

Review Article

**A REVIEW ON MEDICINAL USES OF OCIMUM
TENUIFLORUM LINN (TULSI)**

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ABSTRACT

Ocimum tenuiflorum Linn (Tulsi) is an aromatic perennial plant with numerous branches, subshrub, and 30-60 cm tall hairy stems, which is found in all regions of India because tulsi is a worshiping plant in Hindus. Tulsi has been used from medieval times in Ayurveda and Siddha practices for its capability of treating various diseases which are confirmed by the scientist through different pharmacological screenings. Staggering endeavors have been made with the aid of experts to concentrate the concoction and natural capability of the plant. The detailed pharmacological effects of Ocimum tenuiflorum Linn are as an antibiotic, antiseptic, analgesic, CNS depressant, anthelmintic, antipyretic, combats respiratory ailments, lowers blood pressure and reduces stress, treats gastrointestinal disorders, regulates blood sugar, increases immunity and many other effects which are beneficial to the human body. Ocimum tenuiflorum Linn is available formulations are available in the form of tulsi capsules, tulsi drops, tulsi powder, tulsi ras, dried leaves, tulsi green tea, and tulsi seed balls.

INTRODUCTION

Various types of Ocimum tenuiflorum are referred to and used as pharmaceutical preparations in the Indian arrangement of medicine. Within Ayurveda Ocimum tenuiflorum Linn is known with many names like "Queen of Herbs", "The incomparable one", "Mother medicine of nature", "Elixir of Life", etc. According to Ayurvedic wisdom Tulsi is a tonic for the mind, body and spirit which offers a cure to many modern days illnesses.

The leaves of Ocimum tenuiflorum Linn are simple green or purple, petioled and oval-shaped with a 5 cm lengthy blade, which generally has a slightly toothed margin. These leaves are strongly scented and have a decussate phyllotaxy. The purplish flora is located near whorls on elongated racemes. There are three morph types that are mainly cultivated in India. Rama tulsi (which is the most common one, with broad bright leaves which are slightly sweet in

taste) Shyama tulsi (this is the least common one with purplish leave) Vana Tulsi (which is called wild tulsi and grows in the forests)

Ocimum tenuiflorum Linn are mostly grown from seeds and vegetative proliferation. Various helpful items for example- essential oils, herbal tea, wood are obtained from this medicinal plant. The plant bears aromatic leaves and small inflorescence which is cultivated or grown for its medicinal and worship purposes in India.

Botanical name

Ocimum tenuiflorum Linn

Taxonomy

Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Lamiales
Family	Lamiaceae
Genus	Ocimum Linn
Species	Ocimum tenuiflorum Linn

Vernacular Names

English	Holy Basil
Hindi	Tulsi
Sanskrit	Tulasi
Gujarati	Tulsi
Bengali	Tulsi
Marathi	Tulasa
Tamil	Thulasi
Telugu	Tulasi
Malayalam	Trittavu

CHEMICAL CONSTITUENTS

Some main chemical constituents of Ocimum tenuiflorum Linn which are present in the major amount are:-

Oleanolic Acid (C₃₀H₄₈O₃), Ursolic Acid (C₃₀H₄₈O₃), Rosemarinic Acid (C₁₈H₁₆O₈), Eugenol (C₁₀H₁₂O₂), Carvacrol (C₁₀H₁₄O), Linalool (C₁₀H₁₈O), Beta-Caryophyllene (C₁₅H₂₄), Estragole (C₁₀H₁₂O), Methyl Cinnamate (C₁₀H₁₀O₂).

Essential oil consists mostly of Eugenol (~70 %), Beta-Elementene (~11%), & Beta-Caryophyllene (~8%), Germacrene (~2%)

PHARMACOLOGICAL ACTIVITIES

Anticancer activity: The anticancer movement of Ocimum tenuiflorum Linn has been demonstrated and referred to by a few examiners. The alcoholic concentrate (Beer) of leaves of Ocimum tenuiflorum Linn affects cancer-causing agents utilizing compounds, for example, cytochrome P 450, cytochrome b5, aryl hydrocarbon hydroxylase and glutathione S-transferase (GST), which are significant in detoxification of cancer-causing agents and mutagens. The anticancer movement of operating system has been accounted for against human

