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REVIEW ON "MIRACLE TREE"- TULSI

Shradha B. Gorde[1]

[1]Research Scholar -Bachelor Of Pharmacy Ashvin College Of Pharmacy, Manchi Hill Ashvi B.K, India.
EMAIL Id – gordeshradha@gmail.com

ABSTRACT

The leading factors contributing to global illness and death are chronic diseases linked to lifestyle, many of which can be mitigated through Ayurveda, which emphasizes healthy living habits and the regular use of adaptogenic herbs. Among the various herbs utilized in Ayurveda, tulsi (Ocimum sanctum Linn) stands out as particularly significant, and scientific studies are increasingly validating its positive impacts. Evidence is accumulating that tulsi can alleviate physical, chemical, metabolic, and psychological stress through its distinct pharmacological effects. Research indicates that tulsi protects organs and tissues from chemical stress caused by industrial pollutants and heavy metals, as well as from physical stress resulting from extended physical activity, ischemia, physical constraints, and exposure to cold and loud noises. Furthermore, tulsi has demonstrated the ability to mitigate metabolic stress by regulating blood glucose, blood pressure, and lipid levels, and psychological stress through its beneficial effects on memory and cognitive function, along with its anxiolytic and anti-depressant properties. The extensive antimicrobial properties of tulsi, which are effective against various human and animal pathogens, imply that it can serve as a hand sanitizer, mouthwash, water purifier, and in applications such as animal husbandry, wound treatment, food preservation, herbal resource management, and travel health. Cultivating tulsi plants has both spiritual significance and practical importance, linking the cultivator to nature's creative forces. Additionally, organic farming practices can address issues like food security, rural poverty, hunger, environmental harm, and climate change. Incorporating tulsi in daily rituals exemplifies the wisdom of Ayurveda and illustrates how ancient knowledge can provide solutions to contemporary challenges.

1. INTRODUCTION

Tulsi, known as Tulasi in Sanskrit and holy basil in English, is a highly esteemed aromatic herb from the Lamiaceae family, native to the Indian subcontinent, and has been employed in Ayurvedic medicine for over 3000 years. In Ayurveda, tulsi is commonly called the "Elixir of Life" because of its medicinal properties and is recognized for its ability to address various common health issues. The Indian Materia Medica details the use of tulsi leaf extracts for the treatment of conditions such as bronchitis, rheumatism, and fever.(1)There are also reported therapeutic uses for epilepsy, asthma, dyspnea, hiccups, coughs, skin and haematological diseases, parasitic infections, neuralgia, headaches, wounds, and inflammations. (2)A drop of the juice of the leaves has been applied to earaches.(3)A traditional use of the roots and stems included treating mosquito bites and snake bites as well as malaria.(4)

There are three types of tulsi. Ocimum tenuiflorum (or Ocimum sanctum L.) includes two botanically and phytochemically distinct cultivars, Rama or Sri tulsi and Krishna or Shyama tulsi. (5,6)A third type of tulsi known as Vana or wild/forest tulsi (dark green leaves) is Ocimum gratissimum. (7,8)

While different Ocimum species exhibit vast diversity in morphology and phytochemical composition, tulsi species are differentiated by the yellow colour of their pollen and high levels of eugenol.(9)Ocimum tenuiflorum has six times less DNA than Ocimum gratissimum despite being a distinct species.(10)

Tulsi has been the focus of many scientific investigations, with over a hundred publications in the past decade that highlight its pharmacological properties and diverse therapeutic uses. Various in vitro and animal studies demonstrate that tulsi leaves possess significant pharmacological effects, including adaptogenic properties.(11,12, 13)

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Synonyms : Ocimum sanctum, Ocimum tomentosum,holly basil.

Biological source: The biological source of tulsi is the Ocimum species.which belongs to the Lamiaceae family. The scientific name for tulsi is Ocimum sanctum. Tulsi is also known as holy basil.

