

# The Journal of Phytopharmacology

(Pharmacognosy and phytomedicine Research)

## Review Article

ISSN 2230-480X  
JPHYTO 2016; 5(5): 205-207  
September- October  
© 2016, All rights reserved

Sunita Verma  
Maharaja Ganga Singh University,  
Bikaner, Rajasthan 334001, India

## Chemical constituents and pharmacological action of *Ocimum sanctum* (Indian holy basil-Tulsi)

Sunita Verma\*

### ABSTRACT

The plant of *Ocimum sanctum* commonly known as “Tulsi”, belong to Lamiaceae family. It is an erect, much branched, fragrant and erected plant attaining a height of about 20-50 cm. Different parts of the plant are used in Ayurveda and Siddha systems of medicine for prevention and cure of many illnesses like cough, influenza, common cold, headache, fever, colic pain, bronchitis, asthma, hepatic diseases, fatigue, skin diseases, arthritis, digestive disorders. The present paper is an attempt to provide a detailed botanical description, taxonomy, traditionally used and various pharmacological activity study of the plant.

**Keywords:** Cough, Fever, Fatigue, Phytochemical, Medicinal.

### INTRODUCTION

Ayurveda is a system of traditional Hindu medicine which is native to India and is renowned as one of the major systems of alternative and complementary medicine. According to Hindu mythology, Dhanvantari, the physician of the God's, is attributed with the origin of ayurvedic medicine. Ayurveda traces its origin to the Vedas particularly Atharvaveda and it stresses the use of indigenous plant based medicines for the treatment of diseases<sup>[1]</sup>.

*Tulsi* “Queen of herbs” is described as sacred and medicinal plant in ancient literature. It is an important symbol of the Hindu religious tradition. The name *Tulsi* is derived from ‘Sanskrit’, which means “matchless one”<sup>[2]</sup>. Its other name, Vishnupriya means the one that pleases Lord Vishnu. This plant belongs to the family *Labiatae*, characterized by square stem and specific aroma. Botanical name of *Tulsi* is *Ocimum sanctum* (Linn). In India, the plant is grown throughout the country from Andaman and Nicobar islands to the Himalayas up to 1800 meters above the sea level<sup>[3]</sup>. It is also abundantly found in Malaysia, Australia, West Africa and some of the Arab countries. *Ocimum sanctum* (Linn) is the most prominent species of the genera. The leaves of the plant are considered to be very holy and often form a consistent part of the Hindu spiritual rituals (*Tirtha* or *Prasada*). *Ocimum sanctum* has two varieties i.e. black (*Krishna Tulsi*) and green (*Rama Tulsi*), their chemical constituents are similar. Both the varieties also have common medicinal properties<sup>[4]</sup>.

### TAXONOMY

Kingdom : Plantae  
Subkingdom : Tracheobionta  
Superdivision : Spermatophyta  
Division : Magnoliophyta  
Class : Magnoliopsida  
Subclass : Asteridae  
Order : Lamiales  
Family : Lamiaceae  
Genus : *Ocimum*  
Species : *O. sanctum*

### Correspondence:

Sunita Verma  
Maharaja Ganga Singh University,  
Bikaner, Rajasthan 334001, India  
Email: vermas.bot[at]gmail.com



Figure 1: Plant of *Ocimum sanctum* (Tulsi)

## BOTANICAL DESCRIPTION

It is an erect, much branched, fragrant and erected plant attaining a height of about 30-60 cm when mature. Its aromatic leaves are simple, opposite, elliptic, oblong, obtuse or acute with entire or sub serrate or dentate margins, growing up to 5 cm long. The Tulsi flowers are small having purple to reddish color, present in small compact clusters on cylindrical spikes. Stalk less heart-shaped bracts are there at the base of each flower cluster. Sepal cup is not hairy within. Flowers are rarely longer than 5 mm, calyx tube bearded outside near base. Flower tube is hairy. The fruits are small and the seeds yellow to reddish in colour<sup>[5]</sup>.

