

Review Article

A Review on Ethnobotanical, Pharmacological, and Conventional uses of *Fumaria indica*

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	International Archives of Integrated Medicine, Vol. 11, Issue 2, February, 2024. Available online at http://iaimjournal.com/ ISSN: 2394-0026 (P) ISSN: 2394-0034 (O)
	Received on: 3-2-2024 Accepted on: 18-2-2024 Source of support: Nil Conflict of interest: None declared. Article is under Creative Common Attribution 4.0 International DOI: 10.5281/zenodo.10694027
How to cite this article: Muhammad Amjad Chishti, Rafiq Ahmad, Tahreem Riaz, Muhammad Akram, Umme Laila, Muhammad Talha Khalil, Rida Zainab, Momina Iftikhar, Fethi Ahmet Ozdemir, Gawel Sołowski, Ebrahim Alinia-Ahandani, Marcos Altable, Chukwuebuka Egbuna, Adonis Sfera, Muhammad Adnan, Pragnesh Parmar. A Review on Ethnobotanical, Pharmacological, and Conventional uses of <i>Fumaria indica</i> . Int. Arch. Integr. Med., 2024; 11(2): 26-32.	

Abstract

An annual herb is known as "Fumitory," *Fumaria indica* (Hausskn.) Pugsley (*Fumariaceae*), is a widespread weed in Pakistan's and India's plains. The plant is frequently employed in the Unani and Ayurvedic medical systems, both as a single herb and in different polyherbal preparations. It is helpful for aches, diarrhea, fever, influenza, liver issues, dyspepsia, constipation, vomiting, diuretic, anthelmintic, leukoderma, diaphoretic, blood purification, and for jaundice when combined with black pepper. It has several different chemical components, including carbohydrates, amino acids, proteins, phenolic compounds, alkaloids, flavonoids, terpenoids, glycosides, phytosterols, fixed oils, saponins, steroids, tannins, and more. According to research investigations, this plant has a wide range of pharmacological properties, including antioxidant, analgesic, anticancer, antidiabetic, antibacterial, aphrodisiac, and therapeutic effects on biliary disorders and irritable bowel syndrome. This review focused on the chemical components and pharmacological properties of this plant, which may be useful in future molecular and phytochemical research for the development of medication formulations for the treatment of various ailments.

Key words

Fumaria indica, Active constituents, Pharmacological uses.

Introduction

Evidence from ancient times supports the use of medicinal plants to treat particular illnesses. All around the world, this medical lore is routinely passed down from one generation to the next. The abundance of plants that contain natural chemical components that treat illnesses and promote health has been a gift from nature to humans. Medicinal plants have the potential to be effective in treating a variety of diseases and are also abundant sources of secondary metabolites. Deep understanding and interest in the use of herbal medicines have grown during the past few decades [1]. Around the world, people have been using plants as remedies for thousands of years. According to WHO estimates, 80% of the world's people, primarily in impoverished nations, still rely on plant-based medications for their basic care. The plants that were utilized were known as therapeutic plants. India is a nation with a substantial natural resource reserve and a lengthy heritage of traditional medicine. Numerous physiologically active substances found in medicinal plants are advantageous for prolonging life and treating diseases such as terpenoids, flavonoids, sterols, proteins, enzymes, carbohydrates, proteins,

enzymes, lipids, oils, and simple phenolic substances. Herbal medicine has grown in popularity over the past few decades in both developed and developing nations. This is due to the herbal medicines' low cost, natural origin, higher safety margins, and little or nonexistent side effects [2].

Occurrence

Fumaria herb genera can be found in Asia, Europe, and Africa (**Table – 1**). The majority of Pakistan, Iran, and India also have *Fumaria indica* plants growing there Baluchistan, the Himalayas, Afghanistan, Persia, and Mongolia up to 2438 m in Pakistan and Iran [4].

Botanical Description

A 7–3 cm tall, upright herb with branches that is herbaceous. The light brown and light green stem has grooves and is wavy. Petiolate, decomposed, pinnatifid, ovate, orbicular, 1.5–5x1–3 cm, and green on both surfaces are the characteristics of the leaves. The seeds have a 1 mm diameter and are an almost spherical brown color [5].

Active Constituents

Alkaloids including methyl fumarate, tetrahydrocoptisine, protopine, narulimidine,

naralumidine, narceiminebicuculline, and fumariline are the active components of *Fumaria indica*. The parfumine, sinactine, N-methylstylophine, protoberberines including aurotensine, stylophine, and spirobenzyl isoquinolines including benzophenone. Other chemical components include bitter principles, flavonoids, mucilage, and resin [6]. It also includes acids, including chlorogenic, caffeic, and fumaric acids.

Table – 1: Introduction of *Fumaria indica*.

Tibbi Name	Shahtara
English Name	Fumitory
Botanical Name	<i>Fumaria indica</i>
Vernacular names	(A) Shahataraj, Baqlatulmulk (P) Shahatara (S) Shahataro (B) Akshat Paprha
Family	Fumariceae
Parts Used	above ground parts
Temperament	Warm and dry in 2 nd degree [3]

Medicinal Uses

It is used for long-term fevers, as a stomach tonic, and for various conditions like syphilis, itching, and warts. It can be used as a decoction as a single herb or in combination with other plants. It improves the liver's capacity for function. It eliminates pus and cleanses the body's blood. Bilious disorders also benefit from its use. Its water or extract is beneficial for treating diabetes, good hair, improved liver function, and illnesses brought on by blood insufficiency or other problems with the blood [7].

