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PHARMACOLOGICAL ACTIVITIES OF OCIMUM SANCTUM (TULSI): A REVIEW

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ABSTRACT

In present review, an attempt has made to assemble the botanical, phytochemical, pharmacological and toxicological information of Ocimum sanctum Linn. (OS, Tulsi), a medicinal herb uses in the indigenous system of medication. OS has been worshiped in nearly all ancient ayurvedic texts intended for its extraordinary medicinal properties. pungent and bitter in taste and hot, light & dry in effect. Its seeds are considered too cold in effect. The roots, leaves and seeds of Tulsi have several medicinal properties. Ayurvedic texts categorise OS as stimulant, fragrant and antipyretic. While improving kapha and vata, it worsens pitta. It has a wide range of action on the human body mainly as a cough alleviant, a sweat-inducer and a mitigator of indigestion and anorexia. OS has a variety of pharmacological activities such as antibacterial, antiviral, antifungal, anthelmintic, antidiarrheal, analgesic, antipyretic, anti-inflammatory, antiallergic, antihypertensive, central nervous system (CNS) depressant, memory enhancer, hepatoprotective, antidiabetic, antiasthmatic, antioxidant, anticancer, radioprotective, immunomodulatory, antifertility, antistress, antileucodermal and anticoagulant activities. This review will definitely benefit for the researchers as dealing with O. sanctum to know its proper usage as this herb is appeared to be highly valuable, having many pharmacological properties.

KEYWORDS: Medicinal properties, Ocimum sanctum (OS, Tulsi), Pharmacological activities.

INTRODUCTION

Ocimum sanctum also known as Tulsi or Holy basil is an aromatic herb and it belongs to the family Lamiaceae. It is widely used as medicine to cure various ailments.[1]

Plants are the significant sources of medicine and a large number of medications in use are derived from plants. The therapeutic uses of plants are safe, economical & effective as their comfort of accessibility. Amongst the plants identified for medicinal value, the plants of genus Ocimum belonging to family Lamiaceae are actual important for their therapeutic aptitudes. Ocimum sanctum consumes two varieties i.e., black (Krishna Tulsi) and green (Rama Tulsi), their chemical constituents are alike. Ocimum sanctum is generally distributed cover the whole Indian sub-continent, growing up to 1800 m in the Himalayas and as far as the Andaman and Nicobar Island. Tulsi is Sanskrit word which means "the incomparable one" and have very greater place in the Hindu philosophy. Various synonyms used in India and all concluded the world. The phytoconstituents isolated from numerous parts of the plant include eugenol, cardinene, cubenol, borneol, linoleic acid, linolenic acid, oleic acid, palmitic acid, steric acid, Vallinin, Vicenin, Vallinin acid, Orientin, Circineol, Gallic Acid, vitamin A, vitamin C, phosphorous and iron. Ocimum sanctum is one such herb showing various medicinal properties viz. analgesic activity, Immunomodulatory activity, antiasthmatic activity, anticancer activity, antidiabetic activity, antistress activity in addition to possessing useful memory enhancer and neuroprotective activity etc. This review article summarises numerous biological activities of Ocimum sanctum.[2]

The main difference of Tulsi in the Indian sub inside has been characterised with the three specific Ocimum genus i.e., Rama Tulsi (Ocimum sanctum) with green leaves and Krishna Tulsi (Ocimum tenuflorium) with purple leaves, and Vana Tulsi (Ocimum gratissimum), furthermore a prominent species of Ocimum which does not show authority in this area but in other area of world, is known as Ocimum basilicum. known as sweet basil. Tulsi is considered as the holy plant in the Indian regulations. Since earliest times, is widely used for divine and medicinal resolutions.[3]

Taxonomy

Kingdom: Plantae.

Subkingdom: Tracheobionta.

Super division: Spermatophyta.

Division: Magnoliophyta.

Class: Magnoliopsida.

Subclass: Asteriidae.

Order: Lamiales.

Family: Lamiaceae.

Genus: Ocimum.

Species: O. sanctum.

Botanical Description

It is a vertical, much branched, perfumed and erected plant achieving a height of around 30-60 cm when mature. Its fragrant leaves are simple, conflicting, elliptical, oblong, imperceptive or acute with whole or sub indent or dentate margins, growing up to 5 cm long. The Tulsi flowers are slight having purple to reddish colour, present in small compacted groups on cylindrical thorns. Flowers remain rarely longer than 5 mm, calyx tube hairy outside near base. Flower tube is hairy. The fruits be located small and the seeds yellow to reddish in colour.[4]

Chemical Constituents

The different parts of Ocimum sanctum contain diverse types of constituents in variable amounts. The leaves contain a high contented of essential oils which include Toluene,

