

## A CRITICAL REVIEW ON THERAPEUTIC USES OF *TULSI* - *OCIMUM SANCTUM L.*

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### ABSTRACT

*Tulsi*, also known as holy basil in English, is indigenous to the Indian continent and is highly respected for its medicinal uses in the Ayurvedic and Siddha medical systems. *Tulsi* is used for treatment of many diseases individually or in combination with other herbs either internally or externally. *Tulsi* have multiple therapeutic actions such as anti-inflammatory, antimicrobial, anti-viral, adaptogenic, anti-ulcer, cardio protective and immunomodulatory. Some studies have also revealed its anti-diabetic, cholesterol reducing properties. The *Rama Tulsi* is the effective in ailments of respiratory system like cold, fever, bronchitis and cough. It is also very effective in treatment of indigestion, headache, hysteria, insomnia, malaria and cholera. Recent studies suggest that *Tulsi* may be a COX-2 inhibitor, like many modern painkillers, due to its high concentration of eugenol (1-hydroxy-2-methoxy-4-allylbenzene). The oil extracted from the *Karpoora Tulsi* is mostly used in the herbal toiletry. Its oil is also used against the insects

and bacteria. *Tulsi* can not only keep flu like viral infections at bay but also help in fast recovery of an afflicted person. The anti-flu property of *Tulsi* has been discovered by medical experts across the world quite recently. *Tulsi* improves the body's overall defense mechanism including its ability to fight viral diseases.

**KEYWORDS:** *Tulsi*, Analgesic, Antimicrobial, Anti-viral, Cardio protective, Immunomodulatory.

## INTRODUCTION

Ayurveda is a science of life and world's oldest medical system. Ayurveda has a holistic approach to health and disease that focuses on preserving and promoting good health and preventing disease through healthy lifestyle practices and treating diseases if encountered. Many natural ways and drugs in our surrounding are mentioned in Ayurveda for this purpose. *Tulsi* is one of such drugs used for prevention and treatment of diseases. *Tulsi* has major spiritual and medicinal importance in Indian culture. *Tulsi* is consequent from Sanskrit, which means "the incomparable one".<sup>[1]</sup>

Right from Charak Samhita and Sushrut Samhita to newer texts like *Nighantus*, *Tulsi* is widely mentioned in various groups of drugs and for treatment of many diseases. Many in vitro, animal and human studies are conducted in recent times to confirm multiple therapeutic actions of *Tulsi* including adaptogenic, antimicrobial, anti-inflammatory, cardio-protective, and immunomodulatory effects mentioned in ayurvedic texts.

Present study is aimed to review and correlate the literature and research work about *Tulsi* from books, Journals, research papers etc.

## MATERIAL AND METHODS

Information about *Tulsi* is collected from *Samhitas*, *Nighantus*, journals, online journals and websites keeping therapeutic uses the main focus. All information is processed and presented in this article.

## OBSERVATIONS AND DISCUSSION

This plant belongs to the family Lamiaceae which is cultivated for religious and medicinal purposes. It is an erect, 30-60 cm high, much branched annual herb found throughout the country.<sup>[2]</sup>

**Table: Botanical classification of *Ocimum sanctum* L.<sup>[3]</sup>**

| Taxonomic rank | Taxon                    |
|----------------|--------------------------|
| Kindgom        | Plantae                  |
| Class          | Magnoliopsida            |
| Division       | Magnoliophyta            |
| Order          | Lamiales                 |
| Family         | Lamiaceae                |
| Genus          | <i>Ocimum</i>            |
| Species        | <i>Ocimum sanctum</i> L. |

**Varities<sup>[4] [5] [6]</sup>**

*Nighantus* of Ayurveda mentioned different types/varieties of *Tulsi* based on the color of leaves and stem. Two types of *Tulsi* are mostly described by most of Ayurvedic texts while some have described three varieties. Bhavaprakasha Nighantu, Raja Nighantu, Priyanighantu, Shaligrama Nighnatu have mentioned two varieties viz. *Shweta Tulsi* and *Krishna Tulsi*, while Kaiyyadeva nighantu mentioned *Karpura Tulsi* and Nighantu Adarsha mentioned *Ram Tulsi* in addition to previous two.

