

Exotic Spice *Illicium Verum* Hook.F

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ABSTRACT

Chinese Star anise (*Illicium verum* hook.f.) spice is generally consumed in food, beverages and confectionery item due to their characteristic spiciness as well as zesty flavor. Star anise is extensively employed in Chinese traditional medicine and as a tonic for home remedies since ancient times for many complaints such as gastrointestinal disorder, colic discomfort and inflammation. The active components present in star anise has been identified by many researchers and several favorable, pharmacological effects of its constituents confirmed and authenticated recently by experiment. Additionally, many studies reveal numerous health effects of this spice. This article concisely reviews the most noticeable investigations which have validated the potential of star anise such as anxiolytic, anti-microbial, antioxidant, chemopreventive, insecticidal, flu prevention, atherogenesis, lactagouge, anticolic action. However star anise is usually nontoxic and used as a functional ingredient of daily cuisine.

Keywords: Star anise, Pharmacological effects, Anti-spasmodic, Anxiolytic, Lactagouge, Nutraceuticals, Anti-microbial, anti-Inflammatory, Anticancer.

INTRODUCTION

Illicium verum Hook. f belongs to the family (Austrobaileyales: Schisandraceae)¹; is a medium-sized native evergreen tree of Northeast Vietnam and South West China² formerly allocated in the tropic and subtropics areas of Asia and utilized as a traditional medicine in East Asia³. The genus name is derived from Latin 'illicere' (allure), probably because of the sweet and pleasant fragrance. In 2002, Ministry Health of People's Republic China confirmed that star anise one of the item act as "both food and medicine"⁴.

Star Anise (*Illicium verum* Hook. f) is prehistoric spice, recognized in China as far back as 100 B.C⁵. However traditionally Japanese use star anise plant and their bark as incense to produce perfumed smoke on their temples and on tombs. Seventh centuries recipes disclosed that this spice also used to prepare Jam and syrup⁶. Star anise flavor is oftenly mixed up with licorice and depict as a "licorice like" flavor⁷. In Europe fruit of star anise used as a liqueur to prepare tincture and distillate⁸. In Chinese cusin star anise play important role they use it in seasoning dishes especially sweet dishes and to enhance the flavor of coffee and tea⁹.

METHODOLOGY

A comprehensive literature search was being conducted from 1993-2017.the search engines utilized were Google Scholar, Pub Med, Springer link and Med line. In this review keyword of history plant description, chemical constituent, traditional use and pharmacological properties of spice Chinese star anise (*Illicium verum* Hook.f) were used and

45 articles of Asian and Pakistani literature are selected for write up.

LITERATURE REVIEW:

a) Origin of the Name:

The generic name of star anise (*Illicium verum* Hook. f) originated from Latin word "Illicio" or "Illicere" which means to attract or the fragrance¹⁰.

b) Local Names:

Star anise recognized by many substitutes' names according to the origin of specific regions. In China it is known as a "Ba Jiao Hui Xiang". Following are other synonyms by the other countries¹¹.

English Name: Star anise

Danish: Sjerne Anis

Dutch: Adas china, Steranijs

French: Anis de la Chine, Badiane

German: Badian, Sternanis

Indonesian: Adas cina, bunga lawang, Pe ka

Italian: Anice Stellato

Khmer: Phka Cann, Poch kak lavhak, Innish Tähtianis

Portuguese: Anis Estrelado

Spanish: Anís Estrellado

Thai: Dok chan, poy kak bua

Vietnamese: vat giac huong, dai hoi, hoi sao, mai, cay hoy

In Hindi and Urdu its commonly known by "Badiyan Ka Phool" (Badayan, Anasphal)¹².

c) Plant Description:

Illicium verum hook.f (Figure-1) medium sized evergreen plant having 8-15 m height and equal to 30 cm in dbh along with green, glabrous branches on straight rounded stem. The bark is white to bright grey in color. The plant of this spice is proliferated by seed and generally planted for fragrance, medicine and culinary purposes in southern china and Vietnam. The fruit of this spice is collected before they ripen and then sun dried. The flowers are grow from March

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Received: 24-05-18
Accepted: 11-07-18

to May and fruits are ripen from September to October^{13,14}.

d) Traditional Uses of Star Anise in Medicine:

Nearly seventeenth century European firstly introduces Star anise spice having specific licorice type taste due to the presence of chemical constituent anethole¹⁵. In 1505's book



Fig: 1 (*Illicium verum* hook.f)

of "Herbal Essentials Collection" stated that *Illicium verum* is used for the cure of cholera and fistula. In 1769 HUANG Gongxiu discovered that spice star anise is used to prevent chronic¹⁶. It was documented in book "Herbal positive" *I.verum* play a vital role to eliminate teeth and mouth disease. It is used as a common flavoring agent in coffee and tea, lozenges and cough syrups, stimulant, expectorant and diuretic. Star anise oil has beneficial effects in the treatment of rheumatism and lower back pain and possesses anti-

oxidants properties due to presence of Linalool^{17,18}.

