THYME

Thymus vulgaris L.

Family

Lamiaceae (Labiatae is an alternative name) – the mint family. This family yields a large number of medicinal taxa due to their high essential oil content.[1]

Parts Used

Herb.

Description

Thyme is native to the Mediterranean but is now widely cultivated, especially in countries with a temperate climate. It is a perennial, low-lying aromatic shrub growing to 30cm high with a fibrous, woody root and thin stems bearing small greenish-grey leaves in opposite pairs which have abundant oil globules and minute violet flowers. The flowers terminate the branches in whorls. The green or purplish calyx is 3 to 4mm long, bell-shaped, hairy and dotted with oil globules. The white or pinkish-mauve corolla is 4 to 6mm long, while the upper lip has large, broad teardrop shaped lobes, and is sparsely hairy or smooth. The lower lip is at right angles to upper. The stamens are not, or scarcely, pushing out and the anthers are purplish. In the southern hemisphere this hardy, groundcover shrub flowers from September to December. The dark brown, spherical nutlets are 6 to 8mm in diameter. They retain their germinating power for three years.[2,3]

Traditional Use

Are you going to Scarborough Fair?
Parsley, sage, rosemary and thyme;
Remember me to one who lives there,
She was once a true love of mine.
(Scarborough Fair, Canticle)

Scarborough Fair was adapted from an English folk song from the 16th Century[4] and made famous by Simon and Garfunkel.

Thyme is traditionally part of every herb garden, even the most meagre. It has acquired such a wide medicinal, and culinary, reputation that it is a mainstay of the modern herbal array.[5]

Several explanations exist concerning the origin of the name thymus. Some authors assume that the Latin name thymus comes from the Greek word thyo meaning perfume. Here we find a clue to Thyme's key constituent, it's essential oil, and among the early Greeks the phrase 'to smell of Thyme' was used as an expression of praise for the stylish. This sweet scented garden treasure was used as a form of incense to drive away undesirable insects. Conversely, it attracts bees in great profusion and thyme honey is still esteemed today.[6]

Another interpretation of its etymology considers the Greek word thymos, signifying courage, and indeed in ancient days an infusion of thyme was given as a remedy for depression and those troubled by 'melancholia' were advised to sleep on thyme-stuffed pillows. Also, during the Middle Ages women would embroider pennants of a bee hovering over a sprig of Thyme on the scarves they presented to knights as an emblem of bravery. Thyme has a long history as a treatment for coughs. It continues to be one of the most commonly recommended herbs in Europe for this indication.[7]

Thyme was used medicinally by Hippocrates ("the father of medicine") over 4,000 years ago and later by the first-Century Greek physician Dioscorides, as a treatment for respiratory disorders. The ancient Romans Virgil (poet) and Pliny (scientist) mention thyme as a meat preservative and it was this action that introduced it into the culinary world. It was used as an antiseptic during plagues such as the bubonic plague of the 14th Century. The second Century Greek physician Galen noted the antimicrobial properties of thyme and recommended its use in treating musculoskeletal disorders, including joint disorders.[8] Medieval anatomists named the lymph gland in the chest the 'thymus' because it reminded them of a thyme flower.[9]

An often quoted phrase from the 17th Century botanist Nicholas Culpeper is:

'It is a noble strengthener of the lungs, as notable a one as grows; neither is there scarce a better remedy growing for that disease in children which they commonly call the Chin-cough (whooping cough), than it is. It purges the body of phlegm, and is an excellent remedy for the shortness of breath. It kills worms in the belly, and being a notable herb of Venus, provokes the terms (menstruation), gives safe and speedy delivery to women in travail (labour), and brings away the afterbirth.
It is so harmless you need not fear the use of it.
An ointment made of it takes away hot swellings and warts, helps the sciatica and dullness of sight, and takes away pains and hardness of the spleen.
Tis excellent for those that are troubled with the gout. It eases pain in the loin and hips. The herb taken any way inwardly, comforts the stomach much, and expels wind.' [10]

In the late 17th Century, apothecary shops were selling thyme oil as a topical antiseptic under the name "oil of origanum". Its active constituent was extracted in 1719 by German chemist Caspar Neumann and named "camphor of thyme". In 1853 it was named thymol by French chemist M. Lallemand.[11]

Thymol is mentioned in the textbook for America's Eclectic physicians Kings' American Dispensatory (1854) as an antiseptic superior to carbolic acid (made famous in 1867 by the father of antiseptic surgery, Joseph Lister) and was recommended as a disinfectant for sick rooms. The book also notes thyme as a tonic, carminative, emmenagogue, antispasmodic and diaphoretic, and for dyspepsia, hysteria, dysmenorrhea, flatulence, colic, headache and neuralgia.[12]

