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Review Article

A contemporary review on pharmacognosy and pharmacological activities of *mentha arvensis*.

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Abstract

Mentha arvensis belongs to the family Lamiaceae, it is also called Japanese menthol mint. This plant is endemic to Japan, as well as other parts of Europe, Central Asia, and Eastern Siberia. The pharmacological activity of *M. arvensis* is anti-microbial, anti-ulcer, radioprotective, cardiovascular, antioxidant activity, anti-allergic activity, and antidiabetic activity, cytotoxic properties, which are consistent with the plant's ethnopharmacological applications. Menthol is obtained from plant leaves of *M. arvensis*. Natural menthol is widely used in foods, confections, and cigarettes because of the cooling impact it has on the skin and mucous membranes of various body organs. Traditionally it is used as a contraceptive, carminative, antispasmodic, anti-peptic ulcer healing agent, and as a treatment for cough and cold. *M. arvensis* also used to treat liver and spleen illnesses, as well as asthma and jaundice. The leaf extract is used to treat rheumatoid arthritis, treat infections, and prevent mosquitoes.

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Introduction

Many people in the world use plant-based medicines as a source of health care. Today, plants, shrubs, and herbs still provide 25% of all medications. Chemists and pharmacists have been isolating and purifying the "active" chemicals from plants to manufacture viable pharmaceutical medications since ancient times [1]. According to estimates, there are between 250, 000 and 500, 000 species on our planet [2]. For medical purposes, active substances were extracted from the plant's leaf, stem, flowers, seeds, fruit, and other components. *Mentha arvensis* Linn is also called a Japanese menthol mint. This plant is endemic to

Japan, as well as other parts of Europe, Central Asia, and Eastern Siberia. This plant's entire structure offers medicinal benefits. Plant leaves are popular for the creation of natural medicines in both domestic as well as global markets.

Menthol is obtained from plant leaves of *Mentha arvensis* [1]. Natural menthol is widely utilized in foods, confections and cigarettes because of the cooling impact it has on the skin and mucous membranes of various body organs. Natural menthol is preferred to synthetic menthol because of the associated aromas. Due to terpenoid contamination in menthol crystallized from essential oil. It can also be found in toothpaste, liquors, mouthwashes, polishes, lipsticks, hair lotions, cough drops, lip balm, gum after shaves lotions, inhalers, cooling gel and oral

preparations. Towels, handkerchiefs, deodorizers and shampoos contain it as a perfume [3]. The oil in the leaves contains 40-50 percent menthol, which is used to treat skin diseases and has antibacterial, carminative, cooling, stimulant, and diuretic properties. Essential oils can be diluted and used as a mosquito repellent, as well as for skin irritations, itching, burns, inflammations, scabies, and ringworm. It's also utilized to treat sensitivity and reduce pain [4-5].

Taxonomical Classification [6]

Kingdom	Plantae
Subkingdom	Tracheobionta
Subdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Lamiales
Family	Lamiaceae
Genus	Mentha
Species	Arvensis

Vernacular names [7]

A number of alternative vernacular names in different languages, (Table-1)

Name of the languages	Vernacular names
Sanskrit	Puthea
Hindi	Pudina, Podina
English	Corn Mint
German	Minze
Japanese	Midorihakka
Tamil	Puthina
Bengali	Pudina
Unani	Pudinah
Nepalese	Nawaghya
Arabian	Putnaj
Sinhalese	Odutalan

Botanical description

Morphological Characteristics

The flower is borne in verticillasters on top of the stem axils of *M. arvensis*, which is an erect herb with a branched stem that grows up to 60 cm high. The leaves are simple and opposite, oblong-ovate or lanceolate, densely or

sharply serrated at the base, hairy or glabrous; stems have a pendant bloom [8-9].

On the lower surface of the leaf, there are diacytic stomata. The leaf additionally has 3-8 celled trichomes with striated cuticles under the microscope. There are two forms of glandular trichomes in the family, there as a single-cell base and a small single-cell head, whereas the other has a multicellular head. There is no calcium oxalate present [10].



Figure No: 1, *M. arvensis*: a) leaves b) stem and c) Root

Chemical Constituents

The chemical constitution of essential oils extracted from *M. arvensis* by the hydrodistillation method [11]. GC-MS (Gas chromatography and Mass spectroscopy) examination of *M. arvensis* oil produced 21 peaks, of which 17 peaks (representing 98.82 percent of the oil) were recognized [12].

Menthol accounted for 71.40 percent of the oil, followed by p-menthone 8.04 percent, iso-menthone 5.42 percent, and neo-menthol 3.18 percent. The chemical profile of *M. arvensis* oil showed significant differences. A complex mixture of monoterpenoids was detected in the menthol mint oil. Menthol, p-menthone, iso menthone, and neo-menthol were the most popular and effective among them and these components, along with menthol mint oil were shown to have antifungal properties [11].

