

REVIEW ARTICLE

A Detailed Review on Pharmacological Profile of *Mentha piperita*

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Received date: October 10, 2019; **Accepted date:** November 3, 2019; **Published date:** March 31, 2021**Abstract**

Among the several plants, *Mentha Piperita* Linn, commonly known as peppermint, is an important medicinal herb that belongs to the family called *Lamiaceae*. It's one of the ancient medicinal herb or species majorly used in food, medicines, and cosmetics. The leaf of this drug has been proven useful in relief of common cold; decreases the symptoms of irritable bowel syndrome; digestive problems, such as nausea, vomiting, diarrhoea, flatulence, and dyspepsia. The herb is used as analgesic topically and helps to treat the minor headache. *M. Piperita* is in the Food and Drug Administration's (FDA) Generally Recognized as Safe (GRAS) list, but this herb has its own few side effects. The peppermint oil leads to burning sensation in heart or irritation in perianal region so that it's contraindicated in patients who suffer from bile duct obstruction, inflammation in gall bladder, and sever damage in liver and precaution should be taken in patients with gastrointestinal tract (GIT) reflex. Menthol and their derivatives are not used directly under the nose of small children and infants due to the risk of apnea.

Keywords: *Mentha Piperita*, Peppermint, Phytoconstituents, Medicinal benefits, Pharmacological actions

Introduction

Herbal medicines are now an integral part of standard healthcare, so that they are used both in ongoing research and traditionally. Herbal medicinal compounds are the major source for phytochemicals; hence, they are rich in bioactive substance. The herb is hybrid between spearmint (*Mentha Spicata* L.) and water mint (*Mentha aquatic* L.) containing wide range of antioxidant properties and phytochemicals are capable for neutralizing the free radicals that results in slowing down of various chronic disease progression, which is associated with oxidative stress. The plants that have several phytoconstituents in addition to polyphenols highly act as antioxidants and are less toxic compared to synthetic ones, and this property makes the herb of great interest to the food industry. The herb is also of great interest for medicinal use, because of its medicinal

benefits, such as antinociceptive, anti-inflammatory, anti-diabetic, antioxidant, antiemetic, etc.^{1,2}

Mentha Piperita commonly known as peppermint is an important medicinal herb that belongs to the family *Lamiaceae*. It is one of the oldest medicinal known species found in eastern and western countries. The main aim to cultivate this plant is to produce peppermint oil (waxy white crystalline monoterpene substance, solid at room temperature) around the world. India plays a dominant role in the production of mint oil and menthol in the world market. Cultivation of peppermint is usually best with good supply of water; as the herb is hybrid so it is sterile, and its plantation is done in the months of December and January last week. Peppermint is rhizomatous perennial herb, about 30-90 cm in height.³

Species

M. Spicata Linn (spearmint), *M. Aquatica* Linn (watermint), *M. Rotundifolia* Linn, *M. Longifolia* Linn, *M. Piperita* Linn, and *M. Arvensis* Linn.⁴

Vernacular Names for *Mentha Piperita* English name: brandy mint or peppermint; **Tamil, Telugu, Urdu, Bengali, and Punjabi names:** Pudina; **Kashmiri name:** Puduyan; **Malayalam name:** Puthina; **Chinese name:** Po Ho; **Dutch name:** Peppermint; **French name:** Menthe; **Italian and Mexico names:** *Mentha Piperita*.³

Distribution

The herb is mainly indigenous to Europe and widely spreads in all over the world. It is found in Australia, Asia, Galapagos islands, New Zealand, United States, and India.⁵

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 (8-10 cm long, 40-60 cm spacing, and 400-450 kg Stolon's/ha) by selecting young shoots from old stocks and dibbled into the ground around 1.2-1.4 feet apart. Harvesting is done twice in the month of June and October on bright sunny days.³

Botanical Description

Stem

Usually square erect or ascending, slightly branched, and upper portion always quadrangular (Figure 1).



Figure 1: *Mentha piperita* stem

Rhizomes

They are wide spreading and fresh with fibrous roots in the herb.

Flower

It is 6-8 mm long, purplish, occurs in thick, terminal, spicoid racemes of verticillasters. Each flower shows tubular calyx with 5 sharp, hairy teeth along with

purplish, irregular, 4 cleft corolla, 4 short stamens, 4-celled ovary, and projecting style ending with bifid stigma in the herb (Figure 2).



Figure 2: Flowers of *Mentha piperita*

Leaves

They are opposite, petiolate having 4-9 cm long and 1.5-4 cm broad, pointed, and dark green on the upper surface of the herb (Figure 3).



