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**Ashish Rai**Dr. C. V. Raman University,  
Bilaspur, Chhattisgarh, India**Anurag Singh**Department of Biotechnology,  
Dr. Ghanshyam Singh PG  
College, M.G.K.V. University,  
Varanasi, Uttar Pradesh, India**Amit Sharma**Dr. C. V. Raman University,  
Bilaspur, Chhattisgarh, India

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

**Ashish Rai, Anurag Singh and Amit Sharma**

**Abstract**

*Ocimum sanctum* are known as basil or Tulsi, is an aromatic perennial plant in the family of Lamiaceae. Some of the phytochemical constituent of Tulsi are oleanolic acid, eugenol, carvacrol, linalool,  $\beta$  caryophyllene (About 8%). Tulsi essential oil consist mostly of eugenol (70%)  $\beta$  elemene (11.0%)  $\beta$  caryophyllene (8%) and germacrene (2%) with the balance being made up of various trace compound, mostly terpenes. Phytochemical are compound made by plant that have antioxidant or hormone like actions. Tulsi contains phenols, tannins, flavonoids, Glycosides, Steroids, carbohydrates, Aminoacid, Saponin, fixed oil and resins has been used medicinally for thousands of years. Tulsi has been used in Ayurvedic medicine as an adaptogenic herb to improve the body's ability to cope with stress and disease. The herb has been used to treat respiratory ailments, stomach problem, heart disease and even also showing antimicrobial properties. An attempt was made to analyse the antimicrobial activity of *Ocimum sanctum* leaf extract against bacterial strain viz. *Staphylococcus aureus* *Pseudomonas aeruginosa*. Antimicrobial study was carried out by liquid inhibition test method against the bacteria by using methanolic extract of *Ocimum sanctum*.

**Keywords:** Antibacterial, phytochemicals, zone inhibition test

**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 holybasil 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. 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. 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 Commoncold. 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 *Ecoli staphylococcus aureus* and *pseudomonas aeruginosa*.

**Material and Method****Collection of Plant material**

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

**Soxhlet extraction of plantmaterial**

The leaves of *Oscimum sanctum* plants were shade dried and pulverized 250g of powdered material was packed in soxhlet apparatus and subjected to continuous percolation for 8h using 450 ml methanol as solvent. The methanol extract was concentrated under vaccum and dried in desicators and then submitted to lyophilization in order to remove solvent completely to

**Corresponding Author:****Ashish Rai**Dr. C. V. Raman University,  
Bilaspur, Chhattisgarh, India

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*

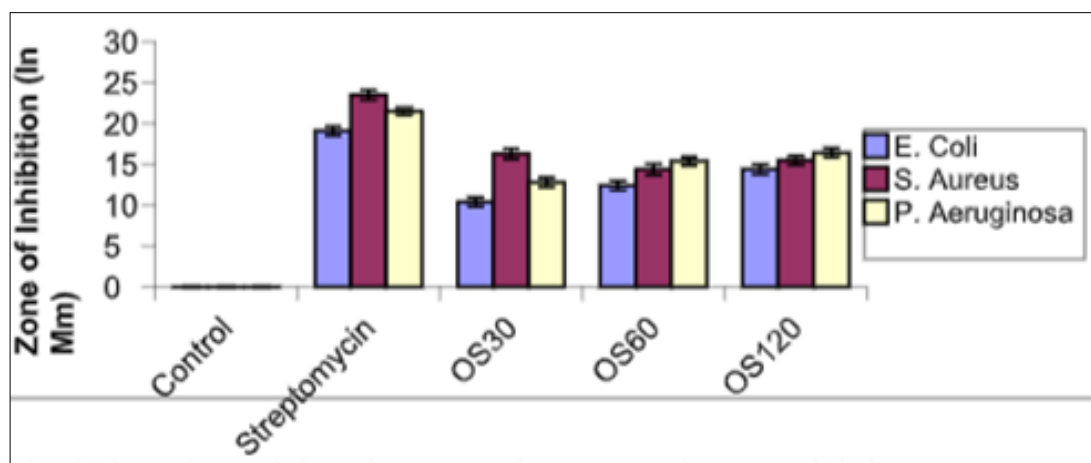
Qualitative and quantitative analysis of the leaves of *Ocimum sanctum* revealed the presence of phenols, saponins, tannins and terpenes. Quantitative estimations of bioactive constituents are summarized in table. The presence of these phytochemicals (Table-1) in the leaves of *Ocimum sanctum* makes 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
Lipids	+	1.31±0.14
Proteins	+	1.37±0.64

#### Antimicrobial activity of leaves of *Ocimum sanctum*

In our result the anti-microbial activity of the methanolic 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 aeruginosa*) 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*. (Figure-1)



**Fig 1:** Antimicrobial activity of methanolic extract of 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 specially 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 (Chopra *et al.*, 1993).

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.

### 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, antihyper lipidemic and antibacterial properties 9 (Sen., 1993). Future research on search basis should be explored as significant remedy regarding neuropsychological disorder for the welfare and service of mankind.

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