of vitamin C with *Telfairia occidentalis* sourced from Awka, Southeast Nigeria with highest vitamin C content (86.20 ± 0.11). The result indicated that the four investigated green leafy vegetables from Awka, Southeast Nigeria are better sources of all the researched vitamins. Hence, the consumption of these vegetables should be encouraged among the dwellers of this zone.

Keywords: Vitamin; Green Leafy Vegetables; Southeast; Southwest

Introduction

Vegetables are known to be vital sources of protective foods [1,2]. Green leafy vegetables are succulent plants parts grown in gardens and consumed as a side dish or soup with starchy staples among the tribes in Nigeria [1]. The importance of dietary components of leafy vegetables is significant in African population since they are generally comparatively rich in fiber while cereals, root vegetables and other foodstuff are relatively poor sources [3,4]. Several vegetables species abound in Nigeria which is utilized rather as condiments or spices in human diets or as supplementary feeds to livestock such as rabbits, poultry, swine and cattle [5]. Vegetables have also been reported to be good sources of nutrients such as carotene, protein, vitamins, calcium, iron, ascorbic acid and tangible concentration of trace minerals [6,7]. According to George [8], the potassium content of leafy vegetable is good in the control of diuretic and hypertensive complications. He also ascertained that the proteins in vegetables are superior to those in fruits but inferior to those in grains. Vegetable fats and oils are known to lower blood lipids thereby reducing the occurrences of diseases associated with the damage of the coronary artery [6]. Leafy vegetables are highly beneficial for maintenance of health and prevention of diseases. They serve as valuable source of food ingredients that can be utilized to build up and improve the body successfully [9]. For years, there has been increasing demand for fresh vegetables mainly because of their convenience as ready-to-eat products as well as health benefits associated with their consumption [10,11]. In Nigeria, and in most other tropical countries of Africa, where the daily diet is dominated by starchy staple foods, vegetables are the cheapest and most readily available source of important proteins, vitamins, minerals and essential amino acid [12]. Leafy vegetables are important items of diet in many Nigerian homes, apart from the variety which they add to the menu [13,14], they are valuable sources of nutrients especially in rural areas where they contributes substantially to protein, minerals, vitamins, fibers and other

nutrients which are usually in short supply in daily diets [15]. The numerous vitamins present in vegetables provide health-promoting effects for its consumers [16]. The concentrations of these vitamins however vary from one location to the other. Hence, a need for comparative investigation of the level of these vitamins in leafy vegetables remains crucial. This study thus compares the vitamins composition of some leafy vegetables from two different zones in Nigeria.

Materials and Methods

Materials

Fresh green leafy vegetables were gotten from Awka central market in Awka, Anambra State, Nigeria and from Central market in Ado-Ekiti, Ekiti State, Nigeria. The vegetables are water leaf (*Talinum triangulare),* fluted pumpkin (*Telfaria occidentalis*), bitter leaf (*Vernonia amygdalina*) and ukazi (*Gnetum africanum*). The vegetable leaves were harvested, destalked, washed with clean cold tap water and was cut into smaller piece. The fresh leaves were used for the study.

Determination of vitamin B_1 (Thiamin)

5g (0.5ml) of the sample was homogenized with 50ml (5ml) 10% ethanoic sodium hydroxide. It was filtered into a 100ml conical flask, 10 ml(1ml) of the filtrate was pipetted and the color was developed by addition of 10 ml(1ml) of (1%) potassium dichromate, the absorbance was measured at 360 nm [17].

Determination of Vitamin B_2 (Riboflavin)

5 g of the sample was extracted with 100 ml of 50% ethanol and shaken for one hour. This was filtered into 100 ml flask. 10 ml of the extract was pipetted into 50 ml volumetric flask. 10 ml of 5% potassium permanganate and 10 ml of 30% H_2O_2 was added and allowed to stand over a hot water bath for 30 min. 2 ml of 40% sodium sulphate was added. This was made up to 50 ml mark and the absorbance measured at 510nm using spectrophotometer [17].

Determination of Vitamin C

This was done using 2, 4-dinitrophenyl hydrazine (DNPH) method as described in AOAC [18]. The sample (20 g) was extracted (blended) with 200 ml of 6% trichloroacetic acid (TCA) solution and filtered. Small quantity of animal charcoal was added to the filtrate to decolorize it a little. One milliliter of the filtrate was pipetted into a test tube. Ascorbic acid standard (1 ml) was also pipette into another test tube and 1 ml of 6% trichloroacetic acid pipetted into a third test-tube as a blank. Dinitrophenyl hydrazine-theourea – copper sulphate (1 ml) reagent (DHTCS) was added to all the test tubes, capped, mixed and incubated in a water bath at 37oC for 3 hours. The tubes were removed from the water bath and allow cooling for 30 minutes in an ice bath while mixing slowly. Then 2ml of 12M sulphuric acid was added to all the test tubes. The spectrophotometer was adjusted with the blank to read zero absorbance at 520 nm.

Determination of vitamin E

This was determined according to the method of Rutkowski., *et al* [19]. The sample extract, 0.5 ml was mixed with 0.5 ml of anhydrous ethanol and shake for 1 min. This was followed by the addition of 3 ml of xylene. The tube was shook again for 1 minute and the content of the tube was centrifuged for 10 mins at 1500 rpm. 1.5 ml of the upper layer was mixed with 0.25 ml of batophenanthroline, this was followed by the addition of 0.25 ml of Ferric chloride solution. 0.25 ml of Phosphoric acid was added and mixed well. The absorbance was measured at 539 nm with tocopherol used as the standard (23.2 µM).

