Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Der Pharmacia Lettre, 2016, 8 (9):315-320
(http://scholarsresearchlibrary.com/archive.html)

Scholars Research Library
ISSN 0975-5071
USA CODEN: DPLEB4

Study of pharmacological effect of Thymus vulgaris: A review

Sepideh Miraj[1] and Sadegh Kiani[2*]

[1]*Assistant Professor, Fellowship of Infertility, Cellular and Molecular Research Center, Shahrekord University of Medical Sciences, Shahrekord, Iran*
[2]*Student of Nursing, Islamic Azad University, Shahrekord Branch, Shahrekord, Iran*

ABSTRACT

Thymus vulgaris (common thyme, German thyme, garden thyme or just thyme) [1]is a species of flowering plant in the mint family Lamiaceae, native to southern Europe from the western Mediterranean to southern Italy The aim of this study was to overview its therapeutic effects than its nutritive and industrial effects. This review article was carried out by searching studies in PubMed, Medline, Web of Science, and Iran Medex databases .The initial search strategy identified about 88 references. In this study, 40 studies was accepted for further screening and met all our inclusion criteria [in English, full text, therapeutic effects of Thymus vulgaris and dated mainly from the year 2008 *to 2016. The search terms were "Thymus vulgaris.", "therapeutic properties", "pharmacological effects". It is commonly used for antioxidant effect, anti-cancer, antimicrobial activity, antifungal effect, anti-dysmenorrhea, hepatoprotective effect, toxicity ,anti-dysmenorrhea, antibacterial activity ,anti-bacterial effect, antimicrobial effect, anti-Leishmaniasis effect, anti-inflammatory effects, antimicrobial and antioxidant activities, anti-fungal effect,anti-adhesion activity, larvicidal effect.Thymus vulgaris is widely used for therapeutic purposes causing its highly usefulness.*

Keywords: *Thymus vulgaris*, Phytochemicals, Therapeutic effects, Pharmacognosy, Alternative and complementary medicine.

INTRODUCTION

Thymus vulgaris (common thyme, German thyme, garden thyme or just thyme) [1]is a species of flowering plant in the mint family Lamiaceae, native to southern Europe from the western Mediterranean to southern Italy. Growing to 15–30 cm tall by 40 cm wide, it is a bushy [2, 3], woody-based evergreen subshrub with small, highly aromatic, grey-green leaves and clusters of purple or pink flowers in early summer. It is useful in the garden as groundcover, where it can be short-lived, but is easily propagated from cuttings [4). It is also the main source of thyme as an ingredient in cooking and as an herbal medicine [5]. It is slightly spicier than oregano and sweeter than sage. Numerous cultivars and hybrids have been developed for ornamental purposes. Nomenclature can be very confusing. French, German and English varieties vary by leaf shape and color and essential oils [6, 7]. The many cultivars include 'Argenteus' (silver thyme) [8].The cultivar 'Silver Queen' possess white-margined leaves [9,10].

Chemical compound

The major compounds found in T. vulgaris were thymol and o-cymene, with the major components being oxygenated monoterpenes and monoterpene hydrocarbons [11].

Antioxidant effect

Liver cells was investigated regarding to experimental animals drinking extracts of sage or thyme will manifest increased resistance against oxidative stress. Results indicate that the consumption of S.officinalis and T.vulgaris extracts positively affects resistency of rat liver cells against oxidative stress and may have hepatoprotective potential [12].

the composition and the quantitative estimation of plant extracts, the protective effects of plant extracts against hydrogen peroxide- and 2,3-dimethoxy-1,4-naphthoquinone-induced DNA damage, and levels of enzymatic and non-enzymatic antioxidants (superoxide dismutase, glutathione peroxidase, glutathione) in human HepG2 cells was investigated. The results showed that the oxidant-induced DNA lesions were significantly reduced in cells pre-treated with the plant extracts studied. The observed DNA-protective activity could be explained by both elevation of GPx activity in cells pre-treated with SO and TV and antioxidant activity of SO and TV [13].