The phytochemical constituents present in *M. arvensis* are flavanol, flavones, xanthenes, flavanones, heterosides, saponins, tannins, flavonoids, steroids, triterpenes, Camarines, quinones, organic acids, and alkaloids [13]. Many of them are recognized to have a variety of therapeutic uses. Tannins, for example, are antibacterial, antiviral, molluscicidal, and antitumoral [14-15]. Flavonoids, which are also found in *M. arvensis* extract have anticancer, antiviral, and antihemorrhagic activities [13]. All parts of the plant-like stem, roots, and leaves contain alkaloids, flavonoids, phenols, tannins, and cardiac glycosides in different concentrations [16].

Traditional uses

Mentha arvensis Linn is commonly used as a contraceptive, carminative, antispasmodic, anti-peptic ulcer healing agent, and as a treatment for cough and common cold [17]. It is also used as a domestic cure; in the industry, it is utilized as a food seasoner and has also been employed for hypertension and coronary heart disease in the old days [9]. *M. arvensis* is used to treat liver and spleen illnesses, as well as asthma and jaundice. The leaf extract is used to treat rheumatoid arthritis, treat infections and prevent mosquitoes [18].

Pharmacological Properties

Antimicrobial activity

B. Rachel Madhuri Sugandhi et.al., have investigated the impact of *Mentha arvensis* extract on *Escherichia coli*, *Shigella Flexner*, *Pseudomonas aeruginosa*, and *Klebsiella pneumonia* using the agar diffusion method. The bacterial lines were grown in Brain Heart Infusion media (BHI) for 24 hours at 37 degrees Celsius. They were then replicated on Muller Hilton (MH) agar in a Petri dish after this period. Then this experiment is performed at different concentrations. The diameter of the zone of inhibition was used to determine microbial growth. The conclusions were expressed in terms of the diameter of the inhibitory zone: inactive (<9mm), partially active (9-12mm), active (13-18mm), and very active (>18mm) [19].

Radioprotective activity

Ganesh Chandra Jagetia. et.al. has been studied mint extract has a radioprotective effect against radiation-induced disease and mortality in mice and the maximum protective dose of 10 mg/kg is safe. since the lethal dose exceeds 1000mg/kg body weight and in this experiment gamma radiation was used to treat the mice, it causes Reduced food and water intake, irritability, epilation, weight loss, emaciation, lethargy, diarrhea, and hair ruffling in animals [20].

Antiulcer activity

Ramesh L Londonkar. et.al., have examined antiulcer activity by using *M. arvensis* Linn extract on the healthy mice [25-30g of weight] and swiss albino rats [150-200g of weight] and finally gives the standard oral dose of 2g/kg, then the conclusion has given as the plant extract was then found to have no acute toxicity in mice. As a result, in all investigations to identify the general antiulcer profile of various extracts of the plant *M. arvensis*, a 5-fold lower dose was utilized as the maximum dose [9].

Cardiovascular Disease

Saima Gul. et.al., have investigated the effects of three polarity-based fractions of crude extract on arachidonic

acid metabolism were examined. The arachidonic acid metabolites thromboxane B2-a stable analog of thromboxane-A2, which is created via the cyclooxygenase and lipoxygenase routes, as well as 12-hydroxyeicosatetraenoic acid, which is produced via the lipoxygenase pathway, were both inhibited by this pure extract. This plant may have antiplatelet characteristics because thromboxane-B2 is one of the most effective promoters of platelet aggregation. *M. arvensis* was observed to decrease human platelet aggregation generated by arachidonic acid and adenosine diphosphate; however, *M. arvensis* had no effect on the platelet-activating factor. It suggests that platelet aggregation inhibition may be a key mechanism behind the herb's therapeutic effects in patients with ischemic heart disease. It was also successful in increasing glutathione peroxidase activity [21].

Antioxidant activity

Nripendra NathBiswas.et.al., To assess antioxidant activity invitro DPPH[2,2 -diphenyle-1-picryl-hydrazylhydrate] radical scavenging experiment will be used in *M. arvensis* ethanolic extract and then compared with standard antioxidant ascorbic acid (IC5019 g/mL), the extract shows free radical scavenging activity in the DPPH assay (IC50 = 41 g/mL) then concluded that the ethanolic extract of *Mentha arvensis* has potential antioxidant activities that support the ethnopharmacological uses of this plant[22].

Antibacterial activity

M Johnson. et.al., To see the chloroform, ethanol, ethyl acetate, and water extracts of inter-nodal and leaf derived calli extracts from *M. arvensis* were active against *Salmonella typhi* (*S. typhi*), *Streptococcus pyogenes* (*S. pyogenes*), *Proteus Vulgaris* (*P. Vulgaris*), *Bacillus subtilis* (*B. subtilis*). Antibacterial effectiveness was determined using the disc diffusion method and incubated at 37 °C for 24 hours. The calli-mediated tissues have the largest inhibition zone, according to the bio-efficacy analysis [23].

