

Original Research Article

Evaluation of Nutritional Composition of *Ocimumgratissimum* Leaf Extract

ABSTRACT

Vegetables are known to be vital sources of nutritive foods. This study evaluates the nutritional composition of *Ocimumgratissimum* leaf extract vis-a-vis proximate minerals and vitamins analyses. Fresh leaves of *Ocimumgratissimum* were purchased from a local market in Awka North Local Government Area of Anambra State, Nigeria. and were washed, destalked, oven-dried at 40 °C, pulverized, and sieved through 2.0 mm mesh (prior to)...replace with (before) analysis. Proximate, minerals and vitamin analyses were carried out, using standard methods. Results indicated that *Ocimumgratissimum* contained a high level of carbohydrate (51.78 ± 0.50 %), protein (10.50 ± 0.04 %), and fiber (9.38 ± 0.05 %), with a minute quantity of crude fat (4.94 ± 0.03 %). analysis of the mineral compositions showed that the vegetable contained a considerable quantity of minerals that is sufficient to improve general well-being, while the vitamin analysis revealed that the leaves of *Ocimumgratissimum* are sufficiently rich in Vitamin E and could therefore act as antioxidants and consequently help to improve health status of its consumers.

Keywords: Green leafy vegetables, *Ocimumgratissimum*, nutrition, health,

INTRODUCTION

Green leafy vegetables are widely succulent **plant** 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 **are** significant in **the** African population since they are comparatively rich in fiber, **(which)...replaces with (while)** cereals; root vegetables and other foodstuffs are relatively poor sources [2]. In Nigeria, just as in most other African countries where diet is dominated by starchy staple foods, vegetables are considered **a** cheap source of energy. They are very rich sources of nutrients such as carotene, protein, vitamins, calcium, iron, ascorbic acid and **a** tangible concentration of trace minerals [3].

Many species of vegetables abound in the world and they are characterized with **the** addition of flavor, taste, and color to **the** diet **(which)...replace with (that)** would have otherwise been monotonous. The invaluable food nutrients contained in vegetables can be used for body building, protective and regulatory material as well as sources of energy for the body.

Vegetables also contain **plant** secondary metabolites which act as anti-nutrients [4]. These secondary metabolites include tannins, phytate, oxalate, and cyanide; all of which have different detriments to nutrition and health [5]. A good leafy vegetable is **(the)...delete** one that contains a great deal of these beneficial nutrients and a very minute amount of anti-nutrients. One of the promising vegetables that has been acclaimed **as** 'good' is *Ocimum gratissimum*.

Ocimum gratissimum Linn (Lamiaceae) is an herbaceous shrub notably found in tropical countries, including Nigeria [6], where it is commonly called Clove basil, Sweet basil, tea-bush, Scent leaf, or fever plant; but it is also popularly known

(with)..replace with (as) different local names in Nigeria as “*Daidoya*” (hausa), “*Effirin*” (yoruba) and “*Nchuanwu*” (igbo).

Ocimumgratissimum is a widespread and commercially viable perennial herbaceous plant with a very strong aromatic smell. It is used as a natural flavouring agent, condiment, or vegetable in the preparation of fish, meat, soup, and stew.

Scientific reports have shown that *O. gratissimum* has a wide range of bio-active compounds such as flavonoids and polyphenols [7] and essential oils with several beneficial effects [8]. Since the concentrations of the nutrients vary from one leafy vegetable species to another, there is a need to investigate these varying concentrations in the vegetables. Hence, this study evaluates the nutritional composition of *Ocimumgratissimum*.

MATERIALS AND METHODS

Plant Materials

Fresh leaves of *Ocimumgratissimum* were purchased from the daily market, Mgbakwu in Awka North Local Government Area of Anambra State, Nigeria and were authenticated by a Taxonomist, MrIrokaFinan of the Department of Botany, Nnamdi Azikiwe University, Awka, and a voucher specimen was deposited with Herbarium no NAUH 35B. The leaves were then detached from the stalk, rinsed with distilled water, and were oven-dried at 40 °C. The dried samples were ground into fine powder and sieved through 2.0 mm mesh (prior to)..replace with (before)analysis.