Figure 3: *Mentha Piperita* leaves

Fruit

Fruit contains four ellipsoidal nutlets in the herb, which is pale purplish or pinkish in colour.⁶

Taxonomical Position (Table 1)⁷

Table 1: Taxonomical classification of *Mentha Piperita*

Taxonomy	
Kingdom	: Plantae
Binomial	: <i>Mentha piperita</i> Linn
Class	: Magnoliopsida
Order	: Lamiales
Family	: <i>Laminaceae</i>
Genus	: <i>Mentha</i>
Species	: <i>piperita</i>

Phytochemistry

The study based on phytochemical analysis confirmed that the aqueous extract of dried leaves of *Mentha*

Piperita contains major constituents. Peppermint oil contains mainly menthol (46.32%), methyl acetate (12.10%), menthone (7.42%), menthofuran (13.18%), 1,8-cineole (6.06%), limone, pulegone, α -thujene, α -pinene, sabinene, and β -pinene.^{6,8} It also contains flavonoid glycosides, such as narirutin, hesperidin, isorhoifolin, diosmin, and rutinoid. Polyphenols, such as eriocitrin, rosmarinic acid, cinnamic acid, caffeic acid, and salvianolic acid are also present.^{8,9}

Oil extraction

Oil was extracted by harvesting the whole plant just before the flowering and above the ground. The oil can be extracted by the steam distillation procedure or with some organic solvent either by using fresh or dried plant. Due to some defect of the two procedures recently, the oil can also be extracted by using other techniques, such as supercritical fluid extraction, direct thermal desorption, atomization technique, and hydroalcoholic extraction method. Final yield was 0.1%-1.0%.^{10,11}

Pharmacological Actions

Anti-carcinogenic effects

Mentha Piperita leaves extract exhibited significant anti-carcinogenic activity by arresting G1 cell cycle arrest and mitochondrial-mediated apoptosis, perturbation of oxidative balance in the treated animal dose and time dependently.¹²

Anti-allergic effects

Mentha Piperita aqueous extract has shown dose-dependent anti-allergic activity by inhibiting compound 48/80-induced histamine release from rat peritoneal mast cell in animals.¹³

Anti-oxidant effects

Methanolic extracts of these plants showed protective effects against hydrogen-peroxide-induced toxicity in PC12 cells, antioxidant activity, and neurochemical properties. *Mentha Piperita* produced significant protection of the PC12 cells against oxidative stress.¹⁴

Antinociceptive effects

Plant extract of *Mentha Piperita* showed antinociceptive effects against acetic acid-induced writhing and hot plate induced thermal stimulation on mice.

Anti-inflammatory effects

Extract of these plants showed anti-inflammatory activity against xylene-induced ear edema in mice and cotton pellet granuloma test in rats.¹⁵

Radio protective activity

The leaf extract of these plants showed radio protective properties against radiation-induced chromosomal damage in mice bone marrow.¹⁶

Anti-TB effects

Peppermint essential oil-inhaled patient showed anti-tuberculosis activity.¹⁷

Anti-tumorigenic effects

Mentha Piperita leaves showed anti-tumor properties in mice.¹⁸

Anti-bacterial effects

Peppermint oil and other leaf extract reported potential anti-bacterial action against both gram positive and negative bacteria that inhibits their growth.¹⁹

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.²⁰

Hepato-protective effects

Mentha Piperita leaves showed hepatic protective properties on animals by reducing side effects of arsenic-induced toxicity.²¹

Anti-spasmodic effects

The herb showed calcium channel 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.²²

Anti-edema activity

Topical application of a methanol leaf extract of *Mentha Piperita* on mice (2.0 mg/ear) inhibited ear edema, which was induced by the 12-*O*-tetradecanoylphorbol-13-acetate.²³

Cardiovascular activity

Mentha piperita reported vasodilation properties on some animals and it has lowering effects on systolic pressure and heart rate. Relaxation of bronchial smooth muscles is another effect of peppermint oil.²⁴

Analgesic and coolant

Stimulation of cold receptor on the skin by peppermint oil leads to dilation of blood vessels, which in turn causes cooling and an analgesic effects.²⁵

Medicinal Benefits

The entire herb has its own medicinal value. The dried peppermint leaves are used in tea that is helpful in treating cough and bronchitis along with oral mucosal and throat inflammation. Traditionally, the herb is used to overcome the problems, such as flatulence, diarrhea, nausea, vomiting, indigestion, anorexia, and morning sickness. The drug also acts as spasmolytic agent resulting in reduction of gas and abdominal cramps. Presence of menthol oil is used in the preparation of toothpaste and it also relieves menstrual cramps in women. Species, such as *M. Piperita* nowadays is used to treat Crohn's disease, irritable bowel syndrome, gall bladder, and biliary tract diseases.^{3,26}

Conclusion

It can be concluded that *M. Piperita* is a well-known herb in all over the world, because of its vast and numerous pharmacological benefits or potential. It has strong future in the world market for extraction of oil. Nowadays, this herb is very popular in Indian region too; hence, it has been cultivated to export volatile oil, because of its medicinal uses. Various formulations of this herb are also available in the market, such as Pudina Hara, Itch-guard, pudina plus capsules, peppermint gels, and peppermint creams etc.

Conflicts of interest

Authors declare that there is no conflict of interest.

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