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Ocimum sanctum and its Therapeutic Effects - A Review

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ABSTRACT:
The medicinal herbs are widely used by the traditional medical practitioners especially in India for the treatment of various diseases in their day to day practice. *Ocimum sanctum* Linn. (known as Tulsi in Hindi), is a small herb seen throughout India. The different parts (leaves, stem, flower, root, seeds and even the whole herb) of the plant have been recommended for the treatment of various diseases like bronchitis, bronchial asthma, malaria, diarrhea, dysentery, skin diseases, painful eye diseases, chronic fever, insect bite etc. due to its different medicinal properties. *Ocimum sanctum* Linn. It has also been suggested to possess anti-hyperglycemic, anti-stress, anti-oxidant anti-fertility, anti-cancer, anti-fungal, anti-malarial, anti-microbial, hepato-protective, cardio-protective, analgesic, adaptogenic and diaphoretic actions.

Key words: Tulsi, Medicinal, Hypoglycemic, Anti-stress, Anti-oxidant.

INTRODUCTION

India is a country which is blessed with the Vedic knowledge of curing diseases through large number of its medicinal plants. From time immemorial people are dependent on the plants for the treatment of various diseases. Today the large number of drugs in use is derived from plants, like morphine from *Papaver somniferum*, Aswagandha from *Withania somnifera*, Ephedrine from *Ephedra vulgaris*, Atropine from *Atropa belladonna*, Reserpin from *Raulphia serpentine* etc. Tulsi *(Ocimum sanctum* Linn.*)* is a widely grown, sacred plant of India. It is one of the most important herbs in Hindu tradition having a wide range of medicinal importance and is being used daily as house hold medicine. In India, Tulsi is also known as Manjari/Krishna-tulsi, Trittavu, Tulshi, and Thulsi and Holy Basil. Hindus use Tulsi leaves in regular worship and grow it as a religious plant in their homes and home gardens, temples and also in their farms. The natural habitat of Tulsi varies from sea level to an altitude of 2000 meters. It is found growing naturally in moist soil nearly all over the globe [1].

TAXONOMIC POSITION AND AFFINITY

According to Bentham and Hooker system of classification, Tulsi belongs to the family Labiatae, which is included in the 7th cohort Lamiales, series Bicarpellateae, sub-class Gamopetalae and class Dicotyledonae. The family Labiatae is closely related to Verbenaceae. It also bears some affinity with the family Boraginaceae [2].

HABIT

Tulsi is a branched, aromatic, erect herb with hairs all over the body. It attains a height of about 75 to 90 cm when mature. The leaves are more or less round with margin entire or toothed and about 5cm long. Inflorescence is verticillaster. Flowers are bisexual, hypogynous, and zygomorphic [3].

BIO-ACTIVE HERBAL INGREDIENTS

Apart from religious significance, Tulsi has a long history of medicinal value as mentioned in *Charak Samhita*, the ancient textbook of Ayurveda. The plant as a whole is used in various ailments (Table 1). It is an aromatic herb. It contains a large number of bioactive chemical constituents which includes phenolics, non-phenolics, flavonoids, etc. It contains phenolics such as carvacrol and eugenol; non-phenolics such as methyl eugenol, methyl chavicol and caryophyllene etc. The flavonoids include apigenin, luteolin, vicenin-2, orientin, isoorientin, vitexin, isovitexin, cirsilineol, isothymusin, rosmarinic acid and caffeic acid. Petroleum extract of the Leaves found to contain beta-carotene, sterols and fatty acids. Presence of Triglyceride, l 3-Dilinoleneoyl-2-palmitin in the leaves has also been reported [4, 5].

