



A Review On Peppermint

¹Mr. Wagh A.P, ²Miss. Balkate. R.R, ³Mr. Chauhan A.G, ⁴Mr. Dhumal A.A, ⁵Mr. Patil S.V.

¹Student, ²Associate Professor, ³Student, ⁴Student, ⁵Student

¹B. Pharmacy

College of Pharmacy, Paniv, Malshiras, Solapur,

Maharashtra, India, Pincode – 413113.

ABSTRACT –

Mentha piperita L., a perennial herb, and *Mentha arvensis* var. *piperascens*, a member of the Labiatae family, are used to make peppermint oil. Numerous well-known essential oil species, including spearmint, basil, lavender, rosemary, sage, marjoram, and thyme, belong to this family. Known for its numerous therapeutic benefits, including analgesic, anesthetic, antiseptic, astringent, carminative, decongestant, expectorant, nervine, stimulant, stomachic, inflammatory diseases, ulcer, and stomach problems, this plant is highly valued in many indigenous medical systems. This review provides a thorough and current examination of the chemistry, pharmacology, analysis, and applications of peppermint oil. The culinary and pharmaceutical sectors have paid increased attention to the medicinal plant peppermint (*Mentha piperita* L.) due to its positive effects on human health. This article uses theoretical research to assess the molecular structure of peppermint molecules. Yes, an assessment of peppermint's health advantages was done. Two peppermints substances that appeared to bind to the active site of the aryl amine N-acetyltransferase enzyme were cineol and menthyl acetate, according to our molecular docking analysis. The inhibition of this enzyme by these substances is indicated by this kind of interaction. Popular plant *Mentha piperita* comes in a variety of forms (i.e., oil, leaf, leaf extract, and leaf water). The most versatile oil is peppermint oil, and usage statistics for this oil are also thought to be pertinent to compositions using leaf extracts. This herbal preparation is utilized for its taste and fragrance qualities in meals, pharmaceuticals, cosmeceuticals, and personal hygiene products. The aroma of peppermint oil is crisp and strong, and it tastes strongly before providing a cooling effect. It is also utilized in mouthwashes, toothpastes, aromatherapy products, bath preparations, and topical treatments due to its many medicinal qualities. Peppermint oil formulations applied topically have been used to reduce inflammation and itch.

KEY WORDS – Peppermint, Antiviral, Antibacterial, Muscle pain

I. INTRODUCTION -

Peppermint oil is clear to pale yellow in colour, has a watery consistency, and smells sharp and fresh like menthol. Ingredients and derivatives of mint oil find use in the food, medicinal, fragrance, and flavouring industries. Menthol, the primary ingredient, is utilised in the production of Dabur Pudín Hara, lozenges, toothpastes, pain and cold balms, and other products. The leaves of the *Mentha arvensis* plant serve as the primary raw material for mint oil. The oil is used to treat a variety of gastrointestinal issues, including acidity, gas, and indigestion. It serves as the primary component of ayurvedic medications such as Dabur's "Pudín Hara." Menthol, the primary component in cough drops and ointments such as Vicks VapoRub, is naturally found in the oil. It was discovered that the capsules helped shorten the duration of the entire operation, lessen colonic spasm, improve endoscopist satisfaction, and lessen patient pain throughout the colonoscopy. As a tea, tincture, oil, or extract, peppermint can be consumed internally. It can also be used physically as a liniment or massage. It is frequently used to treat nausea, irritable bowel syndrome, stomach pain, and cough symptoms in paediatric patients.[1]

Medicinal plants are used by people all around the world and offer enormous promise for human societies. Their medicinal activities can be taken into consideration in the treatment of current or future diseases, even if the majority of their health advantages have not yet been thoroughly studied. For their basic medical requirements, over 80% of people on the planet now turn to traditional medicine and medicinal plants, particularly plant extracts and essential oils.[2]

