



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.03

TPI 2020; 9(1): 460-462

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www.thepharmajournal.com

Received: 10-11-2019

Accepted: 14-12-2019

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Phytochemical analysis & antimicrobial activity of the leaves of *Ocimum sanctum*

Anurag Singh, Anu Singh, Jyoti Singh and Maruti Prasad Singh

Abstract

Ocimum sanctum are commonly known as basil or tulsi. Several phytochemical constituent of tulsi has been reported such as Oleonic acid, eugenol, carvacrol, linalool and β caryophyllene. *Ocimum sanctum* contains phenols, tannins, flavonoids, glycosides, steroids, carbohydrates, and saponin. Tulsi has been used in Ayurvedic medicine to improve the body's immunities to cope with stress and disease. Due to presence of these secondary metabolites, it is used in treating respiratory ailments, stomach problem and heart disease. The study was performed to analyze the antimicrobial activity of the leaves of *Ocimum sanctum* against bacterial strain viz. *Staphylococcus aureus* *Pseudomonas aeruginosa*. Antimicrobial study was carried out by disc diffusion methods by calculating inhibition zone against the bacteria.

Keywords: Antibacterial, phytochemicals, zone inhibition, secondary metabolites

Introduction

Ocimum sanctum or holy basil is an aromatic plant that is native to the tropics of Asia and Africa and is wide spread as a cultivated plant and weed. It is a small shrub with many branches and strongly scented green leaves. *Ocimum sanctum* is cultivated for medical and religious purpose and for its healing properties^[3].

Ocimum sanctum is known as a general vitalizer and increases physical endurance. It contains no caffeine or other stimulant. The stem and leaves of holy basil contain a variety of constituents that may have biological activity, including saponins, flavonoids, triterpenoids and tannins. In addition some phenolic activities have been identified which also exhibit antioxidant and antiinflammatory activities^[4]. Two water soluble flavonoids Orientin and Vicenin have shown to provide protection against radiation. Induced chromosomal damage in human blood lymphocytes.

Ethanol extract of *Ocimum sanctum* significantly decreases blood Glucose level. The constituents of *Ocimum sanctum* leaf extracts have stimulatory effect on physiological pathway of insulin secretion which are reported as antidiabetic action^[5]. The therapeutic efficiency of *ocimum sanctum* is well considered in the field of medicine to treat various disease to all over world it is used for the prevention and treatment of Asthma and Common cold. It appears to have antistress action. Clinical studies suggest the potential for beneficial effect in disease like cancer and lung infection. Therefore the present study was carried out to investigate the phytoconstituent and antibacterial activity of *Ocimum sanctum* against *E coli* *staphylococcus aureus* and *pseudomonas aeruginosa*^[6].

Material and Method**Collection of Plant material**

The leaves of *Ocimum sanctum* were collected from Department of Ayurveda IMS, BHU, Varanasi. The material was shade dried pulverized and preserved in air tight containers.

Soxhlet extraction of plant material

The leaves of *Ocimum sanctum* plants were shade dried and pulverized 250g of powdered material was packed in soxhlet apparatus and subjected to continuous percolation for 8h using 450ml methanol as solvent. The methanol extract was concentrated under vacuum and dried in desiccators and then submitted to lyophilization in order to remove solvent completely to produce powdered form of extract so that it can retain satisfactory pharmacological activity during long term storage. The weight of dried mass is recorded and used for experimental studies.

The yield was 5.9% with respect to dry starting material with characteristics odour & greasy consistency.

Phytochemical analysis

The phytochemical screening of the leaf extract of *Ocimum sanctum* was done. Quantitatively and qualitatively to reveal the presence of phytoconstituents such as flavonoids, triterpenoids, saponins and phenolic compounds according to phytochemical method.

Antimicrobial activities

The methanol leaf extract of *Ocimum sanctum* were tested by the disc diffusion method. Different concentration of the extracts was prepared by reconstituting with methanol. The test microorganisms were seeded in to respective medium by spread plate method.

With the 24hr culture of bacteria growth in nutrient broth after solidification the filter paper discs (5mm in diameter). Impregnated with extracts were placed on test organism seeded *E.coli* were used for antibacterial test streptomycin sulphate uses as positive control and methanol solvent used as negative control the antibacterial assay plates incubates at 37 °C 24hrs. The diameter of the inhibition zones measured in mm.

Results

Antimicrobial activity of the leaves of *Ocimum sanctum*

Qualitative and Quantitative analysis of the phytochemicals in the leaves of *Ocimum sanctum*

Qualitative and quantitative analysis of the leaves of *Ocimum sanctum* revealed the presence of phenols, saponins, tannins and terpenes. Quantitative estimations of bioactive constituents are summarized in table. The presence of these phytochemicals in the leaves of *Ocimum sanctum* makes it medically and therapeutically important.

Table 1: Qualitative and Quantitative analysis of the phytochemicals in the leaves of *Ocimum sanctum*

Bioactive constituents	Presence	Quantity in gram%(w/w)
Carbohydrate	+	0.26±0.12
Alkaloids	+	1.14±0.17
Steroids	+	1.18±0.14
Saponins	+	2.23±0.89
Tannins	+	1.07±0.11
Flavonoids	+	1.19±0.18
Phenols	+	1.27±0.20
Lipds	+	1.31±0.14
Proteins	+	1.37±0.64

