



Review Article

PHARMACOLOGICAL AND PHYTOCHEMICAL STUDIES OF *ORIGANUM VULGARE*: A REVIEW

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ABSTRACT

Origanum vulgare has been used traditionally for treatment of various ailments. Almost every part of *O.vulgare* including roots, leaves, stem and flower are used in the systems of medicines for the treatment of various diseases. In modern scientific literatures, the plant has been reported to have potential efficacy against diabetes, antibacterial, antifungal, and anthelmintic activities etc. *O.vulgare* is reported to contain various biologically active phytochemicals such as carvacrol, thymol, limonene, piene, ocimenes, caryophyllene, p-Cymene, terpenes etc. The present review highlights the traditional uses of *O.vulgare* and its phytochemical constituents with therapeutic activity and the evidence based studies on various pharmacological effects of the plant.

Keywords: *origanum vulgare*, thymol, carvacrol, terpenes.

INTRODUCTION

Origanum vulgare is a species of Oregano, family (Lamiaceae). It is firstly introduced in south western Eurasia [1]. In India, it is represented by a single species, *Origanum vulgare* L. ssp, widely distributed in the sub-temperate/temperate region of the Himalayas [2]. It is a mounding herb, which can grow from 20–80 cm tall, with leaves 1–4 cm long and will develop in a Ph near to the 7.12 [3]. The flowers are whitish-purple, 3–4 mm (0.12–0.16 in) long, produced in erect spikes [4]. It is also known as wild marjoram which is in family related to *Origanum majorana* [5]. Oregano is the anglicized kind of the Italian word organo, or maybe of the Medieval Latin organum [6]. Both were drawn from the Latin word organum, which referred to sweet marjo, and wit was derived from the the type of Greek strain or species, which simply referred to an acrid herb [7]. The etymology of the Greek name is regularly particular as oros means mountain + ganos means brightness [8]. Oregano is interrelated to the majo, body referred to as wild marjoram. Oregano has purple flowers and spade-shaped, olive color leaves [9]. It is a perennial, though it is grown-up as an twelve-monthly in colder climates, as it frequently does not live through the winter [10]. Oregano is planted in the month of March, and they are planted at space of 45 cm at a in soil which is rich in iron, with best sunlight. It prefers a hot, rather parched climate, but does all right in other environments [11].

Subspecies of oregano been developed by humans for their unique flavours and characteristics. [12]. And tastes are of next level like sweet and spicy. Oregano which are sold in shops or plant stores are not as good as the wild one cause they don't have some characteristic like they are not bushier, with a tasteless remarkable and pungent [13]. It can pollinate other added complex strains, but the offspring are not better if developed in future [14]. *Origanum onites* from Greece and *Origanum*

syriacum from West Asia have similar flavours [15]. Some plants show a flavour between oregano and sweet marjoram [16].

GEOGRAPHICAL DISTRIBUTION OF *ORIGANUM VULGARE*

In India Jammu and Kashmir, Himanchal Pardesh, Uttar Pradesh, and Sikkim.

In northern Himalayan region: *O.Vulgare* found in seven districts of Uttarakhand situated at different geographical locations:

1. Nainital (1480–2240 m);
2. Uttarakashi (2500–2800 m);
3. Rudrapryag (3555 m);
4. Chamoli (3260 m);
5. Bageshwar (2260 m);
6. Champawat (1840 m); and
7. Almora (2220 m) [17].

O. vulgare can also be found in other places like Portugal, Spain, Afghanistan, China, Nepal, Pakistan, Denmark and also in European parts of Russia [18].

MORPHOLOGY

Origanum vulgare is an aromatic, woody-based perennial, which grows to 20-30 cm in height, and flowering season is between May to October [19]. The leaves are ovate (egg-shaped, with wider end at the base), 10-44 mm long and 5-25 mm wide, and are opposite to each other on the stem [20]. The edges of the leaves are smooth and tips vary shapes from acute (pointed) to obtuse (rounded) [21]. The bunch is many-flowered grouped together, with flowers grouped into terminal spike. The corolla is whitish purple in colour and 5-8 mm long. The calyx has five sepals in it. Each flower has four stamens (male parts). Fruits has four small nutlets (single-seeded units) [22].