A natural cross between spearmint (*Mentha spicata* L.) and water mint (*Mentha aquatic* L.), peppermint, often known as mint (*Mentha piperita* L.), is a perennial aromatic herb that belongs to the Liliaceae (Labiatae) family. Despite being a native to the Mediterranean, this genus is grown all over the world for its flavour, smell, and medical and pharmaceutical uses.[3]

II. TAXONOMY –

Domain	eukarya
kingdom	plantae
subkingdom	tracheobionta
superdivision	spermatohyta
phylum	angiospermophyta
class	magnoliopsida
order	lamiales
family	lamiaceae
genus	mentha
species	<i>mentha x piperita</i>

III. MORPHOLOGY –

Pinkish lavender flowers are grouped in blunt oblong clusters on square stems of peppermint, which also features smooth, stalked, dark green leaves. The plant can spread quickly through stolons, or underground stems, just like other mints.

The leaves are oblong, petiolate, pointed, smoother on top than underneath, and have a darker green color on top that is paler below. Small, purple, and cymosely arranged, the flowers are in terminal obtuse spikes that are interrupted below.[4]



Image 1 – Peppermint (Pudina)

IV. CHEMICAL CONSTITUENTS –

The International Pharmacopoeia monographs list the following constituents of peppermint oil: isomenthone (1.5-10.0%), menthone (14.0-32.0%), menthone (1.0-9.0%), menthofuran (1.0-9.0%), isopulegol (max. 0.2%), menthol (30.0-55.0%), pulegone (max. 4.0%), and carvone (max. 1.0%). A minimum of two cineole to limonene ratio should be present. Flavonoid glycosides (such as narirutin, luteolin-7-o-rutinoside, isorhoifolin, and hesperidin, among others) are additional components.[5]

The aerial parts of mint were also used to purify polyphenols (such as rosmarinic acid, eriocitrin, cinamic acid, caffeinic acid, and naigenin-7-ogluconide); luteolin-diglucuronide and eriodictyol glucopyranosyl-rhamnopyranoside.

Different species have varying amounts of peppermint compounds. The chemical composition of these plants varies due to a number of factors, including physiological variations, environmental conditions, geographic differences, and genetic factors.[6]

V. CULTIVATION –

Although peppermint essential oil has a high economic value, its production and cultivation are restricted by various agricultural and environmental factors, the presence of certain pathogens, and disparities in cost (Maffei, 1999). Baslas (1970) examined a few of the variables influencing *M. piperita* essential oil production in India based on a review of the literature. These variables include the kind of soil, the environment, altitude, fertilizers, and drying circumstances.[7]



Image No – 2 (Cultivation of Peppermint)

VI. HARVESTING –

The herb is trimmed just prior to flowering based on regional conditions. When properly grown and irrigated, a second crop may occasionally be harvested in the following 60 to 75 days.

Harvesting should be done in the late morning on a dry, sunny day after the last of the dew has evaporated. To protect the stolons, the first crop is always cut with a sickle. Depending on crop management, the crop in India that is sown in January–February is ready for the first harvest in April–June. After 60–70 days from the first harvest, the second harvest is harvested. The herb is spread out in the shade after harvesting in order to decrease bulk and boost oil recovery. The average yield of 60–70 kg of oil and 15–20 t of herb per hectare varies.[8]

Gulati et al. (1978) report the findings of another field trial on the impact of crop age on the yield of herb oil and quality of essential oil of *M. piperita*. It is stated that in India, the crop should be properly harvested after 145 to 160 days for the first harvest and 97 to 111 days for the second harvest. The amount of oil and its chemical components change depending on the plant's stage of growth and development.