Up until World War I, thymol enjoyed great popularity as an antiseptic. At this time most of the world's thymol supply was distilled in Germany so when World War I broke out there was a major shortage of the oil, vital as a battlefield antiseptic. While thymol has largely been replaced by more potent germ fighters, it remains an ingredient in antiseptic mouthwashes such as Listerine.[13]

The British Herbal Pharmacopoeia recommends thyme for use in children with either diarrhoea or enuresis.[14]

From an energetic perspective thyme is seen as a pungent, warm, dry and bitter expectorant. This makes it an ideal remedy for resolving cold and damp in the respiratory, digestive and urogenital systems.[15]

In modern times, thyme oil is commonly used in manufacturing as a constituent of soaps, cosmetics, mouthwash and toothpaste.[16]

Constituents

Volatile oils (0.8% to 2.6%) containing the phenols (0.5%) primarily thymol (30 to 70%) and carvacrol (3 to 15%); others include eugenol, cymol, borneol and linalool. The pharmacopoeial standard minimum for the volatile oil is 1.2%;[17] Flavonoids including apigenin and luteolin; Saponins; Tannins – up to 10%;[18] Polyphenolic acids including rosmarinic acid and caffeic acid; Bitter principle; Resins; Salicylates; B-complex, C and D; and it contains calcium, sodium, silicon, iron and sulphur.[19,20,21]

Actions

Expectorant (thymol, saponins), antispasmodic (thymol and carvacrol, flavonoids), antitussive (volatile oil), antibacterial (thymol, tannins), carminative (thymol and carvacrol), antifungal (thymol, carvacrol, eugenol), antiviral (volatile oil), antioxidant (volatile oil), astringent (tannins), anthelmintic (thymol), anti-inflammatory (flavonoids, polyphenolic acids, volatile oil).

Pharmacological Activity

To date there are no well-defined controlled clinical trials in humans to support thyme as a monotherapy for any condition.[22] Due to this, much of the information is based on traditional use or evidence of activity.

Most documented studies on thyme investigate the activity of thymol and the volatile oil component of the herb.

Respiratory Conditions: Expectorant, Antispasmodic and Antitussive Activities

Thyme can help in all cases where coughing occurs in conjunction with spasmodic symptoms.

When administered orally, thyme oil is largely eliminated by the pulmonary alveoli (via the lungs). Hence, concentrated drug effects occur at the site of the disease. The spasmolytic effect of thyme on the bronchioles is particularly significant.[23]

Numerous studies have been conducted evaluating the effects of the herbal combination formula Bronchipret (containing thyme and primrose [tablet] or thyme and ivy [syrup]), and other thyme containing combination products. Reductions in cough, with limited side effects, have been reported.[24, 25, 26, 27, 28, 29]

The Bronchipret thyme and primrose film-coated tablets (one tablet three times daily) gave positive results in a double-blind, placebo controlled, multicentre study in 361 outpatients with acute bronchitis and productive cough. The mean reduction in coughing fits on days 7 to 9 relative to baseline (primary endpoint) was 67.1% under thyme-primrose combination compared to 51.3% under placebo. The probability of that happening was less than 1 in 1000 ($p < 0.0001$). In the thyme-primrose combination group, a 50% reduction in coughing fits from baseline was reached about two days earlier compared to the placebo group.[30] The importance of thyme alone in the combination was not reported.

A bioassay test showed thyme fluid extracts have antispasmodic activity that is at least due to synergistic effects of phenolic volatile oil compounds and the flavone luteolin. The testing was done by quantification of antispasmodic activity in the preconstricted smooth muscle trachea of rats against papaverin (an opium alkaloid antispasmodic drug) as the positive control.[31] Their mode of action is thought to involve calcium-channel blockage.[32]

A recent study investigated the impact of thymol in thyme extracts, and its antispasmodic action and ciliary clearance in rat trachea and ileum. The conclusion reached was that thymol, and carvacrol, are active, although other not identified components of thyme extract appear to be very important as well.[33]

An earlier *in vitro* study concluded that thyme extract may help in diseases related to endothelin hyper-activity of the bronchus system, such as asthma and COPD (chronic obstructive pulmonary disease), although thymol is not involved in this effect.[34]

Further animal studies have demonstrated expectorant activity due to the saponin content

of thyme extract.[35] Improved expectoration and mucocilary clearance were observed however the mechanism is still to be elucidated.[36]

Antibacterial Activity

The antibacterial activities of thyme, thymol and other constituents of thyme have been reported *in vitro* (alone or in combination with other herbs) and in animal studies.[37]