Leprosy, jaundice, abdominal pains, diarrhea, blood problems, and tuberculosis can all be treated with the herb. The herb's decoction and infusion are recommended for treating goiter, constipation, and dyspepsia. By ingesting its early morning extraction, the plant's fresh juice is

taken orally to treat diabetes, bladder infections, and abdominal worms [8, 9].

Traditional uses

Numerous nations also employ *Fumaria indica* to treat infections, rheumatism, skin conditions, and hypertension. It was used as a tea in northern Portugal to treat gallbladder and hepatic ailments. The herb was employed as an anti-arteriosclerosis agent, cholagogue, hypertensive, antispasmodic, and respiratory stimulant in Italy. In Cyprus, the herb was utilized as a spasmolytic, for hypertension, constipation, and liver detoxification. In Morocco, the herb was also used to cure heart problems and hypertension. The plant was one of the main ingredients in several pharmacological phytopreparations that were used to alleviate colicky pains in the biliary and digestive systems [10–12]. The plant is also used in Iranian folk medicine to treat bronchitis, scabies, and skin conditions [13–14].

Pharmacological Activity

Diaphoretic, diuretic, laxative, cholagogues, stomachic, anthelmintic, tonic, sedative, antibacterial, antiviral, antifungal, antidiabetic, antiulcer, anti-inflammatory, antioxidant, and blood purifier [15].

Antifungal activity

In plants, *Colletotrichum* species including *Colletotrichum falcatum*, *Curvularia maculans*, *Colletotrichum gloeosporioides*, and *Curvularia lunata*, an alkaloid fuyuziphine isolated from *Fumaria indica* exhibits antifungal action. The findings showed that fuyuziphine, at concentrations between 100 and 750 ppm, significantly slowed down the germination of a vast number of fungi [16].

Antibacterial activity

Fumaria indica was tested for its antibacterial properties against several bacteria and *Klebsiella pneumoniae* was the most susceptible bacterium [17].

Antioxidant activity

In the *Fumaria* plant, different kinds of fatty acids and antioxidant properties were discovered. These lipids were also discovered, as well as phospholipids. It was discovered that 61.85 free radicals were being scavenged [18, 19].

Hepatoprotective effect

In a study, the entire *Fumaria indica* plant was discovered to have hepatoprotective potential against the liver damage that d-galactosamine causes in rats. The fraction of butanol showed the highest concentration of alkaloid protopine, and provided more than 90% protection. Both the conventional medicine silymarin (single dose 25mg p.o.) [20, 21].

Spasmogenic and spasmolytic activity

The whole plant crude extract demonstrated effects. Plant's cholinergic and CCB components may account for the traditional applications of *Fumaria indica* for diarrhoea and constipation [22].

Chemoprotective effects

Fumaric acid *indica* demonstrates chemopreventive activity [23].

Anti-anxiety activity

Research strongly suggests that *Fumaria indica* may inhibit cytokine expression in the brain. The three studied cytokines were overexpressed in the rat brain due to scopolamine, and fumaric acid prevented this. Additionally, it has positive effects on cognitive processes similar to those of nootropics [24].

Anti-inflammatory and Analgesic activity

Even at the lowest tested doses, the study demonstrated strong anti-inflammatory effects of *Fumaria indica* in carrageenan-induced edema and cotton pellet granuloma. Hot plate and story flick tests revealed significant analgesic actions as well [25].

Antiviral activity

Two phytochemicals from *Fumaria indica*, namely Narlumicine and Oxysanguinarine, have been found to suppress the dengue virus (DENV). They showed a -8 kcal/mol binding affinity for DENV4-NS4B [26].

Gastroprotective activity

Both the methanolic extract of *Fumaria indica* and the study's results strongly support the idea that these compounds function as modulators or regulators of cytokine, corticosteroid, and monoamine homeostasis and are potent gastro-protective medicines against ulcers brought on by prolonged, inevitable stress [27;28]. *Fumaria indica* demonstrated gastroprotective, antacid, and antisecretory properties [28].

Discussion

It must be underlined that *Fumaria indica*, like many other medicinal plants, yields a range of bioactive secondary plant metabolites that are physically and functionally different, not all of which can be recovered using a single extraction solvent or technique [29, 30]. The extracts' psychopharmacological activity profiles must now receive the proper attention.

It is generally widely accepted that all chronic illnesses inevitably result in mental health issues and that there are bidirectional relationships. After decades of extensive research in our labs and other locations, we have learned a great deal about *fumarium indica* and believe it can lead to more successful and consistent outcomes with phytopharmaceuticals comprising its extracts as active ingredients. Attempts to better understand and describe *Fumaria indica*'s therapeutic potential can be strongly suggested, as it is a weed and holistic pharmaceutical approaches are easy to use in many underdeveloped and undeveloped nations. Furthermore, since many plants produce structurally identical or similar bioactive secondary metabolites to *Fumaria indica*, understanding its pharmacology will surely aid in determining the potential therapeutic benefits of many other, as of yet

undiscovered plants. Anyway, research on *Fumaria indica* makes it quite evident that the best methods for precisely determining a plant's potential as a psychotherapy agent may be to do repeated oral dose experiments using plants that contain psychoactive alkaloids.

Conclusion

A thorough literature review reveals *Fumaria indica*'s promising pharmacological action. To transform it into the formulation of contemporary pharmaceuticals following correct scientific evaluation of biomolecules, their toxicity, mode of action, and suitable standardization, more research is required.

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