

Pharmacological significance of medicinal herb *Ocimum sanctum* (Tulsi): An updated Review

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Abstract

The medicinal plants are generally used by the traditional medical physicians for therapeutic use of various ailments in their daily practice. *Ocimum sanctum* Linn., which belongs to the family Lamiaceae also known as Tulsi in Hindi, have been mentioned in Unani medicine for the treatment of *Iltehab Shobatur Riyah* (Bronchitis), *Zeequn Nafs* (Bronchial asthma), *Ishal* (diarrhoea), *Zaheer* (dysentery), *Wajaul mufasil* (arthritis), *Humma* (chronic fever) etc. It has also been recommended to retain antifertility, anticancer, antimicrobial, hepatoprotective, cardioprotective, antiemetic, antispasmodic, analgesic, antidiabetic, antifungal, adaptogenic and diaphoretic activities. In this review, an effort has been made to assemble the pharmacological actions, therapeutic uses and pharmacological activities of *Ocimum sanctum* Linn. In classical text.

Keywords: medicinal plants, *ocimum sanctum*, pharmacological activities

Introduction

Tulsi is an important sign of the Hindu religious ritual. Although the word 'Tulsi' gives the implication of the incomparable one, Vishnupriya other name of tulsi means the one that pleases Lord Vishnu. It is bitter and pungent in taste and hot in effect. Seeds of tulsi are measured to be cold in effect. [1]The seeds, roots and leaves of Tulsi own several medicinal properties. It has made significant involvement to the field of science from ancient times as also to recent research due to its large number of therapeutic properties. Two types of Tulsi has been labelled - vanya (wild) and gramya (grown in homes) [2]. It has a wide range of pharmacological activities such as anti-inflammatory, antifungal, antimalarial, anthelmintic, antidiarrhoeal, analgesic, antipyretic, anticataract, antiallergic, antibacterial, antiarthritic, antiviral, antihypertensive, cardioprotective, central nervous system (CNS)depressant, memory enhancer, antimalarial, antihypercholesterolaemic, antiasthmatic, antithyroidic, antioxidant, anticancer, chemopreventive, radioprotective, antiprotozoal, immunomodulator, antifertility, hepatoprotective, antidiabeticantiulcer, adaptogenicantistress, antileucodermal and anticoagulant activities.[1]

Taxonomical Classification [3]

Kingdom: Plantae
Subkingdom: Viridiplantae
Superdivision: Embryophyta
Division: Tracheophyta
Class: Magnoliopsida
Superorder: Asteranae
Order: Lamiales
Family: Lamiaceae
Genus: *Ocimum*
Species: *sanctum*

Botanical name: *Ocimum sanctum* Linn.

Vernacular Names [4, 5, 6]

English: Holy Basil, Monks Basil, Rough Basil, Sacred Basil
Urdu: Raihan, Tulsi
Arabic: Badroj
Persian: Raihan
Hindi: Tulasi, Tulsi, baranda, kala tulsi
Bengali: Tulasi, Tulsi, Kalatulasi, Kural, Tulshi
Gujarati: Tulasi, Tulsi, Talasi
Kannad: Tulasi, Vishnu tulasi, kari tulasi, sri tulasi
Tamil: Tulasi, Thulasi, Thiru Theezai
Malayalam: Tulasi, Tulas, Trittavu, Krishnatulasi,
Kunnakam, Punya, Sivatulasi, Surasam Trittavu, Tulasi
Marathi: Tulas, tulasi chajadha
Punjabi: Tulasi, Bantulsi
Telugu: Tulasi, brynda, gaggera, Krishna tulasi, nalla tulasi
Sanskrit: Ajak, brinda, manjari, parnasa, patrapushpa, suvasa tulasi
Bombay: Tulas, Tulas
Burma: Lun
Canarese: Kalatulasi, Karitulasi, Sritulasi, Tulasi
Deccan: Tulsi
Varanda: Ilocano
Biday: Konkani, Tulsi
Philippines: Albahaca
Portuguese: Mangericao
Sinhalese: Madurutala, Mudurutulla

Distribution [5]

An erect much branched, softly hairy, annual herb about 30-75 cm. high found throughout India ascending upto 1,800 m in the Himalaya, and in Andaman and Nicobar Islands.

