

Foeniculum vulgare: Its Traditional Use and Volatile Constituents

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COMMENTARY

Foeniculum vulgare (Apiaceae) generally known as sweet fennel, is a common kitchen herb used around the world - but it is also a highly invasive weed that can severely damage ecosystems. *Foeniculum vulgare* may be a well-known and significant medicinal and aromatic plant widely used as digestive, carminative, lactagogue and diuretic and in treating respiratory and gastrointestinal disorders. Its seeds are utilized as flavourings in prepared merchandise, meat and fish dishes, frozen yogurt, cocktails and herbal mixtures. Phenols, phenolic glycosides and volatile aroma compounds like trans-anethole, estragole and fenchone are accounted because the major phytoconstituents of this species.

Different pharmacological experiments in several of *in vitro* and *in vitro* models have convincingly exhibited the capacity of *F. vulgare* to exhibit anti-fungal, antibacterial, anti-oxidant, anti-thrombotic, and hepatoprotective activities, lending support to the rationale behind several of its therapeutic uses. Phenolic compounds isolated from *F. vulgare* are considered to be liable for its antioxidant activity while the volatile aroma compounds make it a tremendous flavouring agent. The current survey is an exceptional and comprehensive examination of the chemistry, pharmacology, traditional uses and protection of *F. vulgare*.

F. vulgare seeds are compelling against diseases affecting spleen, chest and kidneys. Fennel seeds are associated with high oil content which is used as flavouring agent. *F. vulgare* has been accounted to contain 6.3% of moisture, 9.5% protein, 10% fat, 13.4% minerals, 18.5% fibre and 42.3% carbohydrates. The minerals and vitamins present in *F. vulgare* are iron, potassium, calcium, sodium, riboflavin, thiamine, niacin, phosphorus and vitamin C. *F. vulgare* is renowned for its volatile oil. The major components of *F. vulgare* seed essential oils are have been reported to be fenchone, trans-anethole, estragol (methyl chavicol), and β -phellandrene. The accumulation of those volatile compounds inside the plant is variable, appearing practically in any of its parts roots, stem, shoots, flowers and fruits.

A steam distilled volatile oil obtained from the undeveloped green seeds of Indian fennel, *Foeniculum vulgare* belonging to Umbelliferae family, was examined by capillary GC and GC-MS. The essential oil predominantly comprises of 5 monoterpenes, cumic aldehyde (87.3%), was found to be major constituent followed by fenchone

(8.2%), anethole (2.1%), citronellal (1.6%) and geraniol (0.6%). *F. vulgare* is employed in many parts of the world for the treatment of variety of diseases, as an example, abdominal pains, antiemetic, fever, aperitif, arthritis, cancer, colic in children, constipation, diarrhea, diuresis, depurative, conjunctivitis, emmenagogue, gastralgia, flatulence, insomnia, gastritis, kidney ailments, liver pain, leucorrhoea, irritable colon, laxative, mouth ulcer, and stomach-ache. One of the foremost conditions to be used of herbal preparations in medicinal conditions is the absence of such risks as mutagenicity, carcinogenicity, and teratogenicity. In general, such products got to have minimal toxicity and side effects.

Phytochemical research carried out on *F. vulgare* has led to the segregation of fatty acids, phenolic components, hydrocarbons, volatile components, and few other classes of secondary metabolites from its various parts. Mostly these phytochemicals are found in volatile oil. Some of the phytoconstituents of *F. vulgare* were find application as coloring and anti-aging agents. They also have significant biological and pharmacological activities.

Few extracts of *F. vulgare* and isolated compounds are evaluated for several activities, namely, antiaging, antiallergic, anticolitic, antihirsutism, anti-inflammatory, antimicrobial and antiviral, antimutagenic, antinociceptive, antipyretic, antispasmodic, anti-stress, antithrombotic, anxiolytic, apoptotic, cardiovascular, chemomodulatory action, antitumor and cyto-protection, diuretic, cytotoxicity, expectorant, hepato-protective, galactogenic, estrogenic properties, gastrointestinal effect, human liver cytochrome P450 3A4 inhibitory, hypolipidemic, hypoglycemic, nootropic, oculohypotensive activities and memory-enhancing property.

F. vulgare is a medicinal and aromatic plant with a wide-ranging pharmacological spectrum and having impressive significance specifically to food industry. Its aroma active compounds such as anethole (and its polymers like dianethole and photoanethole) estragole, (+)-Fenchone and β -anisaldehyde are recognised, because the biologically active molecules possessing oestrogenic, acaricidal and antithrombotic activities. The phenolic molecules present in fennel have been displayed to have strong cell reinforcement movement in various trials. These bioactive atoms in fennel can be developed as unique pharmacological lead particles providing their bioavailability, pharmacokinetics, physiological pathways, and importance to human health are known with adequate detail.

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Received: September 09, 2021; **Accepted:** September 23, 2021; **Published:** September 30, 2021

Citation: Baquer N (2021) *Foeniculum vulgare*: Its Traditional Use and Volatile Constituents. Med Aromat Plants (Los Angeles) 10: 406.

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