

Ethanopharmacological Activities of *Mentha arvensis*: An Updated Review

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ABSTRACT

Economical natural menthol is derived from *Mentha arvensis* Linn (menthol mint) oil. It is an aromatic perennial herb. The leading *Mentha* producing state in area and production is Uttar Pradesh and India is the leading exporter contributing about 80% of essential oil, menthol crystal and allied products. It is a native herb from the Labiatae family and is most frequently referred to as “pudina”. It has historically been used to treat ischemic heart disease and hypertension. Terpenoids, alcohols and phenolics are just a few of the bioactive substances that have been identified from this plant. These bioactive compounds’ pharmacological activities include antibacterial, neuroprotective, antioxidant, antiulcer, immunomodulatory, antimutagenic, and anti-tumor properties. Studies on Ayurvedic, unani, and other traditional medical systems have also revealed this plant’s pharmacological capabilities. The current article provides a summary of the plant’s general description, phytochemical ingredients, historical context, and pharmacological qualities.

Keywords: Analgesic activities, Antibacterial, Antifungal, Anti-inflammatory, Antioxidant, Anticancer Activity.

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INTRODUCTION

Mentha arvensis Linn variant *Piperascens* is being investigated further as a result of the resurgence in ancient Indian medicines.^{1,2} It is a seasonal spice that originates in Japan and is available in India.³ Additionally, it is acknowledged in Australia, Europe, North America, and South America. It releases the chemical menthol and used in the perfume and medicinal industries for seasoning. (CSIR, 1962, Vol. 6, Wealth of India, Raw Materials).⁴⁻⁶ It is a prominent medicinal oil-producing plant. (Verma, *et al.*, 2003.) Asia is the origin of the Labiatae family and the genus *Mentha*. The herbaceous *Mentha* species are cultivated primarily for their aromatic and therapeutic qualities.⁷⁻⁹

It has a potent, invigorating aroma. It is commonly referred to as hortel-vick, which is classified in traditional medicine as a carminative, stomachic, respiratory decongestant used to cure skin infections.¹⁰ When someone has diarrhea or dysentery, along with jaundice, bronchitis, indigestion, arthritis, or swollen joints, they should prefer drinking juice of *M. arvensis* leaves Figure 1.

Additionally, natural and manufactured goods contain this plant.^{11,12} Essential oils differ significantly in their chemical makeup. As a result, different portions of mint create distinct compounds and have diverse biological effects. Menthol

is found in a 40 to 50% concentration and functions as an antiseptic, carminative, and stimulant.¹³

MATERIAL AND METHODS

A large database of many different websites was viewed using phrases like *M arvensis*, pharmacological action, applications, and phytochemicals. This study discusses the botanical description, traditional uses, ethanopharmacological role, phytochemicals, various pharmacological roles, uses in industries, and medicinal uses. Multiple papers from several websites were consulted for the literature review, including Google Scholar, Elsevier, Research Gate, National Medical Library (NLM) New Delhi, and National Institute of Science Communication and Information Research (NISCAIR), Pusa Road, New Delhi.

History Origin

M. arvensis has a lengthy history. The word “*Mentha*” was supposed to be originated with the Greek legendary nymph Minthe. The Greek deity Hades was captivated to her because she was beautiful, lovely and a better woman than Persephone (the mistress of Hades). She incited Persephone’s hostility and was murdered which resulted from her disdain. The Greek god Hades then hid Minthe’s decomposing remains within a mint plant and gave mint as a gift to the English king.

Around 2000 years ago, people first recognised and used

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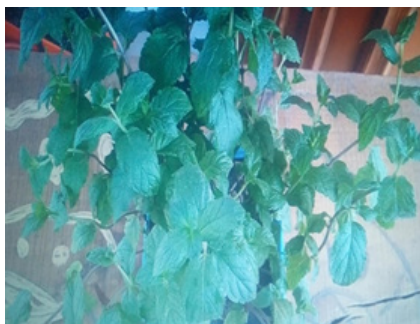


Figure 1: *Mentha arvensis*

Mentha as a medicinal plant. According to historical records,¹⁴ the term *Mentha* was originally used by Swedish biologist Linnaeus in 1753. (Ogunleye and Ibitoye 2003).