According to Vaverkova et al. (1997), the onset of bloom can be considered as the stage of vegetation when the essential oil content in peppermint leaves and herb is highest, with the highest concentration found in the youngest leaves. The amount of menthol progressively rose.[9]

VII. THERAPEUTIC ACTIVITY –

1) Antibacterial activity –

Since medicinal plants are utilised in everyday therapy, plant secondary metabolites are becoming more and more interesting as antibacterial agents. Scientists studying infectious diseases have always been very interested in the physiologically active chemicals found in peppermint. *Salmonella pullorum*, *Escherichia coli*, *Streptococcus faecalis*, *Acinetobacter* sp., *Streptococcus thermophiles*, *Lactobacillus bulgaricus*, *Staphylococcus pyogenes*, *Staphylococcus aureus*, *Streptococcus pyogenes*, *Serratia marcescens*, *Mycobacterium avium*, *Salmonella typhi*, *Salmonella paratyphi A/B*, *Proteus vulgaris*, *Enterobacter aerogenes*, *Yersinia enterocolitica*, and *Shigella dysenteriae* were among the microorganisms that the PO and extracts demonstrated good antimicrobial activity against.[5]

2) Antiviral activity -

One of the most researched methods for treating harmful viruses nowadays is the creation of phytotherapies meant to limit viral infections when combined with traditional anti-viral treatments. Since many viruses have remained resistant to treatment or prevention longer than other microbes, infectious viral illnesses continue to be a major global health concern. There are currently very few antiviral medications that work well for treating viral illnesses. It is necessary to discover novel molecules possessing both external and intracellular antiviral capabilities. Numerous studies have demonstrated the strong antiviral properties of different peppermint extracts. Peppermint appears to support the immune system and shield the body from infections.[10]

3) Antiplasmid Activity –

The *E. coli* bacterial strain was used to study the antiplasmid properties. Three of the oils showed antiplasmid activity while all of the oils showed antimicrobial activity. Using the checkerboard approach, the effects of menthol and peppermint oil on the antibiotics were investigated in relation to the same bacterial strain. The antiplasmid action of peppermint oil and its primary ingredient, menthol, was demonstrated in tests.[11] This suggests that compounds containing menthol have the potential to act as agents in the elimination of bacterial resistant plasmids. This menthol-induced plasmid elimination's unique mechanism of action is its key selling feature. Because the plasmid-containing bacteria are more sensitive to menthol, the chemical kills them preferentially. Research indicated that the antibacterial activity of peppermint leaf extract was greater than that of peppermint stem extract against Gram-negative bacilli.[12]

4) Irritable Bowel Syndrom -

Increased gas production is linked to small intestine bacterial overgrowth and lactose intolerance, which can occasionally cause bloating and pain in the abdomen, which are also thought to be the hallmark symptoms. Moreover, those who have both a positive H₂ lactose breath test and bloating and diarrhoea have been found to have a high prevalence of celiac disease. The only signs of celiac disease that these patients appear to have are those associated with lactase deficiency. Some authors propose, based on these facts, that these disorders ought to be precluded from clinical trials including investigational medications that impact IBS.[13] Conflicting results have been found in tests conducted on adults 21 and children 20 years old with IBS. A recent meta-analysis on this subject came to the conclusion that peppermint oil's function is still up for debate. In this context, 57 individuals with irritable bowel syndrome were treated with peppermint oil (two enteric-coated capsules twice daily or a placebo) in a double-blind trial by L. Marzio et al. The results showed that four weeks of peppermint oil treatment improved the patients' gastrointestinal symptoms.[23]

5) Treatment Nervous Conditions and Mental Illnesses –

According to Tissierand (1993), peppermint and its EO are thought to be useful in treating neurological diseases and mental exhaustion, which may indicate that they have some psychedelic properties. Reports indicating the oil may be useful in treating mental weariness (Tisserand, 1993) provided explicit guidance for the specific hypothesis used to test for such pharmacological activities, implying that the oil may have an action like to that of psychostimulants.[14] A study by Toyoshi Umezawa et al. examined how peppermint oil affected mice's behaviour. This study demonstrated a significant dose-dependent increase in ambulatory activity following intraperitoneal delivery of natural peppermint oil, which is used medicinally in aromatherapy. This outcome showed that peppermint oil appears to have an impact on mice's behaviour.[15]

