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Research

A Review on Medicinal Uses of Ocimum Tenuiflorum Linn (Tulasi)

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	Abstract
Published on: 06 Sep 2025	<p>Tulasi, also known as Indian basil, is a member of the <i>Lamiaceae</i> family and regarded as one of the most effective herbs for treating various conditions. Its pharmacological properties have been described as being able to boost immunity, lower stress levels, and treat gastrointestinal and respiratory ailments. Formulations of <i>Ocimum tenuiflorum</i> Linn include tulasi capsules, tulasi drops, tulasi powder, tulasi ras, dried leaves, tulasi green tea, and tulasi seed balls.</p>
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INTRODUCTION

The Indian medical system uses *Ocimum tenuiflorum* or *Ocimum sanctum* (tulasi) to prepare pharmaceuticals. Queen Of Plants, Elixir Of Life, Mother Medicine Of Plant and how the Ayurvedic medical system refers to *ocimum sanctum*. *Ocimum tenuiflorum* Linn's leaves are oval, petioled, and light green or purple colour. The blade is 5 cm long and typically has a somewhat toothed edge. The leaves are decussate phyllotaxy, emit a pungent smell. The purplish plants are seen on lengthy racemes close to whorls. [1, 2]

OBJECTIVES

- To determine and assess *Ocimum tenuiflorum*'s phytochemical components, such as ursolic acid, eugenol, and other bioactive substances
- Researching the traditional uses of *Ocimum Tenuiflorum* in traditional medical systems like ayurveda
- To show the pharmacological effects, such as hepatoprotective, immunomodulatory, antibacterial, anti-inflammatory, antioxidant, and antidiabetic qualities

- To determine whether it can treat specific diseases like respiratory disorders, infections associated with stress, and metabolic disorders One classification for tulsi is adaptogen. [4, 5, 6]
- Modern study has demonstrated that Tulasi possesses the following qualities in addition to its spiritual significance:
 - Antioxidant
 - Anti-inflammatory
 - Antimicrobial
 - Immunomodulatory

For its health advantages and because it is historically thought to purify the air and fend off negative energy, many Indian homes keep tulsi in the courtyard, In particular, essential oils containing eugenol, citronellol, and Linalool is produced by basil Apart from providing basil with its distinct taste and smell, these substances act as natural insect repellents. As a result, In many places, basil can be grown beside windows, entrances, or vegetable areas. plants that yield fresh leaves for cooking and help keep pests away! [2,3,4] The process of photosynthesis.tulasi is only plant that known to release trace amount of ozone in addition of oxygen. According to certain traditional and contemporary research, tulasi helps to purify the air by lowering pollutants and dangerous microorganisms in the environment in addition to releasing oxygen.

- Resistance to electricity
- Natural antibiotic utilized in recreational areas; Ayurvedic super plant



Fig 1: Tulasi plant

Different from other plant. It release oxygen even at night time.It is believed that Tulasi releases oxygen continuously. Although this assertion is debatable from a scientific standpoint, tulsi does have great air-cleansing qualities and a potent scent that has antibacterial advantages

- As a deity, Tulasi is revered in many Hindu homes and is regarded as sacred in Hinduism. It is thought to provide prosperity, peace, and spiritual purity. Marriage Ceremony: During Kartik month, Tulasi and Lord Vishnu (in the guise of Shaligram) marry symbolically with Tulasi Viva.
- Natural Immunity Booster: Tulsi includes ursolic acid, rosmarinic acid, and eugenol, which are known to have antioxidant and anti-inflammatory qualities.
- From mild colds to more serious illnesses, both antiviral and antibacterial qualities help fight infections.
- By balancing cortisol levels, tulasi, an adaptogen, helps the body cope with stress and reduce anxiety.
- As an air cleaner, tulasi emits oxygen even at night and absorbs harmful gas are like that sulfur dioxide, and others, unlike most other plants. The strong aroma of tulsi naturally repels mosquitoes and other insects.[4,5,6]

BOTANICAL NAME

Ocimum tenuiflorum linn or ocimum sanctum

Taxonomy Kingdom	Plantae
Subkingdom	<i>Tracheobionta</i>
Superdivision	<i>Spermatophyta</i>
Division	<i>Magnoliophyta</i>

Class	<i>Magnoliopsida</i>
Subclass	<i>Asteridae</i>
Order	<i>Lamiales</i>
Family	<i>Lamiaceae</i>
Genus	<i>Ocimum Linn</i>
Species	<i>Ocimum tenuiflorum Linn</i>

CHEMICAL CONSTITUENTS

- 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-Elemene (~11%)
- Beta Caryophyllene(~8%)
- Germacrene (~2%) [7,8,9]

METHODOLOGY

Search Techniques: The word tulasi, (or) Holy Basil, botanical name of holy basil *Ocimum sanctum*, *ocimumtenuiflorum*, *ocimum gratissimum*, *ocimum*, *AlbahacaMorada*, and the searching techniques for holy basil on clinical trial were used alone or in combination in the title or abstract . PubMed , Google Scholar, Science Direct, and Indian Medical database were researched in order to find clinical research.

