

BIOLOGICAL ACTIVITY OF GLYCYRRHIZA GLABRA: A REVIEW

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Abstract: *Glycyrrhiza glabra* is a significant traditional plant that is a rich source of medically effective components against several diseases. This plant comes under the Fabaceae family. In Western herbal medicine, licorice is the most used herb. It has been utilized as a source of natural drugs for more than 4000 years. Its use as a medicinal plant is mentioned in many historical books and traditional medicines alone and in combination with other herbs. Usually, its cultivation is seen in the Mediterranean and some specific areas of Asia. Important phytochemical components include glycyrrhizin, liquiritin, iso-liquiritin, flavonoids and many more which is good for the management of respiratory problems, cardioprotective, possess anti-depressant effects, hepatoprotective effects etc.

Key Words: *Glycyrrhiza glabra*, Phytochemical composition, Herbal Medicine, Traditional medicine, hepatoprotective,

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INTRODUCTION

According to ancient medical history, *Glycyrrhiza glabra* (commonly known as licorice) is broadly used as both a flavoring herb and medicine. The most suitable cultivated areas for licorice are Asia and the Mediterranean (a genus that acquire almost 14 species). These are native to countries with warmer temperature in both old and new worlds. In Western herbal medicine licorice is most the used herb. It has been utilized in drugs for more than 4000 years (1).

GEOGRAPHICAL DISTRIBUTION AND HABITAT

Liquorice usually grows at a height of about 2.5 meter and it is a perennial shrub. Leaves of this plant are imparipinnate, alternate, compound containing 4-7 elliptical pairs, lanceolate with oblong leaflets. The flowers are papilionaceous, narrow and lavender to violet in color. The taproot is about 1.5 cm in length and further divides into subsidiary roots approximately 1.25 cm long from which woody stolons arise horizontally. It is found either peeled or unpeeled. Fibrous fracture breaks the root

into pieces exposing the golden-colored anterior with a specific odor and sweet taste Fig 1,2 (2).

TAXONOMICAL CLASSIFICATION

Glycyrrhiza glabra is from the kingdom of Plantae and its Division is Angiosperms. The Class of *Glycyrrhiza glabra* is Dicotyledons and its Order is Fabales of Family Fabaceae. The Genus of this plant is *Glycyrrhiza* and Species is *glabra* (3).

PHYTOCONSTITUENTS

The phytochemical analysis revealed that the root of *Glycyrrhiza glabra* carries the basic constituent glycyrrhizin, the sweetness of licorice component saponin is more than cane sugar, and its almost 60 times. Its flavonoids include liquiritin, isoliquiritin, rhamnoliquiritin & liquiritigenin. The medically potential active part of licorice is their dried root, which is the richest source of flavonoids, important flavonoids isolated from this include shikimeric acid, apioside Glucoliquiritin, A prenyllicoflavone, and 1-methoxy phaseolin. The structures of Glisoflavone, Licoaryl coumarin, Licopyranocoumarin, and new Coumarin GU-

12 were also isolated and determined. From its roots 4 new compounds substituted isoprenoid, constituents of phenol including iso-langoustine A1-methoxy-ficifolinol, lico-riphenone & semilico isoflavone B were also separated (Fig 3 (4)).

PHARMACOLOGICAL ACTIVITY

Charaka suggested that paste of *Picirrhizakurroa* and *Glycyrrhiza glabra* with sugar water could be used as cardio-tonic. Mixture of *Santalum album* and *Glycyrrhiza glabra* powdered with milk was prescribed by Charaka for the cure of hematemesis (5). For the treatment of intrinsic hemorrhage, Sushruta prescribed that 10-gram paste of liquorice is useful. In case of edema a paste of *S. indicum* and *Glycyrrhiza glabra* milk with butter is an effective treatment. For bruises and burns wounds liquorice mixed with butter was applied topically. For erysipelas, decoction of liquorice was useful when applied topically. For the cure of falling and greying of hair, decoction of liquorice root is a very good wash (6). Because of its vast biological activities, this plant species is described in the literature as it is used as expectorant, anti-inflammatory, antitussive, good hormonal effects, detoxifies & give protection to liver. This plant shows profound effects against asthma, bronchitis, arthritis, peptic ulcer, Addison's disease, allergic complaints, and steroid therapy (7). When we observe its external uses, we see that it can be used in shingles, herpes, and eczema. In females, the level of testosterone is reduced by using the extract of *Glycyrrhiza Glabra* which also shows potential efficacy in aplastic anemia. Phytochemical component of Liquorice extract produces both estrogenic and antiestrogenic characteristics also helpful for the management of autoimmune diseases and some viral infection like acquired immune deficiency virus. Consequently, it is considered as significant drug for the cure of hormone related female problems. Its root is added to numerous