Star anise has a long history being consumed in Chinese traditional cooking and medicine for the treatment of skin inflammation, vomiting, stomachaches, rheumatic and sleeplessness¹⁹. Essential oil of *I.verum* contain approximately 70-90% anethole, having estrogenic properties thus it is used to relief from rheumatism and lower back pain²⁰. It has a good carminative property for that reason it is often chew up in minute amounts after each meal to stimulate digestion and helps to relieve flatulence. This spice is used in several preparations which is intended for both external and internal application. The most common internal use of this spice is for dyspeptic complain on the other hand topically it is implemented as an inhalant for the respiratory tract congestion. It is also a chief constituent of anti-tussives remedies and currently employ as a flu medicine. However, large quantity of this spice can cause neurotoxic effects²¹.

Chemical constituents of Star Anise:

Chinese star anise contains numerous numbers of chemical constituents having various pharmacological actions^{22,23}, few of them are mentioned below

Culinary usage of star anise:

Illicium verum as an essential spice and main constituent of Chinese, Malay and Indonesian cuisines²⁴. In Asian cuisines

COMPOUND	PHARMACOLOGICAL ACTION
Anethole	Antimicrobial, Antifungal and Insecticidal
Anisaldehyde	Fragrance, scent of licorice.
Beta-caryophyllene	Anti-inflammatory, Anti-nociceptive, Neuroprotective
Benzoic acid-4-beta-d-glucoside	Antifungal
Cinnamic acid	Flavoring agent
Cinnamaldehyde	Fungicide, Insecticide
Cinnamyl alcohol	Sensitizing agent
Caffeic acid	Antioxidant and Anti-inflammatory
Cineol	Mouthwash, cough suppressant, Insecticide and repellent
Citronellol	Perfumery and Insect repellents
Estragole	Perfumes and food additive for flavor
Eugenol methyl ether	Perfumes, flavorings, local antiseptic and anesthetic.
Kaempferol	Antioxidant
Kaempferol-3-o-beta-d-rutinoside	Flavonol glycoside
Lignans	Anticarcinogenic, Anti-inflammatory
Myrcene	Perfumery agent
P-methoxy-cinnamaldehyde	Fungicide
P-coumaric acid	Antioxidant and Anticancer
Phenylpropanoids	Defensive agent against herbivores and pathogens
P-methoxycinnamaldehyde	Flavor and Perfumery agent
Quercetin	Mental performance or cardiovascular health
Quercetin-3-o-alpha-d-xyloside	Potent free-radical scavenger and antioxidant
Sesquiterpenoids	Defensive agents or pheromones.
Trans-anethole	Antimicrobial, Antifungal and Insecticidal
Shikimic acid	Anticoagulant and Antithrombotic
Terpinen-4-ol gamma-terpinene	Antibacterial and Antifungal
Veranisatins A, B and C	Analgesic

star anise usually use with other spice such as fennel seeds, cloves, cinnamon, pepper etc and considered as one of the “Five Chinese Spice”, used for its potent taste and spicy flavor²⁵. A special spicy ingredient called “Garam masala” is made by the addition of other popular Indian spices with star anise. Vietnamese use this spice as a major ingredient in noodle soup called pho²⁶. In soak form, it intensifies and enhances the flavor of coffee. Star anise is a pleasant spice can be used in whole or ground form. The whole form of this spice is usually make use of to flavor tea, coffee, soup, and other liquids conversely in ground form, star anise is strong and can be added directly to foods. In Asian cuisine, star anise use to enhance the flavor of many spicy dishes especially meat, curries, biryani and also used in desserts and beverages²⁷.

Medicinal and Pharmacological Properties:

Anxiolytic Effects

Hexane-extract of *Illicium verum* fruit oil possess strong anxiolytic effects in male ICR mice. It is proposed that this effect is due to the presence of chief constituents trans-anethole and related compounds trans- α -methylstyrene, propiophenone and 4'-methoxy-propiophenone. Researchers validated and reported structure activity relationship of several constituents of *I.verum* such as anethole and trans-anethole. Result of this analysis show that *I.verum* fruit oil at the dose of 1lL produce anxiolytic effects in male ICR mice²⁸.

