

A Review On *Mentha spicata*

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❖ Abstract :

Mentha spicata, scientifically known as *Mentha viridis*, is a member of the Lamiaceae family of medicinal plants that is valued for its ability to produce and secrete secondary metabolites, which are essentially essential oils. Different populations employ the aerial parts of this plant for tea preparation, and this tisane (herbal tea) has exhibited several effects, according to ethnopharmacological (study of traditional medicine) surveys carried out in different places across the world. These actions are ascribed to various *M. spicata* substances, the biological effects of which have lately been demonstrated by experimental means^[1]. Grown all over the world for its exceptional fragrance and economic worth. *M. spicata* is well recognized for its traditional medicinal purposes, which include treating colds, coughs, asthma, fevers, obesity, jaundice, and digestive issues. It is also used as a flavoring component in traditional dishes ^[2].

The antibacterial, antioxidant, anticancer, antiparasitic, and antidiabetic actions of *M. spicata* extracts and essential oils were studied for their pharmacological qualities. Studies conducted in vivo and in vitro revealed beneficial effects that may be linked to the various bioactive chemicals found in *M. spicata*. Indeed, it appears that volatile chemicals effectively suppress a variety of microbiological organisms, including fungus, bacteria, and parasites, via a number of different ways. Furthermore, several research have reported that *M. spicata* has demonstrated promising benefits as an antioxidant, antidiabetic, anti-inflammatory, and anticancer agent. These findings suggest that *M. spicata* may be a useful source for discovering natural medications to treat disorders associated with cellular oxidative stress. Crucially, toxicological studies on *M. spicata* demonstrate the species' safety at various dosages and

over an extended period of time, supporting its use in conventional medicine similar to tisane and tea. Here, we provide, examine, and highlight the information that has been published about *M. spicata*, including its pharmacological characteristics, phytochemical composition, geographic distribution, botanical description, and toxicological studies ^[1].

❖ Introduction:

Medicinal plants have been a cornerstone of traditional medicine for centuries, particularly in developing countries where access to modern healthcare is limited. The World Health Organization (WHO) estimates that approximately 80% of the population in developing countries rely on traditional medicine, mostly plant-based, for their primary healthcare needs. Medicinal plants contain diverse bioactive compounds like alkaloids, glycosides, terpenes, and flavonoids. These compounds have led to traditional herbal remedies, phytopharmaceuticals, and synthetic derivatives. Examples of approved drugs include vinorelbine from *Catharanthus roseus* for cancer, artemether from *Artemisia annua* for malaria, paclitaxel from *Taxus brevifolia* for cancer, and galantamine from *Galanthus caucasicus* for Alzheimer's.

Medicinal plants are evaluated for their therapeutic properties through chemical profiling or ethnobotanical analysis, linking traditional uses to specific health conditions. Identifying a particular compound effective against a particular disease is a complex, time-consuming process. Modern scientific methods have investigated numerous herbal remedies, revealing their significant pharmacological potential ^[2].

Mentha (Mint) belongs to the family Lamiaceae, the subfamily Nepithoidae, and there are about 38 species in all agro-climates worldwide. *Mentha spicata* L., commonly known as spearmint, is a perennial herb cultivated worldwide for its medicinal and culinary uses. The leaves are used fresh or dried to make teas, aromatic agents, and various products. Traditionally, spearmint has been employed to alleviate gastrointestinal issues, ease respiratory problems, freshen breath, relieve carminative and anti-spasmodic symptoms, act as a diuretic, and provide sedative benefits. In traditional Iranian medicine, spearmint preparations, such as decoctions, tinctures, and tablets, have been used to treat flatulence disorders ^[2].

Spearmint (*Mentha spicata*) is a versatile and highly valued essential oil crop, renowned for its widespread applications. It is utilized in various culinary forms, including flavorings, cuisines, spices, and teas, imparting a refreshing flavor and aroma. Beyond culinary uses, spearmint oil is employed in pharmaceutical applications to treat multiple human diseases, leveraging its therapeutic properties to alleviate digestive issues, respiratory problems, skin conditions, and oral health issues. Additionally, spearmint serves as a natural aromatic agent in dental cream, chewing gum, and mouthwashes, and is also used in consumer products like sweets and fragrances. Industrial applications extend to pesticides and antimicrobial agents, capitalizing on its antimicrobial and anti-inflammatory compounds. Overall, spearmint's fresh flavor, natural remedial properties, versatility, and economic importance as a cash crop solidify its significance ^[3].

