



Holy Basil

Ocimum tenuiflorum

Common names

Tulasi, sacred basil, monk's basil, garden balsam, sursa

Family

Lamiaceae (mint)

Part used

Aerial parts

Background and traditional uses

Holy basil is an aromatic shrub that grows up to one metre in height. The plant is multi-branched with square stems and simple, opposite, oblong-shaped leaves that grow between 3-7.5cm long. Holy basil is thought to have originated in north-central India although it is now native throughout many tropical areas of the east.¹

Holy basil is revered in Ayurveda as an 'elixir of life', being referred to as 'The Incomparable One', 'Mother Medicine of Nature' and 'The Queen of Herbs' throughout the literature.² It is treasured not only for its medicinal qualities, but also its spiritual properties, credited with fostering beauty, intelligence, stamina and a calm emotional disposition. Holy basil has a hot, pungent, dry, bitter taste and is said to balance and pacify the vata and kapha doshas³ penetrating the tissues deeply and drying excess secretions. Daily consumption is thought to prevent disease and promote general health, wellbeing and longevity, largely via its adaptogenic and nutritive qualities.²

Actions

Primary:^{2,3}

- Adaptogen
- Anti-inflammatory
- Antioxidant
- Antimicrobial
- Analgesic
- Immune modulating

Secondary:^{2,3}

- Antianxiety
- Anticarcinogenic
- Antidepressant
- Antiemetic
- Antispasmodic
- Blood pressure modulating
- Cardioprotective
- Chemoprotective
- Diaphoretic
- Hypoglycaemic
- Hypolipidaemic
- Hepatoprotective

Applications and indications

- A systematic review of clinical literature on holy basil conducted in 2017 suggested that the herb is an effective treatment for lifestyle-related chronic illnesses including, but not limited to, diabetes, metabolic syndrome and psychological stress.⁴
- It is important to note that the traditional indications and applications for holy basil are wide and varied and include anxiety, arthritis, asthma, back pain, bronchitis,

coughs, colds and fevers as a demulcent, diaphoretic and expectorant, cardiac disorders, coughs, diarrhoea, dysentery, eye diseases, fever, gastric disorders, genitourinary disorders, hepatic disorders as a laxative, stimulant, anti-inflammatory, cardiogenic and depurative, hiccups, indigestion, malaise and convalescence as a digestive stimulant, malaria, otalgia, ringworm, vomiting and topically for ulcers and other inflammatory skin disorders.^{2,3}

Active constituents and pharmacodynamics

Holy basil contains a complex spectrum of active constituents reflective of its wide-reaching traditional applications. **Tannins** and **essential oils** appear to be the most pharmacologically active and concentrated components of the herb.¹

The leaves are very high in **volatile constituents** which have been identified to include eugenol, carvacrol, methyl chavicol, linalool, caryophyllene, beta-elemene and others.³ The ratios of these volatile components appears to be dependent of the growing conditions of the herb.¹

Stearic, myristic, palmitic, oleic, linoleic and linolenic acid and their methyl esters are also present alongside ursolic acid, campesterol, cholesterol, stigmasterol, B-sitosterol and others. Vicenin-2, rosmarinic acid, galuteolin, cirsilinole, gallic acid, gallic acid methyl and ethyl esters, protocatechuic acid, vanillin acid, 4-hydroxybenzoic acid, vanillin, 4-hydroxybenzaldehyde, caffeic acid, chlorogenic acid and phenyl propane glucosides have also been identified in holy basil.³

Summary of clinical evidence

There is a lack of human clinical trials on holy basil, but its traditional actions have been somewhat verified by preclinical *in vivo* and *in vitro* evidence. Modern application of the herb is based upon this data in addition to traditional Ayurvedic prescriptions and traditional philosophy.

Immune modulation

Both a methanol extract and an aqueous suspension of holy basil leaves were shown to increase cellular immunological responses in rats, affecting both lymphocytosis and erythrocyte rosette formation.⁵ Another *in vitro* test indicated that holy basil appears to modulate the humoral immune response by influencing the production of antibodies, tissue responses to mediators in target organs and mediators of hypersensitivity responses and a significant inhibition of antigen-induced, peritoneal mast-cell histamine release. The herb also appeared to increase serum red blood cell haemagglutination titre and IgE antibodies.⁶

Adaptogen

Holy basil has been shown to improve the stress responses in several animal models. In one such study, an ethanolic extract of holy basil leaves was shown to significantly reduce changes in blood plasma corticosterone in rats exposed to both acute and chronic noise stress compared to untreated animals.⁷ Another showed significant inhibitory and protective action was seen on stress-induced ulcers in rats, with less intensity of symptoms including congestion, erosion and haemorrhage in the treated rats.⁸

