



Antibacterial Potential of *Ocimum Gratissimum* Leaf Extracts

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ABSTRACT

Ethanol extract of the leaves of *Ocimum gratissimum* was screened for its antibacterial properties against *Escherichia coli*, *Pseudomonas* sp., *Klebsiella pneumoniae*, *Shigella sonnei* and *Staphylococcus aureus* at varying concentrations (50, 100, 150, 200 and 250µl). The Agar gel diffusion method was used to assay for the antibacterial properties on the test isolates. The ethanolic extracts at different concentrations inhibited the growth of all the test cultures with higher degree of inhibition noted in *Escherichia coli* at the concentration of 100µl. The concentration of 100µl inhibited the isolate with highest zone of inhibition (25.0 mm).

Keywords: Antimicrobial activity, *Ocimum gratissimum*, Ethanolic extract.

INTRODUCTION

In spite of great advances observed in modern medicine, plants still make an important contribution to health care. This is due to the recognition of the value of traditional medical systems, particularly of Asian origin, and the identification of medicinal plants from indigenous pharmacopoeias, which have significant healing power.

Medicinal plants are distributed worldwide, but they are most abundant in tropical countries^{1, 2}. In Brazil alone, about 80,000 species of higher plants were described which offer enormous prospects for discovering new compounds with therapeutic property³. Among all families of the plant kingdom, members of the Lamiaceae have been used for centuries in folk medicine.

The present study was aimed at elucidating the antibacterial properties of the ethanolic leaf extract of *Ocimum gratissimum* against five different bacteria viz., *Escherichia coli*, *Pseudomonas* sp, *Klebsiella pneumoniae*, *Shigella sonnei* and *Staphylococcus aureus*.

MATERIALS AND METHODS

Ocimum gratissimum L. (Labiatae) is widely distributed in tropical and warm temperature regions. The plant is commonly used in folk medicine to treat different diseases, e.g. upper respiratory tract infections, diarrhoea, headache, ophthalmic, skin diseases, pneumonia and also as a treatment for cough, fever, and conjunctivitis^{4, 5}. Its greatest variability occurs in tropical Africa, where it probably has its origin and India⁶. The leaves of the plant, which are highly appreciated for their pleasant aroma are used as seasoning and are eaten as a vegetable. The plant has interesting medicinal properties⁷, while its essential oils have been extensively investigated⁸, little is known about its nutritional composition and antimicrobial activity.

Moreover, a lot of work has been done to show the antimicrobial properties of this plant to some selected pathogens. For example, *O. gratissimum* has been reported to be active against several species of bacteria and fungi^{3, 9}.

Extraction

The dried leaves were milled into a fine powder, using a Waring blender. The ethanol extract of the active ingredient of the leaves were carried out using the method as described previously¹⁰. 25 g of the grinded fresh leaves were soxhlet extracted using 250 ml of 95% ethanol. The extract was sterilised, using a membrane filtration unit (Sartorius). The resulting sterile filtrate was aseptically transferred into a labelled sterile bottle.

Antibacterial assay

The following bacteria were used in this study; *Escherichia coli*, *Pseudomonas* sp, *Klebsiella pneumoniae*, *Shigella sonnei* and *Staphylococcus aureus*. These organisms were collected from the Microbial Type Culture Collection Centre, Chandigarh. Cultures of these bacteria were grown in nutrient agar at 37°C and maintained on slopes of nutrient agar. Each of the organisms was transferred into a separate test-tube containing nutrient broth to reactivate them by culturing overnight at 37°C. The prepared ethanolic extract of the leaves of *O. gratissimum* was tested for antimicrobial activity against the test organisms using the agar diffusion method of^[11]. The concentrations of ethanolic extracts used were 50, 100, 150, 200 and 250µl. The organisms were used to seed different nutrient agar plates; one organism per plate, wells were made on the plates with a sterile cork borer of 6 mm diameter to contain the different concentration of the extract and the plates were incubated at 37°C for 24 h. The zones of inhibition were measured at the end of the incubation period.

RESULTS AND DISCUSSION

Following the extraction of the leaves of *O. gratissimum* using ethanol, the antimicrobial activities of the extract against various bacteria were determined. Table 1 shows the antimicrobial activity of the different concentration of the extract on the selected bacteria. Of all the different concentrations used, 100µl inhibited the growth of the *Escherichia coli* with diameter of zone of inhibition of 25.0mm and 150µl inhibited the growth of *Klebsiella pneumoniae* with an inhibitory zone of 22.0mm.

The anti-diarrhoeal activities of leaf extracts of *O. gratissimum* investigated by disc diffusion and tube dilution methods have been reported¹². These authors have shown that the extracts were active against *Aeromonas sobria*, *E.coli*, *P. shigelloides*, *S. typhi* and *S.*

dysenteriae. They have also shown that the MIC for those organisms ranged from 8 to 50 mg/ml, while the MBC were from 8 to 62 mg/ml.

Recent studies on *Ocimum gratissimum* proved to be a useful medication for people living with Human Immuno deficiency Virus (HIV), and Acquired Immuno Deficiency Syndrome virus (AIDS)¹³. The volatile oil also stops spasm, the hyperactivity of the gastrointestinal tract, by combining with the antibacterial activity and thus lowers the amount of times the muscle of the stomach and gastrointestinal tracts contracts stopping the diarrhoea¹³ that are usually adverse for most other pathogenic bacteria. It can be isolated from soil, silage and other environmental sources¹⁴.

Table 1: Antibacterial activity of ethanolic leaf extract of *Ocimum gratissimum*

Concentration of extract (µl)	Zone of inhibition (mm)				
	<i>Escherichia coli</i>	<i>K.pneumoniae</i>	<i>Pseudomonas sp</i>	<i>Shigella sonnei</i>	<i>Staph. Aureus</i>
50	20	18	15	16	15
100	25	21	16	17	17
150	27	22	18	19	18
200	28	24	19	20	19
250	30	26	20	21	21

The study has showed that the ethanolic leaf extracts of *Ocimum gratissimum* exhibited antibacterial effect against the tested isolates. The use of this plant and its derivatives for the primary purpose of treating diseases will be of interest for further study.

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