Determination β-carotene

The AOAC [18] method using the colorimeter was adopted. This method measures the unstable color at the absorbance of 620 nm that result from the reaction between Vitamin A and $SbCl_3$. Pyrogallo (antioxidant) was added to 2g of the sample prior to saponification with 200 ml of alcohol potassium hydroxide. The saponification took place in water bath for 30 minutes. The solution was transferred to a separating funnel where water was added. The solution was extracted with 1.5 ml hexane. The extract was washed with equal amount of water and filtered through filter paper containing 5 g anhydrous Na_2SO_4 into volumetric flask. The filter paper was rinsed with hexane. Then, hexane was evaporated from the solution and blank, this was followed by the addition of 1 ml chloroform and $SbCl_3$ solution to the extract and blank. The reading of the solution and blank was taken from the colorimeter adjusted to zero absorbance or 100%.

Result and Discussion

Means along the column with the same superscript are not significantly different by DMRT ($p<0.05$)

The vitamin compositions of the researched Nigerian green leafy vegetables are represented in table 1.

Parameters	*Vernonia amygdalina*	*Gnetum africanum*	*Talinium triangulare*	*Telfairia occidentalis*
		Awka		
Vitamin B1	$0.28^{c} \pm 0.31$	$0.58^{b} \pm 0.13$	$0.55^{b} \pm 0.21$	$0.75^{c} \pm 0.16$
Vitamin B2	$0.72^{b} \pm 0.01$	$0.72^{bd} \pm 0.12$	$0.76^{b} \pm 0.21$	$1.17^{c} \pm 0.21$
Vitamin C	$39.32^{a} \pm 0.11$	$36.22^{a} \pm 0.11$	$65.34^{a} \pm 0.11$	$86.20^{a} \pm 0.11$
Vitamin E	$0.89^{b} \pm 0.11$	$0.45^{b} \pm 0.12$	$0.64^{b} \pm 0.21$	$0.12^{c} \pm 0.11$
β- Carotene	$34.12^{a} \pm 0.12$	$36.51^{a} \pm 0.10$	$55.61^{a} \pm 0.13$	$34.56^{b} \pm 0.10$
	Vernonia amygdalina	*Gnetum africanum*	*Talinium triangulare*	*Telfairia occidentalis*
		Ado-Ekiti		
Vitamin B1	$0.28^{d} \pm 0.12$	$0.57^{c} \pm 0.11$	$0.63^{b} \pm 0.21$	$1.12^{c} \pm 0.11$
Vitamin B2	$0.73^{c} \pm 0.11$	$0.61^{c} \pm 0.12$	$0.68^{b} \pm 0.22$	$1.17^{c} \pm 0.21$
Vitamin C	$53.76^{a} \pm 0.13$	$37.34^{a} \pm 0.13$	$86.14^{a} \pm 0.12$	$56.23^{a} \pm 0.22$
Vitamin E	$0.91^{c} \pm 0.21$	$0.72^{b} \pm 0.22$	$0.67^{b} \pm 0.11$	$0.23^{c} \pm 0.11$
β- Carotene	$35.65^{b} \pm 0.12$	$41.22^{a} \pm 0.21$	$64.71^{ab} \pm 0.21$	$30.67^{b} \pm 0.21$

Table 1.

From the result above, it is shown that the vegetables are good sources of Vitamins. Green leafy vegetables occupy an important place among the food crops as they provide adequate amounts of many Vitamins for humans.

The Vitamin B1 content of the four green leafy vegetables ranged from 0.28mg/100ml in *Vernonia amygdalina* to 1.12mg/100ml in *Telfairia occidentalis*. Vitamin B1 functions as the co-enzyme thiamin pyrophosphate (TPP) in the metabolism of carbohydrates and branched-chain amino acids. Hence, its deficiency result in overall decrease in carbohydrate metabolism and its inter-connection with amino acid metabolism (via α–keto acids) and consequently leads to decrease in the formation of acetylcholine for neural function [20]. *Talinium triangulare* sourced from Ado-Ekiti had (86.34mg/100ml) of vitamin C content when compared with *Gnetum africanum* with (36.22mg/100ml) which is the least of the leafy vegetables investigated. Vitamin C is a potent antioxidant that facilitates the transport and uptake of non-heme iron at the mucosa, the reduction of folic acid intermediates and the synthesis of cortisol. Its deficiency includes fragility to blood capillaries gum decay, scurvy [4]. The Vitamin C content of the investigated vegetables is considerably higher than some other leafy vegetables reported by Achikanu., *et al* [21]. B-carotene content varied from 30.67 to 64.71 mg/100ml. B-carotene is a pro vitamin A carotenoid that is converted to vitamin A by the body and gives pigments to vegetables. Vitamin A is important for normal vision, gene expression, growth and immune function by its maintenance of epithelial cell functions [22].

Conclusion

The investigated four green leafy vegetables from the two different zones show that all the investigated vegetables are good source of vitamins with vitamin C being highest. Meanwhile, *Talinum triangulare* sourced from Ado Ekiti had the highest Vitamin C content compared to its counterpart sourced from Awka. Hence, this vegetable could be an alternative source of vitamins to the consumers in this region and consequently serve as rich source of antioxidant which helps to fight diseases thereby improving health.

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