M arvensis was thought to vegetate in Europe for the first time ever during the early era. In the late 19th century, Japan began cultivating it for commercial use and has gradually begun to be used in the medical field. As it is known, *Pudina* was brought to the subcontinent, primarily in India and Pakistan.¹⁵

Description

In many communities, plants generally hold a great deal of significance, for people's basic needs, including caring, clothing, protection, hunting, and nursing, depend on plants. Plants have served as a source of prescriptions for sophisticated social structures and continue to provide mankind with novel treatments. *M arvensis* is a widely distributed, intensely scented herb with upstanding terminal branches on up to 40 cm long stems. The elliptic to elongated leaf is on the 1.5 and 2.5 cm in length, short-petiole, toothed, adjustable, or rough pointed leaflets. The color of axillary flowers ranges from bristly purple to pale blue.^{16,17}

The plant is utilized to treat liver and spleen problems, asthma, and jaundice. The amount of oil produced by extracting the leaf, which includes 40 to 50% menthol, is 5%. The oil has antibacterial, carminative, cooling, energizing, and diuretic properties. Both migraine medicines and medications for gastrointestinal issues contain menthol. This leaf transplanting is used to relieve heartburn and rheumatic discomfort.¹⁸⁻²⁰

Distribution

M arvensis first appeared in Eurasia, the family's sole member thrives in subtropical environments. In Latin and North America, it currently overflows gardens and the banks of rivers and creeks. (2005 Ram *et al.*). Only moderately temperate parts of Europe, Northwestern Asia, and especially Central Asia support the plant's growth.²¹

Cultivation Details

It is a mature plant that does grow in a number of soils and environments, the ground must not be too dry. Compared to other species in the genus, this species can survive in drier environments. It has a propensity to be somewhat caustic and works well as a filler in thick mud soils.²² Plants can withstand temperatures as low as 15°C.²³

The majority of mints have genuinely strong, spreading roots that should be restrained in some way such as planting them in dirt-covered spaces, unless you have enough room for them to roam. The peppermint scent permeates the entire plant, and it freely crosses with other members of its kind. It is polymorphic as well. Both honeybees and butterflies are drawn to the blossoms in droves. It is a good companion plant to grow next to tomatoes and brassicas, helping to reduce pest annoyances.

Rarely do people of this kind experience pain when deer browse. Japanese mint is one of the famous aromatic herbs grown in India (*M arvensis*). Recently, interest in the growth on Japanese mint has increased.²⁴⁻²⁶

Mint in Traditional Medicine

In Eurasia, Asia, Yemen, and the Indian subcontinent, peppermint is commonly utilized in both conventional and alternative therapies for disorders connected to the stomach. The carminative leaves serve to cure stomach disorders like dyspepsia (which is characterized by spastic protest of an upper GI tract), caused by infection, loose stools, flatulence, gastritis, and enteritis. Further uses include narcotic, cholagogue, expectorant, vermifuge, and enhancement of lactation. It moves in a way that is both antibacterial and antifungal. The leaves can cure various conditions, including bronchitis, diabetes, watery stool, colds, hypertension, jaundice, pain, respiratory infections, and contaminations of the urinary system.²⁷⁻³²

Phytochemical

Although their concentrations may differ, the phytochemicals found in the various *Mentha* varieties are the same regardless of the plant type. More than 40 unique chemical components are present in mint plants (Table 1).^{33,34}

There have been reports of terpenes and flavonoids in mint plants Table 2.

Use in Industries

Although menthol gemstones are still used in many drug products as beauty care items, germicide, energizer, and an inhibitor, *Mentha* (mint) was once used as a healing spice.

Due to its physical chilling effect, it is commonly utilized in dental products like tooth glue and mouthwash. Pakistan pays billions of rupees to purchase menthol rare stones for modern usage. often utilized as a smell component in toothpaste, cleansers, cosmetics, and modern scents (Alvi *et al.*, 2001) Table 3.⁷¹⁻⁷⁴

DISCUSSION

Restorative plants keep on being a significant remedial guide for reducing the illnesses of humanity. Early man's investigation of his immediate natural environment and search for answers to ease suffering and inconvenience led him to use numerous plants, make goods, and minerals, among other things and led to the development of a variety of helpful professionals.⁷⁵⁻⁷⁷ There is a resurgence of curiosity in traditional medicine today, combined with a new emphasis on more medicines made from plant sources. The continued, inevitable belief that pricey, commercial drugs, many of which have negative side