Description of Plant in Unani (Mahiyat) [4, 7]

Rehan consists of dried whole plant of *Ocimum sanctum* Linn. It is an erect annual herb, much branched, which

originate from a root. Three types of Rehan mentioned in classical literature. In first type of rehan leaves are like Berg aloo, simple opposite and has a characteristic odour. It consists of flowering spikes from which seeds are originate, in second type of rehan leaves are small and greenish yellow in colour. This is the best type of rehan, in third type of rehan is Badroji which has large leaves and dark green in colour. According to Gilani first type of rehan is the best one. It is cultivated for religious and medicinal purposes and for its essential oil.

Morphology of Plant ^[8]

Macroscopic

Root: Thin, wiry, branched, hairy, soft, blackish-brown externally and pale violet internally.

Stem: Erect, herbaceous, woody, branched, hairy, subquadangular, externally purplish-brown to black, internally cream coloured, fracture, fibrous in bark and short in xylem, odour faintly aromatic.

Leaf: 2.5-5cm long, 1.6-3.2cm wide, elliptic obtuse, entire or serrate, pubescent on both sides, petiole thin, about 1.5-3cm long hairy, odour aromatic, taste characteristic.

Flower: Purplish or crimson coloured, small in close whorls, bracts about 3mm long and broad, pedicels longer than calyx, slender, pubescent, calyx ovoid or campanulate, 3-4mm bilipped, upper lip broadly obovate or suborbicular, shortly apiculate, lower lip longer than upper haing four mucronate teeth,lateral two short and central two largest; corolla about 4mm long, pulbescent, odour, aromatic, taste is pungent.

Fruit: A group of 4 nutlets, each with one seed enclosed in an enlarged, membranous, veined calyx, nutlets subglobose or broadly elliptic, slightly compressed, nearly smooth, pale brown or reddish with small black marking at the place of attachment to the thalamus, odour, aromatic, taste, pungent.

Microscopic

Root: Shows a single layered epidermis followed by cortex, consisting of seven or more layers of rectangular, round to oval polygonal, thin-walled, parenchymatous cells, filled with brown content, inner layers or cortex devoid of content, phloem consisting of sieve elements, thin walled, rectangular parenchyma cells and scattered groups of fibres, found scattered in phloem, xylem consists of vessels, tracheids, fibres and parenchymal vessels spotted, fibre tracheides, long, pitted with pointed ends, fibres thick walled and with pointed ends.

Stem: Shows a single layered epidermis with uniseriate, multicellular covering trichomes having 5-6 cells, occasionally a few cells collapsed, cortex consists of 10 or more layers of thin-walled, rectangular, parenchymatous cells, phloem consists of sieve elements, thin walled, rectangular parenchyma cells and fibres, fibres found scattered mostly throughout phloem in groups and rarely in singles, xylem occupies major portion of stem consisting of vessels, tracheids fibres and parenchymal fibres with pointed ends, centre is occupied by narrow pith consisting of round to oval, thin-walled, parenchymatous cells.

Leaf

Petiole: Shows somewhat cordate outline, consisting of single layered epidermis composed of thin-walled, oval cells having a number of covering and glandular trichomes. Covering trichomes are multicellular, 1-8 celled long, rarely slightly reflexed at tip, glandular trichomes short, sessile with 1-2 celled stalk and 2-8 celled ballon-shaped head, measuring 22-27 in diameter, epidermis followed by 1-2 layers and 2-3 layers of thin-walled, elongated, parenchymal cells towards upper and, lower surfaces respectively, three vascular bundles are situated centrally, middle one larger than the other two, xylem is surrounded by phloem.

Midrib: Epidermis, trichomes and vascular bundles are similar to those of petiole except cortical layers which are reduced towards the apical region.

Lamina: Epidermis and trichomes similar to those of petiole, both anomocytic and diacytic type of stomata present on both surfaces, slightly raised above the level of epidermis, palisade is single layered followed by 4-6 layers of closely packed spongy parenchyma with chloroplast and oleo-resin, stomatal index 10-12-15 on upper surface and 14-15-16 on lower surface; palisade ratio 3.8, vein islet number 31-35.