Morphologically, the phones indicated contracted cytoplasm and dense cores. The DNA was seen as divided on perception in agarose gel electrophoresis. Tulsi essentially diminished the

frequency of benzo (a) pyrene instigated neoplasia of front stomach of mice and 3'-methyl-4-dimethylaminoazo-benzene actuated hematomas in rodents. The Beer of the leaves of *Ocimum tenuiflorum* Linn was appeared to inhibitory affect artificially actuated skin papillomas in mice. Topical treatment of Tulsi leaf separate in 7,12-dimethylbenz(a)anthracene (DMBA) initiated papilloma genesis altogether decreased the tumor occurrence, normal number of papillomas/mouse and total number of papillomas in mice. Topical use of the concentrate essentially raised diminished GSH substance and GST exercises.

A comparative movement was watched for eugenol, a flavonoid present in numerous plants, including Tulsi. Oral treatment of new leaves glue of Tulsi may be able to forestall the early occasions of DMBA instigated buccal pocket carcinogenesis. Leaf concentrate of *Ocimum tenuiflorum* Linn squares or stifles the occasions related to compound carcinogenesis by hindering metabolic initiation of the cancer-causing agent.

The anticancer movement of *Ocimum tenuiflorum* Linn was seen in Swiss pale skinned person mice bearing Ehrlich ascites carcinoma (EAC) and S 180 tumors.

Cell reinforcement activity / Antioxidant Activity

the cancer prevention agent movement of tulsi has been accounted for by numerous workers. The cell reinforcement properties of flavonoids and their connection to film assurance have been observed.

Cancer prevention agent movement of the flavonoids (orientin and vicenin) in vivo was communicated in a critical decrease in the radiation incited lipid peroxidation in mouse liver. *Ocimum tenuiflorum* Linn remove has the critical capacity to rummage exceptionally responsive free radicals. The phenolic mixes, viz., curvilinear, cirsimaritin, isothymusin, apigenin and rosmarinic corrosive, furthermore, obvious amounts of eugenol (a significant segment of the unpredictable oil) from tulsi concentrate of new leaves and stems had great cell reinforcement activity.

Antimicrobial activity: AqE of *Ocimum tenuiflorum* Linn demonstrated development restraint for *Klesbiella*, *E. coli*, *Proteus* and *Staphylococcus aureus*; while AIE of *Ocimum tenuiflorum* Linn demonstrated development hindrance for *Vibrio cholerae*. The AIE of *Ocimum tenuiflorum* Linn was moreover seen as dynamic against multidrug-safe strains of *S. aureus* that are additionally impervious to basic beta lactam antibiotics. Thus, *Ocimum tenuiflorum* Linn was seen as dynamic against safe *Neisseria gonorrhoea* strains. Tulsi fixed oil indicated great antibacterial movement against *Bacillus pumilus*, *Pseudomonas aeruginosa* and *S. aureus*. Higher substance of linolenic corrosive in *Ocimum tenuiflorum* Linn fixed oil could contribute towards its antibacterial action.

Immunomodulatory activities: Steam refined concentrate from the new leaves of tulsi indicated

alteration in the humoral resistant reaction in pale skinned person rodents which could be ascribed to such instruments as immunizer creation, arrival of middle people of extreme touchiness responses and tissues reactions to these middle people in the objective organs. *Ocimum tenuiflorum* Linn seed oil seems to adjust both humoral what's more, cell-intervened insusceptible responsiveness and GABAergic pathways may intercede these Immunomodulatory effects.

Anti-inflammatory activity: Methanolic extract (500mg/kg) and aqueous suspension of *Ocimum tenuiflorum* Linn showed analgesic, antipyretic and anti-inflammatory effects in acute (carrageenan-induced pedal edema) and chronic (croton oil induced granuloma and exudate formation) inflammations in rats. The fixed oil and linolenic acid possess significant anti-inflammatory activity against PGE₂, leukotriene and arachidonic acid induced paw edema in rats by virtue of their capacity to block both the cyclooxygenase and lipoxygenase pathways of arachidonic acid metabolism.

Chemopreventive activity: The chemopreventive impact of *Ocimum tenuiflorum* Linn leaf separate is most likely through the enlistment of hepatic/extra hepatic GST in mice. Raised degrees of diminished GSH in liver, lung and stomach tissues in tulsis separate enhanced mice were likewise found. Critical anti-proliferative and chemopreventive exercises were seen in mice with high grouping of

Ocimum tenuiflorum Linn seed oil. The expected chemopreventive movement of seed oil has been mostly ascribed to its cancer prevention agent activity.

