

COMPARATIVE ANALYSIS OF THERAPEUTIC BENEFITS OF *OCIMUM
GRATISSIMUM* AND *VERNONIA AMYGDALINA*Sylvester C. Ohadoma^{1*}, Louis U. Amazu¹, Joseph C. Enye², Chris E. Okolo¹¹Department of Pharmacology, College of Medicine, Imo State University, Owerri, Nigeria.²Department of Pharmacology, Faculty of Pharmacy, Madonna University, Elele, Rivers State, Nigeria.

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ABSTRACT

Objective: To compare the therapeutic benefits of *Ocimum gratissimum* and *Vernonia amygdalina* based on their chemical contents. **Materials and Methods:** Phytochemical analysis as well as total reducing properties, total antioxidant, total flavonoids, and vitamin C content determination were carried out on the leaves extract. Colorimetric method was adopted using Gallic acid and rutin standard reagents for total antioxidants (phenols) and total flavonoids respectively. The reducing properties and vitamin C contents were determined using trichloroacetic acid colorimetric and 2, 6- dichlorophenol indophenols titrimetric methods respectively. **Results:** Both plants showed a good reducing power, significant antioxidant activity, wide distribution of flavonoids, and appreciable vitamin C contents with *Vernonia amygdalina* having higher values except for total reducing properties, than, *Ocimum gratissimum*. **Conclusion:** The leaf extract of *V. amygdalina* may be associate with wide therapeutic benefits than the extract of *O. gratissimum*.

KEYWORDS: *Ocimum gratissimum*, *Vernonia amygdalina*, therapeutic benefit, Comparative analysis.

INTRODUCTION

Many indigenous plants in west Africa are used as species, goods or as medicinal preparations. Modern good processors use spices to give appealing and appetizing flavours to food.^[1] From earliest times, medicinal plants have crucial in sustaining the health and well-being of mankind. Fortunately, most developing countries are endowed with vast resources of medicinal and aromatic plants. The use of herbs to treat diseases is almost universal among non-industrialized societies.^[2] Herbal medicine constitutes a large part of what is practiced as traditional medicine around the world.^[3] In Europe and America, where the phytomedicine industry is thriving, extracts from medicinal plants are sold in a purified form for the treatment and prevention of various kinds of diseases. Three quarters of plants that provide active ingredients for prescription drugs came to the attention of researchers because of their use in traditional setting.^[4,5,6] In Africa, modern and orthodox health care has never been, and probably will never be adequately and equitably provided, due to financial limitation related to rapid population growth, political instability, high inflation rates, and declining real income.^[7,8] *Ocimum gratissimum* referred to as scent leaf and *Vernonia amygdalina*, bitter leaf are so called because of the pleasant scent and bitter properties respectively. *Ocimum gratissimum* is shrub and also a spice which

grows to about six feet (1.8 m) tall with an erect stem. Known as “nchanwu” in South-eastern Nigeria, scent is used medicinally. *Vernonia amygdalina* is a shrub of 2.5 m tall with petiolate leaf of about 6 mm diameter and elliptic shape. In South-eastern Nigeria, bitter leaf is called “Olugbu”; no seeds are produced and have therefore, to be distributed through stem cutting. It is also used medicinally. Considering the contrasting flavouring properties of these two plants which are commonly consumed in Nigeria, this present work investigated the chemical compositions and compared their therapeutic benefits.

MATERIALS AND METHODS

Sample collection and separation

The leaves of the plants *Ocimum gratissimum* and *Vernonia amygdalina* were collected from Owerri, Imo State, Nigeria. The leaves were ground into powder using an electric blender and stored in airtight bottles.

Phytochemical screening

The plants were screened for tannins, flavonoids, phenolic compounds, alkaloids, inulin, steroids and saponins, using standard methods.^[9,10]

Determination of total reducing properties

Methanol extract (25 ml) of the leaf was mixed with 2.5 ml of 0.2 M sodium phosphate buffer and 2.5 ml of 1% potassium ferricyanite and incubated at 50 °C for 20 minutes. Then, 2.5 ml of 10% trichloroacetic acid was added and the mixture centrifuged for 10 minutes. The upper layer (2.5 ml) was mixed with 2.5 ml of glass distilled water and 0.5 ml of 0.1% ferric chloride and its absorbance measured spectrophotometrically at 700 nm against a blank. Ascorbic acid was used as the reference standard.^[9]

Determination of total antioxidant content

The total antioxidant content was assayed using the Gulcin *et al.*, method.^[12] One milliliter of the extract and standard gallic acid solution (10, 20, 30, 40, 50 and 100 mg / L) was added to the mixture and vortexed twice. After 5 min, 10 ml of 7% sodium carbonate was added to the mixture and incubated for 90 minutes at 25%. The absorbance against spectrometer at 750 nm.

Determination of total flavonoids content

The total flavonoid determination was carried out using colorimetric aluminum chloride methanol.^[13, 14] Rutin was used to construct the calibration curve. Hundred milligrams of rutin was dissolve with 48 ml of 60% ethanol and the volume made up to 100 ml with 30% ethanol. The standard curve was constructed by diluting 0, 0.1, 0.2, 0.3, 0.4 and 0.5 ml rutin to 1 ml with water to obtain 0, 10, 20, 30, 40 and 50 mg/ml of rutin. To this 0.5 ml 5% NaNO₂ was added alongside to 1 ml of the sample extract and shaken for 5 minutes. Then, 0.5 ml of 10% Al(NO₃)₃ was also added and the test tube shaken for 5 minutes. Four millilitres of 4% NaOH were then added, and the test tube shaken for 15 minutes. The absorbance was determined at 510 nm using test tube 0 to zero the UV/visible spectrometer.