Chemical Composition

The biochemical structure of Tulsi is extremely complex, comprising several nutrients and biologically active compounds. These ingredients considerably vary with cultivation, process time and storage. The leaves of tulsi contain 0.7% volatile oil containing nearby 71% eugenol and 20% methyl eugenol. The oil of tulsi also comprises sesquiterpine hydrocarbon caryophyllene and carvacrol. Stem and fresh leaves of tulsi extract produced certain phenolic compounds (antioxidants) such as circimaritin, apigenin, rosameric acid, isothymusin and cirsilineol appreciable quantities of eugenol. From aqueous leaf extract of tulsi two flavonoids orientin and vicenin had also been isolated. Apigenin, apigenin-7-O-glucuronide, luteolin-7-O-glucuronide, ursolic acid, orientin luteolin and molludistin have also been isolated from the leaf extract. Tulsi also comprises a number of sesquiterpenes and monoterpenes. ^{[9], [10]}

Mizaj (Temperament)

Hot 1^o and dry 1^o ^[4]

Hot 1^o and dry 2^o ^[11]

Hissa Mustamela (Part used)

Root, Leaves and Seeds ^[11]

- Stem ^[12]
- Flowers and Fruits ^[4]

Miqdare Khurak (Therapeutic Dose): 7 g ^[11]

- 5-7 g ^[4]

Pharmacological Actions

- Exhilarant (*Mufarreh*) ^[4]
- Cardiotonic (*Muqawwie Qalb*) ^{[4],[11]}
- Stomachic (*Muqawwie meda*) ^{[4],[6]}
- Expectorant (*Munaffise Balgham*) ^[6]
- Diuretic (*Mudirre Baul*) ^[4]
- Antiinflammatory (*Mohallile Waram*) ^[4]

- Tonic (*Muqawwi*)^[5]
- Demulscent (*Mulattif*)^[5]
- Emmengogue (*Mudirre Haiz*)^[5]
- Antipyretic (*Dafe Humma*)^[6]

Therapeutic Uses-

- Asthma (*Ziqun- Nafas*)^[6]
- Vomiting (*Qai*)^[6]
- Conjunctivitis (*Ashobechashm*)^{[6], [5]}
- Cough (*Sual*)^{[6], [13]}
- Rheumatism (*Hudar*)^[6]
- Bronchitis (*Warme Shoeb*)^[6]
- Cold and catarrh (*Nazla Zukam*)^[6]
- Headache (*Suda*)^[11]
- Earache (*Wajaul Gosh*)^{[6], [8]}
- Palpitation (*Khafqan*)^[11]
- Amenorrhoea (*Ahtabase Haiz*)^[8]
- Weakness of stomach (*Zofe Meda*)^[11]
- Haemorrhoids (*Bawasir*)^[11]

Pharmacological Studies

- Anticancer activity^[14]
- Antidiabetic activity^[14]
- Antifungal activity^[14]
- Antimicrobial activity^[14]
- Cardio protective activity^[14]
- Analgesic activity^[14]
- Antispasmodic activity^[14]
- Adaptogenic actions^[14]
- Psychopharmacological activity^[15]
- Antibacterial activity^[16]
- Anti-inflammatory activity^[17]
- Anti-pyretic activity^[17]
- Ameliorative effects^{[17], [18]}
- Anti-lipidperoxidative activity^[19]
- Antibiotic property^[20]
- Antioxidant properties^[20]
- Hepatoprotective activity^[20]
- Nephroprotective activity^[20]
- Neuroprotective activity^[20]
- Prophylactic agent^[21]
- Antiviral activity^[21]
- Immunomodulatory^[21]
- Anti hyperglycemic activity^[22]
- Anti-ulcerogenic activity^[23]
- Chemopreventive activity^[10]
- Radioprotective activity^[10]
- Antihypertensive activity^[10]
- Central Nervous System (CNS) depressant activity^[10]
- Memory enhancer activity^[10]
- Antiarthritic activity^[10]
- Adaptogenic activity/antistress activity^[10]
- Anticataract activity^[10]
- Anticoagulant activity^[10]
- Anti-fertility activity^[10]

Conclusion

Ocimum sanctum Linn. (tulsi) is a communal herb, full-grown in many families with a well-known range of therapeutic properties. Its oil possesses antipyretic, anti-inflammatory, antiarthritic, analgesic, hypotensive, antibacterial and antiulcer activities. Still more clinical trials need to be conducted to support its medicinal therapeutic uses. Presence of anti-inflammatory, antibacterial and

antiulcer activities in single unit i.e. fixed oil also seems to be distinctive.

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