**Rasa Panchaka<sup>[6]</sup>**

*Rasa-panchak* is most important observations of ayurvedic medicines which is related to its activity in body and against diseases. Most Nighantus mentioned *rasa-panchak* of *Tulsi* as below

***Rasa:*** *Katu, Tikta, Kasaya*

***Virya:*** *Ushna*

***Vipaka:*** *Katu*

***Guna:*** *Laghu, Tikshna, Ushna, Ruksha*

***Doshagnata:*** *Vatakaphahara or Kaphahara*

**Karma And Roghagnata<sup>[7]</sup>*****Karma***

*Agnidipan* (Digestive), *Dahakar*, *Pittakar*, *Ruchikar*, *Hrudya*.

***Roghagnata***

*Kushtha*, (Skin diseases), *shitapitta*, *udarda*, *kotha* ( Yogratanakar), *Mutrakrucchra* (urinary tract infections), *Raktavikar* (diseases related to blood), *Shool* (Pain), *Parshwashool* (Chest pain), *Kaphavaataj vyadhi*, *Krumi* (worm infestation, bacterial, viral, fungal infections), *Vishamjwara* (fever) - sharangadhar, *Shwas*, *Kasa* (*kaphaj*), *Hikka* (Respiratory system diseases), *Chhardi* (vomiting), *Daurgandhya/Putigandha* (Bad odour), *Vishabadha* (poisoning and bites), *Mutrashmari* (Urinary calculus), *Nav netra vyaadhi* (Eye problems). *Hrudrog* (cardiac diseases), *Putikarna* (otitis media), *Vruschik dansha* (Scorpion bite), *Bhutabadha*.

Details of therapeutic actions and activity against diseases is discussed below

**KARMA**

*Tulsi* has *katu ras* and *vipak*, *ushna virya* and *Laghu*, *Tikshna guna* which helps in increasing digestive power and decreases anorexia (*Agnidipan*, *Ruchikar*). *katu ras* and *vipak*, *ushna virya* and *Tikshna guna* of *Tulsi* increases *Pitta Dosha*, in turn cause burning sensation in body (*Dahakar*, *Pittakar*).

**ROGHAGNATA*****Kushtha, Shitapitta, Udarda, Kotha (Skin diseases)***

Most nighantus mentioned *Tulsi* as *Kushthaghna*. *Tulsi* leaves juice with ginger is used for it. Yogaratnakar advised to use in *Shitapitta*, *Udarda* and *Kotha* for internal and local application. Above mentioned diseases are due to vitiated *kapha* and *vata dosha*. *Vatakaphahara* property of *Tulsi* is found useful in treating these diseases. *Tulsi* juice is beneficial in the treatment of ringworm and other skin diseases when applied locally.

Antihistaminic and anti-inflammatory activity of *Tulsi* leaves extractive is seen in a study on guinea pigs.<sup>[7]</sup>

***Mutrakrucchra (Urinary Tract Infections)***

*Tulsi* is found to have antibacterial activity against Gram-positive and Gram-negative bacteria including *E. coli* and others. Hence can be effectively used in UTI.

***Shool (Pain)***

Any pain is due to *vaat dosh* according to ayurveda. As *Tulsi* has *vaatahar* action it is useful in treatment of pain.

*Tulsi* can act as COX 2 inhibitor, like modern analgesics due to its significant portion of eugenol (1 hydroxyl- 2 methoxy-4 allyl benzene). *Ocimum sanctum* leaves contain 0.7 % volatile oil comprising about 71% eugenol & 20% methyl eugenol. The analgesic properties of fixed oil derived from the seeds of *Ocimum sanctum* was investigated in mice and rats by Singh S and Majumdar DK in 1995. The study employed various techniques such as tail flicking, tail clipping, tail immersion, and acetic acid-induced writhing. It was found to be efficacious in a dose-dependent manner against writhing induced by acetic acid, indicating that the oil's ability to inhibit writhing is peripherally mediated by the combined inhibitory effects of prostaglandins, histamine, and acetylcholine.<sup>[8]</sup>

**Parshwashool (Chest pain)**

It can be due to pneumonitis, chest infection or heart disease. *Tulsi* in various studies found to be effective in respiratory diseases and heart diseases. Thus useful in conditions of chest pain.