Phytochemical analysis reveals spearmint contains volatile oils like menthol and menthone, flavonoids like luteolin and quercetin, and phenolic acids like rosmarinic acid. These compounds contribute to its therapeutic properties, including antioxidant and anti-inflammatory effects, antimicrobial and antifungal activities, and smooth muscle relaxation ^[2].



❖ Different Types Of Mintha ^[4]



❖ Pharmacognostic Account

- **Botanical Name:** *Mentha spicata* L.
- **Family:** Lamiaceae
- **Common Names:** Spearmint, Garden Mint, Menta de Castillo ^[5]
- **Macroscopical:**
 1. Leaves: Lanceolate, 2-5 cm long, acute apex, serrated margins, dark green.
 2. Stem: Erect, quadrangular, 30-90 cm tall.
 3. Flowers: Purple or pink, 3-4 mm long, in terminal spikes.
- **Microscopical:**
 1. Leaf: Upper epidermis with trichomes, lower epidermis with oil glands.
 2. Stem: Cortical region with sclerenchymatous cells.
- **Physicochemical:**
 1. Volatile oil content: 0.5-1.5% (mainly menthol, menthone).
 2. Flavonoids: Luteolin, diosmin.
 3. Phenolic acids: Rosmarinic, caffeic.

- **Chemical Constituents** ^[5]

1. Essential oil: Menthol (35-50%), menthone (15-30%).
2. Flavonoids: Luteolin-7-glucoside, diosmetin.
3. Terpenoids: Limonene, beta-caryophyllene.

- **Toxicity** ^[5]

1. High doses may cause gastrointestinal upset.
2. Allergic reactions (rare).

- **Mechanisms of Action** ^[5]

1. Interaction with GABA receptors (anxiolytic, sedative effects).
2. Blockage of calcium channels (antispasmodic, bronchodilator effects).
3. Inhibition of prostaglandin synthesis (anti-inflammatory effects).

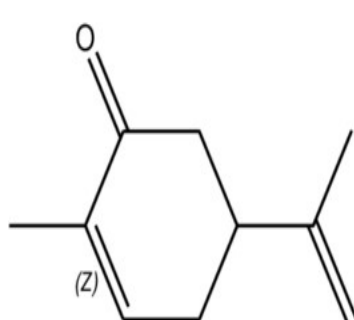
- **Essential Oil** ^[6]

Mentha spicata, or spearmint, essential oil's chemical composition has been extensively studied, revealing variations due to factors like climate, geography, and extraction methods. Despite discrepancies, carvone consistently emerges as the main component, typically ranging from 50-80%. This monoterpene possesses antioxidant, anti-inflammatory, and antimicrobial properties.

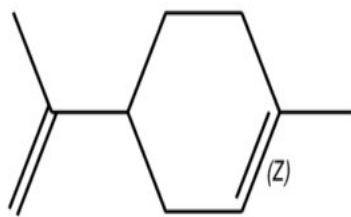
Other notable compounds commonly found in *M. spicata* essential oil include :

1. limonene,
2. β -caryophyllene
3. α -pinene
4. β -pinene
5. 1,8-cineole (eucalyptol)
6. linalool.

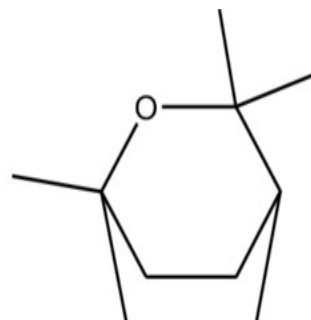
❖ Chemical Structure Of compounds^[7]



