

## Phytochemical Composition and Antibacterial Activities of *Ocimum Gratissimum* (L)

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### ABSTRACT

*Ocimum gratissimum* L. (*Lamiaceae*) is an herbaceous plant for many medical practices amongst Nigerian. Phytochemical and antibacterial activity of aqueous extracts of *O. gratissimum* were determined, preliminary phytochemical screening showed that leaf, stem and root extract contains, Alkaloids, tannins, Saponins and cardiac glycosides. The leaf showed no activity against *E. Coli* but the stem and the root showed inhibitory effect on the growth of *E.Coli* while the leaf and stem showed inhibitory effect on growth of *S. Pneumoniae* but the root shows no inhibitory effect. The strongest activity was found at concentration of 120mg/ml of the extracts but less efficacious at 30mg/ml. The study Elucidate that *O. gratissimum* posses vital components of strong inhibitory effect on bacteria pathogens and may be recommended for use in the management of gram negative bacterial infection

**Keywords:** Antibacterial, *E. Coli*, *S. Pneumoniae*, *O. gratissimum*, phytochemical.

### INTRODUCTION

Traditional medicine continues to provide health, coverage for over 80% of the world population of the developing world plants are the major constituents of traditional medicine [1]. They have contributed immensely to health care in Nigeria. This is due part to the recognition of the values of traditional medical system, particularly in Asian origin and the identification of medical

plant from indigenous pharmacopoeias which have significant healing power. Among all families of the plant Kingdom, members of the *lamiaceae* have been use for centuries in folk medicine. *Ocimum gratissimum* commonly known as 'Doddoya' is naturally used in the treatment of different diseases such as upper respiratory tract infections, diarrhoea headache, fever, ophthalmic, skin disease,

asthma, pneumonia, bronchitis, urogenital infection including sexually transmitted infections (dermatitis, scabies), wound, and ulcer, bleeding, stroke and measles [2,3,4,5 & 6]. Many species of the genus *ocimum*; *ocimum americanum*, *ocimum basicum* linn, *ocimum viride*, *ocimum sauve* linn. *O. cernuus*, *O. sanctum* and *O. gratissimum* have been reported for their numerous medical uses [7].

*O. gratissimum* proved to be a useful medication for people living with Human Immune Deficiency Virus (HIV) and acquired immune deficiency syndrome virus (AIDs) in according to the recent studies reported by [8]. It is said to have properties such as tannins and sweet smelling volatile oil known to have antibacterial agent. The volatile oil also stops spasm, the hyperactivity of the gastrointestinal tract [8]. The onset of pneumonia is usually preceded by influenza like symptoms, is an infection of lungs that is caused mostly by bacteria *streptococcus pneumoniae*. It characterized mostly by inflammation of the alveoli in the lungs or by alveoli that are filled with fluid. Other causative agents of this disease are *klebsella pneumomae*, *Escherichia coli* and *Chlamydia pneumoniae*. In view of economic importance of traditional medicine, the study was conducted to determine the active principle

contains in the leaf, stem and the root of *O. gratissimum* that possess pharmacological activity against the growth of *Streptococcus pneumoniae* and *Escherichia coli*.

## MATERIALS AND METHODS

### Collection of Plants Material

The fresh leaf, stem and root of *ocimum gratissimum* were collected from Makera village of Usmanu Dainfodiyo University, Sokoto State. The Plant was identified at herbarium of a biological sciences Department, Usmanu Dainfodiyo University, Sokoto State. They were dried under a shade and later pulverized into powdered.

### Extraction of Plant Material

25g of the plant parts were dissolved in 200ml of distilled water and kept to settle and filtered using Muslim cloth. The water extracts were used for phytochemical screening [9].

### Phytochemical Analysis

#### Test for Alkaloids

2g of each of leaf, stem and root was dissolved in 20mls of 1% aqueous hydrochloric acid in steam bath for 20 minutes. 1ml of the filtrate was treated with few drops of Mayer's reagent turbidity or precipitate indicate the presence of alkaloids [9].

#### Test for Tannins and Glycosides

2g of each on the table plant part was boiled for 7-10 minutes with

20ml of distilled water and filtered 2ml of the filtrate was treated with few drops of 50% ferric chloride solution. The colour produced is noted, condensed tannins give dark green color while hydrosable tannins give blue black <sup>[9]</sup>.

#### **Test for Saponins**

2g of each of the plant part was placed into a beaker 20ml of distilled water was added and heated to boil for 3 minutes. It was filtered while hot and allowed to cool, following test was conducted.

#### **Frothing Test**

1ml of the filtrate was placed in a test tube and shaken vigorously formation of froth that lasted for several minutes confirmed the presence of Saponins <sup>[9]</sup>.

#### **Emulsifying Test**

5ml of the extracts was diluted to 10ml with distilled water 5ml of the above mixture was placed in test tube. 5ml of olive oil was added and shake vigorously for half of a minute formation of a thick white emulsion indicate the presences of saponin <sup>[9]</sup>.

