Tulsi the Medicinal Value

Anand Shukla, Kawaljeet Kaur, Puneet Ahuja

Head of Department Pharmacology ITS-DCHRC GNOIDA, Uttar Pradesh, India
Pediatrics ESI Hospital Delhi, India
Head of Department Oral Pathology ITS-dchrc, Uttar Pradesh, India

Tulsi is a sacred Holy HINDU LUXAMI GODESSES BASIL medicinal plant. It is a member of mint or Labiatae family from India. Medicine is from leaves, seed & stem, commonly used for cold, influenza, H1N1 (swine flu), hepatitis, bronchitis, stress, cancer, headache, heart disease, malaria, digestive disorder. This is a powerful anti-oxidant demonstrated as anti fungal antibacterial, act as anti inflammatory, immunomodulator, increase metabolism and lowering down stress hormones. This is also an antirepellant for mosquitoes. This has strong healing power in catarrh matter and phlegm. This also works as supplements to combat Stress by lowering corticosteroid level by active compounds at therapeutic dosages & standardised for Eugenol, caryophyllene and triterpenoic acid such as ursolic and oleanolic acid. Tulsi has antifertility & anti sperm role by reducing estrogen in female.

It has strong immunomodulator and Adaptogen to counter life style diseases in cancer, hypertension, diabetes and stress.

KEYWORDS: Tulsi, Ocimum sanctum, Therapeutic properties, Pharmacologic basis

INTRODUCTION

Tulsi, scientific name Ocimum sanctum Linn, is considered a holy plant and even given the status of deity in Indian subcontinent. People plant it in the garden and perform prayers to it. It is widely grown in India from North to South and is also found in other continents as different species of genus Ocimum. Two varieties of Tulsi found in India include black and green. Traditionally it is also considered to have medicinal properties. It finds mention in Atharveda and is also a component medicine of Ayurveda. Although it is popularly believed to have therapeutic properties for a wide variety of diseases, Modern medicine requires scientific evidence and clinical proof. The researchers and scientists are working to find the pharmacological actions and the chemicals responsible. Also most of the studies are in vitro or in vivo in lab animals. Whether they hold true in clinical trials in humans also needs to be determined. The advantage of Tulsi is that it is traditionally acceptable and considered safe. The experience of over centuries have led to the belief that it is safe. Researchers are also studying the safety profile but these studies are so far in lab animals. (1, 2)

PHARMACOLOGY

Tulsi has a highly complex chemical composition containing a variety biologically active compounds. Some of them have been well studied for their pharmacological actions and researchers are working to find new bioactive principles so that their preparations can be standardized for use. There are different species of Ocimum genus and also among species sanctum there are several strains and they differ in their relative
composition of phytochemicals so the standardization of the preparations according to bioactive compounds is important.

- **Leaves** contain essential oils including eugenol, ursolic acid, rosmarinic acid, $\beta$-caryophyllene, oleanolic acid, $\beta$-elemene & germacrene D, Q & B – Pinene, orientin and vicenin. Nutritional components include Vit A & C, minerals calcium, iron & zinc as well as chlorophyll.(3)

- **Seeds** contain fixed oils with linoleic acid, linolenic acid and sitosterol.

- **Roots** contain sitosterol and three triterpenes A, B, C

**EUGENOL** (1-Hydroxy – 2 – Methoxy – 4 – allylbenzene) active constituent present in Ocimum sanctum which is largely responsible for therapeutic potentials of fresh tulsi leaves. Other parts which are source of eugenol are flowers and stem. It has following actions:

1. Possesses membrane stabilizing property on synaptosomes, erythrocytes & mast cells which accounts for its therapeutic potential in management in neurological disorders (i.e. convulsions & epilepsy), inflammatory and allergic disorders.(4)
2. Anti-ulcerogenic potential in treatment of gastric ulcer.(4)
3. Eugenol decreases elevated blood sugar level, triglycerides, cholesterol and liver enzymes (LDH, SGOT, SGPT, Alkaline Phosphatase) and is responsible for cardioprotective, hypolipidemic and hepatoprotective agent.(5)
4. It has significant antioxidant activity and cyclooxygenase inhibiting activity. The activity was comparable to ibuprofen, naproxen and aspirin at 10, 10, 1000 microM concentration respectively. This supports traditional use of O sanctum for its antiinflammatory activity.(6)
5. The mosquito repellant and larvicidal actions are attributed to Tulsi. Eugenol has mosquito repellant activity.(7) Mosquitocidal activity of Tulsi was investigated on Aedes aegyptii larvae. When seeds of Tulsi were placed in water. Within an hour they exuded mucilaginous substance (polysaccharides) and the larvae which came in contact with the seeds died due to drowning.(8)

**ORIENTIN AND VICENNIN**: - Orientin and vicenin are isolated from O. sanctum leaves. These are flavanoids and both have showed significant protection to human lymphocytes against the clastogenic effect of radiation at low, non toxic concentrations. The radioprotection is probably associated with antioxidant activity.(9,10)

