

Asafoetida, God's Food, a Natural Medicine

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ABSTRACT

Introduction: Asafoetida is dried latex which is extracted from the taproot of many species of *Ferula*, a perennial herb native to the East Mediterranean and Central Asian regions. It is also a common ingredient in some cuisines.

Methods: A literature search was conducted in Science Direct, Google, Google Scholar, PubMed, Wiley Online Library, Springer and Medline.

Results: The most important health benefits consist of reducing bloating, helping to relieve asthma, lower blood pressure and menstrual pain, as well as treating headaches, insect bites, indigestion and as a laxative. It is good for diabetic people, treats nerve disorders, helps fight free radicals, aids in reducing acne, treats corns and calluses and reduces hair loss.

Conclusion: This review article allowed verifying asafoetida as sources of compounds with valuable nutritional and bioactive properties with great ability for incorporation into foods with functional properties.

Key words: Medicinal plant, Health benefits, Asthma, Anti-cancer, Headaches.

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INTRODUCTION

Traditional medicinal plants are an essential part of the health care system in most Asian countries,¹⁻⁹ and they rely on natural products which has been playing a significant and important role in health protection and disease control for many years.¹⁰⁻¹² The aim of this mini-review was to survey the most important health benefits and pharmaceutical characteristics of asafoetida.

ASAFOETIDA

Asafoetida (*Ferula asafoetida* Linn.) is an old traditional phytomedicine used to treat various diseases in different countries.^{13,14} Several different chemical compounds including coumarins, polysulfides and sugars have been isolated from it.^{15,16} *F. asafoetida* is one of the most important native species of the genus *Ferula*, which is native to Iran, India and Afghanistan. It is commonly known as ferula and belongs to the family *Umbelliferae* (*Apiaceae*). In Iranian folk medicine, asafoetida is mostly used as the analgesic agent, antispasmodic, carminative and diuretic.¹⁷ The oleo-gum-resin obtained from the roots possesses antiviral, anti-diabetic, anti-inflammatory, anti-mutagenic and antifungal activities.^{18,19} The roots and latex of *F. assa-foetida* yielded various mixed vinyl disulfides, including two novel asadisulfide-type esters.²⁰ *F. assa-foetida* has a long history for treatment of infectious diseases including influenza.²¹ The highest accumulations of sulphur compounds and essential oil in asafoetida are related to different mean annual temperatures and altitude.²² The gum asafoetida, is composed of carbohydrate (67.39% w/w) with a monosaccharide distribution of 11.5: 5.9: 2.3:1 between Gal, Ara, Rha and GlcA (molar ration) and proteins (arabinogalactan protein). The most important compounds in Oleo gum resin were found most abundantly in the samples. These were (*E*)-1-propenyl sec-butyl disulfide (13.66–49.35%), β -pinene (1.06–21.18%), (*Z*)-1-propenyl sec-butyl disulfide (2.02–15.29%), α -pinene (2.04–17.61%), thiophene (0.03–36.81%) and thiourea (0.08–9.63%).²³ In Iranian *Ferula assa-foetida* oil, *E*-1-propyl sec-butyl disulfide was a major component.²⁴ The most important characteristics of *Ferula assa-foetida* is shown in Table 1. The most important reported functions of asafoetida are presented in

Table 2. The most important pharmacological activities of *Ferula assa-foetida* L are shown in Table 3. The image of Asafoetida (*Ferula assa-foetida*) is shown in Figure 1.

Table 1: The most important characteristics of *Ferula assafoetida*.

It is a monoecious, herbaceous, perennial plant.
This giant plant is 2-3 m tall with a circular mass of 30-40 cm. ^{15,25}
Leaves compound, 2-4 pinnate very large and bipinnate, pubescent; segments oblong entire, obtuse.
Flowers are pale greenish yellow produced in large compound umbels, with numerous stem leaves inflorescence densely pubescent.
Petals whitish yellow, persistent.
Fruits broadly oblong to suborbicular about 1 cm long and 8 mm broad, winged and oval, flat, thin, reddish brown and have a milky juice.
They yield a resin similar to that of stems.
Root is a large pulpy thick tap-root.
All parts of the plant have the distinctive foetid smell.
Its main components include resin (40-46%), gum (25%) and essential oil (10-17%). ²⁶
Its resin fraction contains ferulic acid, esters, coumarins and other terpenoids.
Its gum contains glucose, galactose, L-arabinose, rhamnose, glucuronic acid, polysaccharides glycoproteins and umbelliferone. ¹⁵
The main compounds of its oil contain α -pinene, β -pinene, germacrene B, myrcene, limonene, bisabolol and quercetin. ^{24,27}
Anghuzeh (Farsi); asafetida (Spanish); asafoetida; awei (Chinese); aza (Greek); devil's dung; ferule persique or merde dudiabie (French); haltit or tyib (Arabic); hing (Hindi); mvuje (Swahili); stinkasant or teufelsdreck (German); stinking gum are other names of this traditional herbal medicine.

Table 2: The most important reported functions of asafoetida.