Camphene, Octane, Benzene, Citronellel, Sabinene, Limonene, Ledol, Dimethylbenzene, Ethyl-2- methyl butyrate, Eugenol, Terpiniolene, β-elemene, Isocaryophyllene, Iso-eugenol, α-amorphene, α-guaiene, α-humulene, α-terpineol, Borneol, Calamine, Nerolidol, Carvacrol, Geraniol, Humulene oxide, Elemol, Tetra decanal, (EZ)-famesol, Cissesquisainenehydrate, α-bisbolol, 14-hydroxy-α-humulene. To separate constituents' extraction is performed in numerous ways. When alcoholic extraction of leaves and aerial parts of plants remained done, it was found to contain Luteolin, Orientin, Urosolic acid, Apigenin7-Oglucuronide, Luteolin-7-O-glucuronide, Isorientin, Aesculin, Triacontanolferulate, Vallinin acid, Gallic acid, Circineol, Aesculetin, Triacontanolferulate, Chlogenic acid, Stigmasterol, Caffeic acid, Urosolic acid, 4-hydroxybenzoic acid, Vicenin-2, Chlorogenic acid, Procatechuic acid, Phenylpropane glucosides, β-Stigmasterol. The extraction of fresh leaves and stem yielded phenolic compounds like Apigenin, Circimaritin, Isothymusin, Eugenol and Rosameric acid. O. sanctum is also a source of monoterpenes and sesquiterpenes like Neral, Camphene. Cholesterol and stigma sterol. Vitamin A and Vitamin C are also found in this herb which stimulates antibody production up to 20% to provide protection against diseases.[5]

Health Benefits of Holy Basil (Tulsi)

Holy Basil (scientific name is Ocimum Sanctum) or Tulsi is certainly the best medicinal herb forever known. It has boundless amazing medicinal values and is being loved in India since thousands of years. Even going earlier to a Tulsi plant alone can guard you from several infections. A few leaves throw down in drinking water or food stuff can disinfect it and can kill germs in it. Even sensing it or keeping it planted in a pot at home can protect the entire family from infections, coughing and cold and other viral infections. Holy Basil is so virtuous for boosting up the immune system that cannot be elucidated in words. It keeps from nearly all sorts of contaminations from viruses, bacteria, fungi and protozoa. Recent studies demonstrate that it is also cooperative in inhibiting growth HIV and cancer-causing cells.

1. Healing Power

The tulsi plant has several therapeutic properties. The leaves are a nerve tonic and likewise sharpen memory. They encourage the removal of the catarrhal matter and mucus from the bronchial tube. The leaves strengthen the abdomin and induce copious secretion. The seed of the plant are gluey.

2. Fever & Common Cold

The leaves of basil are specific for several fevers. During the raining season, when malaria and dengue fever are widely predominant, tender leaves, boiled with tea, act as precautionary in contradiction of these diseases The juice of tulsi leaves can used to bring down temperature.

3. Coughs

Tulsi is a significant constituent of numerous Ayurvedic cough syrups and linctus. Also It helps to mobilize mucus in bronchitis and asthma. Chewing tulsi leaves let go cold and flu.

4. Sore Throat

Water boiled with Holy basil leaves can be taken as drink in case of sore throat infection. This water also used as a gargle.

5. Respiratory Disorder

The herb is useful in the treatment of respiratory system syndrome. A decoction of the leaves, with honey and ginger is an active remedy for bronchitis, asthma, influenza, cough and cold.

6. Kidney Stone

Basil strengthening effect on the kidney. In case of renal stone, the juice of basil leaves and honey, if taken regularly for 6 months it will eject them through the urinary tract.

7. Heart Disorder

Basil has a helpful effect in cardiac illness. It decreases the level of blood cholesterol.

8. Children's Ailments

Paediatric problems like cough cold, fever, diarrhoea and nausea respond favourably to the juice of basil leaves. If pustules of chicken pox postponement their appearance, basil leaves occupied with saffron will rush them.

9. Stress

Basil leaves are regarded as an 'adaptogen'. Even healthy persons can chew 12 leaves of basil, two times a day, to avoid stress. It purifies blood and benefits in prevent several common fundamentals.

10. Mouth Infections

The leaves are fairly effective for the sore and infections in the mouth. A limited leaves chewed will cure these situations.

11. Skin Disorders

Applied locally, basil juice is beneficial in the treatment of roundworm and further skin diseases. It has also been tried successfully in the treatment of leucoderma.

12. Headache

Basil makes a good medicine for headache. A decoction of the leaves can be given for this ailment. Pounded leaves mixed with sandalwood paste can be applied on the forehead for accomplishment relief from headache, and for provide coolness.