Qualities for Inclusion: Studies were considered if they described a clinical intervention trial at least one trial result involving the consumption of holy basil or tulasi in any form .

Exclusion Standards: Review studies, nonclinical studies, research without human subjects, studies that only employed tulasi topically or as a component of a polyherbal formulation, studies did not report on uses of tulsi as a single herbal intervention, and studies that did not describe a biological outcome were all disqualified.

Study Selection: The Previous Database Mentioned all of the abstracts and titles were examined. After duplications were eliminated, the complete text of every article was examined to determine the study's eligibility. The search encompassed English-language clinical trials and publications published in the aforementioned electronic databases between the beginning of the search and November 2k16. A searching research paper for an references of chosen papers was selection of the paper to find more pertinent research.

Quality Assessment: Data on the study design, randomization, blinding, and participant dropout description were gathered, and the Jadad scale was employed to evaluate methodological quality in record bases to assess the quality of trial design and execution.

Data Extraction: After reviewing eligible studies, the following information was taken out and tallied: (1) name of the first author and year of publication; (2) study design; (3) Jadad score; (4) study participants (control and intervention groups); (5) extraction technique; (6) intervention period; (7) tulsi dose and dose form; (8) comparator; (9) main and secondary outcome measures; and (10) any adverse events.[10,11,12]

PHARMACOLOGICAL ACTIVITIES

- Anticancer activity
- Antimicrobial activity
- Antioxidant activity
- Immunomodulatory activity
- Anti inflammation activity
- Radioprotective activity
- Chemopreventive activity
- Antihypertension activity

- Analgesic activity
- Antipyretic activity
- Anticoagulant activity
- Antiulcer activity
- Antiarthritis activity
- Antifertility activity
- Hepatoprotective activity
- Antidiabetic activity

ANTICANCER ACTIVITY

The alcoholic concentration (beer) of *Ocimum tenuiflorum* Linn leaves impacts cancer-causing chemicals by utilizing compounds such as cytochrome P450, cytochrome b5, aryl hydrocarbon hydroxylase, and glutathione S-transferase (GST), which are crucial in detoxifying cancer-causing agents and mutagens. Humans have been blamed for operating system anticancer attempts.[12] Eugenol, a flavonoid present in tulsi and other plants, was compared for its mobility. The metabolic start of the carcinogenic agent is stopped by *Ocimum tenuiflorum* Linn leaf concentrate, which inhibits or blocks the processes linked to compound carcinogenesis.[10]

ANTIMICROBIAL ACTIVITY

Tulsi fixed oil shows antibacterial activity against *S. aureus*, *Pseudomonas aeruginosa*, and *Bacillus pumilus*. *Ocimum tenuiflorum* Linn fixed oil higher linolenic content may be a factor in its antibacterial properties. While *Ocimum tenuiflorum* Linn's AIE showed development hindrance for *Vibrio cholerae*, its AqE showed development constraint for *Klebsiella*, *E. coli*, *Proteus*, and *Staphylococcus aureus*. AIE Linn from *Ocimum tenuiflorum* was also thought to be safe to use with a variety of medications and against strains of *S. aureus* that resistant to basic beta-lactam antibiotics. Therefore, it was believed that *Ocimum tenuiflorum* Linn was efficacious against a safe strain of *Neisseria gonorrhoeae*. [11]

ANTIOXIDANT ACTIVITY

A significant reduction in radiation-induced lipid peroxidation in the mouse liver removes highly sensitive free radicals is crucial. Curvilinear, cirsimaritin, isothymusin, apigenin, and rosmarinic were among the phenolic mixtures that were corrosive. Furthermore, a significant quantity of the unexpected oil, eugenol, which showed high cell-reinforcing action, its content in the tulasi concentrate of fresh leaves and stems. It has been shown that flavonoids have cell-reinforcing properties and are related to film assurance.[14]