The study evaluated the effect of Spirulina and Thyme dietary supplementation on rabbit meat quality, nutrient true retention and protection against oxidative stress. Result indicated that Spirulina supplementation increased the γ-linolenic acid content of rabbit meat, whereas Thyme improved the oxidative stability of raw and freeze-dried meat [14].

The effect of shortwave ultraviolet light (UV-C) radiation on antioxidant properties of thyme was studied. No significant changes in oxidation rates were observed between UV-C treated and untreated samples at same concentrations [15].

The effect of Spirulina and Thyme supplementation on rabbit meat during retail display was evaluated. Drip loss was significantly reduced in C-T and T groups that also showed the highest content of α-tocopherol and n-3 fatty acids content and the lower lipid oxidation [16].

The total phenolic compounds (TPC) content and the antioxidant activity (AA) of extracts obtained from ground fresh thyme (FT) and depleted thyme (DT) was evaluated and the results suggest that enzymatic treatment is an interesting alternative for producing antioxidant extracts from DT [17].

Anti-cancer

Several compounds including the known flavanone, Nar which was identified using different spectral techniques was produced. The results showed that Nar's pro-apoptotic and chemo-sensitizing effects are mediated by perturbation of cell cycle, upregulation of pro-apoptotic genes and down-regulation of anti-apoptotic genes and inhibition of pro-survival signaling pathways [18].

The anticancer efficacy of T. vulgaris extract (TVE) in CRC cells was determined. Results show that TVE inhibits proliferation in a concentration- and time-dependent fashion. T. vulgaris could have an anticancer effect and that some of its bioactive compounds may prove to be effective treatment modalities for human CRC [19].

T. vulgaris and O. syriacum are both antileukemic in vitro. T. vulgaris represents a potential selective cytostatic and safe target for future anticancer agents' development. O. syriacum on the other hand is cytotoxic against the leukemia cell line THP-1[20].

Cytotoxic effect of Thymus vulgaris L. (thyme) towards head and neck squamous cell carcinoma was investigated. Thyme essential oil inhibits human HNSCC cell growth. Based on pharmacogenomic approaches, novel insights into the molecular mode of anticancer activity of thyme are presented [21].

The protective effect of a dry extract from T. vulgaris L. and of its major synthetic compound thymol against oxidative and genotoxic UVA- and UVB damage were evaluated. Thymol and T. vulgaris L. extract inhibited ROS generation in UVA and UVB-irradiated cells. On the contrary, MDA formation was reduced only in UVA treated cells. Both agents decreased the DNA damage evaluated by the alkaline comet assay, but not in the micronucleus and H2AX tests probably because of the severity of damage (double strands) detected [9].

Antimicrobial effect
The antibacterial potential of two commercial essential oils (EOs) from coriander (Coriandrum sativum L.) and thyme (Thymus vulgaris L.) against vaginal clinical strains of bacteria and yeast were examined. The results provide in-vitro scientific support for the safety possible use of Coriander EO against E. coli, Staph. Aureus and C. albicans vaginal infections in alternative gynaecological treatment [22].

Antimicrobial activity
The antimicrobial efficiency of the EOs from oregano, sage, and thyme cultivated under different conditions was examined.no significant differences were observed concerning the antimicrobial action of all EOs originating from irrigated versus non-irrigated cultivated aromatic plants [23].

Antifungal effect
The antifungal and antiaflatoxigenic properties of Thymus vulgaris essential oil (TEO) were evaluated upon Aspergillus flavus "in vitro". Fungal biomass development and aflatoxin production were dependent on TEO concentration. Therefore, TEO was capable of controlling the growth of A. flavus and its production of aflatoxins[24].

Anti-dysmenorrhea
The effect of thymus vulgaris and ibuprofen on the treatment of primary dysmenorrhea was compared. Reduction of pain severity was not statistically significant between the two medications, however it was significant for each drug compared with placebo ($p<0.001$).The results suggest that thymus vulgaris as well as ibuprofen can be effective in reducing the severity of pain and spasm in primary dysmenorrhea [25].

