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FILE: Licorice (*Glycyrrhiza glabra*)

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RE: Licorice Monograph

Snow, Joanne M. Monograph: *Glycyrrhiza glabra* L. (Leguminaceae).
The Protocol Journal of Botanical Medicine, Winter 1996, pp. 9-14.

Glycyrrhiza glabra or licorice is a perennial herb found in temperate regions. Commercial licorice is cultivated primarily in Turkey, Greece, and other parts of Asia Minor. The stoloniferous root has been used as a medicine and flavoring agent for over 3,000 years. Licorice is used in Ayurvedic or traditional Indian medicine as a tonic, demulcent, expectorant, diuretic, emmenagogue, and gentle laxative. In Chinese medicine it is used as a tonic, antiinflammatory, mucolytic, expectorant, and analgesic in gastrointestinal disorders. This article examines the research on the active constituents found in licorice.

Licorice contains ten triterpenes, glycyrrhizin and glycyrrhetic acid being the most pharmacologically active; 22 flavonoids; and two coumarins. Research referenced in this monograph found the active constituents in licorice to have antiviral, antiulcer, antiinflammatory, chemoprotective, antihepatotoxic, expectorant, antitussive, and adrenalcorticotropic actions. Therapeutic uses of licorice have included treatment of gastric ulcer, duodenal ulcer, inflammation, hepatitis, and HIV.

Glycyrrhizin is a glycoside, a carbohydrate that yields a sugar and a non-sugar when broken. It tastes 50 times sweeter than sugar and is the major triterpenoid in licorice. Glycyrrhizin stimulates tracheal mucous secretions, making it an effective demulcent and expectorant.

Glycyrrhizin breaks down to glycyrrhetic acid in the digestive tract. Both glycyrrhizin and glycyrrhetic acid exhibit a mineralocorticoid, aldosterone-like action on the body. An overdose can result in hypertension, hypokalemia (low serum potassium), sodium retention, and edema. This effect was seen in healthy patients taking 700–1400 mg of glycyrrhizin per day. (Aldosterone is a mineralocorticoid hormone secreted by the adrenal cortex. Its purpose is to maintain the electrolyte balance in the body. The kidneys release renin, a chemical that converts to angiotensin, which in turn stimulates the adrenal cortex to produce aldosterone.) Licorice has been found to suppress the renin-angiotensin-aldosterone axis.

The pseudo-aldosterone effect of licorice can be used therapeutically in the treatment of postural hypotension caused by diabetic autonomic neuropathy. Three grams of glycyrrhizic acid a day improved symptoms for one study subject. Symptoms returned upon withdrawal of the treatment.

A licorice derivative, deglycyrrhizinated licorice (DGL), has been successfully used in the treatment of peptic ulcers in clinical trials. DGL is free of the mineralocorticoid effects of a previous licorice preparation tested for the same use. Animal studies have shown that DGL lessened mucosal damage induced by aspirin, stimulated proliferation (of healthy cells) in the forestomach, and increased gastric mucosal blood flow. A flavonoid (liquiritin) found in licorice has been shown to prevent HCL-ethanol-induced ulcers in rats.

DGL has been extensively tested in human studies. In a double-blind clinical trial involving 16 patients, DGL reduced the size of ulcer niches by an average of 78 percent. In a study of 40 patients with chronic duodenal ulcers who had been referred for surgery, all participants demonstrated substantial improvement. None of the patients required surgery. In a comparison between cimetidine and DGL, no significant difference was shown in effectiveness between the two drugs. On the other hand, some trials have shown no significant difference between DGL and a placebo. DGL is safe and effective in long-term therapy in patients with healed gastric ulcers.

Many studies confirm the antiinflammatory effects of licorice root. These results are attributed to the steroid-like actions of glycyrrhizin and liquiritin. Glycyrrhetic acid (GA) has shown antiarthritic action similar to hydrocortisone. It also reduced inflammatory levels of serum glutamic pyruvic transaminase (S-GTP) (indicative of liver damage) and serum glutamic oxaloacetic transaminase (S-GOT) [representative of cellular damage].

Clinical studies have shown that glycyrrhizin (GL) potentiates the pharmacological effects of prednisolone, an antiinflammatory corticosteroid. GL appears to inhibit the metabolism of prednisolone, enabling it to remain in the bloodstream for longer periods of time.

Licorice has demonstrated antiviral activity in several studies. Glycyrrhizic (GA) acid has inhibited the growth and cytopathology of unrelated DNA and RNA viruses *in vitro*. Viruses affected by GA were vaccinia, herpes simplex type 1, Newcastle disease, vesicular stomatitis, and Varicella-zoster. Glycyrrhizin has been found to provoke the production of interferon in mice. Interferon is a component of the immune system which increases the activity of natural killer cells that attack viruses. One GL preparation has been effective in the treatment of hepatitis.

Licorice derivatives have been studied for use against the human immunodeficiency virus (HIV). *In vitro*, GL has shown an ability to inhibit HIV plaque formation, specific antigen expression, and cytopathic effects. In one clinical study, three AIDS patients were given 400 to 1600 mg of GL per day. Results involving a specific antigen indicate that GL may have suppressed

the replication of the HIV. Another study found that the antiviral effect of a GA derivative surpassed azidotimidine (AZT). Symptoms (oral candidiasis, lymphnode swelling, rashes), immunological functions, and liver functions improved in 42 HIV positive patients with hemophilia when given a GL preparation.

Other studies have demonstrated the antitumor and antimutagenic effects of licorice derivatives. Glycyrrhetic acid has also shown antihepatotoxic effects.

Toxicological studies indicate that excessive amounts of licorice can produce a mineralocorticoid-like effect leading to hypertension, hypokalemia, sodium retention, edema, and weight gain. Withdrawal of the licorice reverses these symptoms. The author advises a potassium rich, low sodium diet for those on therapeutic doses of licorice. According to this monograph, the use of licorice is contraindicated for patients with hypertension, hypokalemia, cirrhosis of the liver, pregnancy, cholestatic liver disorders, and those on thiazide diuretics.

Recommended dosages include: dried root (1 to 2 grams, 3 times a day), liquid extract (2 to 4 ml, 3 times a day), and deglycyrrhizinised extract (380 to 760 mg, 3 times a day). —*Leela Devi, MSN, RN*