



HerbClip™

Mariann Garner-Wizard
Jennifer Minigh, PhD

Shari Henson
Heather S Oliff, PhD

Brenda Milot, ELS
Marissa Oppel, MS

Executive Editor – Mark Blumenthal

Managing Editor – Lori Glenn

Consulting Editors – Dennis Awang, PhD, Francis Brinker, ND, Steven Foster

Production – Tamarind Reaves, George Solis

FILE: ■ Licorice (*Glycyrrhiza* spp.)

HC 120684-374

Date: April 15, 2009

RE: Review of the Pharmacology of Licorice

Asl MN, Hosseinzadeh H. Review of pharmacological effects of *Glycyrrhiza* sp. and its bioactive compounds. *Phytother Res.* Jun 2008;22(6):709-724.

This article reviews the pharmacology of licorice (*Glycyrrhiza* spp.). Licorice contains triterpenoid saponins, including glycyrrhizin, also known as glycyrrhizic or glycyrrhizinic acid that is 50 times sweeter than sucrose. Other constituents include flavonoids, chalcones, isoflavonoids, coumarins, and stilbenoids. Licorice is commonly available as an extract containing large amounts of glycyrrhizin as its ammonium salt.¹ Traditional uses of licorice include the treatment of peptic ulcer disease, constipation, diabetes, tuberculosis, and coughs.

Glycyrrhizin and other licorice constituents have anti-inflammatory effects. Beta-glycyrrhetic or glycyrrhetic acid, a major metabolite of glycyrrhizin, possesses in vivo anti-inflammatory effects, and research has suggested that complementary therapy with hydrocortisone may be useful in the treatment of inflammatory lung disease. Licorice extracts and constituents have antiviral and antibacterial activities. Constituents of licorice are active against methicillin-resistant *Staphylococcus aureus* (MRSA) and *Helicobacter pylori*. Researchers have demonstrated that glycyrrhizin is active against several viruses: hepatitis A, B, and C viruses, influenza virus, herpes simplex virus, human immunodeficiency virus (HIV), and severe acute respiratory syndrome (SARS) coronavirus. Three licorice species (*Glycyrrhiza glabra*, *G. uralensis*, and *G. inflata*) have antiprotozoal properties. Licorice constituents, including isoflavones and chalcones, have in vitro antioxidant effects. The isoflavone glabridin and other constituents of *G. glabra* protect against the oxidation of low-density lipoprotein (LDL) cholesterol. Glabridin also inhibits serotonin reuptake and an aqueous *G. glabra* extract has antidepressant effects. Other central nervous system activities of licorice shown in pre-clinical studies include memory enhancement, anticonvulsant, sedative, and muscle relaxant properties. Licorice has antiplatelet activity, and glycyrrhizin is identified as a thrombin inhibitor. Isoliquiritigenin from licorice possesses vasorelaxant effects. Glabridin from licorice has estrogen-like properties and may be useful in the prevention of cardiovascular disease in postmenopausal

women. Glycyrrhizin and glycyrrhetic acid possess immunomodulatory activities. Pre-clinical studies have also demonstrated that licorice and licorice constituents possess hepatoprotective, renal protective, antitumor, cytotoxic, antitussive, and skin depigmentation effects.

Clinical studies have shown that licorice in combination with other ingredients can heal gastric ulcers. Two derivatives of glycyrrhetic acid, carbenoxolone and enoxolone, are used to treat peptic ulcer disease, gastroesophageal reflux, mouth ulcers, and other gastrointestinal disorders. Glycyrrhizic acid is used intravenously in the treatment of chronic hepatitis B and C. Clinical studies have demonstrated that it decreases aminotransferase levels in chronic hepatitis patients. Glycyrrhizin has been shown to prevent hepatocellular carcinoma in patients with chronic hepatitis C. It is often used to treat patients with liver damage who do not respond to other treatments. Clinical studies have found that topical licorice gel treats atopic dermatitis. The licorice compounds glycyrrhizic acid and liquiritin have skin whitening and depigmentation effects. Clinical studies have also demonstrated licorice's endocrine effects. Licorice has been shown to decrease testosterone levels in both men and women, which can induce ovulation in hyperandrogenic women. Isoliquiritigenin, glabrene, and glabridin are phytoestrogens isolated from licorice. They may help to prevent diseases associated with low estrogen levels in women. Although licorice is used to treat menopausal complaints in traditional Chinese medicine, there is currently no clinical evidence that licorice reduces hot flashes. Licorice soothes oral and throat mucosa and dry coughs. Ammonium glycyrrhizate from licorice is used to treat periodontal disease in toothpastes and other products.

Licorice is added as a sweetener to chewing gum, chocolate, candy, cigarettes, and other products. It is also used to hide the bitter taste of some medications. The consumption of large amounts of licorice can cause hypertension and hypokalemia. Other reported adverse side effects of licorice include headache, tachycardia, cardiac arrest, edema, renal failure, and muscle weakness. Glycyrrhizin is metabolized into glycyrrhetic acid in the intestines. Other licorice constituents may affect the metabolism of glycyrrhizin and glycyrrhetic acid. Chronic ingestion of licorice can affect the metabolism of some drugs due to induction of cytochrome P450. Licorice consumption is contraindicated during pregnancy, for patients with hypokalemia and liver disorders, and those taking cardiac glycoside drugs.

The authors conclude that more research is needed to confirm the efficacy of licorice and its constituents in the treatment of cancer, atherosclerosis, immunodeficiency, endocrine disorders, skin diseases, and other illnesses.

—*Marissa Oppel, MS*

Reference

1. Leung AY, Foster S. *Encyclopedia of Common Natural Ingredients Used in Food, Drugs and Cosmetics*. 2nd Edition, 1996, New York: John Wiley & Sons, Inc.

The American Botanical Council has chosen not to include the original article.

The American Botanical Council provides this review as an educational service. By providing this service, ABC does not warrant that the data is accurate and correct, nor does distribution of the article constitute any endorsement of the information contained or of the views of the authors.

ABC does not authorize the copying or use of the original articles. Reproduction of the reviews is allowed on a limited basis for students, colleagues, employees and/or members. Other uses and distribution require prior approval from ABC.