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PHARMACOLOGICAL STUDY OF TULASI WITH RESPECT TO ITS KRIMIGHNA, SHOTHHARA, VEDANAHARA KARMA WITH SPECIAL REFERENCE TO ANTIHELMINTHIC, ANTIMICROBIAL, ANTIINFLAMATORY AND ANALGESIC ACTIONS

Monica Salaria*[1] and Aditya[2]

[1]P.G. Scholar, Dept. of *Kriya Sharir*, JIAR, Jammu, India.

[2]MD *Kayachikitsa*, Medical Officer, Govt. Ayurvedic Dispensary, Baspur, Jammu, India.

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***Corresponding Author**
Monica Salaria
P.G. Scholar, Dept. of *Kriya Sharir*, JIAR, Jammu, India.

ABSTRACT

Ocimum Sanctum famously known as *Tulsi* in *Hindi* and *Holy Basil* in English belongs to family Labiatae is related to the Gods in *Hindu* mythology. It is said to be very holy because of its qualities. It is found throughout the India. The leaves are consumed empty stomach or in tea in most of the Indian families. It has been used as such since time unknown in India as it is said to be very good in health promotion and the disease eradication as well. The useful parts are leaves, flowers, seeds and root. The various researches have been done that confirm tulsi of its various actions like cardiofriendly, radioprotective, antioxidant, hypolipidaemic, immunomodulator, antiinfective, anticonvulsant, anti helminthic, analgesic, thyroid friendly, antidiabetic, wound healing, genotoxicity improving, antimicrobial, gene transcription effective, gastroprotective, antiinflamatory, anticancerous. The current review is to summarize Description, Phytochemistry, Therapeutic Activity, Pharmacological Activity of *Emblica officinalis*, which may be helpful to establish a Standard Natural drug as an antihelminthic, antimicrobial, antiinflamatory and analgesic.

KEYWORDS: Tulsi, Krimighna, Shothhar, Vedanahar, Antihelminthic, Antimicrobial, Antiinflamatory, Analgesic.

INTRODUCTION

The drug *Tulsi* has been explained by *Acharya Charaka* under *Shwashar gana*[1] while *Sushruta* considered under *Sursadi gana*[2] and *Shirovirechaka*[3] respectively. It is considered

so important drug that it was included in the daily routine of Indians. Now days, it has been formulated as a part of green tea, other teas and health drinks, candies, certain decoctions, arka etc. In the present world, there is always the need of perfect herbs that have multifaceted approach towards various health conditions and the drug Tulsi fulfills all the requirements of multiple health benefits. The name 'Tulsi in Sanskrit means 'the incomparable one'.

VERNACULAR NAMES[4]: Sanskrit : Surasa, Bhutaghni, Bahumanjari, Devdundhubhi, Sulabha **Assamese** : Tulasi, **Bengali** : Tulasi, **English** : Holy Basil, **Gujrati** : Tulasi, Tulsi, **Hindi** : Tulasi, **Kannada** : Tulasi, Shree Tulasi, Vishnu Tulasi, **Malayalam** : Tulasi, Tulasa, **Marathi** : Tulas, **Punjabi** : Tulasi, **Tamil** : Tulasi, Thulasi, Thiru Theezai, **Telugu** : Tulasi, **Urdu** : Raihan, Tulsi.

MORPHOLOGY: TULASI (Whole Plant)

Tulasi consists of dried whole plant of Ocimum sanctum Linn. (Fam. Labiateae); an erect, 30 - 60 cm high, much branched, annual herb. The whole plant seems slight violet coloured. The flowers and fruits rise in Winters. It is of two varieties i.e. 1. *Surasa* 2. *Shweta Surasa.*[5]

TAXONOMY[6]

Kingdom- Plantae

Division- Magnoliophyta

Class- Magnoliopsida

Order- Lamiales

Family-Labiateae

Genus-Ocimum L-Basil

Species-Ocimum tenuiflorum

DISTRIBUTION: Found throughout the country and Himalayas at 6000 feet altitude.[7]

DISCRIPTION

a) Macroscopic

Root is thin, wiry, branched, hairy, soft, blackish-brown externally and pale. Violet internally.

