



## Biological Potential of Culinary Herb Oregano (*Origanum Vulgare*)

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### Abstract:

In Lamiaceae family, *Origanum vulgare* L. (*O. vulgare*) is a significant medicinal herb. With an emphasis on the mechanisms of action of the most significant phytochemicals from *O. vulgare* subspecies, we described in the current study the critical evaluation of traditional applications, phytochemistry, and antimicrobial capabilities of *O. vulgare* and its subspecies. *O. vulgare*'s volatile (essential oil) and non-volatile phenolic components (phenolic acids & flavonoids) are its most significant phytochemicals. Thymol and carvacrol, which are present in high concentrations in *O. vulgare* essential oil (EO), have outstanding antibacterial action either by themselves or in conjunction with other antibiotics.

Interesting findings have been published regarding the exceptional antimicrobial properties of *O. vulgare* infusions or tea products containing a high concentration of essential oil (EO) against bacterial and fungal microorganisms that are resistant to multiple drugs, including *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Candida albicans*, and *Escherichia coli*. Enzyme inhibition, efflux pump inhibition, ATP depletion, suppression of biofilm formation, and cytoplasmic membrane damage are *O. vulgare*'s primary antibacterial strategies. Several in-vitro and in-vivo investigations have verified the hirtum subspecies' antibacterial properties. The clinical and preclinical studies demonstrating the antibacterial properties of *O. vulgare* and its subspecies are supported by the current review.

**Keywords:** *Origanum vulgare* L., Pharmacological, Traditional uses.

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### INTRODUCTION

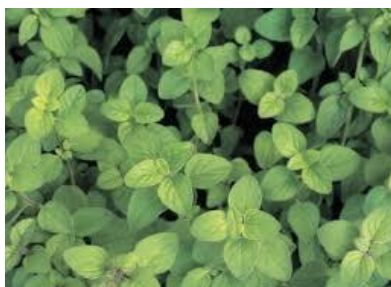
An anglicised form of the Italian term *origano*, or maybe the Mediaeval Latin *organum*, is oregano. It was taken from the type of Greek strain or species, which simply meant an acrid herb, while both were derived from the Latin term *origanum*, which meant delicious marjoram. A species of oregano belonging to the Lamiaceae family is *Origanum vulgare*. South Western Eurasia is where it was initially introduced [1]. It is represented in India by a single species, *Origanum vulgare* L. ssp., which is found throughout the Himalayan sub-temperate/temperate region. This mounding plant will grow in a pH close to 7.12 and can reach heights of 20 to 80 cm with leaves that are 1 to 4 cm long [4,5].

The whitish-purple flowers are produced in upright spikes and measure 3–4 mm (0.12–0.16 in) in length. It belongs to the *Origanum majorana* family and is also known as wild marjoram. The Greek name's derivation is frequently specific, with *oros* meaning mountain and *ganos* meaning brilliance [6,7,8].

The tastes of *Origanum syriacum* from West Asia and *Origanum onites* from Greece are comparable. Certain plants exhibit a flavour that is a cross between sweet marjoram and oregano. Although it is a perennial, in colder locations it is grown as a twelve-monthly since it often does not survive the winter. In March, oregano is planted in soil that is rich in iron and receives the most sunlight, with a 45-cm spacing between plants. Humans have created subspecies of oregano for their distinct flavours and qualities. [9,10 11,12]. and flavours like sweet and spicy are on another level. The wild oregano is superior to those sold in shops or plant stores because it has certain

qualities, such as being bushier and having a strong, pungent flavour [13]. Other complex strains can be pollinated by it, but the progeny are not superior if they are grown later [14].

**Plant Profile** [15, 16]:



**Fig 1. *Origanum vulgare*** [2]

*O. Vulgare* found in different geographical locations in India: Jammu and Kashmir, Himanchal Pradesh, Uttar Pradesh, and Sikkim, Uttarakhand.

<b>Common Name:</b>	Oregano
<b>Synonyms:</b>	<i>Origanum Floridum</i> , <i>Thymus origanum</i>
<b>Genus:</b>	<i>Origanum</i> may be herbaceous perennials or deciduous or evergreen sub-shrubs
<b>Botanical Name:</b>	<i>Origanum Vulgare</i>
<b>Local Name:</b>	Sathra, Ban Tulsi, Kedar Tulsi, Mirzanjosh
<b>Divison:</b>	Magnoliophyta divison
<b>Class:</b>	Magnoliopsida class
<b>Subclass:</b>	Asteridae
<b>Order:</b>	Lamiales
<b>Kingdom:</b>	Plantae
<b>Family:</b>	<i>Lamiaceae (Labiatae)</i>
<b>Phylum:</b>	Magnoliophyta
<b>Size of Plant:</b>	20-80 cm
<b>Flowers:</b>	Purple, pink or white (summer and early autumn)
<b>Plant Growth From:</b>	Shrub
<b>Morphological parts used:</b>	Leaves, Flower & Stem.

