

(REVIEW ARTICLE)



Ephedra: An anti-asthamatic medicinal plant

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Abstract

Ephedra is a drug used as a stimulant. It is also known for its anti-inflammatory properties. It can be good for many ailments such as cold, cough, asthma, fever and flu. It is distributed in many regions such as Asia, Europe, North Africa, Western North America and South America. It has more than 100 active compounds with effects. It contains flavonoids, alkanes, tannins, sugars and organic phenolic acids. It is used in the treatment of asthma, liver disease, skin disease and other diseases, the most important among the effectiveness of the treatment of the disease is COVID-19. It is considered an ancient group and is appreciated for its abundant fossil record. Ephedra, known as "Ephedra" in China, is a gymnosperm plant. It is a dry straw stalk associated with the lung and bladder meridians. Ephedra is one of the largest genera of the Ephedra family and is found in arid and semi-arid regions of the world. In traditional medicine in many countries, some of these species are frequently used to treat asthma, colds, flu, colds, fever, headaches, nasal congestion and cough. The chemical composition of the ephedra plant has been a focus of interest for decades due to its content of ephedrine alkaloids and its medicinal properties. Other chemical compounds such as phenolics and amino acid derivatives are also of interest and provide evidence-based support for the ethnomedical use of Ephedra. Medicinal plants contain many phytochemical compounds related to various treatments (Naiá et al., 2005; Ghoíbani, 2005). Therefore, this medicinal herb is used in various ephedrine formulations and has many adverse effects on diseases such as liver diseases, angle-closure glaucoma, kidney stones, neurodegenerative diseases and heart toxicity. Indian Ayurveda is a traditional herbal medicine with a long history and strong foundations. Medicinal plants play an important role in the prevention and treatment of human diseases. This plant usually grows on dry rocks and soil because it needs high, dry mountain forests to grow. Many parts of plants such as branches and roots are used in various applications for medicinal purposes. For example, the dry part of the plant is used in var tonic medicine systems such as Ayurveda, Siddha and traditional Chinese medicine to treat many diseases such as asthma, hay fever, pain or inflammation, lung disease, heart disease. Aches, coughs, and colds are considered flu-like symptoms.

Keywords: Traditional medicine; Ephedra sinck; Ephedra viridus; Medicinal herb; Gymnosperm plant

1. Introduction

Ephedra is a drug used for energy purposes. It is also known for its anti-inflammatory properties. It can be good for many ailments such as cold, cough, asthma, fever and flu. It is distributed in many regions such as Asia, Europe, North Africa, Western North America and South America. It has more than 100 active compounds with effects. It contains flavonoids, alkanes, tannins, sugars and organic phenolic acids. It is used to treat asthma, liver disease, skin disease and other diseases; This is the best way to treat COVID-19 disease. It is considered an ancient group and is appreciated for its abundant fossil record. Ephedra (Ephedra), called "Ephedra" in China.

As a medicinal plant, the Ephedra genus belongs to the Ephedraceae family, one of the three families of the Ephedra order. Ephedra is found in cool, dry places in both the Old and New World. Members of the Asteraceae family live in

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tropical, subtropical and subtropical regions of Asia, Africa and South America. The plant, which is about one meter tall, grows in semi-arid and desert conditions in both hemispheres throughout the country. Ephedra usually grows in arid and desert regions and needs well-drained soil. Ephedra is a very hot plant whose roots go up to 3 meters deep to use water. It always creates a gap between lines of 3 mm or more. The height of the residence is generally between 2 and 6 meters above sea level. Ephedra (ES) is also considered one of the most important plants in medicine. It belongs to the Ephedra family and is known as "Ephedra" in Korea, China and Japan. 6.9

The word "ephedra" means "yellow hemp" or "yellow astringent" in Chinese and refers to its special color. 10 According to the information obtained, ES has been used for more than 5000 years and ephedra is used in the treatment of many diseases. 11 Traditionally, tea is made from the dried stems of ephedra and used to treat asthma, cough, fever, urinary problems and insufficiency. to sweat. Ephedra is made from many chemicals including ephedrine, pseudoephedrine, norpseudoephedrine, norephedrine, methylephedrine, tannins, kynurenic acid



Figure 1 Ephedra Plant

- Category: Plant
- Family: ephedreaceae
- Genus: - *Ephedra*
- Biological products: - Contains dried fruit
- Region of origin: - China, Pakistan, Northwest Territories
- Synonyms: -Cao mahuang, desert herb, ephedra distachya.