IMMUNOMODULATORY ACTIVITY

Ocimum tenuiflorum can boost the immune response by increasing the activity of T helper cells and natural killer cells as well as cytokine levels like IL-4 and IFN- γ . It may also play a role in fighting against infections by boosting the phagocytic activity of macrophages.[15] Steam-refined concentrate prepared from fresh tulsi leaves changed the humoral resistive reactivity in pale-skinned rats. The creation of vaccinations, the entrance of intermediate individuals with very sensitive sensitivities, and the tissues' responses to these middle persons in the target organs are causes shift. The immunomodulatory effects could be mediated through *Ocimum tenuiflorum* GABA pathways, and linseed oil seems to alter humoral and cell-intervened insusceptible reactivity.[16]

ANTIINFLAMMATION ACTIVITY

Rats' paw edema caused by PGE₂, leukotriene, and arachidonic acid is significantly reduced by the fixed oil and linolenic acid's ability to inhibit the cyclooxygenase and lipoxygenase pathways of arachidonic acid. The metabolism of the methanolic extract (500 mg/kg) and aqueous suspension of *Ocimum tenuiflorum* Linn showed analgesic, antipyretic, and anti-inflammatory effects in rats with acute (pedal edema from carrageenan) and chronic (granuloma and exudate formation from croton oil) inflammations.[16]

RADIOPROTECTIVE ACTIVITY

In 1995, *Ocimum tenuiflorum* Linn's radioprotective properties were first identified. Orientin and vicenin, two distinct flavonoids found in tulsi leaves, showed superior radioprotective effects when compared to synthetic radioprotectors. At low, non-poisonous concentrations, they have shown significant protection for human lymphocytes against the clastogenic effects of radiation.[17].

It was suggested that the combination of *Ocimum tenuiflorum* Linn leaf and WR-2721 (a produced radio protector) would have promising radioprotection in humans because it increased bone marrow cell insurance and decreased the harmfulness of WR-2721 at greater amounts.[18]

CHEMOPREVENTIVE ACTIVITY

Hepatic/extrahepatic GST in mice is most likely the mechanism by which *Ocimum tenuiflorum* Linn leaf extract has a chemopreventive effect. The stomach, liver, and lung tissues of tulsi- separated enhanced animals also showed elevated levels of reduced GSH. Significant anti-proliferative and chemopreventive effects were seen in mice given a high dosage of *Ocimum tenuiflorum* Linn seed oil. The anti-cancer agent qualities of seed oil have been largely responsible for its predicted chemopreventive effect.[19,20,21].

ANTIHYPERTENSION ACTIVITY

Ocimum tenuiflorum Linn has been able to prevent both hypoperfusion, which can result in perivascular provocative invasion, gliosis, and cell edema. According to every investigation, the fringe vasodilator activity of holibasl leaves fixed oil resulted in hypotension in a dog under anesthesia when it was administered intravenously.[21,22]. *Ocimum tenuiflorum* Linn oil contains basic unsaturated fats, such as linolenic acids, that generate arrangement 1 and 3 (PGE1 and PGE3O) prostaglandins and inhibit arrangement 2 (PGE2). By enhancing endogenous antioxidants, prolonged care of *Ocimum tenuiflorum* Linn provides significant protection against isoproterenol- induced cardiac putrefaction in Wistar rodents.[23,24]

ANAGLESIC ACTIVITY

Tulasi oil was found to have no analgesic effect in experimental pain models (tail immersion procedures). Yet, it showed dose-dependent effectiveness against the mice's acetic acid-induced technique. It is hypothesized that the oil's ability to prevent writhing inhibits histamine, and prostaglandins.[25,26]

ANTIPYRETIC ACTIVITY

Typhoid-paratyphoid A/B antibody-induced pyrexia in rodents was used to test *Ocimum tenuiflorum* Linn fixed oil's antipyretic properties. The oil on IP considerably reduced the prostaglandin- inhibiting action of the fixed oil, and the equivalent could elucidate its antipyretic properties.[18,27]

ANTICOAGULANT ACTIVITY

Blood coagulation time was measured using tulsi fixed oil (3 ml/kg, IP), and the result was nearly the same as that obtained using anti-inflammatory medication (100 mg/kg). The effect on platelets exhibits all the characteristics of an anticipated anti-aggregator activity of oil. By slowing down the blood clotting process and preventing the components that cause blood clots when an individual is harmed, it helps avoid blood clotting.[28,29]

