



PHYTOCHEMICAL SCREENING OF *Ocimum gratissimum* GROWN WILD IN ZARIA, NIGERIA



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Received: January 12, 2018 Accepted: March 25, 2018

Abstract: This study investigated the phytochemical screening of plant parts of *Ocimum gratissimum* grown in Nigeria. *Ocimum gratissimum* plants were collected and air dried. Powdered samples of leaves stem and roots were subjected to phytochemical analysis. Roots, seeds and leaves contain alkaloids, flavonoids, saponins, and cardiac glycosides, but flavonoids was absent in the stem and phlobatannins, tannins and alkaloids were absent in the seeds. The studies showed secondary metabolites that makes the plant useful in medicine especially traditional medicine.

Keywords: *Ocimum gratissimum*, phytochemical, flavonoids, secondary metabolites, leaves

Introduction

Ocimum gratissimum belongs to order Lamiales, family Lamiaceae, genus *Ocimum*, and species *gratissimum*. In India, *O. gratissimum* is known as Tulsi “queen of herbs”. The plant also became known to Christians as holy basil and was hailed as the “king of herbs”. It is known to the Sanskrit as Tulasi. Its common names are tea bush, mosquito plant, and fever leaf of Sierra Leone. In Nigeria, It is known as “efirin” by the Yoruba people, daddoya ta gida” in Hausa for *O. gratissimum* and by the Igbo’s as “nchanwu”

The Latin name is *Ocimum Sanctum* “sacred fragrant leaf basil” and more recently this species has become known as *ocimum tenuiflorum* basil with small flowers. *Ocimum gratissimum* is the most recent name (Nakamura *et al.*, 1999). The genera *Ocimum* has high medical values, most especially *O.gratissimum*. That is why it is highly regarded and even worshipped in India by the Hindus (Elujoba, 2000). Leaves and flowers – raw and cooked are used as flavouring (Grieve, 1984; Usher, 1974). They are used especially with tomato dishes, pasta sauces, beans, peppers. The leaves are normally used fresh but can also be dried for use. A refreshing tea is made from the leaves (Lust, 1982). *Ocimum gratissimum* is also used in the treatment of stomach discomfort, diarrhoea, and open wounds. The seed can be eaten as a whole or added to bread dough as flavouring. When soaked in water it becomes mucilaginous and can be made into a refreshing beverage called sherbet tokhum in the Mediterranean (Facciola, 1990). An essential oil obtained from the plant is used as food flavouring in mustards and sauces (Facciola, 1990, Tanaka, 1976).

The genus *Ocimum* comprises of more than 50 species which are distributed in tropical and subtropical regions of Asia, Africa and Americas. These plants are commonly found in gardens, compounds, old farms, near villages and often cultivated in various parts of West Africa. In Northern Nigeria it is found in Bukuru, Jos, Plateau State, and in Kaduna State and in Kano State. In Western part of Nigeria, It is found in Ibadan, Abeokuta and Lagos (Afolabi *et al.*, 2007). It is grown in India, Asia and America. The plants grow well in clay and sandy soils.

The plants grow up to 1m in height and are annual with square stems, ovate-shaped bright green leaves with toothed margins. The white two lipped flowers form in whorls on the terminal spikes, each flower sets a seed capsule with four very small round black seeds. Leaves release a strong clove or anise like aroma when crushed or rubbed (Onajobi, 1986). *O. gratissimum* has been reported to contain the terpenoids,

eugenol and thymol, saponins and alkaloids (Gill, 1988). Aromatic oil from the leaves consist of thymol (32-65%). *O. gratissimum* is grown for the essential oils in the stem and leaves. Eugenol, thymol, citral, geranial and linalool have been extracted from the oil (Sulistiarini, 1999). Essential oil from the plant has been reported to possess an interesting spectrum of antifungal properties (Dubey *et al.*, 2000). The whole plant and the essential oil are used in traditional medicine especially in Africa and India. The essential oil is also an important insect repellent. *O. gratissimum* is germicidal and has been widely use in toothpaste and mouth washes as well as some tropical ointment (Nakamura *et al.*, 1999; Holets *et al.*, 2003; Possoa *et al.*, 2003). It is also used as an excellent gargle for sore throats and tonsillitis.

It is also used as an expectorant and a cough suppressant. The plant extract is used in gastrointestinal helminthes of animal and man (Fakae *et al.*, 2000; Chitwood, 2003). The plant’s carminative properties make it a good choice for stomach upset. It is used as an emetic and for haemorrhoids. The plant is used for the treatment of rheumatism, paralysis, epilepsy, high fever, diarrhoea, sunstroke, influenza, gonorrhoea and mental illness (Dhawan *et al.*, 1977; Abdurahman, 1992; Osifo, 1992; Sofowora, 1993).

The plant is commonly used in folk medicine to treat different diseases such as upper respiratory tract infection, diarrhoea, headache ophthalmic, skin diseases, pneumonia, cough, fever and conjunctivitis (Oliver, 1980). It is used in some parts of Nigeria among the Igbo’s in the management of a baby’s cord. It is believed to keep the baby’s cord and wound surfaces sterile (Iwu, 1986), *O. gratissimum* has been reported to be active against several species of bacteria and fungi (Nwosu and Okafor, 1995; Nakaruma *et al.*, 1999).

