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PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILE OF *Mentha arvensis*: A REVIEW

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ABSTRACT

Mint, or *Mentha arvensis*, is a well-known medicinal and aromatic plant. It is an annual plant that is cultivated under irrigation in tropical and subtropical countries. Its cultivation is important for a variety of reasons, including food flavouring, medical applications, essential oil applications, and traditional uses. Its essential oil contains phenolic, aldehydes, ketones, and carbs, among other things. *Mentha arvensis* essential oil contains a significant amount of menthol. Menthol is used in a variety of industries, including food, cosmetics, pharmaceuticals, and by-products. Depending on the species or cultivars, as well as cultivation conditions such as weather, irrigation, soil type, pruning, and other agronomical procedures, there are different types or variations of menthol found in *Mentha arvensis*. Botany, morphology, and ecology are all fascinating and useful. Changes in factors such as pH, temperature, and soil nutritional qualities have a significant impact on its growth rate. Traditional methods for *Mentha arvensis* oil production in poor nations include essential oil extraction and post-harvest analysis. For the future, more research into oil extraction technologies, optimising production per hectare, and optimum preservation is required, particularly in the post-harvest of mint leaves and roots.

Keywords: *Mentha arvensis,* Phytochemical properties, Pharmacological Properties, Herbal Medicine, Ethnopharmacology

INTRODUCTION

Mother Nature has bestowed to mankind a complete health-care management system based on herbs and medicinal plants **[1]**. Nearly 80% of the population relies on traditional medicine for primary health care, according to the World Health Organization **[2]**. Herbs have been used for medicinal purposes since the dawn of humanity. Plants are believed to number between 250,000 and 500,000 on the planet **[3]**, with only a small portion [1-10%] being used as food for humans and other animals **[1]**. Even more of them are likely to be employed for therapeutic purposes **[4]**. Herbal plants have been employed as a source of folk medicine in practically every culture on the planet from time immemorial **[5, 6]**. Hippocrates, the father of medicine, mentioned around 400 medicinal plants over two millennia ago and recommended, "Let food be your medicine and let medicine be your nourishment" **[5]**. "This highlights the necessity for contemporary medicine and research to once again focus on plants in order to discover a new treatment that could heal cancer, AIDS, diabetes, and a variety of other diseases and conditions" **[7]**. The word drug is derived from the old Dutch term drogge, which means "to dry," because pharmacists, physicians, and traditional healers dried plants for use as medication. Approximately 25% of all prescription medications are still made from trees, bushes, or herbs today. Some are manufactured from plant extracts, while others are synthetically created to look like natural plant compounds **[2]**. Herbs can be leaves, flowers, stems, seeds, roots, fruits, bark, or any other plant part that is used for medical, culinary flavouring, or other purposes **[1]**. In an attempt to manufacture trustworthy pharmaceutical medications, chemists and pharmacists have been isolating and purifying the "active" components from plants for the past 150 years. Digoxin [from *Digitalis purpurea*], reserpine [from *Rauwolfia serpentina*], colchicines[from *Autumn crocus, Colchicum autumnale*], morphine [from opium poppy] *Papaver somniaferum*, and many others are examples **[7, 1]**.

Botany:

Mentha arvensis has a long and illustrious history. There was an old history concerning the genus Mentha that was available **[8]**. The word Mentha is thought to have derived from the Greek mythological nymph Minthe. She was attractive and drew the attention of the Greek deity Hades. She was a great woman, even more lovely than Persephone, Hades's wife. Persephone was envious of her beauty **[8]**. She despised her and murdered her **[8]**. The Greek god Hades then transformed Minthe's lifeless body

into a mint plant. The Greek king presented the English king with Minthe or mint as a gift [9]. Mentha was known and utilised as a medicinal plant around 2000 years ago. In 1753, Sweden biologist Linnaeus used Mentha as a genus for the first time in history **[10, 8]**.

Mint, *Mentha arvensis*, is a member of the Lamiaceae or Labiatae family **[8]**. Lamiaceae is a 'flowering plant' family. It belongs to Verbenaceae family. Because of the increased biodiversity, its naming system has a lot of trouble coming up with the right name **[8]**. Every country on the planet has its own nearly native language. Plants of *Mentha arvensis* are known as podina, pudina, or phodana **[11]**. *Mentha arvensis* is often known as wild mint, corn mint, or field mint around the world. *Mentha arvensis* is known in India by the local names puttiya, phutya, and padina. It is widely used as a medicinal and decorative plant around the world. There are several species in the Mentha genus **[8]**. It has a substantially greater species ratio than the other genera in this family. The genus Mentha contains between 13 and 24 species over the world. It is a tropical plant native to the area. However, several *Mentha arvensis* taxa can be found in temperate and sub-tropical climates around the world **[12]**. It can successfully cross pollinate with other Mentha species. The colour, length, age, and perfume of fresh hybridised mentha plants can all be affected by direct sunlight contacts **[13]**. At a reasonable temperature, it can produce a lot of growth. Its flowers are white, while the majority of the leaves are deep green or light green in hue. Mint plants may be grown in a variety of soil pH conditions, including acid, neutral, and basic [alkaline] **[8]**. The best soil for mint's exceptional growth is heavy clay [bases] soil. The pH of the soil is 6.5-8, and the ambient humidity is 60-70 percent. It can grow in semi-shade, but its pace of growth will be slowed. Wild mint blossoms and leaves thrived thanks to strong agronomic methods **[14]**. Essential oil output is influenced by elements such as soil origins, heredity, and nutritional value **[8]**. Seed germination is more challenging than other techniques of germination, such as budding and grafting **[15]**.