**URSOLIC ACID**: (pentacyclic triterpene acid) ursolic acid has many biological activities eg. antifertility,(11) antioxidant, antiageing, antiinflammatory, antitumor & antimicrobial properties, It acts by being COX-2 inhibitor. It inhibits TPA induced initiation & promotion of tumor growth. It possesses anti cancer activity.(7) Ursolic acid helps keep skin healthy and supple. It removes wrinkles by returning skin elasticity.(7) Ursolic Acid and oleanolic acid have demonstrated cardioprotective effect by inhibiting Adriamycin induced lipid peroxidation.(3)
ROSMARINIC ACID: is natural phenol antioxidant carboxylic acid. Rosmarinic acid has number of biologic activities i.e. antiviral and antibacterial. It also has anti-inflammatory & antioxidant activities. (6) It is also potential anxiolytic as it acts GABA transaminase inhibitor.

OLEANOLIC ACID OR OLEANIC ACID: is naturally occurring tritepenoid (Powerful inhibitor of cellular inflammatory response) Studies shows that they cause induction by IFN of inducible nitric oxide synthase and of cyclooxygenase – 2 in mouse macrophages. They are extremely potent inducers of phase – 2 response (e.g. elevation of NADH-Quinone oxidoreductase and heme oxygenase1) which is major protector of cells against oxidative and elechophile stress.

LINOLEIC ACID is an essential fatty acid that must be considered for proper health. Linoleic acid can be used to show the anti-oxidant effects of natural phenols. Alpha-Linolenic acid is popular for preventing and treating diseases of the heart & blood vessels. It is used to prevent heart attack, lower high blood pressure, lower cholesterol and reverse hardening of the blood vessels (atherosclerosis). Linoleic acid present in O. sanctum fixed oil has the capacity to block both the cyclooxygenase and lipoxygenase pathways of arachidonic metabolism and could possibly be responsible for the anti-inflammatory activity of oil.(12,13,14)

Linoleic acid also used in management of rheumatoid arthritis, multiple sclerosis, diabetes, renal disease, ulcerative colitis & crohn disease.

CARYOPHYLLENE IS A SESQUITERPENE widely distributed in essential ails of various plants several biologic activities are attributed to beta – caryophyllene such as anti – inflammatory, and local anaesthetic activities.

β pinene is monoterpen with enantiomer studies showing action against bronchial hyper reactivity.

β– Elemene a natural sesquiterpere has anti proliferative activity that’s why acts as anti-tumor.

Several constituents have been studied for anti-stress activity eg. Ocimumosides A & B, Ocimarin, apigens and luteolins. Ocimumoside A is the most effective, Ocimumoside B and luteolins also show some antistress activity but Ocimarin and apigens do not show antistress activity.(15)

There are other actions eg. It is used to prevent rancidity of packaged foods (decomposition of fats, oils and other lipids by hydrolysis and/or oxidation). It has been shown to improve shelf life of soybean product Tofu.(16)

It is considered to have antimicrobial properties. Tulsi oil has shown to have inhibitory effect against Mycobacterium tuberculosis,(11) fungi,(17) enteric pathogens,(18,19) MRSA,(20) Propionibacterium acnes(21) and many other Gram positive and Gram negative bacteria (22, 23).

It has significant hypoglycemic and uricosuric effects. It stimulates insulin secretion from
pancreas by stimulating adenylate cyclase. cAMP or phosphatidylinositol or direct effect on intracellular Calcium as well as promoting Calcium entry.(24) Tulsi is shown to promote wound healing by causing increased wound contraction. It may be useful in management of abnormal healing such as keloids and hypertrophic scars.(25) Fixed oil obtained from Tulsi has been shown to prolong blood clotting time and percentage increase was comparable to aspirin and could be due to inhibition of platelet aggregation .(26)

Fresh leaves of Ocimum Sanctum (OS) were used to study its effect on male reproductive function (sperm count and reproductive hormones) in male albino rabbits. A significant decrease was noted in the sperm count in test group rabbits. Serum testosterone levels showed marked increase while FSH and LH levels were significantly reduced in OS-treated rabbits. The results suggest the potential use of OS as an effective male contraceptive agent.(27) In rural India it is also believed to be abortifacient but the only few animal studies available are available (28).

RESULT

So chemical constituents of tulsi extract, essential oils and fixed oils make up the therapeutic potential of tulsi and that’s why tulsi has hypoglycaemic, hypolipidemic activity, Immunomodulatory activity, Antimicrobial activity, Antioxidant activity, Anti – stress activity, Chemopreventive, radio-protective , antifertility, gastroprotective , cardioprotective, mosquito larvicidal and mosquito repellant and wound healing activity. It has been studied for its antifertility and abortifacent action(28) so should be used cautiously in pregnant women.

CONCLUSION: A variety of chemical constituents with pharmacological actions have been extracted from Tulsi plant and scientifically explain some of the popularly known therapeutic uses of Tulsi plant. A variety of Ocimum species are known to mankind. Further research is needed to explain some of the pharmacological actions.

REFERENCES:
PMCID: PMC3059441