

Ocimum sanctum as an Herbal Medicine: A Review

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Tulsi, QUEEN OF HERBS, the legendary “Incomparable one” of India, is one of the holiest and most cherished of the many healing and health-giving herbs of the orient. The sacred basil Tulsi is renowned for its religious and spiritual sanctity, as well as for its important role in the traditional Ayurvedic and Unani systems of holistic health and herbal medicine of the East. An impressive array of health promoting, disease preventing and life prolonging properties of Tulsi have been described and documented over five millennia. In the past few decades, many of these benefits have been investigated and verified by modern scientific research.

The present review enlighten us about the medical and general properties of Tulsi and how it helps us in various ways to prevent various diseases as it is always said “Prevention is better than cure “.

INTRODUCTION:

Tulsi “Queen of herbs” is described as sacred and medicinal plant in ancient literature. The name *Tulsi* is derived from ‘Sanskrit’, which means “matchless one”. 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. 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.¹ Fig.1



Fig. 1 Tulsi Plant

Kingdom:	<u>Plantae</u>
(unranked):	<u>Asterids</u>
Order:	<u>Lamiales</u>
Family:	<u>Lamiaceae</u>
Genus:	<u>Ocimum</u>
Species:	<i>O.tenuiflorum</i>

Table 1: Botanical Classification of Tulsi

HISTORY

The medicinal use of plants is very old. The writings indicate that therapeutic use of plants is as old as 4000–5000 B.C. and Chinese used first metabolism and could be responsible for anti-inflammatory activity of the oil.⁵

Therapeutic uses of *Ocimum sanctum*

Various medicinal properties have been attributed to *O.sanctum*. Whole Tulsi plant has been found to possess several therapeutic properties and it is used by the medical practitioners. Flower, fruit, leaf, stem, root and for that matter almost every part of the plant is used as an expectorant, analgesic, anticancer, anti-asthmatic, anti-emetic, diaphoretic, anti-diabetic, anti-fertility, hepato-protective, hypotensive, hypo-lipidemic etc.

Tulsi as a prophylactic agent

Decoction of leaves is used against the

gastritis and hepatic disorders.⁶ The juice of fresh leaves is also given to patients to treat dysentery. In a study, it has been found that methanolic extract of *Ocimum suave* showed healing effect against chronic gastric ulcers induced in experimental rats. *Ocimum* specially, along with pepper, turmeric and onion is prophylactic against malaria. Oil is insecticidal and larvicidal. It contains: β -bisabolene (13-20%), methyl chavicol (3-19%), 1,8-cineole (9-33%), eugenol (4-9%), (E)- α -bisabolene (4-7%) and α -terpineol (1.7-7%) are the main constituents of Tulsi oil.⁷ Often, Tulsi is planted in Indian gardens as a mosquito repellent. Essential oils of Tulsi possess 100 % larvicidal property. It has been found that Tulsi has excellent anti-malarial properties as well. Eugenol is the main constituent and it is responsible for its repellent property. Paste prepared from Tulsi leaves is used against the ringworm infection. Tulsi removes worms and parasites. Tulsi extract with honey is recommended so that the parasites may be excited, thus drawing them out of their hiding places. Paste of its leaves is applied on face to clear marks.⁸ Urosolic acid present in leaves returns elasticity and removes wrinkles. Tulsi helps skin stay healthy and supple. Use of Tulsi in the treatment of all kinds of cuts, wounds and ulcers is highly beneficial. The leaf juice