Phytochemical Profile:

Mentha arvensis has a distinct aroma, especially in the leaves, as opposed to the stem and root **[8]**. When eaten, it has a sweeter flavour. It has remarkable effects on the digestive systems of both animals and humans **[8]**. The chemical makeup of wild mint essential oil varied depending on the component, especially in terms of total phenol and flavoured content **[16]**. At the commercial level, the yield of essential oil content enhances its applications. The essential oil of *Mentha arvensis* stems,

leaves, and roots is a good source of menthol **[8]**. It is said that the essential oil of leaves contained [93.7%] menthol as a major component, and minor components are menthone [1.5%], isomenthone [3.2%], andcarvenone[0.7%] **[16]**. *Mentha arvensis* essential oil contains a number of different compounds, but menthol, menthone, carvenone, isomenthone, limonene, caryophyllene, alpha-pinene, and hexatone are the most important **[8, 16]**.

Wild mint contains a wide range of taste components and is widely recognised as a cold-releasing plant **[8]**. Although wild mint has a high nutritional value, it is not an excellent dietary source **[8]**. It also contains trace elements like zinc, phosphorus, copper, and manganese, as well as minerals and fibre **[8]**. Mineral nutritional value is also available in the form of calcium and iron **[17]**. Vitamins such as riboflavin, niacin, folic acid, and vitamin C are also present in large concentrations. It has good pharmacological uses due to its high total phenolic content [TPC], which has a wide range of capabilities for preventing fungal, bacterial, and viral damage. It's high in antioxidants and antibacterial properties **[16]**. Chemists have been studying the photochemistry of wild mint essential oil for the past few decades **[18]**. Because of the phenolic and flavonoid content in the oil, *Mentha arvensis* produces a distinct aromatic scent **[8]**. Wild mint leaves essential oil was found to contain high amounts of menthol, menthone, isomenthol, pulgone, and alpha pinene **[8, 17]**.

Reported pharmacological action

The herb has been scientifically proven to be beneficial in the following situations:

Antioxidant activity

The presence of flavonoid and phenolic components in *Mentha arvensis* extract resulted in strong antioxidant activity in the methanolic root extract. *Mentha arvensis* methanolic root extract is an excellent and low-cost source of antioxidant activity that can be used to treat a variety of ailments **[8, 19]**.

Antifertility activity

Mentha arvensis leaf extract exhibits antifertility action that is both effective and substantial **[8]**. Adult albino mice were used to investigate the antifertility activity. Various doses of 10 and 20 mg per mouse per day were employed for 20, 40, and 60 days on separate days. The dose-dependent and reported reduction in the number of progeny of the treated male mated with normal females was detected when the drug was given orally **[8]**. After 60 days of treatment, albino mice were found to be infertile in both dose concentrations **[8]**. The albino's bodyweight remained unaltered. Furthermore, the weight of the testis, cauda epididymal sperm count,

epididymis, viability, viability, and proper morphology of the spermatozoa all decreased significantly **[8]**. Throughout the examination, the levels of serum protein G.O.T., bilirubin, G.P.T., blood urea, and haematological indices were constant. Following the discontinuation of treatment, all of the changed parameters were reversible **[8]**. In male albino mice, a petroleum ether extract of *M. arvensis* leaves displayed reversible antifertility action without causing toxicity **[8, 20]**.

Antiulcerogenic Effect:

In ibuprofen with pyloric ligation, 0.6mol/L HCl, and 90% ethanol generated ulcers, petroleum ether, choloroform, and aqueous extract of *Mentha arvensis* Linn. were found to have a protective effect against acid secretion and gastric ulcers **[21, 22]**.

Inflammatory bowel syndrome [IBS]:

Mint oil has been found to have a protective role in inflammatory bowel syndrome, according to studies on *Mentha arvensis* Linn [IBS] **[21, 23]**.

Antimicrobial activities:

Menthone, iso-menthone, l-menthol, dementholated oil, Mentha monoterpenes, and menthol liquid were found in *Mentha arvensis* **[8]**. Microbial infections, such as bacterial and fungal infections, were on the rise over the world **[8]**. The antibacterial activity of seventeen compounds synthesised using menthol was tested against 12 bacteria and nine fungal species **[8]**. The essential oil, as menthol compounds, inhibited disorders that became a source of bacteria **[24]**.