6) Mosquito repellent action –

The larvicidal activity of *Mentha piperita* L., also known as peppermint oil, was assessed against three different mosquito species: *Aedes aegypti*, *Anopheles Stephansi*, and *Culex quinquefasciatus*. The third instar larvae of the mosquitoes were exposed to the oil using enamel trays measuring 6' 4 inch² and filled with water up to a depth of three inches. When the oil was put on human skin, it had a significant repellent effect on adult mosquitoes. 100%, 92.3%, and 84.5%,

respectively, of the population was protected against *An. annularis*, *An. culicifacies*, and *Cx. quinquefasciatus*. Mentha oil's repelling properties were similar to those of Mylol oil, which is made of dimethyl and butyl phthalates.[16]

7) Postoperative Nausea –

The showed that after gynecologic surgery, breathing in vapours of peppermint oil dramatically decreased postoperative nausea and the need for pharmaceutical antiemetics. A traditional South American treatment for nausea involves inhaling vapours of isopropyl alcohol. Its application has recently been recommended for PONV in both adults and children, as well as transport-related nausea.[7] Compared to ondansetron 4 mg IV, isopropyl alcohol inhalation treated PONV more quickly, according to Winston et al., albeit there was no research done on a placebo group. In the PACU, patients' subjective sense of nausea and usage of IV antiemetic medication are reduced by almost 50% when aromatherapy is used as the first line of treatment for postoperative nausea in a randomised, double-blind, placebo-controlled research involving 33 surgical patients.[17]

VIII. ADVERSE EFFECTS –

A 58-year-old woman who had smoked heavily switched to cigarettes with menthol in it. Three months later, instead of her previous tranquil, good-natured attitude, she became impatient and quarrelsome, and she experienced periodic vomiting due to stomach distress. Her hand trembled, her speech thickened, and her step became shaky.[18]

She experienced mental disorientation and sadness once, and was hospitalised for a toxic psychosis that was thought to be brought on by a menthol addiction. She stopped using menthol cigarettes and, without any special care, returned to normalcy in 17 days.[19] Another case report describes an 18-year-old woman who received an IV injection of peppermint oil and experienced acute lung damage. The woman's condition was likely caused by direct poisoning.[20]



Image No – 3 [24]

IX. CONTRAINDICATIONS –

Acute renal failure and interstitial nephritis have been linked to peppermint oil, which, like many essential oils, can be toxic and even fatal at high dosages.¹⁷ It should not be administered to patients who have cholelithiasis or cholecystitis due to the possibility of choleric effects.^[21] Since peppermint oil has been known to induce menstruation, it is not advisable to use it while pregnant. Not enough information is available to evaluate its safety during lactation. Because peppermint oil can cause bronchospasm, tongue spasms, and possibly respiratory arrest in infants and young children, it should not be applied topically or near the face.¹ Nonetheless, the quantity of peppermint found in over-the-counter drugs, topical treatments, and herbal teas is probably safe for small children, expectant mothers, and nursing mothers.^[22,23]

X. CONCLUSION –

In terms of peppermint's health benefits, it can be said that this plant has a bright future in international trade and enormous potential for treating human ailments.

The cellular and molecular mechanisms of peppermint and its components on the human body require further investigation.

Despite the peppermint plant's many advantageous and practical uses in human culture, studies have to take into account its slight toxicity and adverse consequences. The molecular mechanism of PO in human health will need to be determined by further *in vivo* human investigations. PO is currently the most sold essential oil worldwide, and it is regarded as a valuable target for both culinary and medicinal research in both developed and developing nations.

