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Therapeutic Uses of "Wonder Herb" Tulsi (*Ocimum sanctum* Linn) - A Review

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Abstract

The medicinal plants are widely recommended worldwide by the traditional and modern medical practitioners for curing various diseases of patients. Tulsi or Holy basil (*Ocimum sanctum* Linn) is an annual herb belonging to the mint family. Tulsi emits a spicy scent when bruised. It is believed to purify expectorants, and called the "wonder herb". In traditional systems of medicine, different parts (leaves, stem, flower, root, seeds and even whole plant) of tulsi are proved to possess several medicinal properties. It has also been suggested to possess variety of biological/ pharmacological activities such as anti-allergic, anti-asthmatic, anti-arthritic, antibacterial, anti-coagulant, anticancer, anti-cataract, anti-diarrhoeal, anti-diabetic, anti-emetic, anti-fertility, antifungal, anti-hyper-cholesterolaemic, anti-hypertensive, anti-inflammatory, anti-leucodermal, anti-malarial, antimicrobial, antioxidant, antipyretic, anti-protozoal, antistress, anti-spasmodic, anti-thyroidic, antiulcer, antiviral, anthelmentic, analgesic, adaptogenic cardio protective, chemo-preventive, central nervous system (CNS) depressant, hypoglycemic, hepato-protective, hypotensive, hypolipidemic, immune-modulatory, memory enhancer, radio-protective and diaphoretic actions. The active constituent, eugenol (l-hydroxy-2-methoxy-4-allylbenzene) present in Tulsi has been found to be largely responsible for the therapeutic potentials. The pharmacological studies have established a scientific basis for therapeutic uses of this plant.

1. Introduction

Among horticulture crops, medicinal and aromatic plants forms one of the important groups which have a unique role in sustaining pharmaceutical, perfumery and cosmetic industries in India (Raviprasad Sajjan and Venugopal, 2017; Harshavardhan *et al.*, 2016). Of the thousands of aromatic plants, a few have attained the status of commercial crops which are being cultivated on large scale (Raviprasad Sajjan *et al.,* 2019). Plants are one of the most important sources of medicines. The important advantages claimed for therapeutic uses of medicinal plants in various ailments are their safety besides being economical, effective and their easy availability (De, 2020).

Tulsi is one such indigenous aromatic plant being cultivated in India. Tulsi has a rich and fanciful history known since the Vedic age for its medicinal properties. Therefore it is rightly called as "sacredherb" in India. Tulsi is a Sanskrit word which means "matchless one" (Singh *et al.*, 2010a; Bast *et al.*, 2014). There are numerous uses of Tulsi plant. The plant is increasingly finding its way in the Ayurvedic treatment of diseases. It is found throughout in plains ascending to 1800-2000 meter in Himalayas. It is commonly grown in and around houses, temples and gardens (Patil *et al.*, 2011).

2. Morphology

Tulsi is an erect herbaceous much branched, strongly aromatic, soft hairy annual, growing up to 30-90 cm in height. Stem and foliage are green and dark purple. Leaves are 3-11 cm long and 1-6 cm broad (Naquvi *et al.*, 2012). Leaves are simple, opposite, light green to dark green, elliptic oblong, acute or obtuse, entire or sub serrate, hairy on upper and lower surfaces, dotted with minute aromatic glands. Leaves of Tulsi contain many essential oils. Flowers are small, purplish or creamish in colour with terminal or axillary racemes and close whorled. The flowering season is winter (December to February). The seeds are flat with yellow to reddish in colour (Punam, 2011; Aswar and Joshi, 2010; Pande, 2009).

3. Botanical Classification

Kingdom : Plantae

Divison : Magnoliaphyta

Article History

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Class : Magnoliopsida

Order : Lamiales

Family : Lamiaceae

Genus : *Ocimum*

Species : *sanctum*

3.1 Other Names

English name : Indian basil/ Holy basil/ Sacred basil

Hindi name : Tulsi

Sanskrit name : Tulasi

Gujarati name : Tulsi

Telugu/ Marathi/ Malayalam name : Tulasi

Kannada name : SriTulasi

4. Habitat

Tulsi is native to Indian subcontinent. It generally thrives in the Himalaya's temperate climate, tropical forests of Southern India and Sri Lanka. It is nowadays cultivated in Egypt, France, Hungary, Italy, Morocco, USA. As such tulsi thrives well in any type of soil so it is naturally found wild in the tropical and subtropical regions of the world (Mondal *et al.*, 2009). In India, Tulsi is grown from Himalayas to Andaman and Nicobar Islands. It is distributed in India, Sri Lanka, Bangladesh, Thailand, China, Myanmar and Malaysia (World Health Organization, 2005).