The researchers involved in an animal study on the anti-stress potential of holy basil concluded that the alleviation of symptom of chronic stress in rats could be due to the inhibition of cortisol release, blocking of corticotropin releasing hormone receptors (CRHR1 receptors), and the inhibition of 11-beta-hydroxysteroid dehydrogenase and catechol-O-methyltransferase (COMT) activities.⁹

Antimicrobial

The essential oil components in holy basil have shown significant antimicrobial activity *in vitro*.^{3,10} The essential oil holy basil is significantly high in, eugenol, has been shown to have a broad acting antimicrobial activity in isolation.¹¹

Anti-inflammatory

A preparation of a fixed oil extracted from holy basil leaves was shown to exhibit significant anti-inflammatory activity in rats with carrageenan induced paw oedema. It appeared that the oil preparation inhibited both the lipoxygenase and cyclooxygenase pathways of arachidonic acid metabolism¹² and further investigation found that linoleic acid within the oil was likely to be the primary active principle for this action.¹³

Antiasthmatic

Both a volatile oil extract and 50% hydroalcoholic extract from fresh leaves of holy basil were shown to exert a significant antiasthmatic action in pigs with histamine and acetylcholine induced pre-convulsive dyspnoea at a dose of 200mg per kilogram for the hydroethanolic extract and 0.5mL per kilo of the oil. It was concluded that the volatile constituents of the fresh leaves were likely to be responsible for this specific action.¹⁴

Anticarcinogenic

Essential oil extracted from holy basil was shown to significantly inhibit benzo(a)pyrene-induced squamous cell carcinomas in the stomachs of mice.¹⁵ Additionally, the oil was assessed for chemoprotective potential by studying its effect on glutathione-S-transferase, the carcinogen detoxifying enzyme, and neoplasia induced by 3,4-benzo(a)pyrene in mice and found to have significant activity.¹⁵

Hypoglycaemic and hypolipidaemic

In one animal model, both normal and diabetic rats were fed holy basil leaf powder at 1% of their body weight for a period of one month. Significant reductions in hepatic cholesterol and triglyceride levels, total lipids in the kidney and total cholesterol and phospholipids in the heart were observed in all animals.¹⁶

Antioxidant

In one animal study, holy basil extract was used in conjunction with WR-2721, a radioprotective medication, and their effects on the bone marrow of adult mice was evaluated.¹⁷ Mice were injected with either 10mg/kg of the extract, 100-400mg/kg of WR-2721 or a combination of both substances. Significant antioxidant activity was observed in the cells of mice treated with the holy basil and protection of bone marrow appeared to be enhanced when the two substances were combined and the herb appeared to reduce the toxic effects of the pharmaceutical.¹⁷

Blood pressure modulation

In a pilot study on 50 women with hypotension, a preparation of juiced holy basil leaves with honey was administered for 30 days. A general and significant increase in both diastolic and systolic blood pressure was noted in the participants when comparing measurements at the conclusion of the study with baseline and no adverse side effects were reported.¹⁸ However, *in vitro* studies have reported hypotensive effects of holy basil in hypertensive subjects^{3,10} and it is traditionally thought to normalise blood pressure.

Analgesic

A fixed oil preparation of holy basil showed significant analgesic activity in mice with acetic acid-induced writhing and the researchers proposed that its mechanism of action was related to the peripheral system. However, holy basil did not positively affect pain thresholds in other experiments including tail flick, tail clip and tail immersion tests.¹⁹

Hepatotonic

An ethanolic extract of holy basil leaves was administered to mice at a dose of 400-800mg/kg for 15 days. It was shown to significantly increase the activities of cytochrome P450 enzymes, cytochrome B, aryl hydrocarbon hydroxyls and glutathione-S-transferase and significantly reduce glutathione levels on the liver. All of these processes are important in the hepatic detoxification of mutagens and carcinogens and were observed alongside a general stimulation of humeral immunological response.²⁰

Dosage summary

Liquid extract (1:1): 15-30mL weekly²¹

Dried herb equivalent: 2-3g daily²²

Crude herb equivalent: 6-12g daily as a decoction²²

Dried seed powder: 1.5-2g daily^{3,10}

Safety information

Holy basil is generally considered to be a safe herb for most patients, although the following adverse reactions have been observed:

- Constipation has been reported in patients administered the powdered leaves at a dose of 5-7g per day for three months.³
- Large doses of the leaf extract were shown to have induced an antispermatogenic activity in animal models.³
- The maximum tolerated dose of a 50% hydroalcoholic leaf extract has been noted as 1g/kilogram in albino rats.³



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