Family

Lamiaceae

Origin of Tulsi

Holy basil originates from the Indian subcontinent and is found across Southeast Asia. This plant is commonly utilized in Ayurvedic and traditional medicine, frequently brewed as an herbal tea to address various health issues, and is regarded as sacred in Hindu culture. Additionally, it serves as a culinary herb, possessing a strong flavor that becomes more pronounced during cooking.

Morphological characteristics :

A branching, aromatic shrub that is 30-50 cm high, sometimes woody, and hairy. The flowers are very small, bearing in terminal and axillary racemes. The fruits are subglobose or broadly oblong.

Biological classification:

*Kingdom : Plantae

*Division: Magnoliophyta

*class: Magnoliopsida

*order: Lamiales

*Family: Lamiaceae

*Genus: Ocimum

*species: O. tenuiflorum

Geographical source:

It is native to tropical Asia, Africa and America and widely cultivated in pots and gardens in Europe, South-west Asia and the USA.

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Pharmacology :

- **Anti-bacterial properties of Tulsi:**
  The fixed oil of O. sanctum has a higher concentration of Linolenic acid, which enhances its antibacterial properties. The fresh leaf extract and oil of O. sanctum exhibit greater effectiveness against bacterial strains compared to the extract from dried leaves. Research by Mahmood et al. indicates that O. sanctum contains active compounds that exert effects against the S. aureus strain. Additionally, O. sanctum extract demonstrates antibacterial effects against P. aeruginosa, S. aureus, and Bacillus pumilus.
  These microorganisms lead to the spoilage of food items, fruits, and vegetables, resulting in food poisoning and other severe diseases in humans.(14)Carvacrol and terpenes are the antibacterial components found in this exceptional plant. The sesquiterpene beta-caryophyllene also plays a similar role. This ingredient is an FDA-approved food additive that naturally occurs in Tulsi. It contributes to defending the body against illness-causing bacteria. Additionally, rosmarinic acid serves as a beneficial anti-inflammatory agent while also functioning as an antioxidant. Another compound present in the mixture that fulfills the same role is pegenin. However, the most significant anti-inflammatory element in Tulsi is 'eugenol.' This key ingredient is essential for regulating blood sugar levels in the body as it enhances the beta cell activity of the pancreas, leading to increased insulin secretion.
- **Anti -inflammatory properties of Tulsi :**
  The methanolic extract (500 mg/kg) and aqueous suspension of OS demonstrated analgesic, antipyretic, and anti-inflammatory properties in both acute (induced by carrageenan pedal edema) and chronic (induced by croton oil granuloma and exudate formation) inflammation models in rats. The fixed oil and linolenic acid showed significant anti-inflammatory effects against paw edema induced by PGE2, leukotriene, and arachidonic acid in rats, likely due to their ability to inhibit both the cyclooxygenase and lipoxygenase pathways involved in arachidonic acid metabolism.
- **Anti-oxidant properties of Tulsi :**
  The polyphenol rosmarinic acid found in Tulsi's chemical makeup functions as a potent antioxidant. It safeguards the body's cells from destruction caused by free radicals. An overabundance of oxidation in the body can also lead to cell damage. This acid helps to inhibit the occurrence of excessive oxidation (Simoons and Frederick 1998).
- **Anti -Cancer properties of Tulsi :**
  The anticancer properties of OS have been validated and referenced by numerous researchers. The alcoholic extract (AlE) from OS leaves exerts a regulatory effect on enzymes involved in the metabolism of carcinogens, including cytochrome P450, cytochrome b5, aryl hydrocarbon hydroxylase, and glutathione S-transferase (GST), all of which play a crucial role in the detoxification processes of carcinogens and mutagens. Reports indicate the anticancer effects of OS on human fibrosarcoma cell cultures, demonstrating that at concentrations of 50 µg/ml and higher, the AlE induces cytotoxic effects.
  Cell morphology revealed shrunken cytoplasm and condensed nuclei, and DNA fragmentation was detected through agarose gel electrophoresis. Furthermore, OS significantly reduced the occurrence of neoplasia in the fore-stomach of mice induced by benzo(a)pyrine, along with hepatomas in rats resulting from 3'-methyl-4-dimethylaminoazo-benzene. The AlE from OS leaves also exhibited an inhibitory impact on chemically induced skin papillomas in mice. When applied topically, the Tulsi leaf extract considerably lowered the incidence of tumors, the average count of papillomas per mouse, and the total number of papillomas in those treated with 7,12-dimethylbenz(a)anthracene (DMBA). Additionally, the topical application of the extract notably increased the reduced GSH content and GST activity.
- **Anti-pyretic properties of Tulsi :**
- The antipyretic effects of OS fixed oil were assessed by examining its response to pyrexia induced by typhoid-paratyphoid A/B vaccines in rats.
- Administering the oil via intraperitoneal injection significantly diminished the febrile response, demonstrating its antipyretic properties. At a dosage of 3 ml/kg, the oil's antipyretic effect was found to be comparable to that of aspirin. Additionally, the fixed oil exhibited inhibitory activity against prostaglandin, which may account for its antipyretic effects**.**
- **Anti-Diabetic properties of Tulsi :**
  The oral administration of OS extract significantly reduced blood sugar levels in normal rats, as well as in glucose-fed hyperglycemic streptozotocin-induced diabetic rats. A randomized, placebo-controlled, single-blind human crossover trial revealed a notable reduction in fasting blood glucose levels by 17.6% and postprandial levels by 7.3%. Urine glucose levels exhibited a similar reduction. Additionally, OS demonstrates aldose reductase activity, which could assist in alleviating diabetes-related complications like cataracts and retinopathy