Antibacterial:

The ethanolic extract of *Mentha arvensis* Linn. was found to prevent the growth of bacteria *E coli, S.aureus, S. flexineri, P.aeruginosa*, and *K. pneumoniae* in a study **[25]**.

Antifungal:

Mentha arvensis Linn. hydroalcoholic extracts had antifungal activity against Candida albicans and could be used as a human antifungal **[21, 26]**.

Cisplatin induced nephrotoxicity:

A study on *Mentha arvensis* Linn. hydroalcoholic extract examined the nephroprotective effects of hydroalcoholic extract of the leaves of *Mentha arvensis* Linn. In the case of cisplatin-induced nephrotoxicity, hydroalcoholic extract [MAHE] was used **[27]**.

Anticancer:

In vitro cytotoxicity impact against human cancer cell line [Help G2 cell line], considerable growth retardation, and induction of apoptosis were found in a study on the anticancer activities of *Mentha arvensis* Linn **[21, 28]**.

Hepatoprotective:

After a 67 percent partial hepatectomy in rats, an aqueous extract of *Mentha arvensis* Linn. was reported to accelerate liver regeneration **[21, 29]**.

Antidiabetic:

The methanol extract of *Mentha arvensis* Linn. root and aerial parts was found to have considerable hypoglycaemic action against alloxan-induced diabetes **[21, 30]**.

Anti Candida:

Mentha arvensis Linn. essential oil and ethanolic extract were found to have anti-Candida action in a study **[21, 31]**.

Analgesic:

The ethyl acetate, ethanolic, and aqueous extracts of *Mentha arvensis* Linn. root and aerial portions demonstrated excellent central and peripheral analgesic activity **[21, 32]**.

Antiallergic:

The ethanol extracts of *Mentha arvensis* Linn's leaf and root demonstrated anti-allergic efficacy in a histamine inhibitory experiment. Histamine release from mast cells was significantly reduced **[21, 33]**.

Anti-inflammatory:

Using a histamine-induced paw edoema model, anti-inflammatory testing of the aqueous, ethanolic, and methanolic extracts of *Mentha arvensis* Linn. revealed anti-inflammatory effects, indicating the presence of compounds capable of inhibiting histamine release from mast cells and/or blocking histamine receptors **[33]**.

Insecticidal:

The essential oil of *Mentha arvensis* Linn. leaf showed repellency against larvae and adults of *T. castaneum* in a study, and it powerfully repels *T. castaneum* even at low concentrations. *Mentha arvensis* Linn. had a percent repellency of 97.66 percent **[21, 34]**.

Anti arthritic activity:

Complete freunds adjuvant induced arthritis arthritis induced male albino rats have shown that Methanolic leaf extracts of *Mentha arvensis* Linn. have anti-arthritic effect **[21, 35]**.

In vitro thrombolytic activity:

Mentha arvensis Linn. extracts have been shown to have considerable blood clot lytic activity in ethanol, methanol, acetone, and chloroform. In a test tube **[36]**.

Sedative and Hypnotic:

Mentha arvensis Linn methanolic and aqueous extracts were studied. Potentiation of phenobarbitone-induced sleeping time was seen in mice **[21, 37]**.

Anti-helmintic:

The anti-helmentic action of *Mentha arvensis* Linn. petroleum ether extract against *Ascardia lumbricoides*, a nematode that looks similar to *Ascaris lumbricoides*, was investigated **[21, 38]**.

Radio protective:

Pretreatment of mice with the aqueous and ethanolic extracts of *Mentha arvensis* Linn. resulted in a reduction in the severity of radiation sickness symptoms and death **[21, 39]**.

Antibiotic Resistance–Modifying:

An ethanolic extract of *Mentha arvensis* Linn. was found to have a potentiating effect on Gentamicin, suggesting that it could be used to combat antibiotic resistance in bacteria **[21, 40]**.

CONCLUSION

Herbs have been utilised as medicine by humans since the dawn of time. Modern medicine came with a slew of negative effects in exchange for quick relief. This drug has various flaws in terms of treating AIDS, cancer, diabetes, and other diseases. As a result, the world is looking towards traditional medicine with renewed optimism. *Mentha arvensis* was a common herb used in folk medicine and as a culinary ingredient. Several researchers have suggested that the herb *Mentha arvensis* could be utilised to treat a variety of disorders or as an adjuvant therapy. Because it is ingested in the form of juice by a large number of people, it can help to avoid a variety of ailments. It has been discovered that it includes several types of flavonoids, polyphenols, and essential oil, which may be responsible for its antioxidant and anti-inflammatory properties, based on phytochemical research. Any plant that is reported to be anti-inflammatory or antioxidant could have radioprotective properties. It has been approved for the same purpose. Now is the time to isolate active medicine and formulate it so that it can help control the side effects of contemporary medications.

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