## PHYTOCHEMICAL

Fresh leaves and stem of *Ocimum sanctum* extract yielded some phenolic compounds (antioxidants) such as cirsilineol, circimaritin, isothymusin, apigenin and rosameric acid, and appreciable quantities of eugenol. The leaves of *Ocimum sanctum* contain 0.7% volatile oil comprising about 71% eugenol and 20% methyl eugenol. The oil also contains carvacrol and sesquiterpine hydrocarbon caryophyllene<sup>[6]</sup>. Two flavonoids orientin and andvicenin from aqueous leaf extract of *Ocimum sanctum* have been isolated<sup>[7]</sup>.

## TRADITIONAL USES

Tulsi is also known as "the elixir of life" since it promotes longevity. Different parts of the plant are used in Ayurveda and Siddha systems of medicine for prevention and cure of many illnesses and everyday ailments like common cold, headache, cough, influenza, earache, fever, colic pain, sore throat, bronchitis, asthma, hepatic diseases, malarial fever, as an antidote for snake bite and scorpion sting, flatulence, migraine headaches, fatigue, skin diseases, wound, insomnia, arthritis, digestive disorders, night blindness and diarrhoea. The leaves are good for nerves and to sharpen memory. Chewing of tulsi leaves also cures ulcers and infections of mouth<sup>[8]</sup>. A few leaves dropped in drinking water or food stuff can purify it and can kill germs in it. Holy Basil is so good for boosting up the immune system. It protects from nearly all sorts of infections from viruses, bacteria, fungi and protozoa. Recent studies show that it is also helpful in inhibiting the growth of HIV and carcinogenic cells<sup>[9]</sup>.

## PHARMACOLOGICAL ACTIVITY

### Anticancer activity

In ayurveda, various plants are used as a potential source of anticancer and antitumor properties. It has been found that ethanolic extract of

*Ocimum sanctum* mediated a significant reduction in tumor cell size and an increase in lifespan of mice having Sarcoma-180 solid tumors<sup>[10]</sup>. Similar results were also obtained by others where leaf extract administered orally (200 mg/kg, p.o.) resulted in significant reduction in tumor volume, increase in average body weight, and survival rate of mice<sup>[11]</sup>. *Ocimum* has the ability to protect the DNA of the body from dangerous radiations<sup>[12]</sup>.

### Antidiabetic activity

*O. sanctum* has been reported to possess very good anti diabetic properties. The anti-diabetic activity of hydroalcoholic extract of *O. tenuiflorum* against streptozotocin and nicotimanide induced diabetes in rats was found to be significant at the dose levels of 250 and 500 mg/kg body weight and this effect was comparable with glibenclamide<sup>[13]</sup>. Hyperglycaemia was shown to be reduced in alloxan diabetic rats when administered ethanol extract of *O. sanctum* in both acute and long-term feeding studies<sup>[14]</sup>. In another study by J M A Hannan *et al.* prominent insulin-secretory effects were noted in the rat pancreas perfused with the ethanol extract and three partition (ethylacetate, butanol and aqueous) fractions of *O. sanctum*. Similar effects were found in acute insulin-release studies using isolated rat islets<sup>[15]</sup>.

### Antilipidemic activity

Hyperlipidaemia, atherosclerosis and related diseases are becoming a major health problem now days. Aqueous extract of *O. basilicum* reduces the level of total cholesterol, triglycerides and LDL-cholesterol levels in acute hyperlipidaemia induced by triton WR-1339 in rats<sup>[16]</sup>. In a study conducted on rabbits a diet supplemented with 1-2 % fresh leaves of Tulsi for 28 days lowered the total lipid<sup>[17]</sup>.

### Antibacterial activity

Antibacterial activity of the aqueous, alcoholic, chloroform extract and oil obtained from leaves of *Ocimum sanctum* were studied against *E.coli*, *P. aeruginosa*, *S. typhimurium* and *S. aureus*. Extract obtained from *O. sanctum* were observed equally effective against pathogenic gram-positive and gram-negative bacteria<sup>[18]</sup>. Fresh leaves essential oil had shown more antibacterial properties compared to dried leaves essential oil of *Tulsi* and in case of fungus the property is just the reverse<sup>[19]</sup>.