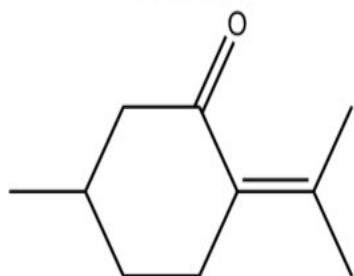
Carvone



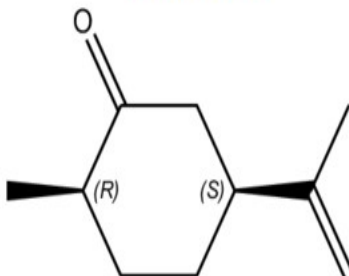
Limonene



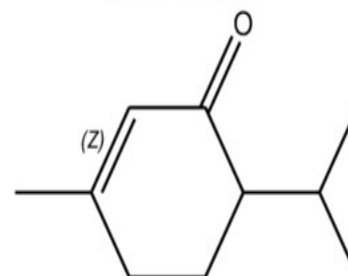
1,8-Cineole



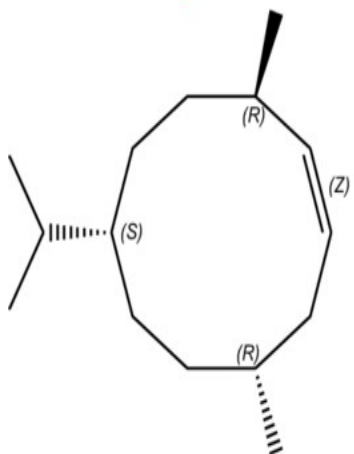
Pulegone



cis-dihydrocarvone



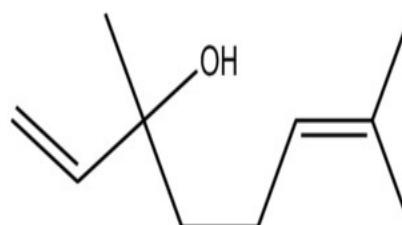
piperitone



germacrene D



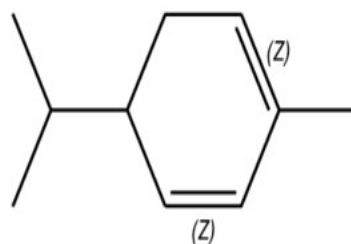
borneol



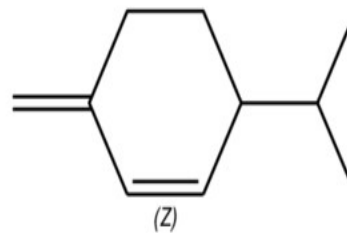
linalool



beta-Pinene



α-Phellandrene



β-Phellandrene

❖ Pharmacological Actions

1. Digestive Aid^[8,9]

- Spearmint is traditionally used to relieve digestive issues, including indigestion and bloating. Its carminative properties may help reduce gas and promote digestion.

2. Antibacterial Activity^[10]

Bacteria strains preparation

The Khyber teaching hospital provided four standard isolated Bacterial strains, namely; Escherichia coli, Klebsiella pneumoniae, Staphylococcus and Klebsiella aerogenes strain. All the strains were grown for one day (24 h) at 37 °C with agitation of 200 rpm in the Mueller Hinton broth (Merck, Germany).

3. Antidiabetic Activity

The α -glucosidase and α -amylase inhibition assays were used to assess the antidiabetic efficacy of Mentha arvensis extract.

4. Antimicrobial activity^[11]

Microbial strains and growth conditions

Staphylococcus epidermidis, a representative of Gram positive, Escherichia coli, a representative of Gram negative and Candida glabrata, fungi, were obtained from the Microbial Culture Collection Center of Medicine School at The University of Jordan, Jordan. Microorganisms were grown in nutrient broth medium and incubated, with shaking, at 37 °C and at 33 °C, for bacteria and candida respectively.