Antimicrobial Effects

Illicium verum hook.f has a strong anti-microbial property. Chemical investigation of this spice reveals that the chief constituent anethole is responsible for antimicrobial activity and this is abundantly present in dried fruit of *I.verum*. Numerous studies illustrated that the chief constituent of this spice (anethole) effective against many strain of bacteria, yeast and fungal^{29,30}. The recent finding disclosed that the volatile oil of *I.verum* at the dose of 6 μ l inhibited the growth of *Fusarium moniliforme* bacteria completely. However the extract of this spice show 50% mycelial zone of inhibition against *P.viridicatum* and *Pencillium citrinum* species³¹.

Antioxidant Effects

Extract of *Illicium verum* hook .f anticipate natural antioxidant activity. The earlier investigation revealed that rapeseed oil of this spice exhibit excellent activity to inhibit primary and secondary oxidation product, responsible for the ailment result from the oxidative deterioration³². It is consider that the antioxidant activity is mainly due to the presence of active constituent specifically anethole more than 80% in this spice³³.

Chemopreventive Effects

Illicium verum contain prenyl moiety “phenylpropanoids” accountable to inhibit the growth of tumor cell and significantly role as a chemopreventive agent. Experimental

Studies revealed that isolated compound of *I.verum* show excellent activity against Epstein barr virus early antigen (EBV-EA) at 1 \times 10⁶ mol ratio and this inhibitory effects is more than β -carotene^{34,35}.

Insecticidal Effects

The fruit extract of *I.verum* also possess insecticidal activities due to the presence of phenylpropene, (E)-anethole. Insecticidal activity against *B.germanica* species were assess by Chang and Ahn in 2002³⁶. This spice is well-known to inhibit and restrain the growth of pest and used to control the progression of various types of insect species. Studies reveal that *I. verum* fruit extract is highly effective against *B.germanica*.

Antiflu Effects

Star anise is utilized to yield shikimic acid industrially³⁷, a principal component to produce the antiflu medicine, Tamiflu³⁸. The rigorousness of bird flu virus strain H5N1 were completely diminish by the use of drug Tamiflu. Nowadays, the avian flue (bird flu) is controlled and treated by commercially available drug Tamiflu³⁹.

Atherogenesis Effects

Treatment with *I. verum* reduce immunoreactivity of iNOS activation and decrease aortic atherosclerotic plaque lesions and cytokines was observed in ApoE^{-/-} mice. Analyses reveal that the *Illicium verum* at the dose of 10 \times 100 μ g/ml reduce transcriptional activity of NF- κ B in a dose-dependent manner⁴⁰. Furthermore, from the investigation it is revealed that *I.verum* deteriorated the manifestation of linkage molecules that are responsible for inflammation in these cells. In experimental studies in HFD-fed ApoE^{-/-} mice administration of *I.verum* or atorvastatin drug depicted the characteristics changes in blood pressure body weight and lipid level⁴¹.

Lactagogue Effects

Studies indicated that the dietary supplementation of *Illicium verum* has beneficial effects, improving lactation performance during gestation and lactation in sows. The diet of this spice increases the concentration of prolactin and IGF-1 (insulin like growth factor -1) in milk of sows⁴².

Anticolic Effects

Anticolic and antidiarrheal effect is also effectively treated by this spice star anise. Recently this study was carried out on mice. In this study percentage of advance activated carbon administered and animal intestinal tract was measured. Diarrhea was inducing by castor oil administration. Orally administration of this spice at different doses 10, 20, 40, and 80mg/kg was given⁴³. The results of studies shown that this spice decrease activated carbon percentage, responsible for delaying the diarrhea also reduce the number of evacuations as compared to the control group. Investigation depict that the combination of chamomile and star anise produce strong antidiarrheal effects.

CONCLUSIONS:

The health benefit of the strong-tasting spice star anise are being progressively recognized and experimentally validated in recent decades. The most studied beneficial pharmacological action of star anise and its active constituents include antimicrobial, antifungal, insecticidal, anticolic, antitumorogenic and anticancer effects. This spice is also a good anxiolytic property and used to prepare antifu drug. Latterly, Chinese star anise (*Illicium verum* hook.f) declare tremendous work and play a functional food among all spices and considered as the natural component of our diet, beyond its role in revealing taste and flavor to our food.

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