

The anti-inflammatory, anti-infectious and anti-cancerous effects of *Thymus vulgaris*

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ABSTRACT

Thymus vulgaris represents a medical herb from the southern region of Europe with anti-infectious, anti-inflammatory and immunomodulatory effects. More recently an antiviral and anti-cancerous activity has been demonstrated. Therefore multiple products have been imagined in order to put in value all these properties. The aim of this paper is to discuss the mechanisms of action, properties and means of administration of this product.

Keywords: *Thymus vulgaris*, immunomodulation, anti-cancerous

INTRODUCTION

Originating from the areas of southern Europe, *Thymus vulgaris* is now present worldwide, especially in the areas with arid climate and well drained soil [1]. Initially used for commercial purposes, especially in food industry due to its intense aromaticity, nowadays it proved to have significant medical properties such as anti-tumorigen, anti-inflammatory, anti-infectious and immunomodulatory effects [2,3]. Therefore, these properties have been widely studied and *Thymus vulgaris* extracts have been proposed in order to treat different disorders. Moreover, it seems that this plant has a protective effect against poisoning, nowadays Thymus extracts of thymol and carvacrol being used like an antidote in different suspicions of poisoning [4,5].

The aim of the current paper is to discuss about the most important properties and their applications in the daily practice.

THE ANTI-BACTERIAL EFFECT OF THYMUS VULGARIS

This plant seems to be particularly efficient in destroying the microorganisms which can be found at the level of the rectum and which can further colonize the genital tract; the most commonly investigated micro-organisms on which thymus vulgaris seems to be efficient are represented by *Escheria coli*, *Klebsiella pneumoniae*, *Yersinia enterocolitica*, *Staphylococcus aureus*, *Listeria monocytogenes* and *Enterococcus faecalis*; meanwhile it seems to have a protective antifungal effect [6]. The antibacterian effect of the *Thymus vulgaris* extract, especially when used as essential oil is related to the solubility of these oils in microbial membrane leading to membrane disruption and leakage of the intracellular components [7-9].

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THE ANTI-INFLAMMATORY EFFECTS OF *THYMUS VULGARIS*

Another significant action of *Thymus vulgaris* is related to the anti-inflammatory capacity which is offered by reducing the effect of free radicals [9]. Therefore, administration of *Thymus vulgaris* extract in rabbits proved to increase the activity of antioxidant enzymes like glutathione-S-transferase, superoxide dismutase or catalase leading therefore to a decreased amount of free radicals without impeding the hepatic or renal function [10]. Oppositely to the anti-infectious effect, the anti-inflammatory effect seems to be a maximal one if ethanolic or aqueous extract are prepared [11]. The anti-inflammatory effects of *Thymus vulgaris* were also evaluated by measuring the intracellular amounts of nitric oxide; therefore, it is well known the fact that during pro-inflammatory phases an increased amount on nitric oxide is produced; after administration of different anti-inflammatory substances a significant decrease of these particles is to be expected. Interestingly, after administration of *Thymus vulgaris* in murine, a decrease of the intracellular levels of nitric oxide by 80% was observed, similarly to the one obtained after dexamethasone administration [12]. The anti-oxidant effect has been clearly demonstrated in humans in cases with cholestasis, chronic hepatitis and hepatic fibrosis [11,12].

THE ANTI-FUNGAL ACTIVITY OF *THYMUS VULGARIS*

Besides the anti-bacterial effect, *Thymus vulgaris* extracts also seem to have an anti-fungal activity against *Phytophthora parasitica*, *Sclerotinia sclerotiorum*, *Botrytis cinerea*, *Pythium aphanidermatum*, *Trichoderma aggressivum f.sp. europaeum*, *Fusarium oxysporum*, *Alternaria brassicae* and *Cladobotryum mycophilum* [13]. Similarly to the anti-bacterial effect, the anti-fungal effect is maximum when administered as oil in liquid or in vapor phase; meanwhile, certain studies came to demonstrate that

these extracts have similar effects with fluconazole, voriconazole or itraconazole [14].

THE ANTI-CANCEROUS ACTIVITY OF *THYMUS VULGARIS*

When it comes to the effect of *Thymus vulgaris* against tumoral development, these effects have been widely studied and demonstrated when it comes to breast, colorectal, hepatocellular, pulmonary and cervical cancer [6]. The effect in regard to breast cancer has been studied on rats; therefore, administration of dry *Thymus vulgaris* extract on breast tumors led to a reduction in volume of the tumors by 85%; this effect was explained by the upregulation of caspases, enzymes with apoptotic effect on the tumoral cells [15]. Although the maximum effect in animal models was obtained by administration of oil extracts, these data are not yet clearly demonstrated in humans [6].

THE ANTI-VIRAL EFFECT OF *THYMUS VULGARIS*

The anti-viral effect of *Thymus vulgaris* has been initially demonstrated when administering vapours of thyme oil against Influenza virus; furthermore, this extract proved to be efficient against sexually transmitted diseases such as human immunodeficiency virus or herpes simplex virus; this aspect is particularly important when it comes to human deficiency virus due to the fact that until now there is no efficient vaccine against this virus [16,17].

CONCLUSIONS

Thymus vulgaris contains a significant amount of active substances with anti-inflammatory, anti-cancerous and anti-infectious properties which proved to be efficient in various situations. Although initial studies were performed in animal models, there is hope that in time these results will be also encountered in humans.

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