**Kaphavaataj vyaadhi**

*Tulsi* has *katu-tikta-kashaya rasa*, *katu vipak*, *ushna virya* and *Laghu*, *Tikshna*, *Ushna*, *Ruksha guna*, which are opposite to *kapha dosha*. With the *ushna virya* it can pacify *vaat dosh*. Hence it is useful in *kaphavaataj* diseases like *shwas*, *sandhigat vaat etc*.

**Krumi (worm infestation, bacterial, viral infections)**

According to ayurved literature *krumi* need environment which is similar for vitiation of *kapha dosha*. *Tulsi* has properties against such situation and pacifies *kapha* and in turn *krumi*.

The essential oil of *Ocimum sanctum* and eugenol showed potent anthelmintic activity in the *Caenorhabditis elegans* model when tested in-vitro.<sup>[9]</sup> Parida MM, et al., found antiviral activity of *Tulsi* extract against various viral agents in a study in 1997.<sup>[10]</sup> 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 *Tulsi* were observed equally effective against pathogenic gram-positive and gram- negative bacteria.<sup>[11]</sup>

**Vishamjwara (fever)**

Sharangadhar mentioned that juice of *Tulsi* leaves along with black pepper is useful in treatment of *Vishamjwar*. *Vishamjwara* can be correlated to Malaria in modern medicine. In a 2012 study on three different species of *Ocimum*, Inbaneson SJ, et al., 2012 found that extracts from the leaves, roots, stem, and flowers of *Ocimum sanctum* exhibited good anti-plasmodial activity.<sup>[12]</sup>

**Shwas, Kasa -kaphaj, Hikka (Respiratory system diseases)**

*Vata-kaphahar* property of *Tulsi* is useful in treatment of respiratory diseases like *Shwas*, *kasa*, especially *kaphaj* and *Hikka* as these diseases are due to vitiation of *vata* and *kapha dosha*. *Tikta katu ras*, *katu vipak* and *ushna virya* normalizes *kapha dosha* while *ushna virya* is useful to pacify *vaat dosha*. That is why *Tulsi* is an important constituent of many Ayurvedic cough syrups and expectorants. It helps to mobilize mucus in bronchitis and asthma. According to Puri et al, A decoction of the leaves, with honey and ginger is effective

in influenza, cough and cold, bronchitis and asthma. A decoction of the *Tulsi* leaves, cloves and common salt also gives immediate relief in case of influenza.<sup>[13]</sup> Chewing *Tulsi* leaves relieves cold and flu. Water boiled with *Tulsi* leaves can be used as drink and to gargle in case of sore throat.

In a study carried out by Singh S and Agrawal SS in 1991 about Anti-asthmatic and anti-inflammatory activity of *Ocimum sanctum*. In this study 50% of aqueous ethanolic extract of both fresh and dried *Tulsi* leaves, along with the volatile and fixed oils of *Ocimum sanctum*, were tested against Pre-convulsive Dyspnea (PCD) in guinea pigs which were induced by histamine and acetylcholine. Study concluded that the guinea pigs were considerably shielded from histamine and acetylcholine-induced pre-convulsive dyspnea by the 50% ethanol extract, volatile oil extracted from fresh leaves and fixed oil from the seeds but not by extractive of dry leaves.<sup>[7]</sup>

***Daurgandhya/Putigandha (Bad odour):*** *kaphahar* property of *Tulsi* is useful in body odor.

#### ***Vishabadha and Vruschik dansha (poisoning and bites)***

The herb is a prophylactic or preventive and curative for insect stings or bites. A teaspoonful of the juice of the leaves is taken and is repeated after a few hours. Fresh juice must also be applied to the affected parts. A paste of fresh roots is also effective in case of bites of insects and leeches.