5. Botany

The genus Ocimum is an extremely versatile group consisting of 160 species. Various species are placed under two broad groups; Basilicum group and Sanctum group (Sharma and Kumar, 2000).

Species belongs to basilicum group are herbaceous annuals while that of sanctum group are biennial, triennial or perennial under shrubs.

Basilicum group includes:

- *O. canum* (Dulal Tulsi)
- *O. basilicum* (Ban Tulsi)
- *O. americanum* (Hoary Tulsi)
- *O. kilimandscharium* (Camphor basil)

Sanctum group includes:

- *O. sanctum* (*O. tenuiflorum*) (Sacred basil)
- *O. gratissimum* (Ram Tulsi)
- *O. viride*
- *O. sauve*
- *O. micranthum*

At least, two types of O. sanctum are referred to in Ayurvedic texts, viz.,

- Green type (Sri tulsi)
- Purple type (Krishna tulsi)

(a) *O. canum* (b) *O. kilimandscharium*

(c) *O. basilicum* (d) *O. sanctum*

(e) *O. americanum* (f) *O. gratissimum*

Figure 1: Different species of Tulsi

6. Ayurveda

Several medicinal properties have been attributed to the Tulsi plant not only in Ayurveda and Siddha but also in Greek, Roman and Unani systems of medicine. Ayurveda has been used for thousands of years in the world; Ayurveda is used as a science of life. In Ayurveda, tulsi is known as "Mother medicine of nature", "The incomparable one", "Queen of herbs" and "Elixir of life" because of its vast medicinal and spiritual properties. An ancient Ayurvedic text, "Charaka Samhita" has mentioned that Tulsi is a tonic for the body, mind and spirit that offers solutions to many modern day health problems. Tulsi is perhaps one of the best examples of Ayurveda's holistic lifestyle approach to health (Mahajan

et al., 2013; Singh *et al.*, 2007).

7. Importance in Hinduism

Tulsi is also grown as a pot herb and in home gardens. Tulsi is cultivated in semi urban areas and the fresh herbage is sold to the temples and worship centres. The major source of tulsi is from wild habitat including uncultivated field and roadside. Large volumes of herbage is collected during seasons and traded throughout the country (Kumar *et al.*, 2011; Pande, 2009). According to Hindu mythology, Tulsi has been originated as one of the 14 "Ratnas (Gems or treasures)" from the ocean as the ultimate sacred plant to enhance health and remove diseases. Tulsi is known as Queen of herbs due to its matchless properties.

8. Chemical Constituents

Among the medicinal plants, aromatic herbs are a rich source of biologically active compounds useful both in agriculture and medicine (Raviprasad Sajjan *et al.*, 2014). The culinary, medicinal and industrial importance of this plant led to explore its chemical and pharmacological properties. More than 60 chemical compounds have been reported from Tulsi including phenolics, flavonoids, phenyl propanoids, terpenoids, fatty acid derivatives, essential oil, fixed oil and steroids. The oil extracted from tulsi has revealed the presence of five fatty acids stearic, palmitic, oleic, linoleic, and linolenic acids (Mondal *et al.*, 2009; Sharma and Kumar, 2000). The main constituents in volatile oil from tulsi are rosmarinic acid (a strong antioxidant), linalool, methylchavicol, methylcinnamat, 1,7-dimethyl, 6-octadien-3-ol, sesquiterpine, estragol, caryophyllene and eugenol. Some biologically active compounds are also extracted from the Tulsi leaves such as, urosolic acid, luteolin and apigenin. Tulsi contains Vitamin C and Vitamin A and minerals such as calcium, zinc, and iron, and also chlorophyll and many other nutritive values. The seeds contain fatty acids and sitosterol. The sugars are composed of xylose and polysaccharides. Phytochemical investigation of stem and leaves has shown to have constituents like saponins, flavonoids, triterpenoids and tannins (Pattanayak *et al.*, 2010; Kumar *et al.*, 2011; Mishra and Mishra, 2011).

9. Properties

The Tulsi leaves have a marked strong aroma and an astringent taste, pungent in the post-digestive effect and has hot potency. Because of this said property it penetrates the deep tissues, dry tissue secretions and removes kapha and vata doshas. The seeds are oily and slimy in attributes and have a cold potency.