XI. REFERENCES –

- 1) A review on peppermint oil by shrivastava alankar
- 2) Agrawal VK. Techniques of mentha species cultivation. Medicinal and Aromatic Plants. Directorate of extension services. IGAU. pp 33
- 3) Gainar I, Vilcu R and Mocan M. Supercritical fluid extraction and fractional Separation of essential oils Available online link: <http://www.chimie.unibuc.ro/biblioteca/anale/2002a/63-67.pdf>
- 4) Xiao J (2016) Report of the international symposium on phytochemicals in medicine and food. Food Chem 204: 497-498.
- 5) Jaberian H, Piri K, Nazari J (2013) phytochemical composition and *in vitro* antimicrobial and antioxidant activities of some medicinal plants. Food Chem 136: 237-244.
- 6) Khalil AF, Elkatry HO, El Mehairy, HF (2015) Protective effect of peppermint and parsley leaves oils against hepatotoxicity on experimental rats. Ann. Agric. Sci 60: 353-359.
- 7) Cosentino M, Bombelli R, Conti A, Colombo ML, Azzetti A, et al. (2009) Antioxidant properties and *in vitro* immunomodulatory effects of peppermint (*mentha x piperita* l.) essential oils in human leukocytes. J Pharm Sci Res 1: 33-43.
- 8) Riachi LG, De Maria (2015) C.A.B. Peppermint antioxidants revisited. Food Chem 176: 72-81.
- 9) Ansari M, Vasudevan P, Tandon M, Razda R (2000) Larvicidal and mosquito repellent action of peppermint (*mentha piperita*) oil. Biosci Rep 71: 267-271.
- 10) Chen H, Zhong Q (2015) Thermal and UV stability of β -carotene dissolved in peppermint oil microemulsified by sunflower lecithin and tween 20 blend. Food Chem 174: 630-636.
- 11) Hawthorn M, Ferrante J, Luchowski E, Rutledge A, Wei X, et al. (1988) The actions of peppermint oil and menthol on calcium channel dependent processes in intestinal, neuronal and cardiac preparations. Aliment Pharmacol Ther 2: 101-118.
- 12) J. A. Reed et al. Effects of peppermint scent on appetite control and caloric intake. Appetite. (2008), doi: 10.1016/j.appet.2008.04.196.
- 13) Anderson PH and Jenson NJ. Mutagenic investigation of peppermint oil in the salmonella/mammalian salmonella test. Mutation Research. 138 (1984) 1720.
- 14) Mimica-Dukić N, Božin B, Soković M, Mihajlović B, Matavulj M: Antimicrobial and antioxidant activities of three *Mentha* species essential oils. Planta Med. 2003, 69: 413-419.

- 15) Umezu T, Sakata A, Ito H: Ambulation-promoting effect of peppermint oil and identification of its active constituents. *Pharmacol Biochem Behav.* 2001, 69: 383-339. 10.1016/S0091-3057(01)00543-3.
- 16) Raudenbush B, Smith J, Graham K, McCune A: Effects of peppermint odor administration on augmenting basketball performance during game play. *Chem Senses.* 2005, 30: 265-278.
- 17) An overview on menthae piperitae (peppermint oil) Anupam Kr Sachan¹, Doli R Das¹, MD. Shuaib, Sudhir S Gangwar³ and Ranjana Sharma
- 18) Tate S: Peppermint oil: A treatment for postoperative nausea. *J Adv Nurs.* 1997; 26: 543-549.
- 19) International Pharmacopoeia. Monograph of peppermint oil. Link:http://lib.njutcm.16_monographs/monographs_lp/Peppermint%20oil.pdf.
- 20) The effect of premedication with peppermint oil capsules (Colpermin) prior to colonoscopy: A double blind randomized placebo-controlled trial
Author links open overlay panel Hassan Al Moussawi^a, Mariam Al Khatib^b, Malak El Ahmar^b, Houssam Al Masri^b, Ali Leddy^c, Tamer Akel^d, Ali Khalil
- 21) Effects of menthol on circular smooth muscle of human colon: Analysis of the mechanism of action by Antonella Amato^a, Rosa Liotta^b, Flavia Mulè
- 22) Peppermint and Its Functionality: A Review by Loolaie M, Moasefi N, Rasouli H and Adibi H
- 23) Nash P, Gould SR, Bernardo DE. Peppermint oil does not relieve the pain of irritable bowel syndrome. *Br J Clin Pract.* 1986;40:292-3.
- 24) Health Benefits of Peppermint (Pudina), Uses And Its Side Effects by hina firdos
<https://www.lybrate.com/topic/peppermint-pudina-benefits-and-side-effects>