### Eye Disease

The leaf juice of *Ocimum sanctum* along with triphala is used in ayurvedic eye drop preparations recommended for glaucoma, chronic conjunctivitis and other painful eye disease. In daily routine one may use about three drops of tulsi oil along with honey and it is supposed to improve eye sight<sup>[20]</sup>.

### Anti fertility activity

The benzene and petroleum ether extracts of leaves of Tulsi have been reported to produce 80% and 60% antifertility activity respectively in female rats<sup>[21]</sup>. In Kerala the local women as well as the Ayurvedic physicians have been reported to use the leaves of Tulsi for antifertility effect<sup>[22]</sup>. One of the major constituents of the Tulsi leaves is ursolic acid and it has been reported that it possess anti-fertility effect. This effect has been attributed to its anti-estrogenic activity which may be responsible for arrest of spermatogenesis in males and due to inhibitory effect on implantation of ovum in females. This constituent may prove to be a promising anti-fertility agent devoid of side effects. In males, Tulsi leaves reduce spermatogenesis by retarding sertoli cells activity<sup>[23]</sup>.

## Mosquitocidal activity

Mosquitocidal activity of *Tulsi* was investigated using its eugenol and triglyceride (isolated from *Tulsi*'s hexane extract) on fourth instars *Aedes aegypti* larvae [24]. When seeds of *Tulsi* was placed in water, it exude within one hour, a mucilaginous substance (polysaccharides) and larvae which came in contact with seeds became firmly attached to it and died due to drowning of larvae [25].

## CONCLUSION

It is observed from various studies that the *Ocimum sanctum* have a number of pharmaceutical and medicinal property and according to this it is effective in the treatment of a number of diseases. Future research on sacred basil should be emphasized for control of various diseases.