Hepatoprotective Effect
The hepatoprotective effect of Thymus vulgaris essential oil was investigated the essential oil also exhibited antioxidant activity, reflected by its DPPH radical-scavenging effects and in the lipid peroxidation assay. These results suggest that TEO has hepatoprotective effects on acetaminophen-induced hepatic damage in mice [26].

Toxicity
The evaluation of the potential toxic effects included histopathological examination of liver, kidney, and lung tissues, as well as serum biochemistry of liver and kidney parameters, and (1)H-NMR-based metabonomic profiles of urine. The results showed that no histopathological changes were observed in the liver and kidney in rats treated with both extracts of thyme. The metabonomic study revealed interesting data which could be further used to determine the cellular pathways affected by such treatments [27].

Anti-dysmenorrhea
The impact of Shirazi Thymus Vulgaris compared to that of Ibuprofen on primary dysmenorrhea was assessed. Shirazi Thymus Vulgaris decreased dysmenorrhea symptoms, which might be attributed to its antispasmodic effects. The herbal Shirazi Thymus Vulgaris can be recommended as an effective medication for treatment of the primary dysmenorrhea disorder [28].

Antibacterial activity
The essential oils of four chemotypes of Thymus vulgaris L. (Lamiaceae) were analyzed for their composition and antibacterial activity to assess their different properties. The results obtained indicate that, despite their different properties, the essential oils of selected T. vulgaris chemotypes are potent antimicrobials to be employed as useful additives in food products as well as for therapeutic applications [29].

Anti-bacterial effect
alternative therapies for H. pylori infections was investigated. The obtained results showed the antibacterial effect of Shoya powder and Essential oils from Thymus vulgaris and Eucalyptus globulus and purposes new therapeutical alternatives to control the H. pylori infection. Additional studies and clinical trials are necessary to approve the use of these data in health care and pharmacopeia systems [30].

the effect of Thymus vulgaris (T. vulgaris) extracts on the planktonic form and biofilm structures of six pathogenic bacteria was examined. According to the potential of Thymus vulgaris (T. vulgaris) extracts to inhibit the test

bacteria in planktonic and biofilm form, it can be suggested that Thymus vulgaris (T. vulgaris) extracts can be applied as antimicrobial agents against the pathogenic bacteria particularly in biofilm forms [31].

Antimicrobial effect
Interactions within such a naturally given multi-component mixture was studied the antimicrobial activity of thyme oil is partly based on additive effects, which might especially enhance the rapidity of the antimicrobial action. In addition, a mixture of several active ingredients that varies in its composition from year to year and from lot to lot as is the case with herbal remedies may be more stable concerning the antimicrobial activity than mixtures containing just a single active component [32].

Anti-Leishmaniasis effect
the efficacy of herbal extracts of Thymus vulgaris (Thyme) and Achilleamille folium (Yarrow), propolis hydroalcoholic extract and systemic glucantime against cutaneous leishmaniasis in Balb/c micewas evaluated. results are suggestive that Thymus vulgaris, Achilleamille folium and propolis extracts are effective for treatment of cutaneous leishmaniasis in mice. [33].

Anti-inflammatory effects
Properties of thyme extracts from three different species (Thymus vulgaris, Thymus zygis, and Thymus hyemalis) were examined. Changes on production and gene expressions were dose dependent and according to the thyme content of each species. Taken together, these results may suggest that thyme extracts could have anti-inflammatory effects [34].

The effect of Thymus vulgaris essential oil (TEO) and its isolated constituents thymol and cavacrol (CVL) were studied in the following experimental models: ear edema, carrageenan-induced pleurisy, and chemotaxis in vitro. It suggest that the antiinflammatory effects of TEO and CVL are attributable to the inhibition of inflammatory edema and leukocyte migration [35].

Antimicrobial and Antioxidant Activities
the essential oil composition, total phenolic content, antimicrobial and antioxidant activities of Thymus vulgaris collected in five different area of the Campania Region, Southern Italy was assessed. The results reported here may help to shed light on the complex chemotaxonomy of the genus Thymus. These oils could be used in many fields as natural preservatives of food and as nutraceuticals [36].