It is used to ease the pain of child birth and expel the after birth. It increases milk in nursing mothers. It is used as a treatment of urinary and respiratory ailment. It is used to reduce indigestion and bad breath. It is used for inflammation and ring worm, nausea, cramps, vomiting (Onajobi, 1986). The plants are used to lower stress related high blood pressure. It is used to control difficult skin diseases like leprosy and infection of the skin (El-Mamood *et al.*, 2008). The plant is used to protect against gastric ulcers, reduces dangerous blood sugar level and supports dental and periodontal health. It also protects against mercury poisoning, speeds healing of bone fracture (Fakae *et al.*, 2000).

Current scientific research offers substantial evidence that *O. gratissimum* protects and reduces stress, enhances stamina and endurance, increase the body’s efficient use of oxygen, boost

immune system, reduces inflammation, protects against radiation damage, lessens aging factor, supports the heart, lung and liver. It has antibiotic, antiviral and antifungal properties, enhances the efficacy of many other therapeutic treatments and provides a rich supply of anti-oxidants and other nutrients (Doughari and Manzara, 2008).

Overall, *O. gratissimum* is a major premier adaptive, helping the body and mind to adapt and cope with a wide range of physical, emotional and infectious stresses and restore disturbed physiological and psychological functions to a normal healthy state (Nakamura *et al.*, 1999; Chitwood, 2003).

Materials and Methods

The seed, leaves, stem and roots of *O.gratissimum* were collected from Wusasa and Samaru in Zaria, Kaduna State and were taken to the herbarium of the Department of Biological Science, Ahmadu Bello University Zaria, Kaduna State, for identification.

The samples of seeds, stems, leaves, roots were dried separately at room temperature to preserve the active constituents. After drying, it was pounded using mortar and stored in plastic containers until required.

Extraction and determination of phytoconstituents

75% ethanol was used for the extraction. The powdered samples of the seeds, leaves, stems and roots of *O.gratissimum* were soaked in ethanol at room temperature for 72 h. The contents were filtered with filter paper and the filtrate was evaporated with an evaporating dish in a hot water bath (Harborne, 1973).

The extracts were screened for tannins, phlobatannins, saponins, flavonoids, cardiac glycosides and alkaloids. The screening was done using methods of Sofowara (1993) and Trease and Evans (1989)

Results and Discussion

Preliminary phytochemical screening revealed the presence of alkaloids, tannins, glycosides, saponins, resins, cardiac glycosides, steroids and terpenes and flavonoids. The presence of these phytochemical bases in *Ocimum gratissimum* accounts for its usefulness as a medicinal plant. Alkaloids, Tannins and Phlobatannins are absent in seeds of *O. gratissimum* while flavonoids, saponins and cardiac glycosides are present. Flavonoids are absent in the stem of *O. gratissimum* and Alkaloids, phlobatanins, Tannins, Saponins and Cardiac glycosides were present. All other phytochemical constituents were present in both the leaves and roots of *O. gratissimum*.

Phytochemical screening of the leaves, stem and roots extracts of *Ocimum gratissimum* showed similarity in their phytoconstituents. The seeds however showed a little disparity. These are believed to be responsible for the antibacterial effects observed. Like in the treatment of diarrhoea and dysentery, some workers have also attributed to their observed antimicrobial effect of plant extracts in the presence of these secondary plant metabolites (Nweze *et al.*, 2004). This is also in agreement with the presence of tannins, alkaloids, flavonoids, terpenes, saponins, carbohydrates and cyanogenetic glycosides that was reported in the findings of Doughari and Manzara (2008). The presence of these phytochemical bases in *Ocimum gratissimum* accounts for its usefulness as medicinal plants. The secondary metabolites found in the seeds, roots, and stems have earlier been reported in the leaves as extract of *Ocimum gratissimum* (Afolabi *et al.*, 2007).

The presence or absence of some secondary metabolites in the plants extracts is usually dependent on the soil type or

environmental conditions where the plant is found growing. This may be as a result of the growing season, harvesting methods, processing and storage conditions (Sulistiarini, 1999).

The seeds of *Ocimum gratissimum* contained no alkaloids, tannins and phlobatannins while flavonoids, saponins and cardiac glycosides were present. This could be related to the environmental conditions or the nature of the soil (Table 1). Absence of flavonoids can be related to the soil nature and environmental conditions. It can also be related to the fact that flavonoids are organic pigments that gives the plants a red, violet or blue coloration.

Table 1: Phytoconstituents present in seeds, leaves, stem and roots of *Ocimum gratissimum*

Phytoconstituents	Seeds	Leaves	Stem	Roots
Alkaloids	–	+	+	+
Flavonoids	+	+	–	+
Tannins	–	+	+	+
Saponins	+	+	+	+
Cardiac glycosides	+	+	+	+
Phlobatannins	–	+	+	+

– = absent; + = present

The presence of glycosides like saponins and cardiac glycosides of which, some are known to structurally resemble sex hormones like oestrogens, gastro gens and androgens are known to protect against gastric infections caused by enteric pathogens (*Salmonella paratyphi*), thus justifying the use of this plant in traditional medicine. (El-Mahmood *et al.*, 2008). The secondary metabolites of *Ocimum gratissimum* have been demonstrated to have antibacterial (Nakaruma *et al.*, 1999) and antihelmintic activities (Possoa *et al.*, 2002).

Conclusion

The presence of alkaloids, tannins, saponins, flavonoids, cardiac glycosides and phlobatannins was observed in the leaves and roots of *Ocimum gratissimum* while the absence of flavonoids in the stem extracts was observed. The presence of these phytoconstituents could be responsible for the therapeutic claims elicited by this plant which make these plants useful as therapeutic agents in the treatment of diseases and malfunctions to humans.

The quantitative analysis of the plants parts of *Ocimum gratissimum* can be done in quantity in the knowledge of health using these plants that are commonly found in the wild and in our environment

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