## REFERENCES

1. Patwardhan B, Warude D, Pushpangadan P, Bhatt N. Ayurveda and traditional chinese medicine: A Comparative overview. Evidence-Based complementary and alternative medicine. 2005;2(4):465-473.
2. Ghosh, G.R. Tulasi (N.O. Labiatae, Genus- Ocimum) . New Approaches to Medicine and Health (NAMA). 1995;3: 23–29.
3. Anonymous. Wealth of India. Vol. 7. Publication and Information Directorate, CSIR, New Delhi. 1991;p. 79–89.
4. Das SK and Vasudevan DM. Tulsi: The Indian holy power plant. Natural Product Radiance. 2006;5:279-83.
5. Buddhadev, S.G., Buddhadev, S.S., and Mehta, N.D. A Review Article on *Ocimum sanctum* Linn. Punarna V. 2014;2(2):1-6.
6. Uma Devi P. Radioprotective, anticarcinogenic and antioxidant properties of the Indian holy basil, *Ocimum sanctum* (Tulasi). Indian J Exp Biol. 2001;39:185-190.
7. Gupta, S.K, Prakash J and Srivastava S. Validation of traditional claim of Tulsi, *Ocimum sanctum* Linn. as a medicinal plant. Indian J Exp Biol. 2002;5:765-773.
8. Prajapati N.D., Purohit S.S., Sharma A.K. and Kumar T.A. Hand book of medicinal plant. Agrobios, India, 2003;pp. 367.
9. Kumar PK, Kumar MR, Kavitha K, Singh J and Khan R. Pharmacological actions of *Ocimum sanctum*– review article. Int J Adv Pharm Biol Chem. 2012;1: 406-414.
10. Nakamura C V, Ishida K, Faccin L C, Filho B P D, Cortez D A G, Rozental S, de Souza W and Ueda-Nakamura T. *In vitro* activity of essential oil from *Ocimum gratissimum* L. against four *Candida* species. Research in Microbiology. 2004;155(7): 579-586.
11. Monga J., Sharma M., Tailor N. and Ganesh N. Antimelanoma and radioprotective activity of alcoholic aqueous extract of different species of *Ocimum* in C (57) BL mice. Pharm Biol. 2011;49:428-436.
12. Panda S and Kar A. *Ocimum sanctum* leaf extract in the regulation of thyroid function in the male mouse. Pharmacol Res. 1998;38(2): 107–110.
13. Parasuraman S, Balamurugan S, Christapher PV, Petchi RR, Yeng WY, Sujithra J, Vijaya C. Evaluation of antidiabetic and antihyperlipidemic effects of hydroalcoholic extract of leaves of *Ocimum tenuiflorum* (Lamiaceae) and Prediction of Biological Activity of its Phytoconstituents. Phcog Res. 2015;7:156-65.
14. Vats V, Grover J.K. and Rathi S.S. Evaluation of antihyperglycemic and hypoglycemic effect of *T. foenumgraecum*, *O. sanctum* and *P. marsupium* in normal and alloxanized diabetic rats. Journal of Ethnopharmacology: 2002;79: 95–100.
15. Hannan, J.M.A, Marenah, L., Ali, L., Rokeya, B., Flatt, P.R. and Abdel-Wahab, Y.H.A. *Ocimum sanctum* leaf extracts stimulate insulin secretion from perfused pancreas, isolated islets and clonal pancreatic beta cells. Journal of Endocrinology. 2006;189: 127–136.
16. Pandey BP and Anita. In: Economic Botany (Published by Chand and Company Ltd., Ramnagar, New Delhi), 1990;p. 294.
17. Paul V T , Mezui C , Enow-Orock G E, Dimo T, Nyasse B. Healing effect on chronic gastric ulcers and short term toxicity profile of the leaf methanol extract of *Ocimum suave* wild (Lamiaceae) in rats. Afr. J. Trad. CAM. 2005;2 (3): 312 – 325.
18. Mishra P. and Mishra S. Study of antibacterial activity of *Ocimum sanctum* extract against gram positive and gram negative bacteria. American J of Food Tech. 2011;6:336-341.
19. Mondal S, Mahapatra SC, Mirdha BR, Naik SN. Antimicrobial activities of essential oils obtained from fresh and dried leaves of *Ocimum sanctum* (L) against enteric bacteria and yeast. Acta Hort. 2007;756: 267–269.

20. Patil R., Patil R., Ahirwar B., and Ahirwar D. Isolation and characterization of antidiabetic component (bioactivityguided fractionation) from *Ocimum sanctum* L.(Lamiaceae) aerial part. Asian Pac J Trop Med. 2011;4:278-282.
21. Nagarajun S, Jain HC, Aulakh G.S. Indigenous plants used in fertility control. In: Cultivation and utilization of medicinal plants. Editors: Atal CK and Kapoor BM (Published by PID CSIR). 1989;pp. 558.
22. Batta, S.K, Santhakumari G. The antifertility effect of *Ocimum sanctum* and *Hibiscus Rosa Sinensis*. Indian J Medical Research, 1971;59:777–781.
23. Prakash P & Gupta N. Therapeutic use of *Ocimum sanctum* Linn (Tulsi) with a note on eugenol and its pharmacological actions: A short review. Indian Jour Physiol. Pharmacol. 2005;49(2): 125–131.
24. Kelm MA, Nair MG. Mosquitocidal compounds and triglyceride,1,3-dilinolenol-2-palmitin from *Ocimum sanctum*. J Agri Food Chem. 1998;40: 3691–3693.
25. Hasan, S.B. Deo PG. *Ocimum sanctum* seeds for mosquito control. Int Pest Control 1994;20–21.

## HOW TO CITE THIS ARTICLE

Verma S. Chemical constituents and pharmacological action of *Ocimum sanctum* (Indian holy basil-Tulsi). J Phytopharmacol 2016;5(5):205-207.