13. Eye Disorders

Basil juice is an effective medicine for sore eyes and night-blindness, which is generally caused by deficiency of vitamin A.[6]

Pharmacological implementation of ocimum sanctum (tulsi)

Anti-stress activity

Stress is a very common disorder. It is described as psychological, physiological, and behavioural responses by individuals when they receive a deficiency in equilibrium between their inadequacies and their ability to quench those inadequacies. Stress reacts due to the lack of number of neurotransmitters such as dopamine, norepinephrine, and serotonin. The previous studies say that Ocimum sanctum leaves produce protective action against the stress activity by enhancing the serotonin level in the brain. Tulsi is an effective herb and gives a calming effect. Both acute and chronic noise stress, which is stimulated by the plasma level of stress hormone cortisone prevented by the extraction of Tulsi leaves. And this effect is confirmed by performing the animal experiment or by animal research. When stress occurs at a high level, it gives noxious effect to the body and raises a variety of disorders such as

psychiatric disorder, immune suppression, peptic ulcer, and hypertension and ulcerative colitis; hence it is very necessary to be cured.[7]

Anticancer activity

It has been found that ethanolic extract of Ocimum sanctum mediated a significant reduction in tumour cell size and an increase in lifespan of mice having Sarcoma-180 solid tumours. Similar results were also obtained by others where leaf extract administered orally (200 mg/kg, p.o.) resulted in significant reduction in tumour volume, increase in average body weight, and survival rate of mice. Ocimum has the ability to protect the DNA of the body from dangerous radiations.[8]

Antioxidant activity

The antioxidant activity guided isolation of OS leaves and stems in liposome oxidation model yielded six flavonoids including apigenin, Rosmarinic acid, Isothymusin, Isothymusin, Circimaritin, cirsilineol along with eugenol. Compounds Isothymusin, isothymonin and eugenol showed good antioxidant activity at 10 μM, compared to standards TBHQ (tertbutyl hydroquinone) and BHT (butylated hydroxyl toluene). A polysaccharide (constituted of 23.3% rhamnose; 19.2% xylose; 42.2% arabinose; 10.3% glucose and 5% galactose) isolated from OS leaves demonstrated antioxidant activity in DPPH free radical scavenging, anti-lipid peroxidation, hydrogen peroxide scavenging and superoxide radical scavenging assays. The polysaccharide showed potent DPPH free radicals scavenging activity with IC0.2 value of 5.61 ± 0.17 μg/ml, compared to α-tocopherol (IC0.2 = 11.9 ± 0.2 mM) and BHA (IC0.2 = 14.5 ± 2.5 mM). Also, OS polysaccharide scavenged ~ 54% and ~79% of superoxide free radicals at 10 and 50 μg/ml, respectively. The antioxidant results showed that OS polysaccharide possesses reactive oxygen species scavenging and iron chelating properties. The pre-treatment of OS polysaccharide at 100 μg/ml protects 30 ± 3.2% mouse splenocytes against γ-ray irradiation. The antioxidant potential of OS polysaccharide against oxidative damage to lipid, DNA and splenocytes warrants its application in radiation protection.[9]

Anticoagulant activity

The OS fatty oil (3 ml/kg, ip) prolonged coagulation time and also the response was cherished that obtained with aspirin (100 mg/kg). The effect appears to ensue to the antiaggregatory action of oil on platelets.[10]

Antipyretic Activity

The crude natural preparation of Tulsi itself, without any processing has effective antipyretic action. The oil on Ip administration considerably reduced the febrile response indicating its antipyretic activity. [11]

Anti-fertility effect

The leaves of Ocimum sanctum L. are said to have abortifacient in women8 & sanctum has also antifertility effect. The local women of Kerala & the ayurvedic physician have been reported to use tulsi leaves for ant fertility effect.[12]

Anti-ulcer effect

It was reported that Ocimum sanctum, decreased the incidence of ulcers and also enhanced the healing of ulcers. Moreover, holy basil completely healed the ulcers within twenty days of treatment in acetic acid-induced model. It was seen that that anti-ulcer effect of holy basil may be due to its cytoprotective effect.40 The antiulcerogenic property of holy basil was examined in pyloric ligated and pyloric ligated and aspirin treated rats. The extract of holy basil reduced the ulcer index, free and total acidity on acute and chronic administration. After seven days of pre-treatment with the drug increased the mucous secretion also. Finding advice that extract has antiulcerogenic property against experimental ulcers, and it is due to its ability to reduce acid secretion and increase mucous secretion.[13]

Anti-asthmatic activity

50% aqueous ethanol extract of dried and fresh leaves and the volatile and fixed oils of OS was evaluated against histamine and acetylcholine induced pre-convulsive dyspnoea (PCD) in guinea pigs. The 50% ethanol extract and volatile oil extracted from fresh leaves and fixed oil from the seeds significantly protected the guinea pigs against histamine and acetylcholine induced proconvulsive dyspnoea.[14]

