

# Pharmacological Activity of Mentha Piperita –A Review

Auti Pranali S<sup>1</sup>, Dethe Akanksha A<sup>2</sup>, Bhosale Srushti S<sup>3</sup>, Atole Shubhangi V<sup>4</sup>, Gadge Shubham C<sup>5</sup>

Samarth Institute of Pharmacy, Belhe, Maharashtra, India<sup>1,2,3,4</sup>

Department of Pharmacology, Samarth Institute of Pharmacy, Belhe, Maharashtra, India<sup>5</sup>

pranaliauti7030@gmail.com

**Abstract:** *Mentha piperita* L. (Family: Lamiaceae; Synonym: *M. balsamea* Wild; commonly known as peppermint) is a natural hybrid (*M. aquatica* × *M. spicata*) with immense therapeutic uses (oldest known medicinal plant species, “medicinal plant of the year 2004”, known as “heirba Buena” meaning good herb) apart from possessing other potential uses (as flavouring agent from chewing gum to after dinner mints, in cosmetics and pharmaceutical products). *Mentha piperita* Linn. emend. Huds. is widely used in food, cosmetics and medicines. It has been proven helpful in symptomatic relief of the common cold. It may also decrease symptoms of irritable bowel syndrome and decrease digestive symptoms such as dyspepsia and nausea, although more research is needed. It is used topically as an analgesic and to treat headaches..

**Keywords:** Mentha piperita, overview, Lamiaceae Peppermint, Peppermint oil, Menthol, Medicine, Toxicity.

## I. INTRODUCTION

**Synonym:** peppermint (*Mentha* × *piperita*), native spearmint (*Mentha spicata*), Scotch spearmint (*Mentha* × *gracilis*), and cornmint (*Mentha arvensis*)

**Biological Source:**

It is derived from the fresh leaves of *M. haplocalyx* belonging to family *Lamiaceae*.

**Family: Labitate**

*Mentha piperita* plant is strongly scented, perennial herb 30-90 cm in height. the square stems are usually reddish-purple and smooth. The leaves are short 2.5-5cm long, oblong-ovate and serrate from which oil is extracted. The flowers are purple-pinkish and appear in the summer months. The plant has runners above and below ground and propagation takes place through these runners.

**Geographical Source: -**

It is growing wild in Europe. Cultivated in Canada, and the US and have been naturalized in many parts of India.

**Local names in Indian languages:**

Hindi, Bengali, Gujarati, Punjabi,

Kashmiri: *Pudyanu*;

Malayalam: *Puthina*.

**Chemical composition: -**

Peppermint oil is composed primarily of menthol (37.4%), menthyl acetate (17.4%) and menthone(12.7%)<sup>14</sup>. cadinene, camphene, carvacrol, carveol, carveol-acetate, carvone, caryophyllene-oxide, cedrene, cedrol, choline, cineole, cinerol, cis-piperitol, cis-roseoxide, cis-sabinol, citronellol, cryptone, flavons hymenoxin, isoamyl-phenylacetate, isomenthol, isomenthol-acetate, isomenthone,



## II. CULTIVATION AND HARVESTING: -

Cultivation of peppermint is usually best with good supply of water (moist)and in shaded locations. Plantation of herb is done in the month of last week of December to last week of January. (8-10cm long,40-60cm spacing and 400-450kg

stolon/s/ha) by selecting younger shoots from old stocks and dibbled into the ground 1.2-1.4 feet apart. Harvesting is done in twice in the month of June and October on bright sunny days.

Peppermint generally thrive in moist, shaded locations and grows best with a good supply of water. Being a hybrid, it is usually sterile, producing very few seeds and reproduces almost vegetative, spreading quickly by underground runners (rainy seasons) and stolons (winter). Mentha oil in the World with around 14000 metric tons' production (followed by China and Brazil) and 3000 metric tons' export annually of around 100 corers rupee – the data is of 2003 and of total Mentha Oil Irrespective of the Species.