Fig 1. *Origanum vulgare* [2]

TRADITIONAL USES

- The oregano herb is used as a remedy of for narcotic poisons, convulsions and dropsy[23].
- Oregano essential oil and leaf extract are both strong natural antibacterial agents due to the high concentration of thymol in it [24].
- The air dried leaves are used in painful swellings and rhumetoid.
- Oregano tea is used to treating cold, fevers and menstrual pain because of antiseptic ability [25].
- Bile flow is stimulated by the oregano and the herb also aid in alleviating the discomfort of flatulence and excess abdominal gas [26].

- Diluted oregano essential oil is used in toothaches and different kind of joint pain in patient.
- The oregano was also used as an antidote for venomous bites of snakes and insects [27].

ETHNOMEDICINAL USES

In India, *Origanum vulgare* has been used to treat food poisoning, indigestion, bloating, cough, urinary problem, bronchial problems, and headache [28]. It has been used in past to relives fever, vomiting and jaundice. It contain numerous phytonutrients -like rosemaric acid, ursolic acid, thymol *etc*, that have also been shown to function as potent antioxidants that can prevent oxygen-based damage to cell structures throughout the body [29].

PRELIMINARY PHOTOCHEMICAL STUDY

Preliminary phytochemical investigation reveals that these chemical compounds are present in various forms of extraction of *Origanum vulgare* like in water extract, methanolic extract and essential oil, the primary metabolites are like Carvacrol, thymol, present in the major contents of aerial parts of the plant [30]. Chemical compounds present in the dried plant material were made up of four main components, which are also found in fresh oregano, thymol, carvacrol, c-terpinene, p-cymene [31] Fig. [2-11].