2. Pharmacological effects of ephedra in the body

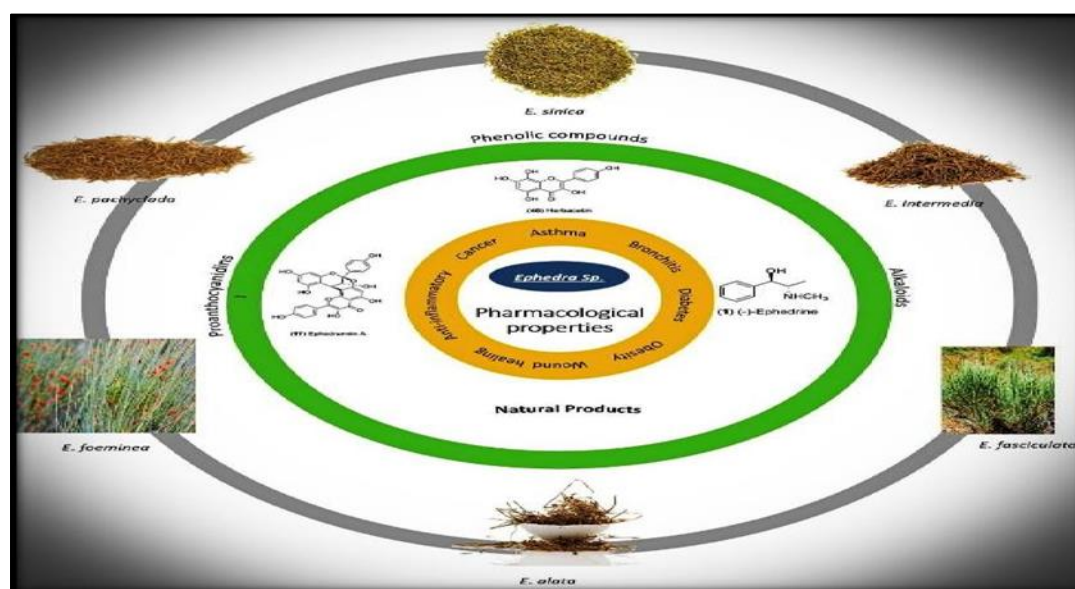


Figure 2 Pharmacological properties

- Ephedra is used to lose weight and fat.
- Ephedra is used to treat asthma, bronchitis, diabetes, prevent diseases.
- Ephedrine is an Ephedra drug used to control and burn fat clinically significant Treat hypotension.
- The primary indication for FDA-approved Ephedra is the treatment of clinically significant perioperative hypotension.

2.1. Ephedra Category

- Anti-asthma
- Anti-cancer
- Antibacterial Activity
- Treatment of Bad Heart Disease
- Anti-Diabetes

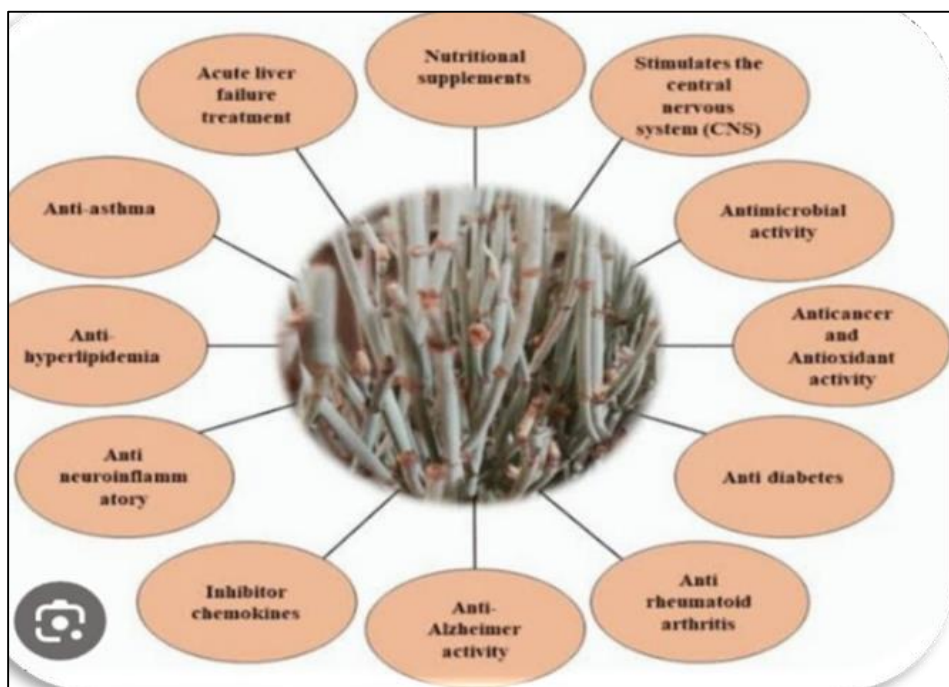


Figure 3 Category of Ephedra

Ephedra type effect for All Groups.

