



A Review on Phytochemicals of Nutraceutical importance in *Illicium verum* (Star-Anise), the major spice from Indian cuisine

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Abstract:

Plants play an important role in everyday life. We cannot imagine life and its growth without plants. Besides food, plants are a primary source of material for other necessities of life. The traditional medicinal practices are important parts of the primary healthcare system in the developing as well as developed world. The herbal medicines are comparatively safer and cheaper than synthetic drugs. The plant-based traditional knowledge has become a recognized tool in search for new sources of drugs and nutraceuticals. *Illicium verum*, as a spice and pharmaceutical treatment of many harmful diseases, has been widely used in most Asian countries. In the present study, the review focuses mainly on food and phytochemical applications of *Illicium verum*. The fruits are commonly used as an ingredient of the traditional “five-spice” powder for cooking, and the essential oil of *I. verum* can be used as a flavouring. The extraction from *I. verum* has carminative, stomachic, stimulant, and diuretic properties, and is used as a pharmaceutical supplement. Shikimic acid extracted from *I. verum* is one of the main ingredients in the antiviral drug Tamiflu, which is used to fight avian influenza. It has also been reported to possess antimicrobial and antioxidative properties as well as significant anticancer potential. This review presents a detailed study on the phytochemical properties of *Illicium verum* which plays an important role in nutrition.

Keywords: *Illicium verum*, acetone, ethyl acetate, TLC

Introduction

Despite of tremendous progress in human health care system, the infectious diseases caused by microorganisms are still a major threat to the public health. Nature has provided an important source of remedies to cure all the ailments of mankind. In the recent years, all the medicines used were from the nature source, especially from the plants. Plants contain hundreds or thousands of metabolites. Medicinal and aromatic plants, a gift of the nature, are being used against various infectious diseases in the world since the past history. Thus the ancient wisdom has been the basis of modern medicine and therapeutics.

Illicium is the sole genus in the family of schisandraceae. It comprises of forty two species of evergreen shrubs and small trees. The species of native is from the tropical and subtropical regions of Eastern and South Eastern Asia, South Eastern North America and the West Indies. The most frequently occurring species are *Illicium dunnianum*, *Illicium graffiti*, *Illicium verum* and *Illicium anisatum*. *Illicium verum* is commonly known as star anise or star aniseed or Chinese star anise (Kumar et al.2012). A common Asian cuisine ingredient, star anise's popularity is steadily growing. It is a spice that closely resembles anise in flavours obtained from the star shaped pericarp of *Illicium verum*. It is a medium sized native evergreen small or medium sized tree of subtropical and temperate regions. *Illicium verum* has been used in a tea as the traditional remedy. They consist of star-shaped fruits, which are reddish-brown in colour and contain 6–8 carpels attached in a whorl arrangement. The shape and size of the carpel is boat-shaped and 10 mm long, also contain a seed. The seeds are brown coloured, ovoid shaped, and possess smooth, shiny, and brittle texture. This plant is propagated by its seeds for its application in different types of medicines, perfume, and as a culinary spice in India, southern China and Vietnam. The fruits are harvested before they ripen, and sun drying is done for further use. Anethole, is the main ingredient found in Star anise, that gives the unrelated anise its flavour, hence it has become a less expensive substitute for anise in baking as well as in liquor production, most distinctively in the production of the liquor Galliano. The fruits are commonly used as a spice, and the seeds are sometimes chewed after the meals to aid the digestion. Star anise has many culinary uses like, enhances the flavour of meat, the major component of *garam masala* and used as a spice in the preparation of *biryani* and *masala chai*. Traditionally, dried seedless fruit is used as incense. It is used for sweet fragrance while preparing butter-salted tea or sugar tea. Besides these properties, it is also gaining importance in the natural health world due to the medicinal values of phytochemicals present in the fruits. These plants have been extensively used for the treatment of infectious diseases in traditional medicine. The fruit consists of essential, as well as volatile oil. Traditionally, the fruit has been used as carminative, digestive, dyspepsia, antispasmodic, stimulant, anti rheumatic, and diuretic. The paste/powder of Star anise is used to treat rheumatism and nostalgia, and is

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also used as an antiseptic. They are also used as medicine to treat cough, toothache, and sinusitis and to improve the strength of local alcohol. The fruit is considered as carminative, stomachic, and galactagogic. It is also used in curing vomiting, abdominal pain, dyspepsia, and food poisoning. There is a growing demand for star anise as a source of shikimic acid for the manufacture of anti-viral drugs widely used in the treatment and prophylaxis of avian flu (commonly bird flu). Shikimic acid is the starting compound utilized for the manufacture of the anti-viral drug oseltamivir. It is also a warming spice that contains powerful terpene antioxidants i.e. Linalool and limonene. Linalool is capable of protecting the lipid bilayer present in the cell membranes, which protects the arteries and improves blood flow. Limonene shows strong anticancer activity within the body. These components also have the property of improving the energy levels and as an expectorant to remediate the mucous associated with bronchitis, asthma, common cold, and whooping cough. Chinese use fruits to treat some skin problems. Star anise has been reported to have antifungal, antibacterial, carminative, analgesic, anticarcinogenic, sedative, and antioxidant properties.