Anti-fungal effect
The potential effectiveness of Thymus vulgaris ethanolic extract (TVE) against Toxoplasma gondii infection in chronic experimental toxoplasmosis was investigated. Considerable amelioration of the pathological lesions in the brain and retina was observed. The results demonstrate the potential efficacy of T. vulgaris as a new natural therapeutic and prophylactic agent for use in the treatment of chronic toxoplasmosis [37].

The in vitro effect of T. vulgaris and O. vulgare essential oils against E. granulosusprotoscoleces and cysts was determined. T. vulgaris and O. vulgare essential oils and thymol can induce cell apoptosis of protoscoleces after short incubation times. The efficacy of T. vulgaris and O. vulgare essential oils was also demonstrated in vitro on E. granulosus murine cysts. Our data suggest that essential oils of T. vulgaris and O. vulgare have anthelmintic effect against protoscoleces and cysts of E. granulosus[39].

Anti-adhesion activity
TE, the agro-food waste material TE-R, and the by-product OE represent sources of bioactive phytochemicals that are effective at low concentrations and can be used as therapeutic agents to prevent bacterial adhesion [38].

Larvicidal effect
The effect of Thymus vulgaris essential oil (TEO) against anisakidae larvae was evaluated. The results obtained showing a significant activity against Anisakis larvae, suggest further investigation on TEO as a larvicidal agent and on its potential use in the industrial marinating process [40].