of tulsi along with triphala is used as an eye tonic and is recommended for glaucoma, cataract, chronic conjunctivitis and other diseases associated with eyes. Chewing 3-4 of leaves before a meal helps stimulating the appetite, and a tea taken after a meal promotes digestion by increasing the flow of gastric juices, while reducing gas and bloating. *Ocimum sanctum* also reduces the chances of ulcers. It is an active diaphoretic common cold. It removes excess cough from lungs and nasal passages. A decoction of Tulsi leaves is a popular remedy for common cold in India. It is also given for fever along with the clove. It also lowers the uric acid levels and hence is considered as a potential anti-inflammatory agent. The leaves of basil are specific for many fevers. During the rainy season, when malaria and dengue fever are widely prevalent, tender leaves, boiled with tea, act as preventive against these diseases. In case of acute fevers, a decoction of the leaves boiled with powdered cardamom brings down the temperature, thereby it has been considered as a potential antipyretic cocktail as a home remedy. Tulsi is an important constituent of many cough syrups and expectorants. It helps to mobilize mucus in bronchitis and asthma. Chewing tulsi leaves relieves cold and flu. The leaves are nerve tonic and also sharpen memory. They promote the

removal of the catarrhal matter and phlegm from the bronchial tube. It is useful in teeth disorders and is also recommended as a remedy against pyorrhea. Also, it is used as a remedy for night blindness and conjunctivitis. Being nerve tonic the leaves are used to sharpen memory. It is a good source of antioxidants and offer substantial protection against free radical induced damage. Oxygen free radicals are natural physiological products, containing one or more unpaired electrons.⁷ Reactive oxygen species (ROS) may damage life important membrane lipids, proteins, DNA and carbohydrates.⁹ This damage has been implicated in the causation of several diseases such as liver cirrhosis, atherosclerosis, cancer, and diabetes etc.^{10,11,12,13} It has been well accepted that dietary antioxidants have great potential in ameliorating these disease processes.¹⁴ Antioxidants thus play important role in protecting the human body against damage by reacting oxygen species.⁶ It also decreases the lipid peroxidation and increases the activity of super-oxide dismutase.¹⁵ Presence of eugenol attributes to its anti-oxidative property and is also thought to be responsible for inhibition of lipid peroxidation.¹⁶ This property helps in maintaining good health and in preventing the chances occurrence of heart diseases as well as most of the other biochemical diseases because oxidative stress is the

hallmark of such diseases.¹⁷

Antibacterial, antiviral and antifungal activities

Essential oil present in most of the *Ocimum* species is responsible for its antifungal, antibacterial and antiviral properties. Microorganisms develop resistance against various antibiotics and due to this an immense clinical problem develops in treatment of infectious diseases. Medicinal plants can be used to overcome this problem. Tulsi leaves have been reported to show strong antifungal activities against the *Aspergillus* species.¹⁸ In vitro antifungal activity was also observed against *Candida* species also when oil from *O. gratissimum* L. was used.¹⁹ *Ocimum* shows strong antibacterial activity against *Klebsiella* (causes pneumonia and urinary tract infections), *E. coli*, *Proteus* & *Staphylococcus aureus* and *Vibrio cholerae*. Studies have shown *O. basilicum* act as a strong antiviral agent against DNA viruses (herpes viruses (HSV), adenoviruses (ADV) and hepatitis B virus) and RNA viruses (coxsackievirus B1 (CVB1) and enterovirus71 (EV71)).¹³ *O. tenuiflorum* also has been reported to be having antiviral activity against Bovine herpes virus -1. Essential oil from *Ocimum* sp which contain eugenol, carvacrol, methyl eugenol, caryophyllene are considered mainly to be responsible for

various antimicrobial properties.

Antidiabetic properties

Leaves of *O. sanctum* have been shown to possess hypoglycaemic effects in experimental animals.^{20,21,22,23} Decoction prepared with various parts of plant lowers the blood sugar level.²⁴ A study conducted²³ on rats has suggested that constituent of *O. sanctum* leaf extracts have stimulatory effects on physiological pathways of insulin secretion. Various studies have been performed on the antiglycemic properties of *Ocimum* but its mechanism of action has not been elucidated as yet.^{25,26} Study²⁷ conducted with tulsi plus neem has suggested that this combination is better for the diabetic patients in lowering the sugar level.

