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Liquorice in Medicine and Dentistry

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ABSTRACT

Ayurvedic medicine is a well known treatment procedure past many years. Glycyrrhiza glabra also known as Liquorice, sweetwood, Mulhatti etc. It has well known properties such as antiviral, glucocorticoid, anti-inflammatory, antioxidant, antiulcerative, anticarcinogenic and many more. Its indications in dentistry are also well noted such as in oral lichen planus, aphthous stomatitis. This herb was tried in the vesiculobullous disorder which is not well recognized. This review portrays the properties, medicinal values such as antiviral, glucocorticoid, Hypocholesterolaemic, antioxidant, toxicities, anticancer, hepatitis, gastric ulcer, hepatocellular carcinoma and dosage of this precious herb.

Keywords: Ayurveda, Liquorice, Deglycyrrhizinated Liquorice, Glycyrrhiza glabra

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INTRODUCTION

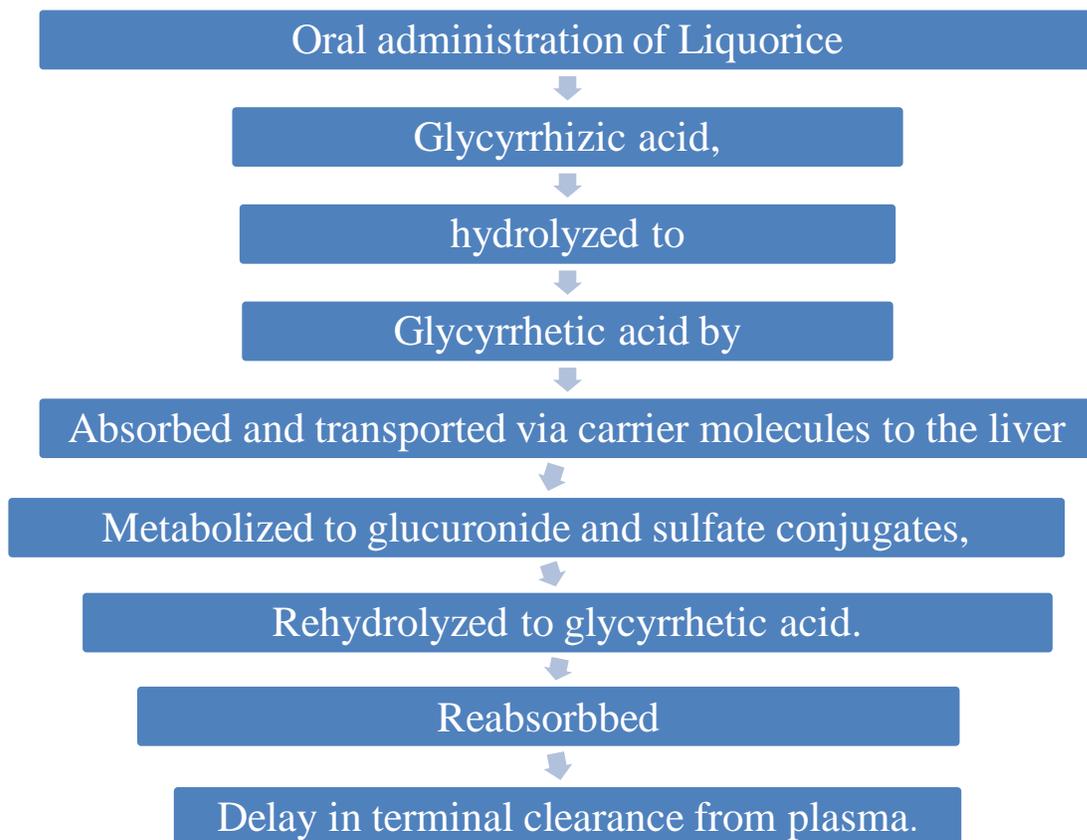
Glycyrrhiza glabra, also known as Liquorice and sweetwood, is native to the Mediterranean and certain areas of Asia. Historically, the dried rhizome and root of this plant were employed medicinally by the Egyptian, Chinese, Greek, Indian, and Roman civilizations as an expectorant and carminative. In modern medicine, Liquorice extracts are often used as a flavoring agent to mask bitter taste in preparations, and as an expectorant in cough and cold preparations. Liquorice extracts have been used for more than 60 years in Japan to treat chronic hepatitis¹.

Glycyrrhiza is derived from the ancient Greek term *glykos*, meaning sweet, and *rhiza*, meaning root².

This review discusses the properties and various medicinal values such as antiviral, glucocorticoid, Hypocholesterolaemic, antioxidant, toxicities, anticancer, hepatitis, gastric ulcer, and hepatocellular carcinoma.