Proximate Analysis

Moisture, ash, crude fat, and crude fiber were analyzed in the fresh samples (in accordance with)..replace with (following)the methods described by theAssociation of Official Analytical Chemists [9], while nitrogen was determined by the micro-Kjeldahl method (1976) and the percentage of nitrogen was converted to crude protein

by multiplying by (6.25)..please explain why?. Carbohydrate was determined by difference [10].**It's suitable if you briefly explain each method and write about the nature of the plant extract.**

Vitamin Analysis

Vitamin A and C were determined by the Fütter-mayercolometric method of Kirk and Sawyer [11] while Vitamin E was determined using the Emmerie-Engel reaction for Tocopherol estimation as reported by Rosenberg [12].

Mineral Analysis

The wetashing method was used in releasing the investigated metals in the samples from biological complexes before evaluating them with atomic absorption spectrophotometer (PinAAcle™ 900H) and flame photometer (Gulfex FP6410). The wet ashing was achieved by heating the sample with a digestion mixture containing concentrated nitric, perchloric and sulphuric acids in a Kjeldahl flask [9]. **(Calcium, Iron, Manganese, Magnesium, and Zinc were determined by atomic absorption spectrophotometer; Sodium and Potassium by Flame photometer while Phosphorus was determined by Molybdate method using hydroquinone as a reducing agent)....that is result please write them in the result section. [9]...delete the reference, you already mention it**

Data Analysis

The values obtained and the significance between the treated and control group was analyzed by one-way ANOVA using the SPSS version 17 and $P < 0.05$ was considered to be statistically significant.

RESULTS AND DISCUSSION

Table 1.0 **shows** the result **of the** phytochemical analysis of the leaf extract of *Ocimum gratissimum*. **The** result showed that the leaf extract contained **a high level of**

Steroids (81.91 ± 14.16 ug/g), Flavol-3-ol (81.88 ± 9.14 ug/g), Anthocyanin (67.13 ± 6.63 ug/g) and Phenol (50.72 ± 6.07 ug/ml), with considerable amount of Sapogenin (26.36 ± 5.68 ug/g), Quinine (19.95 ± 5.11 ug/g) and Lunamarin (14.64 ± 0.15 ug/g), while Proanthocyanin (0.42 ± 0.03 ug/g), Naringenin (0.70 ± 0.03 ug/g) and Epihedrine (1.55 ± 0.51 ug/g) are found in trace quantities.

Table 1.0: Table showing the average phytochemical composition of the leaf extract of *Ocimum gratissimum*

Parameters	Quantity
Proanthocyanin (ug/g)	0.42 ± 0.03
Rutin (ug/g)	6.02 ± 1.56
Ribalidine (ug/g)	4.90 ± 0.00
Quinine (ug/g)	19.95 ± 5.11
Flavol-3-ol (ug/g)	81.88 ± 9.14
Anthocyanin (ug/g)	67.13 ± 6.63
Lunamarin (ug/g)	14.64 ± 0.15
Sapogenin (ug/g)	26.36 ± 5.68
Epihedrine (ug/g)	1.55 ± 0.51
Phenol (ug/ml)	50.72 ± 6.07
Flavonones (ug/g)	6.04 ± 1.14
Steroids (ug/g)	81.91 ± 14.16
Epicatechin (ug/g)	21.02 ± 3.12
Kaempferol (ug/g)	2.97 ± 0.07
Phytate (ug/g)	1.15 ± 0.17
Oxalate (ug/g)	5.61 ± 0.62
Resveratol (ug/g)	5.53 ± 0.54

Flavones (ug/g)	3.32±0.22
Naringenin (ug/g)	0.70±0.03
Tannin (ug/g)	12.39±2.85

Values are mean±SEM

Table 2.0 shows the result of the proximate analysis of the leaf extract of *Ocimum gratissimum*. The result indicated the highest content of Carbohydrates (51.78 ± 0.50%), with minimal content of crude fat (4.94 ± 0.03%).

Table 2.0: The percentage proximate composition of the leaf extract of

<i>Ocimum gratissimum</i>	
Proximate components	Percentage composition (%)
Moisture	11.92 ± 0.02
Ash	11.48 ± 0.10
Fiber	9.38 ± 0.05
Crude fat	4.94 ± 0.03
Protein	10.50 ± 0.04
Carbohydrates	51.78 ± 0.50

Values are mean±SEM

Table 3.0 shows the result of vitamin analysis of the leaf extract of *Ocimum gratissimum*. The result indicated that the sample is rich in vitamin E (35.85 ± 1.56 µg/g), with minimal content of vitamin A (1.86 ± 0.07 µg/g).