Radioprotective activity: The radioprotective impact of *Ocimum tenuiflorum* Linn was right off the bat revealed in the year 1995. Two segregated flavonoids, viz., orientin and vicenin from tulsis leave demonstrated better radioprotective impact as contrasted and engineered radio protectors. They have indicated noteworthy insurance to the human lymphocytes against the clastogenic impact of radiation at low, non-poisonous concentrations. The mix of *Ocimum tenuiflorum* Linn leaf separate with WR-2721 (a manufactured radio protector) bringing about higher bone marrow cell insurance and a decrease in the harmfulness of WR-2721 at higher portions, proposed that the blend would have promising radioprotection in humans.

Antihypertensive and cardio protective activities: The transient cerebral ischemia and long haul cerebral hypoperfusion (causing cell edema, gliosis and perivascular provocative invade) have been forestalled by *Ocimum tenuiflorum* Linn. The *Ocimum tenuiflorum* Linn fixed oil controlled intravenously created hypotensive impact in an anesthetized hound, which is by all accounts because of its fringe vasodilators activity. Basic unsaturated fats like linoleic and linolenic acids, contained in the *Ocimum tenuiflorum* Linn oil produce arrangement 1 and 3 (PGE₁ and PGE₃)

prostaglandins and restrain the arrangement of prostaglandins (PGE₂). The drawn out taking care of *Ocimum tenuiflorum* Linn offers huge assurance against isoproterenol-incited myocardial putrefaction in Wistar rodents through upgrade of endogenous antioxidants.

Analgesic activity: The tulsi oil was found to be devoid of analgesic activity in experimental pain models (tail flick, tail clip, and tail immersion methods). However, it was effective against acetic acid-induced writhing method in mice in a dose dependent manner. The writhing inhibiting activity of the oil is suggested to be peripherally mediated due to combined inhibitory effects of prostaglandins, histamine and acetylcholine.

Central Nervous System (CNS) depressant activity: The lager of *Ocimum tenuiflorum* Linn delayed the hour of lost reflex in mice due to pentobarbital (40 mg/kg, IP), diminished the recuperation time furthermore, the seriousness of electroshock and pentylenetetrazole-prompted spasms. It additionally diminished Apo morphine prompted battling time and ambulation in "open field" preliminaries. At high portions, *Ocimum tenuiflorum* Linn removes expanded swimming time proposing a CNS energizer or potentially antistress action. The impact was equivalent to that of desipramine, an energizer drug. *Ocimum tenuiflorum* Linn fixed oil (2-3 ml/kg, IP) has been reported to increment pentobarbitone-prompted dozing time in rodents. The hindrance of hepatic

digestion of pentobarbitone/renal freedom by fixed oil could be answerable for potentiation of pentobarbitone initiated dozing time.

Memory enhancer activity: The Brew of dried entire plant of *Ocimum tenuiflorum* Linn improved the amnesic impact of scopolamine (0.4mg/kg) and maturing initiated memory shortfalls in mice. The detached shirking worldview filled in as the exteroceptive social model. *Ocimum tenuiflorum* Linn removes expanded advance down dormancy (SDL) and acetylcholinesterase restraint essentially. Thus, *Ocimum tenuiflorum* Linn can be utilized in the treatment of psychological issue, for example, dementia and Alzheimer's disease.

Antipyretic activity: The antipyretic effect of *Ocimum tenuiflorum* Linn fixed oil was assessed by testing it against typhoid-paratyphoid A/B antibody instigated pyrexia in rodents. The oil on IP significantly diminished the febrile reaction demonstrating its antipyretic effect. At a portion of 3 ml/kg, the antipyretic action of the oil was similar to ibuprofen. Further, the fixed oil had prostaglandin inhibitory action and the equivalent could clarify its antipyretic activity.

Hepatoprotective activity: Oral administration of hydroethanolic extract of tulsi leaves @ 200 mg/kg in male Wistar albino rats gave protection against liver injury induced by paracetamol⁴³. The cold water extract (3g/100g, orally for 6 days) of *Ocimum tenuiflorum* Linn was found to be effective against carbon tetrachloride (0.2 ml/100

subcutaneously) induced liver damage in albino rats.