Materials and Methods

Chemicals and reagents Potassium sulphate, Copper sulphate, Boric acid, Sulphuric acid, Chloroform and Sodium hydroxide were purchased from Merck. All chemicals used were of analytical grade.

Extraction procedure

The dried powder samples of *Illicium verum* hook were extracted with water using mechanical shaker for 2 hours. After extraction, it was filtered and used for phytochemical screening. The obtained stock solution was used for phytochemical screening following the methodology of Harborne and Kokate [5,10].

Preliminary phytochemical screening

Test for alkaloids One gram powder samples of *Illicium verum* hook were taken in a conical flask and added ammonia solution (3 mL). It was allowed to stand for few minutes to evaluate free alkaloids. Chloroform (10 mL) was added to the conical flask shaken by hand and then filtered. The chloroform was evaporated from the crude extract by water bath and added Mayer's reagent (3 mL). A cream colour precipitation was obtained immediately that showed the presence of alkaloids.

Test for saponins: About 0.5 g of the plant extract was shaken with water in a test tube and then heated to boil. Frothing was observed which was taken as a preliminary evidence for the presence of the saponin.

Test for tannins : About 0.5 g of extract was added in 10 ml of water in a test tube and filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or blue-black colouration (1).

Test for steroids : 2 ml of acetic anhydride was added to 0.5 g of methanol extract of each sample with 2 ml sulphuric acid. The colour changed from violet to blue or green in some samples indicating the presence of steroids. Marina Paul Das et al /Int.J.Pharm Tech Res.2013, 5(12) 326

Test for flavonoids: The stock solution (1 ml) was taken in a test tube and added few drop of dilute NaOH solution. An intense yellow colour was appeared in the test tube. It became colourless when on addition of a few drop of dilute acid that indicated the presence of flavonoids

Test for anthraquinones : About 0.5 gm of extract was taken in a dry test tube and 5 ml of chloroform was added and shaken for 5 min. The extract was filtered and the filtrate shaken with equal volume of 10% of ammonia solution. A pink violet or red colour in the ammoniac layer indicates the presence of anthraquinones.

Test for cardiac glycosides: 0.2 gm of extract was dissolved in 1 ml of glacial acetic acid containing 1 drop of ferric chloride solution. This was then under layered with 1ml of concentrated sulphuric acid. A brown ring obtained at the interface indicated the presence of a deoxysugar characteristic of cardiods.

Test for Proteins: To 2ml of protein solution 1ml of 40% NaOH solution and 1 to 2 drops of 1% CuSO₄ solution was added. A violet colour indicated the presence of peptide linkage of the molecule.

Test for Amino Acids: To 2ml of sample was added to 2ml of Ninhydrin reagent and kept in water bath for 20 minutes. Appearance of purple colour indicated the presence of amino acids in the sample.

Results And Discussion

The history of natural products used in ancient times and folk medicine around the world is the basis for indicates the presence of anthraquinones. The preliminary phytochemical screening of aqueous extract shown that they contain Alkaloids, steroids, proteins, flavonoids, tannins, and phenolic compounds. However, sensitive phytochemicals were not detected. This could be because as time goes by few phytochemicals might get exhausted. However it was observed that the TPC was found to be very much higher than the flavonoid content. The result of preliminary phytochemical screening is compiled in Table No. 1.

Table 1: Phytochemical analysis of *Illicium verum hook* (Star- anise).

S.No	Phytochemicals	Water
1	Alkaloids	+
2	Flavonoids	+
3	Saponins	+
4	Steroids	+
5	Tannins	+
6	Proteins	++
7	Amino acids	++

(-) indicates absence , (+) indicates presence at good concentration, (++) indicate presence at high concentration.

Discussion

The aqueous extracts revealed that, it contains alkaloids, tannins, saponins, phenols, flavonoids, and steroids compounds. The chemical constituents in the plants or crude extracts are known to be biologically active ingredients. Some chemical constituents are considered as secondary metabolites components. They are directly responsible for different activity such as antioxidant, antimicrobial, antifungal and anticancer [5-6]. Several authors already reported on flavonoids groups exhibited a wide range of biological activities such as antioxidant, anti-inflammatory, antimicrobial, anti-aging, anticancer and anti-allergic [3-5]. Saponins are other type bioactive chemical constituents which are involved in plant disease resistance because of their antimicrobial activity. Tannins are phenolic compound and their derivatives are also considered as primary antioxidants or free radical scavengers. Spices like all other things contain a very wide range of different chemical compounds and show varies in composition and structure. Apart from the obvious inter-specific differences, no two individuals, weather animals or spices are exactly the same or for that matter any two parts. An individual, being largely composed of living tissues which are metabolically active is constantly changing in composition and the rate and extent of such change depends on the physiological role and stage of the organ concerned.

Conclusion

Based on the results, the present investigation conclude that the Star anise contain significant amount of oil, phenols and flavonoids. These constituents may play key role as antioxidant.

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