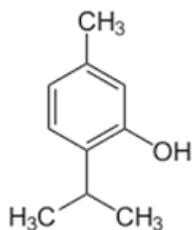


Fig 2. Thymol
 $C_{10}H_{14}O$

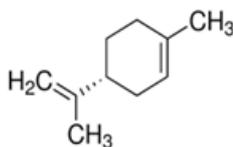


Fig 3. Limonene
 $C_{10}H_{16}$

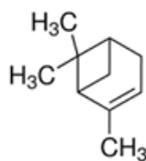


Fig 4. Piene
 $C_{10}H_{16}$

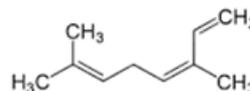


Fig 5. Ocimenes
 $C_{10}H_{16}$

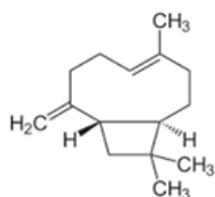


Fig 6. Caryophyllene
 $C_{15}H_{24}$

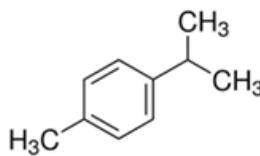


Fig 7. P-cymene
 $C_{10}H_{14}$

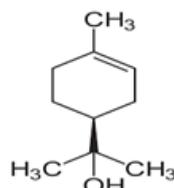


Fig 8. Terpenes
 $(C_5H_8)_n$

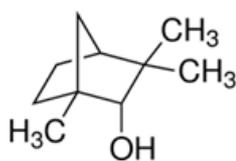


Fig 9. Fenchol
 $C_{10}H_{18}O$

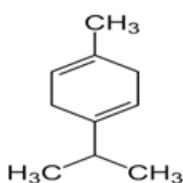


Fig 10. Terpenieol
 $C_{10}H_{18}O$

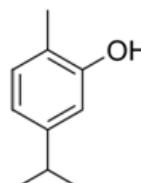


Fig 11. Carvacrol
 $C_{10}H_{14}O$

Fig 2. Phytochemical constituents

PHARMACOLOGICAL SCREENING OF *ORIGANUM VULGARE*

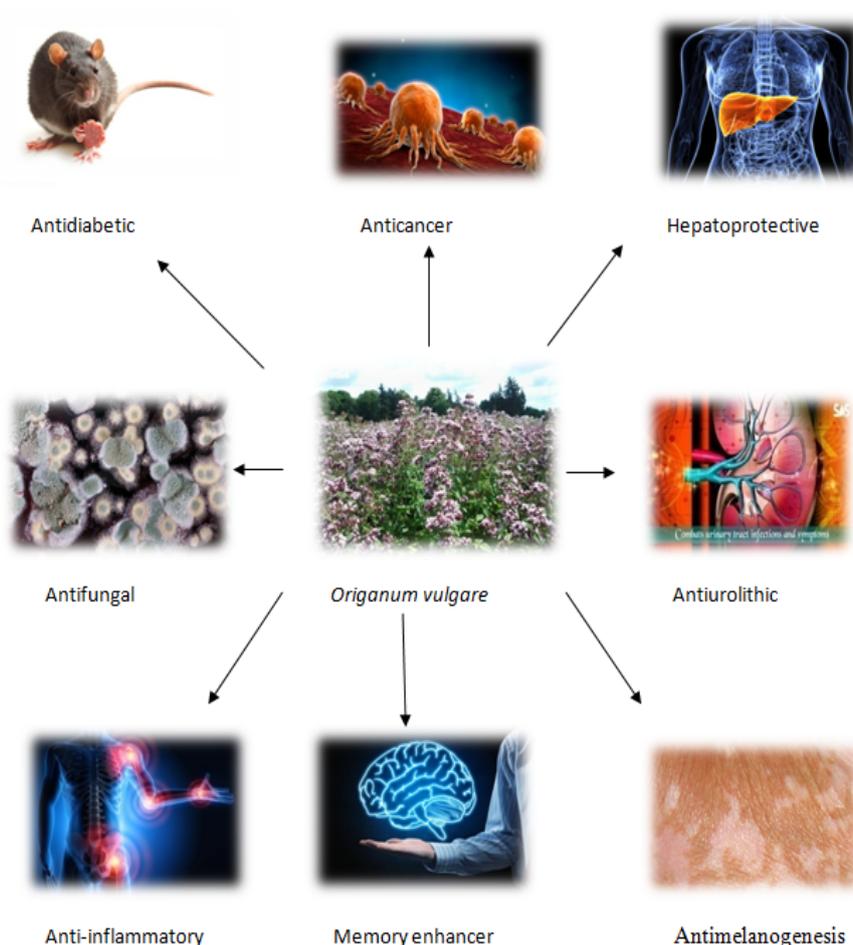


Fig 3. Pharmacological screening of *O. vulgare*

PHARMACOLOGICAL ACTIVITIES OF *ORIGANUM VULGARE* PLANT

ANTIDIABETIC ACTIVITY

A. Lemhadri et al. (2004) studied the anti-hyperglycaemic activity of *Origanum vulgare* (OV) on diabetic rats, which was induced by STZ (65 mg/kg i.v.). OV aqueous extract at a dose of (20 mg/kg p.o.) shown its blood glucose lowering activity [32].

ANXIOLYTIC ACTIVITY

Tajmah Mombeini et al. (2015) investigated the anxiolytic activity of *Origanum vulgare* (ORG) aqueous extract in rats. Rats were administered with ORG at the doses (50,100,200 mg/kg i.p.) and diazepam as standard drug. Then with the help of elevated plus maze (EPM) and open field test (OFT) ORG extract has anxiolytic potential [33].

ANTI-INFLAMMATORY ACTIVITY

Samar Javadian et al; (2015) evaluated the anti-inflammatory activity of *Origanum Vulgare*. By using Methanolic Leaf extract at a dose of (1.5, 2.25 and 2.7 mg/ml). leaf extract showed anti-inflammatory effects on the activated mixed and microglial cells through inhibition of iNOS [34].