In vitro tests have demonstrated activity of thyme extract against *Escherichia coli, Listeria monocytogenes, Streptococcus mutans* and *Salmonella enterica*. Effects are most likely due to eugenol, thymol and carvacrol constituents.[38]

The use of the essential oil of thyme in the prevention and treatment of various human infections may be reasonable according to a study investigating the antimicrobial activity of the oil against clinical multidrug resistant strains of *Staphylococcus, Enterococcus, Escherichia* and *Pseudomonas* genus. The antibacterial activity of the oil was tested against standard strains of bacteria and 120 clinical strains isolated from patients with infections of the oral cavity, abdominal cavity, respiratory and genitourinary tracts, skin and from the hospital environment. Agar diffusion (a means of measuring the effect of an antimicrobial agent against bacteria grown in culture) was used to determine the microbial growth inhibition of bacterial growth at various concentrations of oil from thyme. Susceptibility testing to antibiotics was carried out using disk diffusion (a test which uses antibiotic-impregnated wafers to test whether particular bacteria are susceptible to specific antibiotics). Thyme essential oil strongly inhibited the growth of the clinical strains of bacteria tested.[39]

An aqueaous extract of thyme (1:1) was shown to exhibit a significant inhibitory effect on *Helicobacter pylori*, reducing both its growth and its potent urease activity *in vitro*.[40] The protein urease is an enzyme that catalyses the hydrolysis of urea into carbon dioxide and ammonia. The urease of *Helicobacter pylori* is necessary for colonization of the gastric mucosa in experimental animal models of gastritis and serves as the major antigen and diagnostic marker for gastritis and peptic ulcer disease in humans.[41]

Many researchers agree that *Helicobacter pylori* are an important causal agent of chronic gastritis, peptic ulceration and gastric cancer in humans.[42]

Based on an *in vitro* study, thyme extract or thymol reduced the amount of tetracycline and chlorhexidine required against methicillin-resistant *Staphylococcus aureus*. The flavanoid baicalein was thought to be responsible.[43]

Clinical studies have corroborated thymol's efficacy as a monotherapy in dental outcomes such as reductions in plaque formation, gingivitis and caries. Recent studies of combination products including thymol, such as Listerine, have shown antibacterial activity when used as a mouthwash to reduce oral bacteria. A number of human trials have been conducted on other dental products containing thymol as a constituent as well. These products include mouth rinses to reduce plaque growth,[44] dentifrice (agents used along with a toothbrush to clean and polish natural teeth[45]) and antimicrobial varnishes and sealants.[46,47]

Antifungal Activity

The antifungal activities of thyme oil, thymol, and other constituents of thyme have been demonstrated extensively.

In particular, *in vitro* studies have shown thymol and eugenol to exhibit antifungal activity by their ability to alter the plasma membrane and cell wall of *Candida albicans* and *Saccharomyces cerevisae*.[48,49,50] Thymol is an amphipathic monoterpene, which suggests that it affects cell membrane structure by generating asymmetries and membrane tensions. This is confirmed by the fact that terpenes alter cell permeability by entering between the fatty acyl chains making up the membrane lipid bilayers, disrupting lipid packing, and changing membrane fluidity. All of these phenomena lead to major surface alterations and deformities that also reduce the ability of fungi to adhere to mucosal cells, and decrease their virulence and infectiousness.[51]

A 3% thyme essential oil antifungal cream was used in a two-arm, randomized, double-blind, placebo-controlled trial assessing the efficacy of some cosmetic herbal preparations for common dermatologic problems. Ten subjects (66.5%) treated with the 3% thyme active cream were completely healed vs. four subjects (28.5%) from the placebo group ($p < 0.040$). A high rate of treatment acceptance was registered in both groups

and no adverse effects were reported however further research is needed.[52]

Antiviral Activity

Thyme oil and thymol have been observed to exhibit antiviral effects against herpes simplex virus type 1 *in vitro*, possibly via direct inactivation of free virus particles.[53,54] Thyme oil was found to inhibit herpes simplex virus type 2 (genital herpes) when applied to the virus prior to infection, possibly due to interaction with the viral envelope.[55]

Antioxidant Activity

High antioxidative properties were demonstrated for a dry acetone extract (28.6:1) and a supercritical carbon dioxide extract (18.3:1) of thyme in the carotene bleaching test.[56]

Antioxidative effects of thyme oil have been determined in various test systems and attributed mainly to its phenolic constituents.[57]

