



Chemistry and Pharmacological Action of *Thymus Vulgaris* L.: A Review

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ABSTRACT

Thyme's high concentration of bioactive chemicals and ethnopharmacological significance make it one of the most significant therapeutic herbs. The alternative natural antioxidant and antibacterial thyme, which has potential applications in the food business, is the main topic of this review. This is in keeping with the tastes of the modern customer, who seeks for natural and healthy items. Thyme is a desirable natural additive because various studies have shown that using it prolongs the shelf-life of foods (meat, meat products, milk, fish, or seafood products) and decreases lipid oxidation. In contrast to other natural preservative extracts, thymus extracts and essential oils are used less frequently as natural food additives despite these findings. Taking into consideration the source of the thyme (plants, plant extracts, or essential oils), this study offers a summary of the most significant research on the beneficial effects of the plant's bioactive constituents and its applications as a food preservative.

Keywords: *Thyme, Thymus vulgaris L., Ethnopharmacological*



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INTRODUCTION

Numerous flavonoids, or phenolic antioxidants, including lutein, pigenin, naringenin, zeaxanthin, luteolin, and thymonin, are found in thyme. Among herbs, fresh thyme has one of the highest antioxidant contents. It is brimming with vitamins and minerals that are necessary for good health. One of the best places to find potassium, iron, calcium, manganese, magnesium, and selenium is in its leaves [1]. The primary phenolic component responsible for its antioxidative effect is thymol [2]. Thyme is used to cure cough, fever, diarrhoea, and infected wounds. It is also used as a tonic and stimulant [3, 4]. The preservation qualities of material plants, such herbs in the Labiatae family, have been extensively researched [5]. Natural extracts offer anti-inflammatory, immunomodulatory, spasmolytic, and calming effects in addition to their antibacterial and antioxidant properties. Since the individual activities of natural extracts are typically significantly lower than the combined activity, their biological activity is frequently attributed to the synergy between their numerous constituents. A phenomenon known as buffering occurs when all of an extract's constituents are present in the same amounts as when it is purified, hence reducing the extract's toxicity. As previously mentioned, in response to consumer demand for safer and more natural foods and their rejection of the use of synthetic antioxidants—which are currently being reevaluated for the potential toxicity and carcinogenicity of the components that are formed during their degradation—food companies are currently displaying an increasing interest in the incorporation of natural antioxidants and antimicrobials into food. Over the past ten years, a number of studies have been conducted to find natural compounds that can prevent the addition of lipid auto-oxidation processes during processing to meat products and precooked meats [6]. Thyme is used to cure cough, fever, diarrhoea, and infected wounds. It is also used as a tonic and stimulant [7, 8]. Because of their antibacterial, digestive, and antioxidant qualities, thyme extracts—such as essential or volatile oils—are used in animal feed and are thought to promote immune system function and growth in animals [9, 10]. Thyme is a herbaceous plant belonging to the platoon species that grows in mountainous areas. It can be used as a beverage in place of or in addition to tea, and it can be added to some food to give it a pleasant flavour. The plant is also commonly used in folk medicine, where it is prescribed to treat a variety of conditions including airway, stomach, and mouth infections, gastroenteritis, coughing, and intestinal worms. It can also be used to strengthen the heart [11]. Extracts from Thyme have been used in traditional medicine for the treatment of several respiratory diseases like asthma and

bronchitis and for the treatment of other pathologies thanks to several properties such as antiseptic, antispasmodic, antitussive antimicrobial, antifungal, antioxidative, and antiviral [12]. The medicinal variety is known as common Thyme or garden Thyme, the same variety that is most often used for seasoning. Medicinal preparations of common Thyme are made from the leaves and the flowers [13]. Thyme essential oil also has medicinal applications. Thyme is combined with other herbs to treat ailments that range from bronchitis and sore throat to gastritis and skin disorders. Drinking Thyme tea on a regular basis even helps with arthritis. In the Middle ages Thyme was used as a food preservative and incenses [14]. Thyme contains monoterpene phenols, including carvacrol, thymol and p-cymene, and other monoterpenes, such as α -pinene, 1,8-cineole, camphor, linalool and borneol [15].