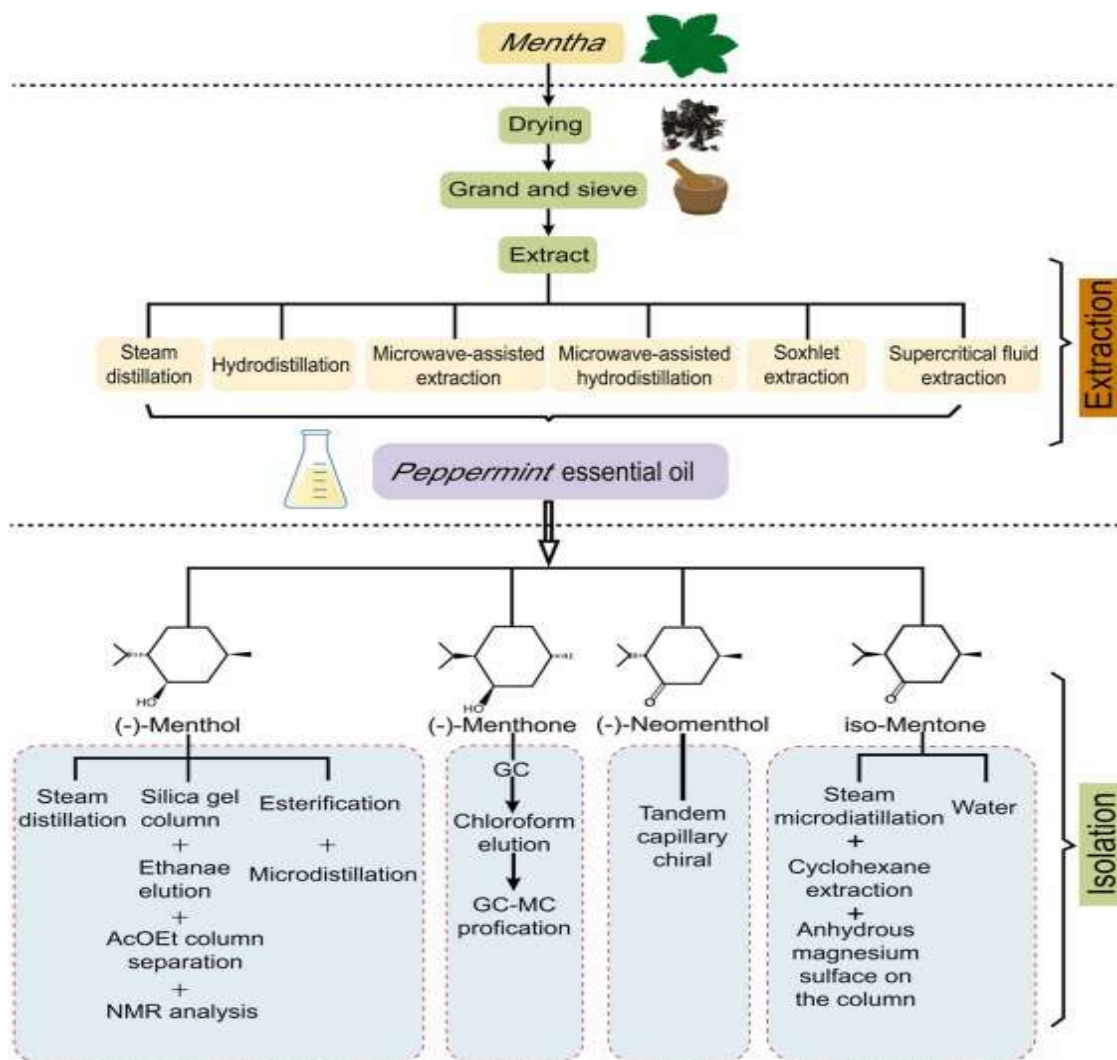
5. Antiproliferative activity

Cells and cell culture conditions

The human colon cancer HCT-116, the human breast adenocarcinoma MCF-7, and the human ductal carcinoma T47D cell lines were purchased from the American Type Culture Collection (Rockville, MD, USA). Cells were grown and maintained in Dulbecco's modified Eagle's medium (DMEM, Gibco, Waltham,

MD, USA) supplemented with 10% fetal bovine serum (FBS), and penicillin (100 U/mL) and were incubated at 37 °C in a humidified atmosphere of 95% O₂ and 5% CO₂. Cell cultures were passaged every 2–3-days or whenever reaching 80% confluent. Cells were seeded at a density of $6-8 \times 10^3$ cells/ well in 96-well plates and incubated for 24 h for adhesion.

❖ Extraction Methods and Isolation Of *Mentha Spicata*^[12]



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