ANTIHYPERGLYCEMIC EFFECT

Several studies in animal models reveal the anti-hyperglycemic properties of *Ocimum sanctum* [6-9]. Anti-diabetic effect of *Ocimum sanctum* seed oil is being evaluated in alloxan diabetic rabbits [10]. It is being reported that the ethanolic extract stimulated insulin secretions under different conditions- from perfused rat pancreas, isolated rat islets and a clonal rat beta-cell [11]. It is also found that the plant extract of Tulsi potentially regulate corticosteroid induced diabetes mellitus [12]. It has been studied that certain inorganic trace elements such as vanadium, zinc, chromium, copper, iron, potassium, sodium, and nickel play an important role in the maintenance of normal glucose level by activating the beta-cells of the pancreas [13]. The levels of the elements like Cu, Ni, Zn, K, and Na are found to be in trace amounts,

whereas that of Fe, Cr, and V levels are found in marginal levels in Tulsi leaves [14]. They decrease in the levels of blood glucose, amino acids, glycated proteins and uronic acid after one month of supplementation with powders of Tulsi leaves in Type 2 diabetes patients [15].

ANTI-STRESS ACTIVITY

Several experimental studies have revealed that Tulsi improves resistance to different types of stress like behavioral despair, induced gastric ulcers, and exposure to hepatotoxins [16]. Ethanolic extracts of Tulsi have been shown to prevent endocrine stress responses to noise induced stress [17].

ANTI-OXIDANT ACTIVITY

Several studies have shown the anti-oxidant activities of Tulsi. It has shown protective effects against copper sulphate toxicity in rats which caused the formation of free hydroxyl radicals and subsequently increased the lipid peroxidation which led to the rise in levels of antioxidant enzymes such as superoxide dismutase and catalase.

Administration of Tulsi restores the various parameters to near normal values [18]. The leaf extract of the plant has also shown radio-protective activity which may be due to its anti-oxidant properties [19-21].

ANTI-MALARIAL ACTIVITY

Fresh leaves of Tulsi with black pepper have been used as a prophylactic against malaria, and a decoction of the root has been recommended for malarial fevers. The leaf juice has also been used for the treatment of chronic fever, hemorrhage, dysentery, dyspepsia and helminthes infestations. It is used topically for ringworm and skin diseases [22].

ANTI-INFLAMMATORY, ANALGESIC AND ANTI-PYRETIC ACTIVITY

Extracts of Tulsi leaves is being reported to inhibit both acute and chronic inflammation in animal models. It also had analgesic and anti-pyretic activities [23]. Tulsi has the ability to inhibit prostaglandin biosynthesis and inhibited the key enzyme involved in the biosynthesis of prostaglandins and cyclooxygenase [24].

In addition to the above therapeutic uses Tulsi has other immense medicinal importance. It is used in the treatment of chemically induced oral cancer and the development of skin papillomas in rodents [25]. The leaf extract has anti-cataract activity [26].

The decoction of the leaves with honey and ginger is being effectively used as a household therapy for the treatment of bronchitis, asthma and influenza. When taken regularly, the leaves are used to increase memory. The leaf juice is used as an antiseptic due to its anti-fungal and anti-bacterial activity [27]. The leaves of Tulsi are being applied to induce abortion by the Ayurvedic practitioners. Tulsi is also reported to be an anti-fertility agent [28-30].

Table 1. Different parts of *O. sanctum* with therapeutic value

Parts of the plant (O. sanctum) used	Therapeutic value	References
Leaves	Used in cold, fever, bronchitis and cough, Hyperglycemia, malarial fever, insecticide, Indigestion,headache,hysteria,insomnia, Cholera, antioxidant and skin diseases	[10], [31]
Roots	Used as diaphoretic in malarial fever	[22]
Seed	Used as hyperglycemia, hypercholesterolaemia, Antioxidant, chemoprevention, anti-, Inflammatory and anti-ulcer activity	[10], [27] [32], [33], [34], [35]
Stem	Antioxidant activity	[36]

CONCLUSION

Tulsi, the holy herb is of immense medicinal and therapeutic values. Tulsi is being documented as a medicinal plant in ancient Hindu literature having wide impacts in hindu religious and socio-ethnic purviews. It is being used in the household for the treatment of different calamities due to its wide acceptability in ancient and folklore medicines. Each and every parts of the plant is useful for the treatment of various diseases. Tulsi has a wide exposure in socio-economic parameters also. However its potential as a drug or drug component in Western classical medicine as a remedial measure to various diseases is yet to be explored fully.

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