Ephedra has bronchodilator properties, which means it can help open the airways in the lungs by relaxing the muscle. This effect may reduce asthma symptoms by making breathing easier.

- **Anti-cancer:** Ephedra contains compounds such as ephedrine and pseudoephedrine that have been studied for their anti-cancer effects. These compounds have been shown in laboratory studies to have the ability to inhibit the growth of cancer cells and cause apoptosis (cell death). However, more research is needed to understand ephedra's mechanism of action and potential therapeutic use in cancer treatment.
- **Antibacterial Activity:-** Ephedra contains compounds such as ephedrine and pseudoephedrine that have been shown to have antibacterial properties. These drugs can damage microbial cells, interfere with cell metabolism, or inhibit microbial growth through various mechanisms, thereby increasing the antibacterial properties of ephedra
- **Treatment of liver failure:** - There is insufficient evidence to support the use of ephedra in the treatment of liver failure. In fact, ephedra has been linked to liver toxicity and is banned in many countries due to safety concerns. If you are severely incapacitated, you should seek immediate medical attention for appropriate treatment and management.
- **Anti-diabetic:** -Ephedra may have some anti-diabetic properties due to its ability to increase insulin sensitivity and may have some anti-diabetic properties. prevents diabetes. Improve glucose metabolism. Compounds

found in ephedra, such as ephedrine and pseudoephedrine, may produce these effects by stimulating beta-adrenergic receptors and improving glucose uptake in skeletal muscle. However, it is important to remember that the use of ephedra in the treatment of diabetes is not yet mature and should be treated with caution, especially considering its side effects.

- Antioxidant Activity: Antioxidant activity of ephedra was evaluated by copper ion reducing capacity in the presence of neocuproline: CUPRAC method, DPPH (2,2-diphenyl-1-trinitrophenylhydrazine), ABTS (2,2'-azino-bis(3-ethyl-benzothiazoline-6)-sulfonic acid), TAC (total antioxidant capacity), FRAP (iron-reducing antioxidant), reducing power, B-carotene bleaching inhibition, iron ion chelation, hydroxyl radicals, hydrogen peroxide scavenging activity and iron chelation drug
- Antibacterial activity: Ephedra plant extract has effective antibacterial properties. Its activity has been found in many studies using in vitro methods such as the agar disc diffusion assay and/or minimum inhibitory concentration (MIC) described in this study.

2.2. Biological activity

- Antioxidant activity: Antioxidant activity of ephedra was evaluated by copper ion reducing capacity in the presence of neocuproline: CUPRAC method, DPPH (2,2-diphenyl-1-trinitrophenylhydrazine), ABTS (2,2'-azino-bis(3-ethyl-benzothiazoline-6)-sulfonic acid), TAC (total antioxidant capacity), FRAP (iron-reducing antioxidant), reducing power, B-carotene bleaching inhibition, iron ion chelation, hydroxyl radical, hydrogen peroxide scavenging activity and iron chelator drugs antibiotics.

The antibacterial properties of ephedra extracts have been described in several studies using in vitro methods such as agar disc diffusion assays and/or minimum inhibitory concentrations (MIC).

2.2.1. Chemistry of Ephedra.

Naufal and Gabardi found the daily dose of ephedra to be 40-3,000 mg. Kidney stones can develop over months, accompanied by back pain, hematuria, and kidney failure. On the other hand, recent studies have shown that ephedra contains many medicinal alkaloids, especially ephedrine, which have been reported to cause liver pain. In this context, Lee and colleagues examined hepatotoxicity and significant regulation of mitochondrial autophagy in ephedrine-treated LX-2 cells. However, mitochondrial swelling and autolytic activity were observed in ephedrine-treated cells. Additionally, ephedrine inhibits mitochondrial biogenesis and reduces mitochondrial cell number., benzyl methylamine. Tannins, primarily proanthocyanidins, are components of many ephedra species (e.g., *Ephedra* spp.).