Plant Descriptions

Thyme is a tiny perennial shrub, with a semi evergreen ground cover that seldom grows quite to (40 cm) with horizontal and upright habits [16]. Figure 1. Shows the *Thymus vulgaris* L. [11]. The stems become woody with age. Thyme leaves are very little, usually 2.5 to 5 mm long and vary significantly in form and hair covering, depending on the variety, with every species having a rather completely different scent. *T. vulgaris* leaves are oval to rectangular in form and somewhat fleshy aerial components are used for volatile oil production, principally by steam distillation. The contemporary and dried herb market uses it for cooking [17].



Figure.1; Thyme

CLASSIFICATION

Kingdom: Plantae

Subkingdom: Tracheobionta

Superdivision: Spermatophyta

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Asteridae

Order: Lamiales

Family: Lamiaceae

Genus: Thymus L.

Species: Thymus vulgaris L.

The generic name comes from the Greek verb Thyme, which translates to perfume, in allusion to the intense and pleasant aroma of the plant. It is an aromatic, vivacious, woody, very polymorphic plant that is 10–40 cm high, with numerous branches that are woody, erect, compact, and brownish or velvety-white. The linear, oblong leaves are 3–8 mm, with the petiole or its margins ciliated and whitish on its underside. The flowers are axillary and grouped at the tip of the branches, forming a kind of terminal node. The fruit is a tetraquanium and brown in color. It blooms from March onwards [18].

Origin and Distribution

Thyme is the general name for the many herb varieties of the *Thymus* species, all of which are native to Europe and Asia. Common or garden Thyme is considered the principal type, and is utilized commercially for flowering and ornamental purposes [19]. It is mentioned by the Greeks as a derivative of a word which meant ‘to fumigate,’ either because they used it as incense, for its balsamic odour, or because it was taken as a type of all sweet-smelling herbs. Others derive the name from the Greek words thyo, meaning perfume or Thymus, signifying courage, the plant being held in ancient and

medieval days to be a great source of invigoration, its pleasant qualities inspiring courage. Another source quotes its use by the Sumerians as long ago as 3, 500 BC and to the ancient Egyptians who called it tham [20]. *Thymus vulgaris* is native to southern Europe, from Spain to Italy. It is commonly cultivated there as well as in most mild-temperate and subtropical climates, which include southern and central Europe. *Thymus zygis* is indigenous to the Iberian Peninsula (Portugal and Spain) and on the Balearic Islands. *Thymus serpyllum* and *T. pulegioides* are the dominant *Thymus* species in northern and middle Europe; in the east they reach Siberia. It is difficult to differentiate these two species and to give their exact distribution areas. The plant material on the market comes from wild collections in the Balkans and the Ukraine[21].

Chemical composition of Thyme

Oils are very complex natural mixtures which can contain about 30 –60 components at quite different concentrations. Generally, these major components determine the biological properties of the essential oils [22]. Table 1 shows the chemical composition of the essential oil of *T. Vulgaris*.

Chemical Composition of Thyme Essential Oil

3-Hxenol, α -Tujene, α -Pinene, Camphene, Sabinene, 3-Otenol, β -Myrcene, 3-Otanol, α -Pellandrene, δ -3-Carene, α -Terpinene, p -Cymene, Sylvestrene, 1,8-Cineol; cis-Oimene, β -Oimene, γ -Terpinene, cis-Sabinene, Camphene, Sabinene, 3-Otenol, 3-Otanone, β -Myrcene, 3-Otanol, α -Pellandrene, δ -3-Carene, α -Terpinene, p -Cymene, Sylvestrene, 1,8-Cineol, cis-Oimene, β -Oimene, γ -Terpinene, cis-Sabinene.