Antidiabetic activity: Oral intake of *Ocimum tenuiflorum* Linn extract prompted stamped bringing down of glucose in typical, glucose taken care of hyperglycemic and streptozotocin-prompted diabetic rats⁴⁷. A randomized, fake treatment controlled, traverse single visually impaired human preliminary showed a noteworthy abatement in fasting and postprandial blood glucose levels by 17.6% furthermore, 7.3%, individually. Urine glucose levels indicated a comparable trend. Further, tulsi has aldose reeducates movement, which may help in diminishing the difficulties of diabetes for example, waterfall, retinopathy, etc.

Antiarthritic activity: The Antiarthritic movement of tulsi fixed oil was assessed against formaldehyde-initiated joint inflammation in rodents. The fixed oil essentially diminished the distance across of aroused paw. On intraperitoneal administration of the fixed oil day by day for 10 days, there was stamped improvement in the ligament conditions in rodents. The Antiarthritic impact at 3 ml/kg portion was equivalent to headache medicine @ 100 mg/kg, IP. The fixed oil restrained carrageenan and incendiary middle people (e.g., serotonin, histamine, bradykinin and PGE₂) prompted aggravation. Normally, the oil could hinder any fiery reaction including these go between. The outcome proposes possibly helpful Antiarthritic movement of the aggravation models,

counting adjuvant just as turpentine oil-actuated joint edema in rodents.

Antifertility activity: Benzene concentration of *Ocimum tenuiflorum* Linn leaves in male rodents indicated diminished all out sperm tally, sperm motility and weight of testis. The drawn out intake (up to 3 months) of tulsi leaves (200 and 400 mg/kg) to grown-up male and female pale skinned person rodents alongside typical eating regimen diminished sperm check, sperm motility, and weight of male regenerative organs.

Adaptogenic activity/antistress activity: The immunostimulant limit of *Ocimum tenuiflorum* Linn might be liable for the adaptogenic activity of plant. The lager of *Ocimum tenuiflorum* Linn entirety plant expanded the physical perseverance (endurance time) of swimming mice, forestalled pressure prompted ulcers and milk actuated leukocytosis, individually in rodents and mice, demonstrating acceptance of vaguely increased resistance against an assortment of stress actuated organic changes by *Ocimum tenuiflorum* Linn in animals.

Antiulcer activity: The fixed oil of tulsi controlled intraperitoneally evoked noteworthy antiulcer movement against anti-inflammatory medicine, indomethacin, liquor (ethanol half), histamine, reserpine, serotonin or stress-instigated ulcers in rats. The fixed oil essentially had antiulcer action because of its lipoxygenase inhibitory, histamine opposing and anti-secretory effects.

Anticoagulant activity: The tulsi fixed oil (3 ml/kg, IP) drawn out blood coagulating time and the reaction was practically identical to that got with anti-inflammatory medicine (100 mg/kg). The impact has all the earmarks of being expected to the anti-aggregator activity of oil on platelets.

Anticoagulant activity: The tulsi fixed oil (3 ml/kg, IP) delayed blood thickening time and the reaction was practically identical to that acquired with headache medicine (100 mg/kg). The impact seems, by all accounts, to be expected to the anti-aggregator activity of oil on platelets.

Anticataract activity: The AqE of new leaves of *Ocimum tenuiflorum* Linn deferred the procedure of cataractogenesis in exploratory models of cataract (galactosemic cataract in rodents by 30% galactose and naphthalene cataract in bunnies by 1g/kg naphthalene). *Ocimum tenuiflorum* Linn 1 and 2 g/kg postponed the beginning too as ensuing development of cataract altogether in both the models.

Toxicity: The middle deadly portion (LD50) of *Ocimum tenuiflorum* Linn fixed oil was decided after IP administration in mice. The fixed oil was very much endured up to 30 ml/kg, while 100% mortality was recorded with a portion of 55 ml/kg. The LD50 of oil was 42.5 ml/kg. There was discovered no untoward impact on subacute toxicity investigation of *Ocimum tenuiflorum* Linn fixed oil at a portion of 3 ml/kg/day, IP for 14 days in rats.

CONCLUSION

In this survey/review study which is concentrated on the phytochemical and diverse pharmacological properties of *Ocimum tenuiflorum* Linn (Tulsi) gives the data about the medicinal uses of this plant in different illnesses and diseases.

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