10. Medicinal Uses

Oils extracted from the leaves and inflorescence of tulsi have been claimed to have numerous useful properties including as anti-allergic, anti-asthmatic, anti-arthritic, antibacterial, anticoagulant, anticancer, anti-cataract, anti-diarrhoeal, anti-diabetic, antiemetic, anti-fertility, anti-fungal, anti-hyper-cholesterolaemic, antihypertensive, anti-inflammatory, anti-leucodermal, anti-malarial, anti-microbial, antioxidant, antipyretic, anti-protozoal, antistress, antispasmodic, antithyroidic, antiulcer, antiviral, anthelmentic, analgesic, adaptogenic cardio protective, chemo-preventive, central nervous system (CNS) depressant, hypoglycemic, hepato-protective, hypotensive, hypolipidemic, immunomodulatory, memory enhancer, radio- protective and diaphoretic activities (Singh *et al.,* 2010a). With these many medicinal properties when anyone consumes Tulsi in any form their body gets prepared to fight against the diseases and other health problems and restores good health (Mishra and Mishra, 2011; World Health Organization, 2005; Singh *et al.*, 2010b).

10.1 Protection and Detoxification

Many of the physiological benefits of tulsi can be attributed to its ability to improve the metabolic breakdown and elimination of dangerous chemicals in the blood included as part of detoxification program. Tulsi also helps to prevent cancers caused by toxic compounds by reducing DNA damage and inducing apoptosis in precancerous and cancerous cells (Kelm *et al.*, 2000). Anti-diabetic-insulin and glucose normalizing blood sugar and blood-lipid levels.

10.2 Eye Diseases

Tulsi is an effective remedy for sore eyes and night blindness. The juice of Tulsi mixed with honey is used as an eye wash to treat conjunctivitis. The leaf juice of Tulsi along with Triphala is used in eye drop preparations recommended for glucoma, cataract, chronic conjunctivitis and other painful eye diseases. The presence of Vitamin A in Tulsi helps in strengthening eyesight (Pattanayak *et al.*, 2010).

10.3 Skin Problems

Tulsi is an effective remedy for skin related diseases. Tulsi is used widely in many herbal cosmetics, skin ointments due to its anti-bacterial properties. Oil extracted from Karpoora Tulsi is used in these preparations. Its antibacterial and antifungal properties are very effective in preventing breakouts on acne proneskin. It is effective against skin disorders, skin rashes (Choudhary, 2020).

10.4 Memory Power

Many animal studies have revealed that tulsi is proven to enhance memory and cognitive function and also protects against aging-induced memory deficits (Pattanayak *et al.*, 2010).

10.5 Antipyretic (Prevents or Reduces Fevers)

The leaves of tulsi 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 (Singh *et al.*, 2010a). Tulsi tea with honey is a good expectorant especially incased where fever is involved. The fresh juice of Tulsi taken with black pepper powder can cure

periodic fevers. The Imperial Malarial Conference has declared Tulsi to be a genuine remedy for malaria.

10.6 Coughs and Sore Throat

Tulsi herb is very useful in the treatment of different types of Coughs. Decoction of Tulsi leaves is a popular remedy for bronchial asthma, Ayurvedic cough syrups, expectorant and bronchodilator effects. It finds its way in 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 and other viral infections in India. The main components of household cough and cold therapies, in the form of decoctions, teas, etc. have Tulsi in it as main ingredient. Chewing of Tulsi leaves relieves cold and flu. Tulsi mobilize mucus in bronchitis and asthma (Singh *et al.*, 2010b).

10.7 Respiratory Disorder

Tulsi is used against respiratory system disorders including bronchitis, influenza and asthma. A decoction of the Tulsi leaves, with honey and ginger is an proven remedy for bronchitis, asthma, influenza, cough and cold. The decoction prepared by mixing Tulsi leaves, cloves and common salt is quite helpful in combating influenza (Aswar and Joshi, 2010; Yamani, 2016). Tulsi can serve as a cure and prophylactic as well for the severe acute respiratory syndrome (SARS). The root of the tulsi plant should be crushed and boiled with turmeric powder for a few minutes, after which it should be filtered. Consuming two spoonfuls of this potion twice daily will cure SARS and prevent contracting of the disease (Mahajan *et al.*, 2013; Singh *et al.*, 2007).