formulas and used as an energy tonic especially for stomach and spleen. In genito-urinary disorders roots of *Glycyrrhiza glabra* are used as demulcent, emollient, and laxative. According to various reports liquorice is also used as antibacterial, anti-viral, anti-fungal, anti-diabetic, anti-ulcer, antioxidant, anticancer, antimalarial, anti-thrombotic, anticonvulsant, immune stimulant, expectorant and antiallergenic potentials (8,9). It was also demonstrated that its roots have hepatoprotective, hypotensive, spasmolytic, antidepressant and memory strengthening function. Along with other functions it is also useful in sore throat, coughs, asthma, tonsillitis, hoarseness, hiccup, gout, epilepsy, flatulence, acidity, sexual debility, fever, swellings, skin diseases, jaundice, bleeding, and leucorrhea (10). The oil of these plants effectively cures the condition related to paralysis, epilepsy, rheumatism, and hemorrhagic disorders. It is also utilized in the management of diarrhea (11). It has many other economic properties other than therapeutics such as in the confectionary industry it is also used as food ingredient in sweets and alcohol-free drinks etc. It is also used in tobacco industry. For many proprietary laxatives, liquorice is used as basis, its extracts are also used as flavoring agent in soft drinks, beer, and many pharmaceutical products. In beers and fire extinguishers it is used as foaming agent (12). Several mechanisms run in the body which shows beneficial effects of *Glycyrrhiza Glabra*. Two significant components of liquorice are glycyrrhizin & glycyrrhizic acid possess growth inhibition effects against different viruses including cytomegalovirus, human immune deficiency virus, herpes zoster and simplex, hepatitis A and C viruses. (13, 14). The inhibition of hepatic metabolism of aldosterone and suppression of 5-[beta]-reductase is carried out by glycyrrhizin and its metabolites, these attributes are also cause of well-documented pseudo aldosterone syndrome. Glycyrrhetic and glycyrrhizic acid possess

gluco-corticoid and mineralo-corticoid actions and the hormones which released from the adrenal cortex is almost similar in structure. Steroid like anti-inflammatory characteristics also presents in licorice constituent that is same as the activity of hydrocortisone. The action of an enzyme that is critical to various inflammatory activities, phospholipase A₂, is inhibited which is also a cause of it. All the elements in the inflammatory activity like the inhibition of Cyclooxygenase (COX) action also secondarily suppressing platelet collection and the development of prostaglandin, has been proved by in vitro research. The antioxidant and hepatoprotective attributes are exhibited by licorice constituents. The production of Reactive Oxygen Species (ROS) is suppressed by glycyrrhizin and glabridin with the help of neutrophils at the place where inflammation occurs (15,16). Hispaglabridin A and B, isoflavones of licorice inhibit [Fe.sup.3]- which induced the lipid peroxidation of mitochondria have been proved by in vitro research in rat liver cells. It is also demonstrated by another research due to presence of Glycyrrhizin the level of lipid peroxide in animal models is lowered with the injury of the liver caused by ischemia-reperfusion (17).

In hepatitis patients, serum liver enzyme levels are lowered, and tissue pathology is improved by licorice elements for possessing hepatoprotective action (18).

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Adrenal steroids and glycoside, glycyrrhizin are almost identical in formation and action while glycoside, glycyrrhizin in present in licorice. Licorice is also beneficial in the treatment of arthritis and allergies as it exhibits anti-inflammatory activity same as cortisone. Moreover, there is the utilization of licorice in mild Addison's disease and other kidney diseases. Licorice is also similar in action to the hormone, ACTH which causes water retention, potassium depletion, and sodium retention. Excess utilization of Liquorice can cause muscular weakness, potassium loss, hypertension with edema and increased blood pressure. The intestinal lining is protected by the mild laxative effect of licorice and Deglycyrrhizinated Licorice (DGL) which increase the formation of mucus, therefore relieving ulcers and heartburn. Licorice and Glycyrrhizinate Licorice (DGL) also have been utilized for coughs as they possess demulcent activity (19).

CONCLUSION

Medicinal plants are much cheaper as compared to allopathic medicine. Its use has increased day by day. From ancient times, people use traditional medicine as an effective remedy for the management of health-related issues. It is concluded that licorice is one of the best medicinal plants that has the potential to cure viral and bacterial infections.

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Figure 1: *Glycyrrhiza glabra* plant Figure 2: *Glycyrrhiza glabra* root

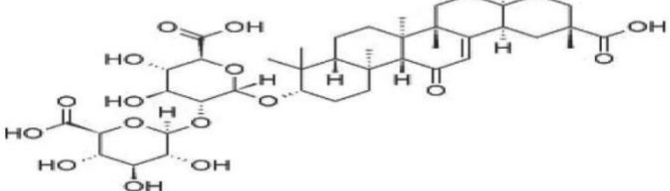
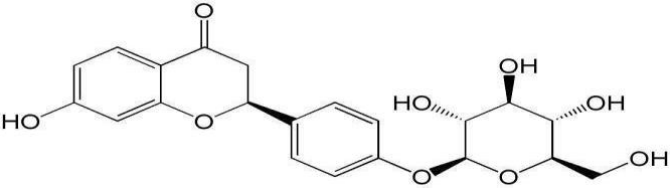
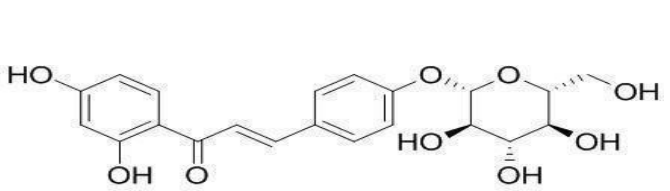
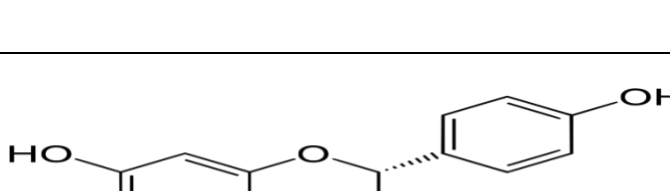
Chemical Constituent	Structure
Glycyrrhizin	
Liquiritin	
Isoliquiritin	
Liquiritigenin	

Figure 3: Structural presentation of chemical constituents present in *Glycyrrhiza glabra*