Table 1: Phytochemicals present in the *M. arvensis*

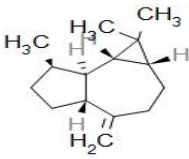
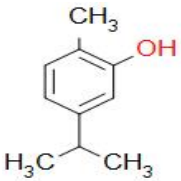
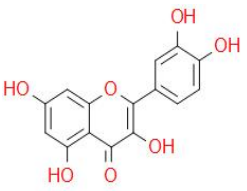
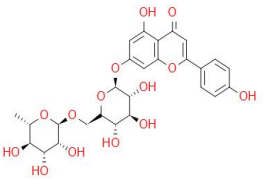
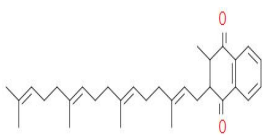
S. No.	Active constituent	Examples	Structures	References
1.	Terpenes	Aromadendrene, Cardinene, Crvacrol, Carvomenthone, Cineol, Dipentene, Isomenthol, Limonine, Neomenthol,, Pipertone, Thujone, α -menthol, α -phellandrene, α -pinene,	 Aromadendrene,  Crvacrol	35 36 37,38
		Quercetin, Menthoside, Isorhoifolin, Vitamin K, Thymol, Eugenol, Baicallin, Naringenin, Morin, Hyperoside, Silymarin, Procyanidine, Fisetin, Apigenin, Quercitrin, Astilbin, Kaempferol, Genistein, Luteolin, Linarin, Hesperidine, Rutin.	 Quercetin  Isorhoifolin  Vitamin K	39 40
3.	Phenolic acids	Vanilic acid, Ferulic, Protocatechuic, Protocatechuic aldehyde, Phytosterols, Sinapinic, Syringic acid, Rosmarinic, β -sitosterol, Daucosterol,		41 42,43
4.	Anthraquinones	Physcion, Rhein, Purpurin, Sennoside, Aloe-emodin		
5.	Tannins			

Table 2: Pharmacological Activities of *M. arvensis*

S. No.	Pharmacological activities	Activities against	References
1.	Antifungal activity	<i>Fusarium moniliforme</i> , <i>Aspergillus niger</i> <i>As. fumigatus</i>	44,45
4.	Antibacterial activity	<i>Acinetobacter baumannii</i>	46-48
5.	Antimicrobial Activity	<i>Escherichia coli</i> , <i>Klebsiella pneumonia</i> ,	49,50
7.	Antimycotic Activity	Human Pathogenic Fungi	
8.	Analgesic		
9.	Sedative		
10.	Anti-inflammatory		51,52
11.	Cytotoxic		
12.	Anticancer	Human cancer Cells	53-55
13.	Anti-allergic		
14.	Antibacterial Activity	<i>Taphylococcus aureus</i>	
15.	Anticancer and Apoptotic Activity	Reactive oxygen species (ROS) Induced Buccal cells	
16.	Hepatoprotective Activity		56,57

Table 3: Medicinal Use of *M. arvensis*

S. No.	Medicinal uses	References
1.	Stimulant, stomachic, antibacterial, antispasmodic, aromatic, and emmenagogue.	58,59
2.	As a stimulating, expectorant, antispasmodic, intestinal worm-killing and mild analgesic plant, pudina is highly regarded. It is widely recognized for its digestive, aromatic, and carminative effects. Pudina also possesses a number of incredible therapeutic benefits. The entire plant has antifungal, antibacterial, and antifebrile properties.	60-63
3.	Due to their rapid evaporation, menthol and volatile essential oil both have a topical anesthetic and anodyne effect. It works well for headaches, rhinitis, sore throats, coughs, colic, prurigo, and vomiting. Balms utilize the menthol that is derived from this. India is quickly overtaking other countries as the world's top producer in menthol mint oil (70%).	64-66
4.	Additionally, it is a flavouring ingredient in food preparations. It is well recognised for use in medicinal preparations as a heart tonic. It effectively cleans the blood. Owing to this antiseptic and anti-bacterial qualities, it can be used for toothaches, oral ulcers, or sore gums. Mint oil can be used internally to treat gas, dysfunctional gastrointestinal and gallbladder diseases, upper respiratory tract catarrhs, and externally to treat myalgia and neuropathic conditions.	67-70

effects, are safer and less trustworthy than “green medicine” is primarily to blame for the renewed interest in plant-derived treatments.⁷⁸

M. arvensis L., often termed as menthol, mint, or maize mint, has flourished economically in tropical and subtropical climes. The biggest market shares internationally are held by menthol and dementholized oil (DMO), which are products of this plant.^{79,80}

CONCLUSION

Many studies of *M arvensis* have shown pharmacological Activities like analgesic and cytotoxic activities, antiallergic, antibacterial, anticancer, antifungal, anti-inflammatory, antimicrobial activity, antimycotic activity, antioxidant, cytotoxic, hepatoprotective, and sedative, inflammatory skin disorders, antiulcerogenic, activities, digestive disorders, anti-tumor, chemopreventive potential, anorexia, anti-diarrhea, also used for lessening cramps, antiviral activity, allopathic effect, headache, skeletal muscle pain, antispasmodic effect, antidiabetic, treating irritable bowel syndrome, radioprotective effects, thrombolytic, nephroprotective, anticaries, anticancer activities, antioxidant, diuretic, carminative, sudorific, kidney tonic anti-vomiting, jaundice, also used as a flavoring agent, in toothpaste cosmetics, beverages, cooking syrups, as a mouth freshener, perfumes. It is also used as folk medicine, giving various medicinal and industrial uses.

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