#### **Extracts of Antibacterial Activity**

The samples each of the leaf, stem and root of *O. gratissimum* plant; 1.5, 3.0, 4.5 and 6.0g were placed in a test tube, 10ml of distilled water was added to give different

concentrated (30, 60, 90 and 120mg/ml). The same concentrations were prepared using tetracycline as a standard control.

#### **Bacteria Culture**

Isolate of bacterial pathogens *E.coli* and *S. pneumoniae* were obtained from microbiology laboratory of department of biological sciences Usmanu Dainfodiyo University, sokoto state.

#### **Antibacterial Test**

The antibacterial tests of the plant extracts were tested on the isolate using disc diffusion method described by (Bauer, 1993). The grams of the plant parts leaf, stem and root; 1.5, 3.0, 4.5 and 6.0g were dissolved in 10ml of distilled water to give the concentrations of 30, 60, 90 and 120mg/ml respectively and autoclaved. Similar concentration of standard control (tetracycline) was prepared. Disc of variable concentrations of the prepared extracts were incorporated into mueller Hinton Agar medium and allowed to solidify. Sensitivity was determined by the absence of growth on or around the plate.

## **RESULTS**

#### **Phytochemical Analysis**

*O. gratissimum* extracts of leaf, stem and root showed that the plant contained the active ingredients

tested such as Alkaloids Tannins, Saponins and cardiac glycosides as shown in the table 3.1 below. Similarly table 3.2 showed antibacterial activities of *O. gratissimum*. Extract of leaf of *O. gratissimum* has no inhibitory effect on the growth of *E. coli*, at 30, 60, 90 and 120mg/ml but inhibits the growth of *S. pneumoniae* at all concentrations. The stem extract of *O. gratissimum* showed no inhibitory activity on the growth of *E. coli* at 30 and 60mg/ml but has effect on

the growth at 90 and 120mg/ml but has inhibitory activity against *S. pneumoniae* at all concentrations. The root extract of the plant showed high inhibitory effect against the isolate *E.Coli* at 60, 90 and 120mg/ml but does not inhibit the growth of *S. pneumoniae* at all concentration when compared with tetracycline a standard control, the leaf extract and stem was found to have more inhibitory effect than tetracycline at 120mg/ml on the growth of *S. pneumoniae*.

**Table 3.1: Phytochemical Compositions of Leaf, Stem and Root of *O. gratissimum* (L)**

Plan Part	Chemical Compositions			
	Alkaloids	Tannins	Saponins	Cardiac Glycoside
Leaf	+	+	+	+
Stem	+	+	+	+
Root	+	+	+	+

Key: += Presence, - = Absence

Table 3.2: Antibacterial activity of Aqueous extracts of Leaf, Stem and Root of *O. gratissimum* (L)

Plant part/ control	Conc. (mg/ml)	Bacteria/Diameter of Growth Inhibition (mm)	
		<i>E. coli</i>	<i>S. pneumoniae</i>
Leaf	30	-	1
	60	-	2
	90	-	3
	120	-	4
Stem	30	-	1
	60	-	2
	90	3	4
	120	3	6
Root	30	1	-
	60	3	-
	90	3	-
	120	3	-
Tetracycline	30	3	4
	60	4	3
	90	4	2
	120	5	3

KEY: - NO Inhibition (Resistance)

+ = Inhibition

Value 1mm = Inhibition (Complete Inhibition)

## DISCUSSION

In the present study the antibacterial activity and Phytochemical screening of leaf, stem and root of *ocimum gratissimum* on *Escherichia coli* and *Streptococcus pneumoniae* were studied. The results obtained from the study showed that aqueous extracts of all the plant parts inhibited the growth of the test isolate at varying concentration. This

is similar to the finding of many scientists <sup>[10, 11 & 12]</sup>; who proved several species and varieties of plant

of the genus *ocimum* have chemical compounds and active principles namely: eugecnol, linol, methylcinnarrate and comphor isolated from *Ocimum gratissimum* to possessed antimicrobial activities. Similar finding was reported by <sup>[13]</sup> for the fungistatic properties of the plant. The plant has also been

reported by [14, 15 & 16] to have antibacterial activity and the antifungal activity which may be similar to this finding.

Similarly The antibacterial activity of *Ocimum gratissimum* due to the presence of active principles that may possess pharmacological activity against the growth of bacteria species such as *Listeria monocytogenes* have also been reported by [16]. The preliminary phytochemical screening revealed the presence of alkaloids, Tannins, Cardiac Glycosides, and saponins, these are believed to be responsible for the observed antibacterial effect. Some workers also attributed to their observed antimicrobial effect of the plant extracts to the presence of secondary plant metabolites [17]. The presence of these phytochemical bases in *O. gratissimum* accounts for its usefulness as a medicinal plant.

## CONCLUSION

The invitro study of *Ocimum gratissimum* has no doubt been confined to have antibacterial components inhibiting the growth of *E. coli* and *S. pneumoniae* and it may be recommended for use in the treatment of infections caused by *Escherichia coli* and *Streptococcus pneumoniae*.

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