Hepatoprotective Activity

Lahon et al. in 2011 studied hepatoprotective activity of Ocimum sanctum alcoholic leaf extract against paracetamol-induced liver damage in Albino rats synergism with silymarin and concluded that Ocimum sanctum alcoholic leaf extract showed significant hepatoprotective activity and synergism with silymarin.[15]

Analgesic activity

The OS oil was found to be lacking of analgesic activity in experimental pain models (tail flick, tail clip and tail immersion methods). But 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.[16]

CONCLUSION

Plants have been used for the treatment of ailments throughout the world meanwhile the beginning of refinement. Tulsi is cultured for religious and therapeutic purposes. It is broadly known across South Asia as a healing plant and an herb tea. Numerous medicinal goods have been accredited to the plant not only in Ayurveda and Siddha but also in Greek, Roman and Unani. The enormous survey of literature showed Ocimum sanctum have a broad spectrum of pharmacologic activities. It has an honoured status in herbs with various biological abilities and has a great space for further new area of surveys. Conventionally crude extracts of several parts of plant have been use for their analgesic, antiasthmatic, antistress, hepatoprotective, anti-ulcer, anti-cancer and antibacterial properties. Future research on sacred basil should be highlighted for control of numerous ailments especially it should be discovered as a important remedy concerning neuropsychological syndromes for the well-being and service of mankind.

REFERENCES

1. R. Borah and S. P. Biswas, “Tulsi (Ocimum sanctum), excellent source of phytochemicals,” 2018; 5: 1732–1738.
2. I. Factor, K. Kumar, A. K. Singh, R. Kumar, V. Gupta, and K. Tripathi, “International Journal of Pharmaceutical and Ocimum sanctum Linn : A Review on Phytopharmacology and Therapeutic Potential of Tulsi,”, 2013; 3(2): 148–151.
3. A. C. View, O. N. The, O. Bassed, and B. E. Oil, “A COMPREHENSIVE VIEW ON THE OCIMUM BASSED ANTI,”, 2019; 8(7): 1991–2001. doi: 10.20959/wjpr20197-15115.
4. V. Kumar, H. C. Andola, H. Lohani, and N. Chauhan, “Available online through Pharmacological Review on Ocimum sanctum Linnaeus : A Queen of herbs,” 2011; 4(2): 366–368.
5. N. Bano, A. Ahmed, M. Tanveer, K. Gm, and A. Mt, “Journal of Bioequivalence &

Bioavailability Pharmacological Evaluation of Ocimum sanctum," 2017; 9(3): 387–392. doi: 10.4172/jbb.1000330.

6. P. Kalyan, M. R. Kumar, and K. Kavitha, "Pharmacological Actions of Ocimum sacntum – Review Article," 2012; 1(3): 406–414.
7. A. R. Ghosh and S. Direct, "Review On Nutritional , Medicinal and CNS Activities of Tulsi (Ocimum. Sanctum)," 2020; 12(3): 420–426.
8. R. Article and S. Verma, "Chemical constituents and pharmacological action of Ocimum sanctum (Indian holy basil-Tulsi)," 2016; 5(5): 205–207.
9. D. Singh and P. K. Chaudhuri, "A review on phytochemical and pharmacological properties of Holy basil (Ocimum sanctum L.) Industrial Crops & Products A review on phytochemical and pharmacological properties of Holy basil (Ocimum sanctum L.)," *Ind. Crop. Prod.*, August 2018; 118: 367–382. doi: 10.1016/j.indcrop.2018.03.048.
10. G. Pandey and S. Madhuri, "Review Article PHARMACOLOGICAL ACTIVITIES OF OCIMUM SANCTUM (TULSI): A REVIEW,", 2010; 5(1): 61–66.
11. M. Ponugoti, "Review Article A PHARMACOLOGICAL AND TOXICOLOGICAL REVIEW OF MATCHLESS HERB : TULASI Department of Pharmacology, Hindu College of Pharmacy,", 2017; 7(4): 407–424.
12. R. K. Joshi, "Phytoconstituents, traditional, medicinal and bioactive uses of Tulsi (Ocimum sanctum Linn.): A review," 2017; 6(2): 261–264.
13. S. A. Almatroodi, M. A. Alsahli, A. Almatroudi, A. H. Rahmani, M. A. Alsahli, and A. Husain, "Ocimum sanctum : Role in Diseases Management Through Modulating Various Biological Activity," 2020; 12(5): 1198–1205.
14. P. Maurya, "OSCIMUM SANCTUM : TULSI (HOLY BASIL)," 2021; 9(1): 1047–1052.
15. K. V. Kulkarni and B. V. Adavirao, "A review on : Indian traditional shrub Tulsi (cimum sanctum): The unique medicinal plant," 2018; 6(2): 106–110.
16. A. Harini and P. L. Hegde, "Journal of Drug Delivery and Therapeutics," 2019; 9: 562–569.