Major chemical constituents:

Constituents that bring about the pharmacological effects of *G. glabra* are *Saponins*, *Flavonoids*, *Alkaloids*, *Tannins*, *Steroids*, etc.



The major constituents are triterpene saponins. *Glycyrrhizin* is generally regarded as the active principle of *G. glabra* and is responsible for its sweetness, which is 50 times more than that of

sucrose. *Glycyrrhizin* (*glycyrrhizic acid*, *glycyrrhizinic acid*) is the major component (2–9%); minor components occur in proportions that vary depending on the species and geographical location. *Glycyrrhizin* occurs as a mixture of potassium and calcium salts. It is a monodesmoside, which on hydrolysis releases two molecules of *D-glucuronic acid* and the aglycone *glycyrrhetic* (*glycyrrhetic*) acid (*enoxolone*). Glabridin, liquiritigenin and Isoliquiritigenin, the lipophilic compounds present in *G. glabra* with comparatively low-molecular weight are likely to be absorbed into blood and distributed to brain according to Lipinski rule of 5³.

PHARMACOKINETICS: (FLOWCHART)

Medicinal applications:

Antiviral:

It has been reported that Liquorice inhibits growth and cytopathology of many unrelated DNA and RNA viruses, while not affecting cell activity or cellular replication. It is found to be effective against Japanese encephalitis virus⁴, Hepatitis A and C, Herpes zoster, HIV, Herpes simplex and CMV⁵.

Glucocorticoid activity:

Glycyrrhizin and its metabolites inhibit hepatic metabolism of aldosterone and suppress 5- β reductase, properties responsible for the well-documented pseudoaldosterone syndrome. The similarity in structure of glycyrrhetic acid to the structure of hormones secreted by the adrenal cortex accounts for the mineralocorticoid and glucocorticoid activity of glycyrrhizic acid⁵.

Anti-inflammatory:

Liquorice constituents also exhibit steroid like anti-inflammatory activity, similar to the action of hydrocortisone due to inhibition of phospholipase A2 activity. *In vitro* research has also demonstrated glycyrrhizic acid inhibits cyclooxygenase activity and prostaglandin formation (Prostaglandin E2) as well as indirectly inhibiting platelet aggregation⁵.

Hypocholesterolaemic and antioxidant effects:

Glycyrrhiza glabra root powder (5 and 10 gm% in diet) was administered to hypercholesterolaemic rats resulted in significant reduction in plasma, hepatic total lipids, cholesterol, triglycerides and plasma low-density lipoprotein and VLDL-cholesterol accompanied by significant increases in HDL-cholesterol levels. Furthermore, significant increases in fecal cholesterol, neutral sterols and bile acid excretion along with an increase in hepatic HMG-CoA reductase activity and bile acid production were observed in these animals. The root powder administration to hypercholesterolaemic rats also decreased hepatic lipid

peroxidation with a concomitant increase in superoxide dismutase (SOD) and catalase activities and total ascorbic acid content⁶.

Anticarcinogenic:

18 β -glycyrrhetic acid is present in higher amounts in the chloroform extract of *Glycyrrhiza glabra* L. (Fabaceae) showed good cytotoxicity against cancerous MCF7 cells (Human Breast cancer).⁷ Contrary to this finding another study in which *Glycyrrhiza glabra* was not a promising anti-cancer plant against the selected cell line by the authors⁸.

Gastric ulcer protectives:

Herbomineral formulation of the Ayurveda medicine consisting of the herbal drugs: *Glycyrrhiza glabra*, *Emblica officinalis* and *Tinospora cordifolia*, was tested for its anti-ulcer activity in rats. Effects were studied on gastric secretion and gastric ulcers in pylorus-ligation and on ethanol-induced gastric mucosal injury. The reduction in ulcer index in both the models along with the reduction in volume and total acidity, and an increase in the pH of gastric fluid was observed⁹.

Chronic Hepatitis

Stronger Neo-Minophagen C (SNMC), a glycyrrhizin preparation, has been shown to significantly lower aspartate transaminase (AST), alanine transaminase (ALT), and gamma-glutamyltransferase (GGT) concentrations, while simultaneously ameliorating histologic evidence of necrosis and inflammatory lesions in the liver¹.

Hepatocellular Carcinoma (HCC)

In a retrospective study four hundred fifty-three patients diagnosed with hepatitis C were given either Licorice, in the form of Stronger Neo-Minophagen C (SNMC) at a dose of 100 mL daily for two months, or other natural treatments, such as vitamin K. After 10 years, analysis of the results showed 30/84 patients (35.7%) employing SNMC had normalized AST levels, compared with seven patients (6.4%) not treated with IV SNMC. Moreover, the 10- and 15-year appearance rate of HCC was 7 and 12 percent in the treated group compared to 12 and 25 percent in the untreated group, respectively. Results showed that HCC and the use of SNMC has confirmed that IV glycyrrhizin not only decreases ALT levels but also improves liver histology and decreases incidence of hepatic cirrhosis¹.