A recent rodent study has revealed that an aqueous-methanol extract of thyme has the remarkable potential to counteract impairment to physiological functions caused by Diabetes Mellitus (DM), probably through its antioxidant and free radical-defusing effects. Streptozotocin (STZ)-induced type 1 DM was induced in rats via a single intraperitoneal injection (into the lining of the abdominal cavity) of STZ (65mg/kg body weight). After one week to allow for development of diabetes, the plant extract was administered to diabetic rats at a dose of 100mg/kg body weight daily for 28 days. The lipid profile was ameliorated by supplementations of thyme extract. Thyme markedly ($p < 0.05$) increased reduced glutathione content and decreased lipid peroxidation levels of erythrocyte, plasma, retina and lens tissues. It also significantly ($p < 0.05$) amended erythrocyte catalase activity, levels of marker serum enzymes (except amylase), urea and blood urea nitrogen when compared to diabetic rats treated with nothing.[58]

Anti-inflammatory Activity

The effect of thyme essential oil (TEO), and its isolated constituents thymol and cavacrol (CVL), were studied *in vitro*. The experiment suggests that the anti-inflammatory effects of TEO and CVL are attributable to the inhibition of inflammatory oedema and leukocyte migration.[59]

Rosmarinic acid has shown anti-inflammatory activity due to inhibition of the classical complement pathway in rats and inhibition of some human polymorphonuclear leukocytes functions (another name for granulocytes which are a category of white blood cells characterized by the presence of granules in their cytoplasm), when tested at several dosage levels and by several application methods.[60]

A 96% ethanolic extract of thyme exhibited significant hyaluronidase-inhibitory activity ($p < 0.05$), reducing the enzyme activity to 35.5%. Thyme oil also inhibited prostaglandin biosynthesis.[61]

Analgesic Activity

In an animal study, 80% methanolic extract of thyme had analgesic effects against both acute and chronic pain. The thyme extract (100, 500 and 1000mg/kg) was injected 30 minutes before pain assessment tests. Further research is required to determine the mechanisms by which thyme extract has an inhibitory effect on pain sensation.[62]

Carvacrol, the second major phenolic component of the essential oil of thyme after thymol, has been shown to have anxiolytic activity when administered orally to mice.[63] A further study produced results that show that carvacrol presents antidepressant effects in mice and this effect seems to be dependent on its interaction with the dopaminergic system.[64]

Other Activity: Insect Repellent

Of all mosquito-borne viral diseases, dengue virus is the one spreading most rapidly worldwide. Conventional chemical insecticides (e.g. organophosphates and carbamates) effectively kill mosquitoes at their larval stage, but are toxic to humans. Natural product-based insecticides may be highly specific. A study has found that ether extracts of thyme were significantly larvicidal toward the dengue mosquito after 24 hours of exposure and could therefore be considered as a potential bioinsecticide.[65]

Research has shown that thyme is popularly used for treating fleas in dogs and cats.[66] Thyme oil, thymol and carvacrol have demonstrated insecticidal activity against various pests including, but not limited to, ticks *(Rhipicephalus (Boophilus) microplus, Rhipicephalus sanguineus*), poultry red mites *(Dermanyssus gallinae)* and various species of mosquitoes.[67]

Indications

- Respiratory tract problems, including bronchitis, coughs, pertussis (whooping cough), pleurisy, asthma, emphysema, sinusitis and laryngitis
- Infections including streptococcal throat, tonsillitis, lung and kidney infections
- Digestive problems including dyspepsia, gastritis, diarrhoea, spasmodic conditions of the gastrointestinal tract, adjunct in treatment of peptic ulcer
- Skin disinfection (topically) – minor wounds, fungal and bacterial skin disorders including herpes, as a mouthwash to reduce oral bacteria or a gargle for sore throats
- Commission E: Symptoms of bronchitis and whooping cough; and upper respiratory tract catarrh

Energetics

Hot, dry.

Use in Pregnancy

Likely safe when used in amounts commonly found in foods. Use medicinal amounts of thyme cautiously in women who are pregnant, or trying to become pregnant, due to possible antifertility and abortifacient effects. Traditionally, thyme has been used as an aid in labour and delivery.[68,69]

Contraindications

Contraindicated in patients with a known allergy, or hypersensitivity, to thyme, its constituents or members of the Lamiaceae (Labiatae) family.

Drug Interactions

Caution with anticoagulant/antiplatelet drugs (such as warfarin). The potential for preparations of thyme to interact with other medicines administered concurrently, particularly those with similar or opposing effects, should be considered.[70]

Administration and Dosage

Liquid Extract:	1:1
Alcohol:	35%
Weekly Dosage:[71]	15 to 80mL
Dried herb:	1 to 4gm daily.[72]

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