Stem is erect, herbaceous, woody, branched; hairy, sub quadrangular, externally purplish-brown to black, internally cream, coloured; fracture, fibrous in bark and short in xylem; odour faintly aromatic. Leaf is 2.5-5 cm long 1.6 - 3.2 cm wide, elliptic oblong, obtuse or

acute, entire or serrate, pubescent on both sides; petiole thin, about 1.5-3 cm long hairy; odour, aromatic; taste, characteristic. Flower is Purplish or crimson coloured, small in close whorls; bracts about 3 mm long and broad, pedicels longer than calyx, slender, pubescent; calyx ovoid or campanulate 3-4 mm bilipped, upper lip broadly obovate or suborbicular, shortly apiculate, lower lip longer than upper having four mucronate teeth, lateral two short and central two largest; corolla about 4 mm long, pubescent; odour, aromatic; taste, pungent. Fruit is a group of 4 nutlets, each with one seed, enclosed in an enlarged, membranous, veined calyx.

b) Microscopic

Root - Shows a single layered epidermis followed by cortex, consisting of seven or more layers of rectangular, round to oval polygonal, thin-walled, parenchymatous cells, filled with brown content, inner layers of cortex devoid of contents; phloem consisting of sieve elements, thin-walled, rectangular parenchyma cells and scattered groups of fibres, found scattered in phloem; xylem consists of vessels, tracheids, fibres and parenchyma; vessels pitted; fibre tracheides, long, pitted with pointed ends; fibres thick walled and with pointed ends. Stem - Shows a single layered epidermis with uniseriate, multicellular covering trichomes having 5-6 cells.

Leaf- Petiole shows somewhat cordate outline, consisting of single layered epidermis composed of thin-walled, oval cells having a number of covering and glandular trichomes; covering trichomes multicellular 1-8 celled long, rarely slightly reflexed at tip; glandular trichomes short, sessile with 1-2 celled stalk and 2-8 celled balloon shaped head, measuring 22-27 in dia; epidermis followed by 1 or 2 layers and 2 or 3 layers of thin-walled, elongated, parenchyma cells towards upper and lower surfaces respectively; three vascular bundles situated centrally, middle one larger than other two; xylem surrounded by phloem. Midrib - epidermis, trichomes and vascular bundles similar to those of petiole except cortical layers reduced towards apical region. Lamina - epidermis and trichomes similar to those of petiole; both anomocytic and diacytic type of stomata present on both surfaces.[8]

PROPERTIES AND ACTION

The *Tulsi* has *Katu, Tikta, Kashaya rasa* and *vipaka* is *Katu*. Its *guna* are *Laghu, Ruksha, Ushna* and the *virya* is *Ushna*. Thus it is *kaphahara* because of *katu Tikta, Kashaya ras, katu vipaka, laghu, ruksha Ushna guna* and *Ushna Virya*. It is *Vatahar* as a result of *Ushna guna*

and *Ushna Virya*. It is *pittavardhak* as a result of *Katu ras, Katu vipak, Ushna guna* and *Ushna virya*.

It is *Krimighna, Vedanahara, Shothhara, Twakdoshahara, Shirovirechak, dipana, pachana, anulomana, mutrala.*[9] *Katu, tikta, kashaya rasa, katu vipaka, ruksha, ushna gun, ushna virya* and *krimighna prabhav* act as *prakritivighat* for the *krimi*. The *Ushna gun*a and *Ushna virya* does the *vatashamana* and is thus *vedanahara*. Its qualities make it *Kaphahara* and *Vatahara* so it reduces *shotha* from dual as well.

CHEMICAL COMPOSITION

The leaf volatile oil contains eugenol, euginal (also called eugenic acid) In addition, the following phenolic actives have been identified, which also exhibit antioxidant and antiinflammatory activities, Rosmarinic acid, apigenin, cirsimaritin, isothymusin and isothymonin[10], urosolic acid[11], carvacrol, linalool, limatrol, caryophyllene, methyl carvicol while the seed volatile oil have fatty acids and sitosterol; in addition, the seed mucilage contains some levels of sugars and the anthocyans are present in green leaves. The sugars are composed of xylose and polysaccharides. The stem and leaves of holy basil contain a variety of constituents that may have biological activity, including saponins, flavonoids, triterpenoids, and tannins.[12] Two water-soluble flavonoids Orientin and Vicenin, have shown to provide protection against radiation-induced chromosomal damage in human blood lymphocytes.[13]