As an anticancer agent

Cancer has been a leading cause of death in the developing countries. With changing standard of living and food habits and also due to availability of curative treatment for many infectious diseases, cancer is surpassing other ailments as a principle cause of morbidity and mortality even in developing countries. Surgery, radiotherapy and chemotherapy- the established treatment modalities for various cancers are costly, mutilating, having serious side effects and associated with residual morbidity as well as frequent

relapses. In ayurveda, various plants are used as a potential source of anticancer and antitumor properties. It has been found that ethanolic extract of *O. sanctum* mediated a significant reduction in tumor cell size and an increase in lifespan of mice having Sarcoma-180 solid tumors.²⁸ Similar results were also obtained by others where anticancer activity of *O. sanctum* in Lewis lung carcinoma animal model has been reported.²⁹ Ursolic acid and oleanic acid possess anticancer property. Ocimum has the ability to protect the DNA of the body from dangerous radiations.³⁰

Antilipidemic efficacy

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.³¹ In a study conducted on rabbits a diet supplemented with 1-2 % fresh leaves of Tulsi for 28 days lowered the total lipid.³²

As an antifertility agent

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.³³ The leaves of *O. canum* have been shown to possess anti-implantation activity in experimental albino rats. Ursolic acid is responsible for its anti-sterility property.⁷ Tulsi leaves have antiandrogenic property as well. Benzene extract of *O. sanctum* in albino rats decreases the total sperm count and sperm motility.³⁴

Stress relieving agents

Stress is a common phenomenon that is experienced by every individual. Stress is defined as “non specific result of any demand upon the body”. Stress can be either physical or psychological. When stress becomes extreme, it is harmful for the body and, hence, needs to be treated. Stress is involved in the pathogenesis of a variety of diseases that includes psychiatric disorders such as depression and anxiety, immunosuppression, endocrine disorders including diabetes mellitus, male impotence, cognitive dysfunction, peptic ulcer, hypertension and ulcerative colitis. Tulsi is an excellent rejuvenator, which has been known to help

reduce stress, relax the mind and assist the body in improving memory. Tulsi has antihypoxic effect and it increases the survival time during anoxic stress.³⁵ A study conducted with rabbits has suggested that Tulsi decreased oxidative stress.³⁶

Tulsi leaves are regarded as an 'adaptogen' or anti-stress agent. Recent studies have shown that the leaves afford significant protection against stress.³⁷ If taken twice a day, Tulsi is a powerful calming herb. It also counteracts many troublesome effects of chronic stress, including nervousness, sleeplessness, and digestive disorders. Animal research has verified that extracts of Tulsi leaves prevented changes in plasma levels of the stress hormone corticosterone induced by both acute and chronic noise stress.

As an immunomodulatory agent

Tulsi strengthens the immune response by enhancing both cellular and humoral immunity. It shows anti-inflammatory action akin to aspirin but doesn't show any side effects. It reduces the pain and dangerous inflammation that leads to arthritis. Studies conducted on Freund's adjuvant induced arthritis, formaldehyde-induced arthritis and also turpentine oil-induced joint edema in rats have shown that oil of Tulsi decreased significantly the symptoms of arthritis and edema.³⁷ Fixed oil of *Ocimum sanctum* (Labiatae) was

found to possess significant anti-inflammatory activity against carrageenan- and different other mediator-induced paw edema in rats. *Ocimum sanctum* may be a useful anti-inflammatory agent which blocks both the pathways, i.e. cyclooxygenase and lipoxygenase of arachidonic acid metabolism.

CONCLUSION:

With emergence of increased resistance of microbes to different antibiotics, it is imperative that antimicrobial properties of *Tulsi* may possess promising results in theory. *Ocimum sanctum* is present in almost every parts of the Indian subcontinent and its immunomodulatory properties may be explored to provide additional immunity to mankind.

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