#### PHARMACOLOGICAL ACTIVITIES OF *ORIGANUM VULGARE* PLANT

- **ANTIDIABETIC ACTIVITY:** *Origanum vulgare* (OV) has anti-hyperglycemic effects on diabetic rats that have been given STZ (65 mg/kg intravenously). At a dose of 20 mg/kg p.o., OV aqueous extract demonstrated its ability to reduce blood glucose [17].
- **ANXIOLYTIC ACTIVITY:** *Origanum vulgare* (ORG) aqueous extract's anxiolytic effects in rats. Rats were given diazepam as a normal medication along with ORG at doses of 50, 100, and 200 mg/kg i.p. Then, ORG extract has the ability to be anxiolytic with the aid of elevated plus maze (EPM) and open field test (OFT) [18].
- **ANTI-INFLAMMATORY ACTIVITY:** *Origanum vulgare*'s ability to reduce inflammation. Methanolic leaf extract at doses of 1.5, 2.25, and 2.7 mg/ml was used. By inhibiting iNOS, leaf extract demonstrated anti-inflammatory effects on activated mixed and microglial cells [19].
- **ANTIOXIDANT ACTIVITY:** Antioxidant properties of both aqueous and methanolic extracts of oregano (*origanum vulgare*) They proved to be effective in the inhibition of all phases of the peroxidative process: first neutralizing free radicals (superoxide anion, hydroxyl radical and 1, 1-diphenyl-2-picrylhydrazyl radical), then blocking peroxidation catalysis by iron (through iron-chelating and iron-oxidizing properties), and finally through interruption of lipid-radical chain reactions (chain-breaking activity)[20].
- **ANTINOCICEPTIVE ACTIVITY:** The antinociceptive effects of the aqueous extract of *Origanum vulgare* were evaluated at doses of 1, 3, and 6 µg per rat via intracerebroventricular administration. The tail flick test model was employed as a behavioral assessment tool to observe the antinociceptive activities of the aqueous extract of *Origanum vulgare*. [21]

- **ANTI-CANCER ACTIVITY:** The anticancer properties of oregano have been studied both in vivo and in vitro. The carcinogen N-nitroso-N-methylure was administered to rats to induce cancer. Oregano was given orally at doses of 3 and 30 g/kg. The findings indicate that, for the first time, a tumor-suppressive effect of oregano has been noted in a breast cancer model [22].
- **ANTIFUNGAL ACTIVITY:** The antifungal activity of oregano extract was demonstrated through the application of the AGAR plate and yeast extract sucrose (YES) broth method. An increase in the concentration of oregano extract, specifically at levels of 0.2 and 2.5 mL per 100 mL, indicated its effectiveness [23]
- **HEPATOPROTECTIVE ACTIVITY:** The aqueous extract of *Origanum vulgare* leaves demonstrates a hepatoprotective effect against CCl<sub>4</sub>-induced toxicity at doses of 50, 100, and 150 mg/kg administered orally. The researcher identified that the antioxidant properties of *Origanum vulgare* can safeguard the liver from hepatotoxicity caused by CCL<sub>4</sub> [24].
- **MEMORY ENHANCER ACTIVITY:** The extract of *Origanum vulgare* L. ssp. *viridis* leaves enhances discrimination learning and facilitates the induction of long-term potentiation (LTP). Administered at doses of 150, 300, and 450 mg/kg, the aqueous extract of *Origanum vulgare* was evaluated using a T-maze apparatus and electrophysiological recordings. The author concluded that the aqueous extract of *Origanum* can positively influence learning capabilities in rats [25].
- **ANTIMELANOGENESIS:** Origanoside has been observed to reduce tyrosinase activity in cell cultures at concentrations ranging from 10 to 20 µg/mL, achieving an inhibition rate of 16.9% to 28.6% in melanoma B16 cells. Furthermore, a topical gel formulated with origanoside, when applied to the skin of mice over a period of 10 days, demonstrated skin whitening effects linked to a decrease in the expression of genes responsible for pigment formation, specifically MITF, tyrosinase, and TRP-2[26]
- **ANTIUROLITHIC ACTIVITY:** The antiurolithic properties of *Origanum vulgare* (OV) were investigated using an animal model of calcium oxalate (CaOx) urolithiasis. Rats received treatment with crude methanolic and aqueous extracts of OV at dosages of 10 and 30 mg/kg. The antiurolithic effects of *Origanum* were assessed through the analysis of urine and serum samples.[27]

#### Traditional Uses

*O. vulgare* has a vast history of being utilized for traditionally purposes and the treatment of various diseases, attributed to its high essential oil content. In the 7th century B.C., it was employed to enhance the flavor of fish, meat, vegetables, and wine. In traditional medicine, *O. vulgare* has been applied to address respiratory issues, abdominal pain, dysmenorrhea, rheumatoid arthritis, nutritional imbalances, and urinary conditions, serving as both a diuretic and an antiurolithic. The aerial parts of the plant were predominantly utilized. Additionally, *O. vulgare* is recognized for its role in cooking as a flavoring agent and in traditional medicine as a tonic, expectorant, carminative, stimulant, and antibacterial substance. The methods of consumption exhibit considerable diversity based on the symptoms being addressed. This includes the use of tea or tinctures that are effective against colds, as well as digestive and respiratory ailments, contributing to the overall health of the body. The preparation of an infusion from *O. vulgare* has been utilized for its expectorant, antiseptic, digestive support, and antispasmodic properties [28,29,30]

**CONCLUSION:** *O. vulgare* is a remarkable medicinal plant that contains a variety of bioactive phytochemicals. Nearly all parts of this plant have been utilized in traditional medicine systems for the treatment of a wide range of ailments. Contemporary scientific literature indicates that extracts from this plant may exhibit significant efficacy in addressing conditions such as diabetes, cancer, and inflammation. Different parts of the plant have demonstrated biological activity, particularly in relation to managing metabolic disorders. A continued emphasis on the development of modern formulations, following a thorough examination of their bioactivity, pharmacokinetics, pharmacodynamics, and safety through suitable animal models and subsequent clinical trials, will yield a new therapeutic agent derived from *O. vulgare* for the management of various diseases.

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