### III. PHARMACOLOGICAL ACTIVITY

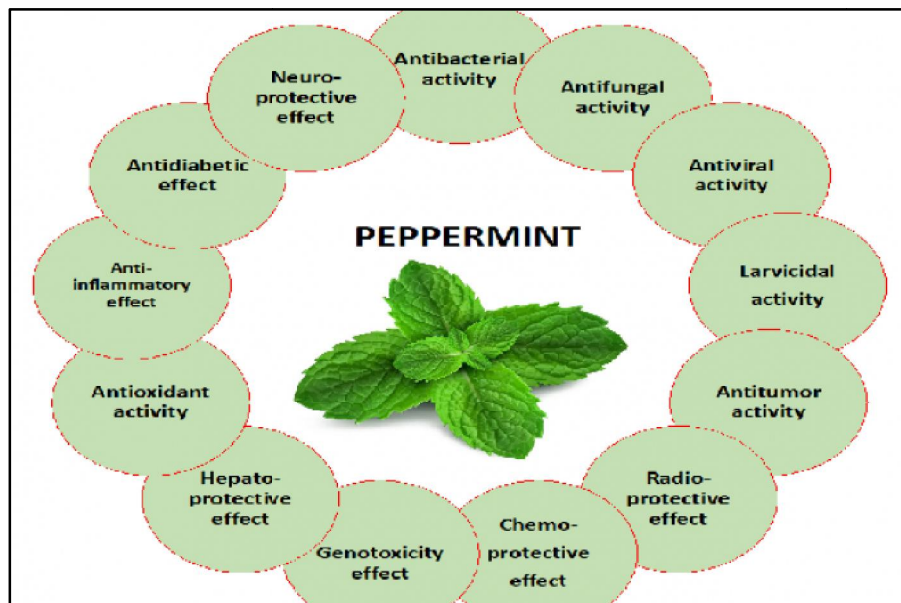


Fig. Activities of *Mentha piperita*

#### 1. AntiInflammatory Activity

The ethanolic extract posse's anti-inflammatory effects in acute (xylene induced ear oedema) in mice and chronic (cotton pellet granuloma) inflammation in rats. (Atta and Alkolahi 1998) Azulene found in oil of peppermint have shown to have anti-inflammatory effects in laboratory animals. (Lucida and Wallace, 1998).

*Mentha piperita* is a plant popularly known in Brazil as "hortela pimenta" whose essential oil is used in folk medicine for its anti-inflammatory activity.

#### 2. Antiviral Activity -

Extract of various plant of the mint family (labiate, were studied for antiviral activity. Peppermint *Mentha piperita* extract had antiviral activity against Newcastle disease (NDV), herpes simplex, Vaccinia, semliki Forest and West Nile viruses in egg and cell culture Systems. It contains a tannin with an affinity for NDV and mumps virus and a nontannin fraction with antiviral effects against herpes simplex virus. *Mentha piperita*.L. leaves were extracted by reflux with ethanol. total phenolic acid and total flavonoid contents were determined. The antiviral activity of MPE against the Respiratory Syncytical virus (RSV) and the anti-inflammatory activity were evaluated in vitro.

#### 3. Anti-diabetic Effects

It has been reported that peppermint juice can reduce levels of glucose, cholesterol, low-density lipoprotein cholesterol (LDL-c), and triglyceride in treated animals.

#### **4. Anti Spasmodic Activity**

The herb showed calcium channel inhibition activity in which the Piper mint oil or mentha block the calcium ion and relax the smooth muscle. The herb showed inhibition activity in guinea pig, papillary muscle, and atrial, rat and their brain, synaptosomes due to presence of menthol and peppermint oil. Relaxation of GIT smooth muscle is also seen due to decrease in the calcium influx. Mechanism of peppermint oil action was performed using isolated pharmacological preparations from guinea pig large intestine and patch clamp electrophysiology techniques on rabbit jejunum. Peppermint oil relaxed carbachol-contracted guinea pig taenia coli (IC<sub>50</sub>, 22.1 µg/mL) and inhibited spontaneous.