According to Plantcultures.org, oil from *Tulsi* is a natural antiseptic and natural anti-inflammatory. According to Botanical.com, *Tulsi* effectively treats snake bites, including those of poisonous snakes, when all parts of the plant are either ingested or mixed with other plants to form a paste that is applied to the bite area.<sup>[14]</sup>

Local application of *Ramtulsi* seeds with goat milk relieves scorpion bite pain.<sup>[5]</sup>

#### ***Mutrashmari (Urinary calculus)***

Kaiyadev nighantu mentioned *Tulsi* in *Mutrashmari*. *Tulsi* has strengthening effect on the kidney. In case of renal stone the juice of basil leaves and honey, if taken regularly for 6 months it will expel them via the urinary tract.<sup>[14]</sup>

**Nav netra vyaadhi (Eye problems)**

*Tulsi* leaves juice with honey can be used for local application in eye diseases. 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>[15]</sup>

**Hrudrog (cardiac diseases)**

Heart disease is a sequel of hyperlipidemia and atherosclerosis. Suanarunsawat et al in 2010 studied the antihyperlipidemic and cardioprotective activity of *Ocimum sanctum* fixed oil in rats fed with a high fat (HF) diet and concluded that treatment with OS fixed oil decreased the high serum lipid profile and expressed antiatherogenic and cardioprotective actions against hyperlipidemia. The anti-hyperlipidemic action of OS fixed oil was resulted from the suppression of liver lipid synthesis. Linolenic acid and linoleic acid contained in *Tulsi* fixed oil were possibly responsible for both lipid-lowering and cardiac protective action.<sup>[16]</sup>

**Raktavikar (Diseases related to Blood)**

*Tulsi* is effective in blood disorders and also useful in skin disorders like *kushtha*. A study carried out by Jeba et al in 2011 shows that aqueous extract of *Ocimum sanctum* at the oral doses of 100, 200 mg/kg/day in rats enhanced the production of RBC, WBC, hemoglobin and also enhanced the production of antibodies without affecting the biochemical parameters.<sup>[17]</sup>

**Chhardi (vomiting):** *Tulsi* leaves can be used for antiemetic action.

**Putikarna (otitis media)**

*Putikarna* is due to *kapha-pitta dushti*. *Tulsi* juice can be used locally for it. It relieves pain and bad odor.

**Bhutabadha**

*Bhutabadha* can be correlated to infectious diseases. *Tulsi* has anti-bacterial, anti-viral property which make it useful in *bhutbadha* (Infections).

**Anticancer Activity**

Leaf extract administered orally (200mg/kg, p.o.) resulted in significant reduction in tumor volume, increase in average body weight and survival rate of mice in a study carried out by by Monga et al. in 2011.<sup>[18]</sup>



### Antihypertensive Activity

The fixed oil of Tulsi administered intravenous produced hypotensive effect in anaesthetized dog which seems to be due to its peripheral vasodilatory action.<sup>[19]</sup>

### Neuroprotective Activity

In a study Administration of Tulsi extract (100 and 200 mg/kg p.o.) and its saponin rich fraction (100 and 200 mg/kg p.o.) for 14 days significantly attenuated vincristine-induced neuropathic pain along with decrease in oxidative stress and calcium levels.<sup>[20]</sup>

### Anti-diabetic activity

In a study carried out by Chattopadhyay, it was seen that, in streptozotocin-induced diabetic rats, ethanolic extract of *Ocimum sanctum* Linn decreased the blood glucose, glycosylated haemoglobin and urea with a concomitant increase in glycogen, haemoglobin and protein, respectively. Various species of *Ocimum* were explored and compared for antidiabetic activity. All extracts were able to show antidiabetic activity at 0.5 mg/kg concentration.<sup>[21]</sup>

### CONCLUSION

Profound research about Tulsi reveals that, its importance and uses are known to mankind from centuries. Ayurveda have used Tulsi in parts like leaves, roots or as a whole for treatment. It is also important part of many formulations like Tribhuvankirti. Tulsi has protective, promotive as well as curative action against diseases. Thus it is a must have plant for physicians as well as common people.

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