REFERENCES

[1] Eraky MA, El-Fakahany AF, El-Sayed NM, Abou-Ouf EA, Yaseen DI *Parasitol. Res*. **2016**.
[2] Cornaghi L, Arnaboldi F, Calo R, Landoni F, Baruffaldi Preis WF, Marabini L, et al. *Cells, tissues, organs*. **2016**;201[3]:180-92.
[3] Nemeth-Zambori E, Pluhar Z, Szabo K, Malekzadeh M, Radacsi P, Inotai K, et al.*Acta Biol* Hung.**2016**;67(1):64-74.
[4] Aguilar O, Hernandez-Brenes C. *Molecules*.**2015**;20(12):22422-34.
[5] Mohsenipour Z, Hassanshahian MAvicenna *J Phytomed*.**2015**;5(4):309-18.
[6] Rudolph K, Parthier C, Egerer-Sieber C, Geiger D, Muller YA, Kreis W, et al.Acta *Crystallogr F Struct Biol* Commun. **2016**;72(Pt 1)16-23.
[7] Horvathova E, Srancikova A, Regendova-Sedlackova E, Melusova M, Melus V, Netriova J, et al.*Mutagenesis*. **2016**;31(1):51-9.
[8] Nasrollahzadeh M, Sajadi SM, Rostami-Vartooni A, Hussin SM. J *Colloid Interface Sci*. **2016**;466:113-9.
[9] Calo R, Visone CM, Marabini L. *Mutat Res Genet Toxicol Environ Mutagen*. **2015**;791:30-7.
[10] de Carvalho RJ, de Souza GT, Honorio VG, de Sousa JP, da Conceicao ML, Maganani M, et al.*Food Microbiol*. **2015**;52:59-65.
[11] Perez Lopez LA, de la Torre YC, Cirio AT, de Torres NW, Flores Suarez AE, Aranda RS. *Pak J Pharm Sci*. **2015**;28(5 Suppl):1911-5.
[12] Horváthová E, Srančíková A, Regendová-Sedláčková E, Melušová M, Meluš V, Netriová J, et al. Enriching the drinking water of rats with extracts of Salvia officinalis and Thymus vulgaris increases their resistance to oxidative stress. *Mutagenesis*. **2015**:gev056.
[13] Kozics K, Klusová V, Srančíková A, Mučaji P, Slameňová D, Hunáková Ľ, et al.*Food Chem*. **2013**;141(3):2198-206.
[14] Dalle Zotte A, Cullere M, Sartori A, Szendrő Z, Kovàcs M, Giaccone V, et al.*Meat Sci*.**2014**;98(2):94-103.
[15] Dogu-Baykut E, Gunes G, Decker EA. *Food Chem*. **2014**;157:167-73.
[16] Dal Bosco A, Gerencsér Z, Szendrő Z, Mugnai C, Cullere M, Kovàcs M, et al.*Meat sci*. **2014**;96(1):114-9.
[17] Cerda A, Martínez ME, Soto C, Poirrier P, Perez-Correa JR, Vergara-Salinas JR, et al. *Food Chem*. **2013**;139(1):138-43.
[18] Abaza MSI, Orabi KY, Al-Quattan E, Raja'a J.*Cancer Cell Int*. **2015**;15[1]:1.
[19] Al-Menhali A, Al-Rumaihi A, Al-Mohammed H, Al-Mazrooey H, Al-Shamlan M, AlJassim M, et al. *J Med Food*.**2015**;18(1):54-9.
[20] Ayesh BM, Abed AA, Doa'a MF.*BMC Res Notes*. **2014**;7[1]:612.
[21] Sertel S, Eichhorn T, Plinkert PK, Efferth T.*Anticancer Res*. **2011**;31[1]:81-7.
[22] Bogavac M, Karaman M, Janjušević L, Sudji J, Radovanović B, Novaković Z, et al.J *Appl Microbiol*. **2015**;119(3):697-710.
[23] Fournomiti M, Kimbaris A, Mantzourani I, Plessas S, Theodoridou I, Papaemmanouil V, et al. *Microb Ecol Health Dis*. **2015**;26.
[24] Kohiyama CY, Ribeiro MMY, Mossini SAG, Bando E, da Silva Bomfim N, Nerilo SB, et al. *Food chem*. **2015**;173:1006-10.
[25] Salmalian H, Saghebi R, Moghadamnia AA, Bijani A, Faramarzi M, Amiri FN, et al. *Caspian J Intern Med*. **2014**;5(2):82.
[26] Grespan R, Aguiar RP, Giubilei FN, Fuso RR, Damião MJ, Silva EL, et al. *Evid Based Complement Alternat Med*. **2014**;2014.
[27] Benourad F, Kahvecioglu Z, Youcef-Benkada M, Colet JM. *Drug Test Anal*. **2014**;6[10]:1069-75.
[28] Direkvand-Moghadam A, Khosravi A.*J Res Med Sci*. **2012**;17(7).
[29] Schmidt E, Wanner J, Hiiferl M, Jirovetz L, Buchbauer G, Gochev V, et al.*Nat Prod Commun*.**2012**;7(8):1095-8.
[30] Esmaeili D, Mobarez AM, Tohidpour A. *Open Microbiol J*. **2012**;6:65-9.
[31] Mohsenipour Z, Hassanshahian M.Avicenna *J Phytomed*.. **2015**;5(4):309.
[32] Iten F, Saller R, Abel G, Reichling *J.Planta Med*. **2009**;75(11):1231-6.
[33] Nilforoushzadeh M, Shirani-Bidabadi L, Zolfaghari-Baghbaderani A, Saberi S, Siadat A, Mahmoudi M.J *Vector Borne Dis*.**2008**;45(4):301-6.
[34] Ocaña A, Reglero G.J *Obes*.2012;**2012**.
[35] Fachini-Queiroz FC, Kummer R, Estevao-Silva CF, Carvalho MDdB, Cunha JM, Grespan R, et al. *Evid Based Complement Alternat Med*. **2012**;2012.

[36] Mancini E, Senatore F, Del Monte D, De Martino L, Grulova D, Scognamiglio M, et al. *Molecules*. .**2015**;20(7):12016-28.
[37] Eraky MA, El-Fakahany AF, El-Sayed NM, Abou-Ouf EA-R, Yaseen DI. *Parasitol Res*. **2016**:1-9.
[38] Šikić Pogačar M, Klančnik A, Bucar F, Langerholc T, Smole Možina S.*J Sci Food Agric*. **2015**.
[39] Pensel P, Maggiore M, Gende L, Eguaras M, Denegri M, Elissondo *MInterdiscip Perspect Infect Dis*. **2014**;**2014**.
[40] Giarratana F, Muscolino D, Beninati C, Giuffrida A, Panebianco A. *Exp Parasitol*. **2014**;142:7-10.