#### **5. Antimicrobial Effects**

The peppermint oil exerts antidermatophytic activity against (+) and (-) strains of *Narinizzia fulva* and *N.gypsea* and antibacterial activity against *Staphylococcus aureus*, *S.pyrogenes*, *Escherichia coli*, *Bacillus subtilis* and *Proteus vulgaris*. It possesses repellent activity against *Tribolium castaneum* and is moderately effective fumigant on both *Callosobruchus maculatus* and *T. castaneum*. Moderate antimyotic property against *Aspergillus fumigatus*, *Candida albicans*, *Geotrichum candidum* and *Rhodotarlula rubra*, *Phytophthora cinnamoni*, *Pyrenochaeta lycopersici* and *Verticillium dahlial* has been reported. Peppermint oil showed antifungal activity against *Aspergillus niger*, *Alternaria alternata* and *Fusarium sp.* by agar well diffusion method. The constituents of the essential oil of *M. piperita* have different modes of action in bacteria and eukaryotic cells. Antibacterial activity of plants may be attributed to the presence of phenolic compounds that behave as pro-oxidants because they undergo high oxidation, so instead of eliminating the reaction of free radical chain, they lead to generation of superoxide and quinones. The most easily oxidized phenolics such as quercetin and gallic acid have pro-oxidant activity but tannins, due to the high molecular weight have little pro-oxidant activity.

#### **6. Antifungal and Antiyeast Activities**

Fungal diseases are a severe health issue especially in subtropical and tropical regions of the world. Due to microbial resistance against common antifungal drugs, there is an urgent need for discovery and development of novel plant-based natural antifungal agents. Besides antibacterial activity, *Mentha* species have also been investigated as a potential source of antifungal agents to control pathogenic molds. Antifungal activity of *M. Piperata* was studied by Nosrati et al. and it was found that the Essential oil significantly restricted the mycelia growth of *Fusarium oxysporum sp.* in a dose-dependent manner. The antifungal potential of Essential oil of four *Mentha* species, including *M. arvensis*, *M. piperita*, *M. longifolia*, and *M. spicata*, was evaluated by Hussain et al.

#### **7. Anti-emetic**

In a placebo-controlled study of gynecological surgery patients, there was a significant effect of peppermint in reducing nausea.

#### **8. Asthma**

Peppermint oil consisting chemical constituents' menthol and menthene of *Mentha* suppressed histamine and ovalbumin induced asthma. The analysis was made using protein network pathway. <sup>1</sup>*Mentha* containing pippermint oil relieve asthma by the mechanism of inhibiting interleukin-6, Janus kinase 2, Signal transducer and activator of transcription

### **IV. TOXICOLOGY**

Peppermint oil has few side effect – it can cause heartburn or perianal irritation and is contraindicated in patients with bile ducts obstruction, gallbladder inflammation, and severe liver damage. Menthol can cause jaundice in newborn babies and in some cases is linked to glucose 6 phosphatase dehydrogenase deficiencies. Menthol products used directly under the nose of small children and infants may undergo the risk of apnea, laryngeal and bronchial spasms, acute respiratory distress with cyanosis and respiratory arrest activity in the guinea pig colon (IC<sub>50</sub>, 25.9 µg/mL) and rabbit jejunum (IC<sub>50</sub>, 15.2 µg/mL).

### V. CONCLUSION

It can be concluded that with its vast and diversified pharmacological potentials *M. piperita* has a strong future in the world market. This plant is now well acclimatized and cultivated in different parts of India and enjoys a strong export potential for the volatile oil extracted from it. Various formulations like Pudina Hara for gastro-intestinal disturbances like flatulence and indigestion and Itch-Gard® for skin disorders are available in the market. *M. piperita* is a natural hybrid and propagated through stolons, therefore genetic diversity is limiting which may be a hindrance to improve peppermint oil yield and quality. Therefore, attempts should be taken to enhance gene pool of the existing varieties following conventional (methodology of induced mutagenesis or polyploidy may be adopted) and biotechnological approaches and to select desirable clones with enriched oil content and composition. Present overview on *M. piperita* is an endeavor in this regard providing unabridged repository of references on different aspects, which may be helpful to researchers to design experiments for exploring the species for maximizing trade.

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