ANTIOXIDANT ACTIVITY

B. Teixeira et al. (2013) investigated the in vitro antioxidant activity of *Origanum vulgare* by three extracts hot water extract, ethanol extract and cold water extract in DPPH and FRAP assay. According to DPPH assay hot water had showed most powerful effect, followed by ethanol extract and cold water extract and in FRAP assay cold water showed the potential [35].

ANTINOCICEPTIVE ACTIVITY

M. R. Afarineshe Khaki et al. (2013) studied the Antinociceptive activity of Aqueous Extract of *Origanum vulgare* at the dose of (1,3,6 µg/ rat i.c.v) and for the behavioural assessment tail flick test model as behavioural parameters has been used by which the antinociceptive activities of aqueous extract of *Origanum vulgare* have been observed [36].

ANTIURO LITHIC ACTIVITY

Aslam Khan et al. (2011) investigated the antiuro lithic activity of the *Origanum vulgare* (Ov) on animal model of CaOx urolithiasis. Rats were treated with administration of crude methanolic and aqueous extract of (OV) at a dose of (10 and 30 mg/kg). Antiuro lithic effect of origanum observed by analyzing the urine and serum samples [37].

ANTI-CANCER ACTIVITY

Peter Kubatka et al. (2016) investigated the anti-tumour effects of oregano in the in vivo and in vitro. Induction of carcinogen in rats by N-nitroso-N-methylure. Origanum orally administration at the dose of (3 and 30 g/kg). According to results, tumour-suppressive effect of oregano in the breast cancer model has been observed for the first time [38].

ANTIFUNGAL ACTIVITY

Suncica Kocic-Tanackov et al. (2012) studied the inhibitory effect of oregano extract on growth of *Aspergillus* spp and on STC biosynthesis. By using the AGAR plate and yeast extract sucrose (YES) broth method. The increase in oregano extract concentration (0.2 and 2.5 mL/100 mL) showed the antifungal activity of oregano extract [39].

HEPATOPROTECTIVE ACTIVITY

Mohammad Sikander et al. (2012) studied the hepatoprotective effect of aqueous extract of *Origanum vulgare* leaves against CCl₄-induced toxicity at the doses of (50,100,150 mg/kg p.o.). Researcher found that the antioxidant potential of OV can protect against hepatotoxicity induced CCL₄ [40].

MEMORY ENHANCER ACTIVITY

Vahid Sheibani et al. (2010) studied the effect of *Origanum vulgare* L. ssp. *viridis* leaves extract increases the discrimination learning and improve the LTP induction. At a dose of (150, 300 and 450 mg/kg) of origanum vulgare aqueous extract. And with the help of T-maze apparatus and Electrophysiological recording author concluded that Origanum aqueous extract can improve the learning criteria in rats [41].

ANTIMELANOGENESIS

Liang et al. (2010) Origanoside has been noted to inhibit tyrosinase activity in cell culture at 10-20µg/mL by 16.9–28.6% (melanoma B16 cells). When applied to the skin of mice, a topical gel containing origanoside over 10 days showed whitening properties associated with reducing the expression of pigment-forming genes (MITF, tyrosinase, and TRP-2)[42].

CONCLUSION

O.vulgare is an excellent medicinal plant which holds numerous bioactive phytochemicals. Almost every part of this plant has been used in traditional system of medicines for treatment of various diseases. In modern scientific literatures, plant extracts have been reported to have potential efficacy against diabetes, cancer, inflammation, etc. Various parts have been found to possess biological activity more specifically towards overcoming metabolic ailment. Further focus on developing contemporary formulations after extensive analysis of its bioactivity, pharmacokinetics and pharmacodynamics, safety, etc. using appropriate animal models followed by clinical trials will provide a novel entity for the treatment of various diseases from *O.vulgare*.

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