Anti-allergic activity

Farnaz Malik1, Shahzad Hussain.et. al., have an evaluation of the anti-allergic activity of ethanolic and aqueous extracts of *Mentha arvensis* was determined by histamine release inhibition test and compared with a standard medication [Disodium cromoglicate]. The outcome revealed that the leaf and root of *M. arvensis* ethanolic extract had significant inhibitory efficacy with 57 and 53% inhibition respectively [16]. Essential oil alleviated bronchial asthma, according to histopathological testing of the lungs. MAEO [*M. arvensis* essential oil] relaxes bronchial

smooth muscles and suppresses the immune response to OVA [ovalbumin], according to the results of this study [24].

Antidiabetic activity

Sachin B Agawane, et.al., researched the antidiabetic activity of Methanolic extract of *M. arvensis* leaves had high antiglycation potential and DPPH free radical scavenging activity (greater than 78 % g/l) (more than 90 % inhibition of AGE formation). The methanolic extract had considerable inhibitory effects on α -amylase (more than 50 g/l) and α -glucosidase (68 g/l) as well as major prevention of postprandial hyperglycemia in starch-induced diabetes in Wistar rats and concluded that methanolic extract of *M. arvensis* leaves has antidiabetic activity [25].

Hepatoprotective effect

Birendra Kumar, et.al., has been studied *Mentha arvensis* extract on Charles foster rats weighing 180 g to 250 g at 12 weeks old. In this experiment designed to find the comparative hepatoprotective effect of *Mentha arvensis* and *Myristica fragrans* against arsenic-induced toxicity in rats. For 8 weeks, participants were given 8 mg/kg body weight of arsenic, followed by 12 weeks of *Mentha arvensis* 200 mg/kg body weight and 12 weeks of *Myristica fragrans* 300 mg/kg body weight. After scheduled treatment blood was collected to analyze SGPT [Serum Glutamate Pyruvate Transaminase], SGOT [Serum Glutamate Oxalate Transaminase], ALT [Alkaline Phosphatase], bilirubin levels and these are the evidence from the study that *Mentha arvensis* effectively restores biochemical parameters of the liver in comparison to *M. Feagans*. *M. arvensis* effectively restores SGPT level, SGOT level, bilirubin, and alkaline phosphatase very effectively and may be used as a future antidote in the restoration of hepatotoxicity caused by arsenic toxicity in mice [26].

Cytotoxic activity

Nripendra NathBiswasa, et.al., have examined the cytotoxic activity of ethanolic extract of *M. arvensis* L. A total of 38 g of sea salt was properly weighed, then mixed in purified water to produce one liter, which was then filtered to obtain a clear solution. Brine shrimp eggs were introduced to the small tank and incubated at 28°C in front of a lamp. The shrimps were allowed to hatch and develop into nauplii for 24 hours (larvae) Then performing the experiment by using dimethyl sulfoxide (DMSO) preparing 5 μ g/ μ L of the extract and Calculated at each sample at every concentration. Finally, on graph paper, % mortality was plotted against log concentration to provide a pictorial representation of an approximate linear connection between them. These results indicate that the

ethanolic extract of *Mentha arvensis* L. has cytotoxic properties, which are consistent with the plant's ethnopharmacological applications [27].

Antifertility Activity

Baban Sukadeo Thawkar, et.al., have investigated the antifertility activity in male albino mice by using the petroleum ether extract of the leaves of *Mentha arvensis*. the doses When given orally, 10 and 20 mg/day/mouse for 20, 40, and 60 days resulted in a dose and duration-dependent reduction in the number of offspring. Males who had been treated mated with normal females [28] and absorbed the animals then take the weight of the male albino mice. The results show that a petroleum ether extract of MA leaves has a reversible antifertility effect in male mice [29].

Antipyretic Activity

Raghavendra Mishra, et.al., was the evaluation of the antipyretic activity of ethanolic, chloroform, and petroleum ether leaf extract on albino at the doses of 250 and 500 mg/kg in a dose-dependent dependent manner, and the result was shown that Ethanolic extract of *Mentha arvensis* Linn of leaves exhibited antipyretic properties and This might be because flavonoids and terpenoids are present in plant leaves. Then gives the result *Mentha arvensis* has a good antipyretic activity [30].

Conclusion

In the past, humans have used herbs as medicine. Modern medicine arrived with several negative effects in exchange for immediate relief. The world is seeing new hope in regard to folk medicine due to its shortfalls as a treatment for AIDS, cancer, diabetes, etc. Researchers have argued that *M. arvensis* herb can be used as adjuvant therapy or as a potential medicine for treating various diseases. The juice of this plant is consumed by many peoples, therefore, as a result, numerous diseases can be avoided. It was discovered that it included several types of flavonoids, polyphenols, and essential oils, all of which can operate as antioxidants and anti-inflammatory agents, based on its phytochemical investigations.

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