Essential oil:

There are at least 6 chemotypes of *Thymus vulgaris* with different compositions of the essential oil; only the ‘thymol’-type with thymol as predominant compound complies with the definition in the European Pharmacopoeia. The dried herbal substance contains up to 2.5% essential oil; the main components are thymol, carvacrol, p -cymene, γ -terpinene, linalool, β -myrcene, terpinen-4-ol. Some compounds occur partly as glycosides [23]. The chemical structure of more important compounds. Thymol, carvacrol and p -cymene are presented in Figure 2 [24].

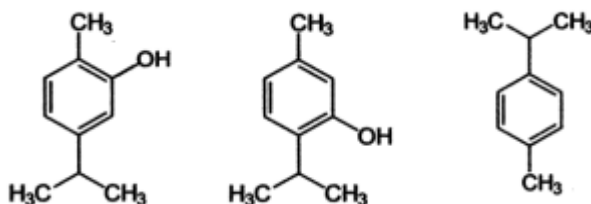


Fig. 2: The chemical structure of Thymol, carvacrol and p -cymen

Prasanth et al. (2014) reported that the essential oil from *T. vulgaris* showed a high content of oxygenated monoterpenes (56.53%) and low contents of monoterpene hydrocarbons (28.69%), sesquiterpene hydrocarbons (5.04%) and oxygenated sesquiterpene (1.84%). The predominant compound among the essential oil components was thymol (51.34%) while the amount of all other components of the oil was less than 19% [25].

MEDICINAL APPLICATION

The main component of the essential oil of Thyme, thymol, is active against *Salmonella* and *Staphylococcus* bacteria. The antiseptic and tonic properties of Thyme make it a useful tonic for the immune system in chronic, especially fungal, infections as well as an effective remedy for chest infections such as bronchitis, whooping cough, and pleurisy [27]. Thyme and Thyme oil have been used as fumigants, antiseptics, disinfectants, and mouth washes. The pleasant-tasting infusion can be taken for minor throat and chest infections, and the fresh leaves may be chewed to relieve sore throats. Thyme is prescribed with other herbs for asthma, hayfever, and is often used to treat worms in children [28]. Thyme is helpful in treatment of laryngitis and inflammation. The main component of the volatile oil of Thyme, thymol is active against enterobacteria [29]. It is used for skin issues like oily skin, sciatica, acne, dermatitis and bug bites. A corrected product, ‘white Thyme oil’ is also used and it’s milder on the skin. Applied to the skin, thyme relieves bites and stings and relieves neuralgia and rheumatic aches and pains [30].

CONCLUSION

Thyme has been extensively studied for its antioxidant and antimicrobial activities. Currently, new advances and techniques in food technology have facilitated efficient identification, processing and extraction of bioactive compounds from herbs and spices in order to include them in functional foods and nutritional supplements. The strategy to produce bioactive compounds with decreased negative organoleptic characteristics and enhanced shelf life will increase overall applications in foods and will subsequently increase spice consumption and, as a consequence, have a positive impact on human health. However, just a few essential oils or plant extracts containing phenolic compounds are currently included in foods. These essential oils and natural extracts represent potential replacements of competitive synthetic antioxidants and antimicrobials in food and possible value-added products for human consumption. Nevertheless, there is much to learn in terms of its stability in specific matrices and the relationship between their structures, the biological activity of

the bioactive metabolites, synergistic effects and effective doses. These themes are the subject of current and future research. Although more studies are needed to establish the broad spectrum of the health benefits of thyme, recent results are very encouraging. Greater public awareness of the properties and benefits of spices to human health would increase the intake of these functional food products. In conclusion, the development of functional foods enhanced by the inclusion of thyme with value-added properties is of great interest to the scientific community and to the food industry. Thus, beyond their role in flavor, spices should be considered natural components of our nutrition when added to food. Thyme (*Thymus Vulgaris* L.) is an important medicinal plant which belongs to the Lamiaceae family; it has been used for centuries as spice, home remedy, drug, perfume and insecticide. Thyme has antihyperglycemic and antilipidemic effect, and kidney functions improvement, which may be helpful in the treatment of diabetes and other diabetic related complications. *Thymus Vulgaris* essential oil is one of the most commonly used essential oils in the food industry and in cosmetics as preservatives and antioxidants.

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