PHARMACOLOGICAL AND BIOLOGICAL ACTIVITIES

The O. sanctum L. has also been suggested to possess anti-fertility, anticancer, antidiabetic, antifungal, antimicrobial, cardioprotective, analgesic, antispasmodic and adaptogenic actions. Eugenol (1-hydroxy-2-methoxy-4-allylbenzene), the active constituents present in O. sanctum L. have been found to be largely responsible for the therapeutic potentials. The several studies have been done to prove the qualities. Some of them are as under:

Anthelmintic activity

The anthelmintic activity of the essential oil from O. sanctum L. was evaluated by Caenorhabditis elegance model. Eugenol exhibited an ED^{50} of 62.1 µg/ml and being the predominant component of the essential oil, it was suggested as the putative anthelmintic principle.[14]

Antimicrobial

Singh et al in his study suggested that higher content of linoleic acid in O. sanctum L. fixed oil could contribute towards its antibacterial activity. The oil show good antibacterial activity against Staphylococcus aureus, Bacillus pumius and Pseudomonas aeruginosa, where S. aureus was the most sensitive organism.[15]

Geeta et al studied that the aqueous extract of O. sanctum L. (60 mg/kg) show wide zones of inhibition compared to alcoholic extract against Klebsiella, E. coli, Proteus, S. aureus and Candida albicans when studied by agar diffusion method. Alcoholic extract showed wider zone for Vibrio cholera.[16]

Extract of O. sanctum L. caused inhibition of Neisseria gonorrhoeae clinical isolates and WHO organization strains. The activity is comparable to penicillin and ciprofloxacin.[17]

Analgesic

The analgesic activity of alcoholic leaf extract of O. sanctum L. (50, 100 mg/kg, ip; 50, 100, 200 mg/kg, po) was tested in mice using glacial acetic acid induced writhing test. O. sanctum L. reduced the number of writhes. Osimum sanctum L. (50, 100 mg/kg ip) also increased the tail withdrawal latency in mice.[18]

Antiinflammatory Compounds isolated from O. sanctum L. extract, Civsilineol, Civsimavatine, Isothymonin, Apigenin, Rosavinic acid and Eugenol were observed for their anti-inflammatory activity or cyclooxygenase inhibitory activity. Eugenol demonstrated 97% cyclooxygenase-1 inhibitory activity when assayed at 1000 µM concentration (pn). Civsilineol, Civsimavitin, Isothymonin, Apigenin and Rosavinic acid displayed 37, 50, 37, 65 and 58% cyclooxygenase-1 inhibitory activity, respectively, when assayed at 1000 µM concentrations. The activities of these compounds were comparable to Ibuprofen, Naproxen and aspirin at 10, 10 and 1000 µM concentrations.[19]

Singh in his study reported that linoleic acid present in different amount in the fixed oil of different species of O. sanctum L. has the capacity to block both the cyclooxygenase and lipoxygenase pathways of arachidonate metabolism and could be responsible for the anti-inflammatory activity.[20]

A methanolic extract and an aqueous suspension of O. sanctum L. (500 mg/kg) inhibited acute as well as chronic inflammation in rats as tested by carrageenin-induced pedal edema

and cratonoil -induced granuloma and exudates, respectively, and the response was comparable to the response observed with 300 mg/kg of sodium salicylate. Both the extract and suspension showed analgesic activity in mouse hot plate procedure, and the methanol extract caused an increase in tail withdrawal reaction time of a sub-analgesic dose of morphine. Both preparations reduced typhoid–paratyphoid A–B vaccine-induced pyrexia. The antipyretic action of methanol extract and aqueous suspension was weak and of shorter duration than that of 300 mg/kg sodium salicylate.[21]

THERAPEUTIC USES - Ashmari, Shwasa, Chardi, Hikka, Kasa, Krimiroga, Kushtha, Netraroga, Parshvashoola.[22]

CLASSICAL PREPARATIONS: Tribhuvanakirti Rasa, Muktapanchamrita Rasa, Muktadi Mahanjana, Manasamitra Vataka.[23]

CONCLUSION

The *Tulsi* has been praised well in classics for its excellent qualities. The recent researches on the said drug are approving the Classically told facts. The active principles found in the plant have shown many properties amongst which the antihelminthic, antimicrobial, antiinflamatory and analgesic actions have been explained well here. These actions were already told in Classics as *krimighna*, *Shoth-hara* and *Vedanahara Karmas*. There have been the recent advancements in the modern medicine but still there is need of development in the field of Chronic ailments, Lifestyle disorders etc. and there is always a search for side effect free treatment. Thus, *Tulsi* can offer very good preventive and curative potential in several ailments.

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