Table 3.0: The vitamin composition of the leaf extract of *Ocimum gratissimum*

Vitamins	Concentration µg/g
A	1.86 ± 0.07

C	3.40 ± 0.00
E	35.85 ± 1.56

Values are mean \pm SEM

Table 4.0 shows the result for the mineral composition of the leaf extract of *Ocimum gratissimum*. Results indicated that the sample contained a considerable quantity of iron (1.40 ± 0.50 ppm) with a minute quantity of copper (0.29 ± 0.17 ppm).

Table 4.0: The mineral composition of the leaf extract of *Ocimum gratissimum*

Minerals	Quantity (ppm)
Copper (ppm)	0.29 ± 0.17
Iron (ppm)	1.40 ± 0.50
Manganese (ppm)	0.31 ± 0.08
Zinc (ppm)	0.79 ± 0.10
Selenium (ppm)	0.37 ± 0.02

Values are mean \pm SEM

The results of the proximate analysis of the leafy vegetable are represented in Table 2.0. Generally, the results indicate that vegetable is a good source of carbohydrates protein, and crude fiber. Carbohydrate content was much higher (51.78 ± 0.50 %) compared to other macronutrients. The high Carbohydrate content of *Ocimum gratissimum* is in accord with the reports of Hussain *et al.* [13] and Oladejo [14]. *Ocimum gratissimum* meets the requirement of providing more than 12% of its calorific value from protein and can thus be considered a good source of protein according to Ajayi *et al.*, [1]. The high protein content of *Ocimum gratissimum* however does not present it as a good source of protein as the quality of a protein is dependent on its ability to supply all the essential amino acids in

the required amount [15]. Hence, protein quality assessment is necessary to ascertain the ability of *Ocimumgratissimum* to meet dietary protein needs.

The microelements: copper, iron, manganese, and zinc are also well represented in the vegetable. Although the Dietary Reference Intake (DRI) of 20.5 mg of iron cannot be met by the vegetable at 100g per day serving, the vegetable is nevertheless a good source of iron as supplementation with other food components will make up for the iron need. Epidemiological studies indicate that diets high in iron can help to fight infections, boost brain health, and also promote systemic circulation of oxygen [14]. Manganese is an essential metal because it is required for proper immune function, regulation of blood sugar and cellular energy, reproduction, digestion, bone growth, blood coagulation, and homeostasis as well as defense against reactive oxygen species [16]. The beneficial effects of manganese are due to the incorporation of the metal into metalloproteins, thus aiding biochemical functions. The minute quantity of manganese (0.31 ± 0.08 ppm) present in this leafy vegetable indicates that it could provide the body with the minimum concentrations of manganese required for basic enzyme activities.

Similarly, the zinc concentrations of the vegetable as observed in this study were found to be comparable with previous works [1, 14]. Zinc is highly recommended in diets as it is required for proper sexual organ functioning and enzyme activity. High levels of zinc are usually associated with high-protein **foodstuffs**, whereas low levels are obtained from food rich in carbohydrates [17].

Vitamins are organic compounds that are essential to an organism in small quantities for proper metabolic function. As depicted in this study, *Ocimumgratissimum* contained a considerable quantity of vitamins, especially vitamins A, C, and E. Vitamin A is a fat-soluble vitamin that is naturally present in many foods.

It is important for normal vision, the immune system, reproduction, growth and development. It has also been reported to help in the proper functioning of the heart and lungs [16]. The vitamin A content as reported in this study is consistent with the findings of Oladejo [14] and Enemoret *al.*, [17]. In the same vein, the researched vegetable is found to be a rich source of vitamin E ($35.85 \pm 1.56 \mu\text{g/g}$). Vitamin E is a fat-soluble vitamin that acts as antioxidant and consequently help to protect the cells from damage occasioned by free radicals. By implication, consumption of this vegetable could aid the body's antioxidant defense mechanism and consequently improve health.

CONCLUSION

This study indicates that the investigated vegetable is a rich source of carbohydrates, protein, fiber, and essential minerals, as well as vitamins A, C and E. *Ocimum gratissimum* presented a nutritive profile capable of promoting health and well-being. The anti-nutrients in leafy vegetables are much lower than the safe limits and the reports for other plant-sourced foods, including nuts, roots, beans and berries. A serving of 100 g per day of the investigated vegetables, complemented by other nutrient sources, will provide the RDA of the essential minerals investigated. While a serving of up to 2 kg per day of the vegetables does not contribute anti-nutrients higher than the safe limits.

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