Function	Reference
*The ethanolic <i>ferula assa-foetida</i> oleo-gum-resin extract can regulate hyperglycemia and complications of diabetes and its antidiabetic and hypolipidemic activities are related to its antioxidant activity. In this mechanism of action, phenolic and flavonoids compounds like ferulic acid, umbelliferone and quercetin may play an important role.	28
*It is effective to relieve menstrual cramps and improve health-related quality of life	29
*Mouth-washing with asafoetida can be recommended as an effective herbal mouthwash for improving the indices of gingival health.	30
*Its extract has showed significant anti-helminthic activity at the highest concentration of 100 mg/mL.	31
*Asafoetida is a nerve stimulant and its administration in neuropathic mice exerted neuroprotecting effects.	32
*The hydroalcoholic extract of <i>F. assa foetida</i> exhibited anti-diarrheal activity due to its inhibitory impact on intestinal fluid accumulation.	33
*Its aqueous extract of resin has a great influence on the healing of diabetic ulcers by increasing epithelial cell proliferation and blood vessel formation and accelerate the inflammatory process.	34
*Asafoetida has potent anti-tumor and anti-metastasis effects on breast cancer and is a potential source of natural antitumor products.	35
*Its extract has anti-obesity, fat lowering effects can prevent liver steatosis in type 2 diabetic rats.	36
*Ethanolic extract of <i>Ferula asafoetida</i> has potent antidepressant-like activity, due to the anti-oxidant property of Ferulic acid, umbelliferone and other neuro-protective compounds.	37
*Oleo-gum-resins of <i>Ferula assa-foetida</i> compose of sulfides and monoterpenes is effective against insects and vectors and resulted cytotoxic to fibroblasts and non-target aquatic micro crustaceans.	38
*Asafoetida showed a significant antinociceptive effect on chronic and acute pain in mice which probably involve central opioid pathways and peripheral anti-inflammatory action.	39
*Asafoetida extract has a potent relaxant effect on tracheal smooth muscle which is due to muscarinic receptor blockade.	40
*Low concentration of asafoetida has a rejuvenating effect on senescent fibroblasts. This impact is because of its role on increasing the expression of the anti-apoptotic factor Bcl-2.	41

Table 3: The most important pharmacological activities of *Ferula assa-foetida* L.

Effects on gastro intestinal tract ^{42,43}
Its effects as anti-cancer ^{44,45}
Its effects as women's ailments ^{44,45}
Its effects on blood pressure and blood vessels
Its influence on chemo-protective therapy ^{46,47}
Its effects on hypersensitivity reactions ⁴⁸
Its effects on lipid profile ⁴⁹
Hepatoprotective effects ^{50,51}
Its effects on blood sugar level ⁵¹
Its antioxidant activity ⁴⁵
Its application as an antispasmodic therapeutic ⁵²
Its antibacterial effects ^{53,54}
Anti-inflammatory and antinociceptive effects ⁵²
Anti-viral activity ⁵⁵⁻⁵⁷

CONCLUSION

Asafoetida has a prominent place in traditional medicine due to its carminative, anti-viral, anti-bacterial, anti-inflammatory, sedative and diuretic properties. Its most important health benefits are reduce bloating and other stomach problems, helps to relieve asthma, lower blood pressure levels, relieve menstrual pain, reduce headaches, reduce acne, a good hair conditioner, anticancer effects, antibacterial, antifungal and antimicrobial effects and protect brain health. The active ingredients in *F. asafoetida* can be developed in combination as potent drugs, which may exhibit better effects compare to other compounds.

**Figure 1:** Asafoetida (*Ferula assa-foetida*).

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CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

ABBREVIATIONS

TCM: Traditional Chinese medicine.

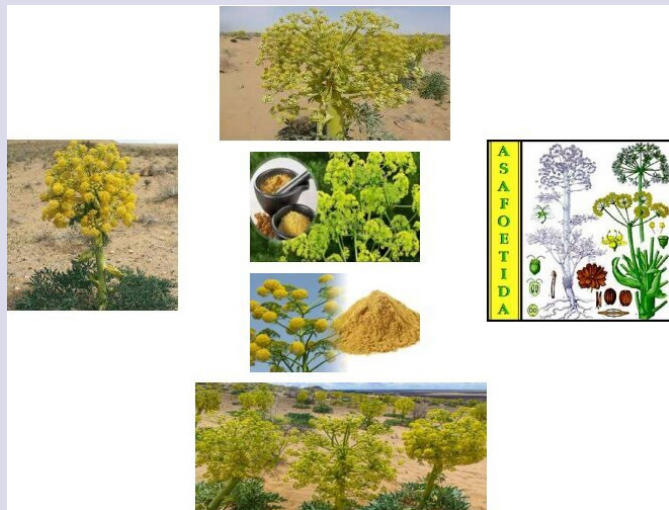
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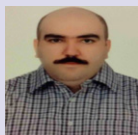
PICTORIAL ABSTRACT



ABOUT AUTHORS



Dr. Wenli Sun: She is an assistant researcher working on related topics of traditional Chinese medicine, allelopathic influence and sustainable agriculture. She is also working on topics which are related to Biotechnology and Molecular Sciences.



Dr. Mohamad Hesam Shahrajabian: He is a senior researcher of Agronomy and Biotechnology. He is interested in crops and herbs which are related to traditional medicine, especially Chinese and Iranian traditional medicine and crops relating to organic farming and sustainable agriculture.

SUMMARY

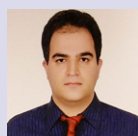
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- Its most important health benefits are reduce bloating and other stomach problems, helps to relieve asthma, lower blood pressure levels, relieve menstrual pain, reduce headaches, reduce acne, a good hair conditioner, anticancer effects, antibacterial, antifungal and antimicrobial effects, and protect brain health.
- The active ingredients in *F. asafoetida* can be developed in combination as potent drugs, which may exhibit better effects compare to other compounds.



Prof. Dr. Qi Cheng: He is a professor of Biotechnology and his researches have connected with agrobiotechnology. Presently, he is interested to traditional Chinese medicine and molecular researches.



Dr. Ali Soleymani: He is an associate professor of Agronomy. He is interested in traditional Iranian medicine.



Mr. Mehdi Khoshkham: A senior researcher of faculty of Agriculture in Islamic Azad University of Isfahan, Iran. He is also expert in green house management and organic farming.