Antimicrobial activity of leaves of *Ocimum sanctum*

In our result the anti microbial activity o the methodic plant extract of OS (leaf extract). At the dose of OS 30, is create maximum zone of inhibition against the gram positive bacteria (*Staphylococcus aureus*) and create minimum zone of inhibition against the gram negative bacteria (*Pseudomonas aeruginosa* & *Escherichia coli*). Then we see that the OS30, is most effected on the *Staphylococcus aureus* and the less effected on the *Pseudomonas aeruginosa* & the *Escherichia coli*. At the dose of OS60, is create maximum zone of inhibition against the gram positive bacteria (*Staphylococcus aureus*) and create minimum zone of inhibition against the gram negative bacteria (*Pseudomonas aeruginosa* & *Escherichia coli*). Then we see that at the dose OS60, is most effected on the *Staphylococcus aureus* and the less effected

on the *Pseudomonas aeruginosa* & the *Escherichia coli*. At the dose of OS 120, is create maximum zone of inhibition against the gram negative bacteria (*Pseudomonas aeruginosa*) and create minimum zone of inhibition against the gram positive bacteria (*Staphylococcus aureus*) and create less zone of inhibition against the gram negative bacteria (*Escherichia coli*). Then we see that the at the dose of OS 120, is most effected on the *Pseudomonas aeruginosa* and the less effected on the *Staphylococcus aureus* & the *Escherichia coli*.

Table 2: Antimicrobial activity of leaves of *Ocimum sanctum* against *Escherichia coli*, *Streptococcus aureus*, *Pseudomonas aeruginosa* by using streptomycin as a positive control

Group	Zone of inhibition (in mm)		
	<i>Escherichia coli</i>	<i>Staphylococcus aureus</i>	<i>Pseudomonas aeruginosa</i>
Control	00 ±00	00 ±00	00 ±00
Streptomycin	19.1 ±0.56	23.5 ±0.61	21.5 ±0.45
OS30	16.4 ±0.53	16.3 ±0.63	12.8 ±0.56
OS60	12.4 ±0.57	14.4 ±0.65	15.4 ±0.25
OS120	14.4 ±0.58	15.5 ±0.53	16.4 ±0.54

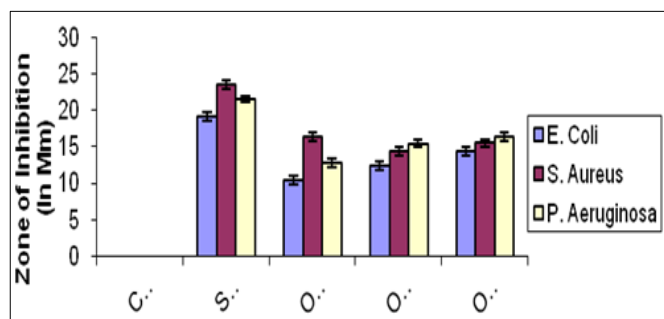


Fig 1: Antimicrobial activity of methanolic extract of leaves of *Ocimum sanctum* with antibiotic streptomycin as positive control

Table 3: Antimicrobial activity of the leaves of *Ocimum Sanctum* against *Escherichia coli*, *Streptococcus aureus*, *Pseudomonas aeruginosa* by using streptomycin as a positive control

Group	Zone of inhibition (in mm)		
	<i>Escherichia coli</i>	<i>S. aureus</i>	<i>P. aeruginosa</i>
Control	00±00	00±00	00±00
Tetracyclin	22.4±0.56	22.5±0.64	17.5±0.44
OS30	12.4±0.52	11.4±0.63	9.8±0.45
OS60	15.6±0.57	13.3±0.66	13.6±0.56
OS120	16.3±0.59	18.1±0.53	14.6±0.54

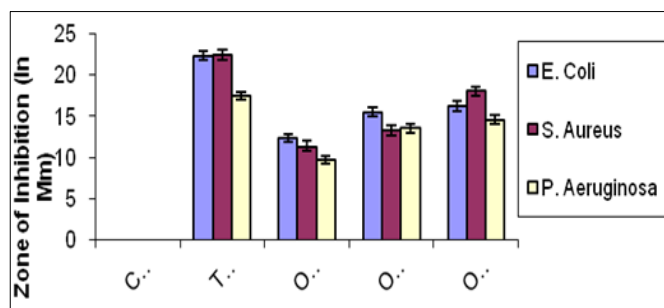


Fig 2: Antimicrobial activity of methanolic extract of the leaves of *Ocimum sanctum* with antibiotic streptomycin as positive control

Discussion

It has been seen that the use of *Ocimum sanctum* plant material as an alternative methods to control pathogen, and many components of plant product have been shown to be

spOecially targeted against resistance pathogenic bacteria. It has many secondary metabolites that have shows their antimicrobial activity. Secondary metabolite have their own antimicrobial effect on bacteria and fungi. Some secondary metabolites are phenolic acid, quinone flavonoids, flavones, tannins coumarin terpenoids and essential oils, alkaloids, lectins and polypeptides and poly acetylenes. The plant based product have been effectively proven for their utilization as source for antimicrobial compound. The methanol leaf extract of medicinal plant were active against staphylococcus species [6].

Conclusions

There are thousands of herbal plant in the world but the *Ocimum sanctum* is considered as queen of herbs. The present investigation revealed that the extracts of *Ocimum sanctum* leaf have potent antimicrobial activity which explains its use in traditional system of medicines. The extracts of *Ocimum sanctum* were found to be more or less active against all tested pathogenic strains. Hence *Ocimum sanctum* can be employed as a source of natural antimicrobial that can serve as an alternative to conventional medicines traditionally crude extracts of various part of plant have been used for their analgesic, antiasthmatic, anti-stress, anti-hyper lipidemic and anti-bacterial properties. Future research on search basis should be explored as significant remedy regarding neuropsychological disorder for the welfare and service of mankind.

Acknowledgment

We are very thankful to the Department of Ethanopharmacology National Institute of Natural Resources and Biomedical Research Center (NBRC), Varanasi, U.P. India for providing Laboratory facility to carry out this work.

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