- **Anti -ulcer activity :**
  The fixed oil of OS, when given intraperitoneally, demonstrated considerable antiulcer effects against various types of ulcers induced by aspirin, indomethacin, 50% alcohol (ethanol), histamine, reserpine, serotonin, or stress in rats. This oil exhibited significant antiulcer properties attributed to its ability to inhibit lipoxygenase, act as a histamine antagonist, and possess antisecretory effects.

Antiarthritic activity of Tulsi :

The antiarthritic effects of OS fixed oil were tested against arthritis induced by formaldehyde in rats. The fixed oil significantly decreased the size of the inflamed paw. When administered intraperitoneally each day for 10 days, the fixed oil led to a considerable improvement in the arthritis symptoms of the rats. The antiarthritic effect observed at a dose of 3 ml/kg was similar to that of aspirin at 100 mg/kg, given intraperitoneally. The fixed oil was effective in inhibiting carrageenan and various inflammatory mediators, such as serotonin, histamine, bradykinin, and PGE2, which are known to contribute to inflammation. Therefore, it is plausible that the oil can inhibit any inflammatory reactions that involve these mediators. These findings indicate a promising antiarthritic potential of the oil across several inflammation models, including those induced by adjuvants and turpentine oil that resulted in joint swelling in rats.

2. CONCLUSION

Medicinal herbs have tremendously and uncharacteristically improve the quality of primary health care system in the provision of herbal drugs with no health effects or reactions. The various healing ingredients found in Tulsi make it essential for a healthier and more tranquil life. This small plant is undeniably a rich source of medicinal benefits. Extensive and thorough research has confirmed that consuming Tulsi in any form is safe.

The medicinal benefits of Tulsi are widely recognized and valued by modern science. This herb is considered a natural remedy for humanity, especially in today's often unhealthy lifestyle. Tulsi is referred to as the "queen of herbs" in India and is primarily used in Ayurvedic medicine. It possesses both healing and cosmetic properties. Tulsi is commonly grown in almost all Indian households. Water infused with Tulsi leaves is effective for soothing a sore throat and can be used as a mouthwash. Chewing on Tulsi leaves can help alleviate symptoms of colds and flu. Consuming Tulsi leaves in the morning purifies the blood. Dried Tulsi leaves can be ground into powder to use as a toothpaste mixed with water. It protects the entire respiratory system and has several cosmetic benefits, making it a popular ingredient in herbal shampoos and body scrubs. It is effective in managing dandruff, and Tulsi oil can also be used for this purpose when combined with coconut oil. A mixture of Tulsi leaf juice and ginger juice can relieve stomach pain, cramps, and provide relief from intestinal worms.

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