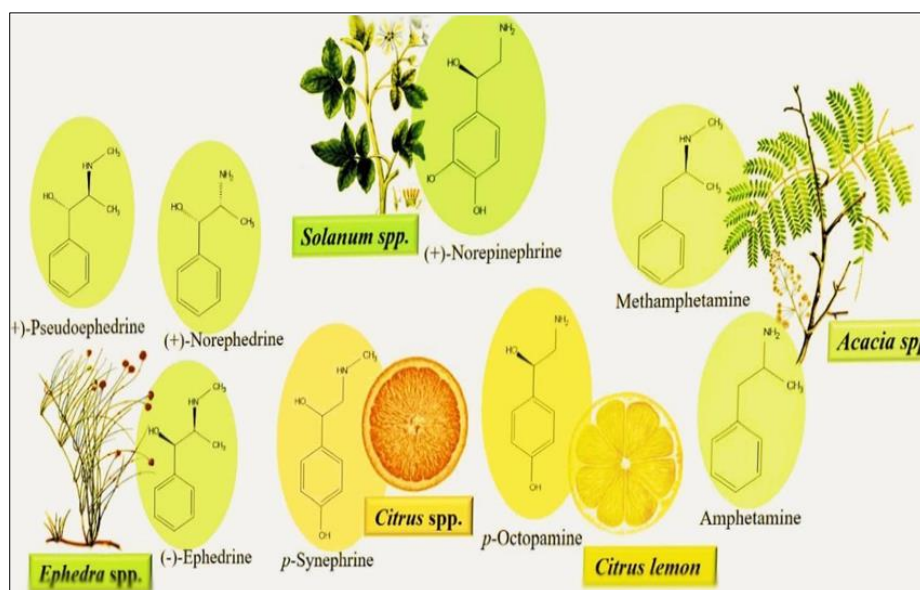


Figure 4 Chemistry of Ephedra

2.2.2. Alkaloids

Alkaloids are the main components of ephedra and 29 species have been identified. The following three stereoisomeric pairs of amphetamine alkaloids have the highest content: L-ephedrine and D-pseudoephedrine, L-norephedrine and D-

norpseudoephedrine, L-methylephedrine and D-methyl-pseudoephedrine. Stereoisomers are generally considered functional units of chemical compounds. labeled as ephedrine).

2.2.3. Flavonoids

Flavonoids generally refer to compounds having two benzene rings (ring A and ring B) with phenolic hydroxyl groups bonded to each other by chemical compounds. According to HPLC/PDA/MS analysis, the total flavonoid content (TFC) of ephedra extracted with water bath ethanol is approximately 0.29%. Currently, more than 40 types of flavonoids such as quercetin, luteolin, and rutin have been isolated from ephedra. Pharmacological studies have shown that flavonoids in ephedra can eliminate diphenyl-pyridine free radicals, and the intensity of its antioxidant effect is related to the number and structure of hydroxyl groups in its active ingredients.

Table 1 Alkaloid different species of the genes Ephedra

Sr No.	Classification	Chemical Name	Plant source
1	Microcyclic spermine alkaloids	Ephedradine A	<i>E. Sinca</i> (root)
		Ephedradine B	<i>E. Sinca</i> (root)
		Ephedradine C	<i>E.sinca</i> (root)
		Ephedradine D	<i>E.sinca</i> (root)
2	Amphetamine -type alkaloids	D(-)-Ephedrine	<i>E.sinca, E.nebrodensis, E.major</i>
		L(+)-Pseudoephedrin	<i>E.sinca, E. nebrodensis</i>
3	Amphetamine-type alkaloids	Feruloylhistamine	<i>E.sinica</i> (root)

2.3. Effects of Ephedra Plant

Ephedra may cause side effects such as nervousness, irritability, anxiety, insomnia, headache, nausea, vomiting and urinary problems. More serious side effects include high blood pressure, fast or irregular heartbeat, stroke, seizures, addiction, and even death.

2.3.1. Applications

Herbs This has long been used to treat asthma, liver disease, skin diseases, etc. Many Asian plants, especially ephedra, have been used as sources of ephedrine. Ephedra has been used in China for thousands of years and is a common herb in Ayurvedic medicine with many important properties. Ephedrine, which is used to treat colds, reduce fever and sweating, and as a decongestant, is now also produced from synthetic products.

3. Conclusion

We review the botanicals, chemical composition, pharmacological effects, medicinal uses, and toxicity of ephedra. At present, it mainly produces Chinese ephedra, medium ephedra, horsetail ephedra, etc. More than 60 species of ephedra have been described, divided into; There are more than 100 compounds such as alkaloids, flavonoids, tannins and sugar. and organic phenolic acids. Drugs with antipyretic, antiasthmatic, anti-inflammatory and hepatoprotective effects have been developed. It has many medical uses and can be used to treat asthma, hepatitis, skin diseases and COVID-19. However, its toxicity cannot be ignored. Ephedra alkaloids are the main cause of toxicity, but there is evidence that alkaloid-free ephedra extracts have similar effects without side effects in the treatment of certain conditions.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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