10.8 Teeth Disorder

Tulsi is useful in teeth disorders. Tulsi is used as mouth wash for reducing toothache. The leaves are quite effective for the ulcer and infections in the mouth. A few leaves chewed will cure these conditions. Leaves after sundried and powdered, can be used for brushing teeth. Tulsi is highly recommended in pyorrhea and other teeth disorders. Mouth rinses are generally considered as adjuncts to oral hygiene and widely used in the delivery of active agents to the teeth and gums (Vishwabhan *et al.,* 2011).

10.9 Anti-fertility Agent

Studies have shown that, Ursolic acid, a chemical in Tulsi has a role as anti-fertility (contraceptive) agent. Anti-fertility effect may reduce the estrogen hormone levels in females and decrease the sperm count in men (Vishwabhan *et al.,* 2011). Ursolic acid because of its anti-estrogenic effect reduces spermatogenesis and causes a decrease in sperm counts (Aswar and Joshi, 2010)

10.10 Swine Flu

Studies have also shown that, anti-flu property of Tulsi has been discovered by medical experts across the world quite recently. Tulsi is known to improve the human body's overall defense mechanism including its ability to fight against viral diseases. If a person is suffering from Swine flu or H1N1 flu, Tulsi has got the power in speeding up the recovery process and also fasten in strengthening the immune system of the body (Yamani, 2016).

10.11 Mental Stress

Tulsi can also help reduce toxic stress by relaxing and calming the stressed mind. In India, Tulsi has been used extensively throughout its history as a supreme anti-stress agent (adaptogen) which has a role in claiming the distraught and dealing with long-term irritants (Gupta *et al.*, 2002). Recent studies have shown that the leaves afford significant protection against stress related disorders. Tulsi is found to be effective in the management of stress effects, and anti-stress activity could be due to inhibition of cortisol release, blocking CRHR1 receptor, and inhibiting 11β-HSD1 and COMT activities.

10.12 Insect Bites

Tulsi is mainly mentioned in Siddha for the treatment of snake bite. The *Ocimum sanctum* has protective effect against snake venom. The roots and stems were also traditionally used to treat mosquito and snake bites and for malaria (Jeba *et al.,* 2011). As soon as bitten, the patient should eat 1-2 fistfuls of tulasi leaves and simultaneously the root of tulsi should be rubbed in butter and applied over the region of the bite. A paste of the fresh roots of Tulsi is also effective in case of leeches. Several researches have proved that tulsi has got strong antidote activity to many poisons such as for dog bite, scorpion bite, snake bite and insect bites. Its external application helps to diminish swelling and pain (Singh *et al.*, 2007).

10.13 Inflammation

Decoction of Tulsi leaves contain anti-bacterial and anti-fungal compounds. A paste prepared from tulsi leaves alongside wood paste and essence will be applied on the face because it helps to forestall inflammation (Mahajan *et al.*, 2013).

10.14 Cardiovascular-Circulatory Systems

Tulsi has a beneficial effect in cardiac disease and the weakness resulting from them. It reduces the level of blood cholesterol. It helps in blockage of the heart arteries. Cardio tonic-prevents heart attack Lowers stress-related high blood pressure normalizes blood pressure Vascular-protection- protects the heart and blood vessels, promotes even circulation Mild blood thinning qualities thereby decreasing like likelihood of strokes Lowers dangerous cholesterol protects against damage caused by foreign toxins in the blood (such as industrial chemicals) treatment of stress-related arterial hypertension (high blood pressure) (Puri and Singh, 2002).

11. Precautions

Although Tulsi is a safe herb, consult a doctor before consuming Tulsi in any form if you are nursing or pregnant. Also consult a physician if you are taking any prescription medications, before you take any tulsi.

12. Conclusion

Tulsi is very good source of medicinal properties such as, asthma, arthritis, bronchitis, cough, sore throat, common cold, flu, catarrhal fever, malaria fever, colic pain, earache, common headache, migraine headaches, hiccough, insomnia, flatulence, fatigue, digestive disorders, night blindness, diarrhea, influenza, gastric disorders, genitourinary disorders, liver diseases, skin diseases, wound and as an antidote for snake bite and scorpion sting. Therefore, Tulsi is rightly considered as India's Queen of herbs. Tulsi is a highly revered culinary and medicinal aromatic herb that is indigenous to the Indian subcontinent and been used worldwide. This review will surely help the researchers as well as clinicians dealing with Tulsi to know its medicinal usage as this herb is seemed to be highly valuable, possessing many pharmaceutical therapeutic applications.

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