Extraction and determination of vitamin C

The vitamin C content of the sample was extracted with 5 ml of 2% HCl into a 100 ml measuring cylinder through a pad of cotton wool, the extraction was repeated three more times and the volume made up to 100 ml with distilled water. Ten millilitres of the extract was titrated with 0.001 M 2, 6-dichlorophenol indophenols solution with a pink coloration persist for 30 seconds.^[15]

RESULTS

The phytochemical studies revealed the presence of saponins, flavonoids, tannins, phenols, steroids, alkaloids and inulin in both *Ocimum gratissimum* and *Vernonia amygdalina* but glycosides occurred only in the later (Table I). The results showed that *Ocimum gratissimum* and *Vernonia amygdalina* were rich in vitamin C with the values of 0.30 and 0.43 mg/100 ml respectively. The result of this study also showed that *Ocimum gratissimum* and *Vernonia amygdalina* were rich in flavonoids with the values of 0.05 and 0.07 mg/g respectively. The results indicated that *Ocimum gratissimum* and *Vernonia amygdalina* were very rich in

total antioxidants with the values of 16 and 32 mg/g respectively. The two samples analysed, showed a good reducing power, *O. gratissimum*, 79 mg/g and *V. amygdalina*, 71 mg/g (Table II).

Table I: Phytochemical analysis of *Ocimum gratissimum* and *Vernonia amygdalina*.

Phytochemicals	<i>O. gratissimum</i>	<i>V. amygdalina</i>
Saponins	+	+
Flavonoids	+	+
Tannins	+	+
Lignin	-	-
Phenols	+	+
Glycosides	-	+
Steroids	+	+
Alkaloids	+	+
Inulin	+	+

+ = Present ; - = Absent.

Table II: Total antioxidant (phenols), total flavonoids, total reducing properties and vitamin C content of *O. gratissimum* and *V. amygdalina*.

Sample	Vitamin C (mg/100 ml)	Total flavonoids (mg/g)	Total antioxidants (mg/g)	Total reducing (mg/g)
<i>Ocimum gratissimum</i>	0.30	0.05	16	79
<i>Vernonia amygdalina</i>	0.43	0.07	32	71

DISCUSSION

There were plethora of phytochemicals revealed in both *O. gratissimum* and *V. amygdalina*. (Table I). The presence of these substances in the studied plants account for their usefulness as medicinal plants.^[9, 16] Steroidal saponins are of significant interest due to their relationship with such compounds as sex hormones. This may not be unconnected with the reason why the infusions of *O. gratissimum* leaf and fruit of *Tetrapheura tetraptera* are often given to expectant mothers or breast feeding mothers to ensure hormonal balance since steroidal structure could serve as potent starting materials in the synthesis of these hormones.^[17] The presence of phenolic compounds in both plants indicated that they might be antimicrobial agents. Phenols and phenolic compounds had been extensively used in disinfections and remain the standard with which other bacteriocides are compared.^[17] Flavonoids have been shown to possess significant antioxidant activities.^[18] Flavonoids exhibit their antioxidant action through scavenging or chelating process.^[19] Dietary flavonoids intake has been reported to significantly reduce mortality from coronary artery disease, incidence of myocardial infarction and total cholesterol concentrations.^[20] To slow down or prevent the oxidative stress induced by free radicals, sufficient amount of antioxidants need to be consumed. This helps to protect cellular systems from oxidative damage and lower the incidence of chronic diseases.^[21] Vitamins C

which occurred in both plants is the most popular single vitamin that has an antioxidant properties.^[22] it aids in collagen production and useful in wound healing of all types.^[22] vitamin C protects the skin from free radical damage of ultraviolet radiation, popular remedy for common cold.^[23] prevents cataract, lower risk of heart disease and strokes.^[24] it regulates blood glucose levels and acts as an oxidative modifier of low density lipoprotein.^[24] From this study, there is no marked difference in their qualitative phytochemical contents except for *Vernonia amygdalina* where in addition, glycosides occurred. Apart from the total reducing properties, other parameters were in favour of *V. amygdalina*. *V. amygdalina* had advantage of vitamin C (0.43 mg/100 ml) supposedly accounting for double its antioxidant richness (32 mg/g) over *O. gratissimum* (0.30 mg/100 ml) with total antioxidant of 16 mg/g. This is in consonance with the vitamin C being the most popular single vitamin that has an antioxidant properties.^[23] The increased intake of leaves of *O. gratissimum* and *V. amygdalina* will result in a high nutritional and therapeutic benefit, as this investigation has provided evidence to support their consumption practice to compensate nutrient deficiency and pathological changes such as free radicals and processes of cellular dysfunction, pathogenesis of cardiovascular and metabolic disorders as well as aging.

CONCLUSION

This work concludes that though leaves of both plants studied showed affective therapeutic benefits, *vernonia amygdalina* exerts greater potency than *Ocimum gratissimum*.

Conflict of Interest: The authors have not declared any conflict of interest.

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