ANTIULCER ACTIVITY

Rats' ulcers caused by stress, anti-inflammatory drugs, indomethacin, liquor (ethanol half), histamine, reserpine, serotonin, and the fixed oil of tulsi elicited a notable antiulcer movement when administered intraperitoneally. Because of its anti-secretory, anti- lipoxygenase, and anti-histamine properties, the fixed oil effectively had anti-ulcer action.[29]

ANTIARTHRITIC ACTIVITY

Tulsi fixed oil's antiarthritic properties were assessed in animals in connection to formaldehyde-induced joint inflammation. The fixed oil essentially decreased the distance across the aroused paw. After 10 days of daily intraperitoneal administration of the fixed oil, the mice's ligament conditions considerably improved. Indian Pharmacopoeia of a headache medication 3 ml/kg, antiarthritic activity equal amount to 100 mg/kg (e.g., serotonin, histamine, bradykinin, and PGE2) and the fixed oil- restrained carrageenan. The oil avoids flammable reaction. The findings suggest that the aggravation models might be helpful for movement that is antiarthritic.[28,30]

ANTIFERTILITY ACTIVITY

Male mice with less levels of benzene in that *Ocimum tenuiflorum* Linn leaves shows decreased testicular weight and motility total sperm count. Sperm check, sperm motility, and the weight of male regeneration organs were all reduced when adult male and female mice with pale skin were given tulsi leaves (200 and 400 mg/kg) for up to three months in addition to their regular diet.[31,32]

HETAPROTECTIVE ACTIVITY

Male Wistar albino rats were protected against paracetamol-induced liver damage by oral administration of a hydroethanolic extract of tulsi leaves at a dose of 200 mg/kg.43. It was shown that *Ocimum tenuiflorum* Linn's cold water extract (3 g/100 g, taken orally for 6 days) was beneficial in preventing albino rats' liver damage from carbon tetrachloride (0.2 ml/100 subcutaneously)[33,34]

ANTIDIABETICS ACTIVITY

When *Ocimum tenuiflorum* Linn extract was administered orally to rats induced diabetes and hyperglycemia, Blood glucose level slowly decreased. [35,36] One visually impaired person's fasting and postprandial blood glucose levels were gradually decrease lowered by 17.6% and 7.3%, respectively, in a randomly, fictional treatment-controlled research. Urine glucose levels showed a similar pattern. Tulsi also includes aldose, which promotes mobility and may help reduce diabetic symptoms, including edema and retinopathy. [35,36]

DISCUSSIONS

This is the first thorough review literature of published human research on consume tulasi as a single herbal intervention. The tulasi long history of traditional use and widespread availability, few human clinical trail studies have been conducted on its effectiveness for clinical conditions. The neuro- disorders, balanced the immune system and infections can be used to categorize the studies are reviewed for the paper These domains are all highly pertinent to the expanding global epidemic of chronic diseases linked to lifestyle choices.[38,39]

The fact that tulasi has therapeutic advantages in a wide range of therapeutic areas many its have inflammation at their heart is fascinating. The anti- inflammatory qualities of tulasi have been documented in number of *in-vitro* and *in-vivo* studies. Numerous bioactive secondary metabolites that function alone or combined to inhibit inflammatory pathways are most likely present in tulasi. There is evidence that tulasi may be beneficial when used in conjunction with pharmacotherapy and nutrition to treat metabolic illnesses. This might reduce the need for high dosages of potentially hazardous drugs.[37,36]

The dried or fresh leaf of the tulsi plant is the most often utilized component of the plant and is known to contain a number of bioactive chemicals, such as ursolic acid, eugenol, linalool, β -caryophyllene, and 1,8-cineole. With differing concentrations in each cultivar, eugenol has been identified as the primary bioactive metabolite shared by all three tulsi cultivars. It has also been proposed that eugenol lowers blood glucose levels through dual cellular pathways. These include blocking the conversion of complex carbohydrates to glucose and competitively preventing glucose from binding to serum albumin. [38,39]

CONCLUSION

Tulsi, often referred to as the “Queen of Herbs,” has long been revered in Ayurvedic medicine for its wide array of therapeutic properties. Scientific studies increasingly validate its traditional uses, demonstrating its antioxidant, anti-inflammatory, antimicrobial, adaptogenic, and immunomodulatory effects. Tulsi shows promise in the management of stress, diabetes, respiratory disorders, cardiovascular health, and skin conditions. While its medicinal potential is vast, further clinical trials and standardized formulations are needed to confirm its efficacy and safety for mainstream medical applications. In summary, Tulsi remains a vital plant of both cultural and medicinal significance, offering a natural and holistic approach to health and wellness.

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