Peptic Ulcer Disease

A study in which Licorice decoction showed a poor protective effect in aspirin-induced gastric ulcers. However, it was significantly effective in the treatment of aspirin-induced gastric ulcers. Authors stated that *Glycyrrhiza glabra* can be used for the treatment of NSAID-induced ulcers as an inexpensive alternative to misoprostol and omeprazole¹⁰.

When a combination of Yashtimadhu and Ashwagandha (*Withania somnifera* Dunal) was given to 91 patients suffering from gastritis, hyperacidity, hypoacidity and peptic ulcer in a clinical trial, it proved to be much beneficial without any untoward side effects¹¹.

Liquorice has been used as an antiulcer agent since early 1970's. The extracted glycyrrhizin, Deglycyrrhizinated Liquorice (DGL) is generally employed for the effective treatment of ulcers. Carbenoxolon from liquorice roots produce the anti-ulcerogenic effect by inhibiting the secretion of gastrin. Liquorice can raise the concentration of prostaglandins in the digestive system that promote mucus secretion from the stomach; it was also reported that liquorice prolongs the life span of surface cells in the stomach and has an anti-pepsin effect².

Oral administration of deglycyrrhizinated Liquorice (380mg 3 times daily) to 169 patients with chronic duodenal ulcers was as effective as antacid or cimetidine treatments. Other unidentified constituents of the herb also contribute to its antiulcer activity. Controlled clinical studies show that glycyrrhizic acid and the aglycone of glycyrrhizic acid accelerate the healing of gastric ulcers¹¹.

Animal study examined and evaluated the ability of liquorice and its derivatives to protect gastric mucosa against aspirin-induced gastric lesions. Aspirin was coated with liquorice or its derivatives and given orally to the animals; the findings showed that liquorice successfully reduced the ratio of gastric ulcer from 96 - 46% and from 96% to 62 - 76% when coated with derivatives¹⁰.

In a study with 66 patients with gastric ulcer were admitted to the study to receive pirenzepine 50 mg three times a day for 6 weeks, carbenoxolone (a component of liquorice) 100 mg/day for 1 week followed by 50 mg tid for the remaining 5 weeks. At the end of the study finally they found that 59% of patients receiving pirenzepine treatment and 52% of patients receiving carbenoxolone were healed. No significant difference was found in healing rates for duodenal ulcers between carbenoxolone and cimetidine when used for short term treatment¹⁰.

USES OF LIQUORICE IN DENTISTRY:

Aphthous Ulcers:

A study evaluated the efficacy of Liquorice bioadhesive hydrogel patches to control the pain and reduce the healing time of recurrent aphthous ulcer. This study was carried out in three episodes of ulcers: in the first episode of ulcer, all 15 patients were asked to record their baseline individual pain level by a visual analog scale. In the second and third episodes, comparative and consecutive subjective and objective evaluations of the bioadhesive were done. Results depicted, Liquorice bioadhesive was found to be effective in the reduction of pain, inflammatory halo and

necrotic center of aphthous ulcers¹².

Oral Lichen Planus:

Glycyrrhizin (GL) was given intravenously who were positive for HCV antibody and HCV RNA, at a dose of 40 ml (0.2% solution) daily, for 4 consecutive weeks. Six (66.7%) of the nine patients given GL improved clinically, suggesting that GL is useful in treating OLP.¹³

Pemphigus:

The oral administration of the powdered root of *Liquorice* in 5 cases of pemphigus, who had been kept free from the bullae with prednisolone, could considerably reduce the dose of prednisolone without the reappearance of the lesions. This appears to be due to its inhibitory effect on the metabolic degradation of prednisolone.¹⁴

Dosage forms¹¹:

Root powder: 3-5 gm

Liquorice liquid extract: 2-4 ml

Toxicity:

The intake of higher doses of *Liquorice* (above 50 g/day) over an extended period may cause sodium retention, hypertension and cardiac complaints.¹¹

Precautions

The drug is contraindicated in patients with a history of hypertension, renal failure and using digitalis preparations. Pregnant or breastfeeding women should not take *Liquorice*. Use of any *Liquorice* product is not recommended for longer than 4 - 6 weeks.¹¹

CONCLUSION

This review clearly labels the medicinal and dental properties of *Glycyrrhiza glabra*. Many researches are being conducted in these ayurvedic herbs which show the diversion of the human search from allopathic to alternative medicines. This doesn't mean that they are ineffective but due to inconclusive or incomplete remedy in many diseases and even the complicated side effects. Even though these herbs have side effects but comparatively minimal. In near future many properties may be revealed due to several research projects.

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