Licorice

Glycyrrhiza glabra

BOTANICAL FAMILY: Fabaceae/Leguminosae

PARTS USED: Root

OTHER COMMON NAMES: Liquorice, sweet root, gancao (Chinese), kanzo (Japanese), yashtimadhu (Sanskrit)

OVERVIEW

Licorice has a long history of medicinal use, being used by the ancient Egyptians, Greeks and Chinese. The genus name Glycyrrhiza is from the Greek meaning “sweet root”, due to the presence of the intensely sweet saponin glycyrrhizin. This sweetness has led to Licorice being used in the food industry, particularly in confectionary, and in the tobacco industry. Today, Licorice is widely used by herbalists in the west, as well as the Chinese, Ayurvedic and Kampo traditions.

Constituents	Triterpenoid saponins, particularly glycyrrhizin (GL) and glycyrrhizic acid Glycyrrhetic acid (GA) Flavonoids, flavanones including liquiritin, chalcones, and isoflavonoids including glabridin, glabrone and formononetin Sterols, coumarins, fatty acids, phenolics and arabinogalactans
Major Actions	Anti-inflammatory, mucoprotective, adrenal tonic
Other Actions	Expectorant, demulcent, laxative (mild), anticariogenic, antiviral, antitussive, hepatoprotective, spasmolytic
Indications	Cough, bronchitis; Sore throat, mouth ulcers (topically); Gastritis, peptic ulcer, indigestion, functional dyspepsia; Cystitis, urinary tract inflammation; Adrenal insufficiency, Addison’s disease, corticosteroid withdrawal; Insulin resistance, type II diabetes, metabolic syndrome; Polycystic ovarian syndrome, menopausal symptoms.
Applications	Practitioners can consider prescribing Licorice in the context of: Relieving inflammation and irritation of the respiratory tract; Relieving inflammation and irritation of the gastrointestinal tract; Relieving inflammation and irritation of the urinary tract; Increasing serum cortisol; Supporting metabolic health; Modulating female hormones; Harmonising herbal blends; As a flavouring for herbal blends.
Preparations	Liquid extract 1:1/20% ethanol or tablet

OVERVIEW

Traditional Use	In the west, the Eclectics traditionally used Licorice for its soothing properties on the mucous membranes of the urinary, digestive and respiratory tracts. In Traditional Chinese Medicine, Licorice tonifies the spleen, benefits the qi, moistens the lungs, clears heat, detoxifies fire poison and soothes spasms. It also harmonises and moderates other herbs and is used as an antidote for many toxins. In Ayurvedic medice, Licorice is used as a tonic, and to treat eye diseases, throat infections, peptic ulcer, genitourinary tract inflammation, constipation and arthritis.

SUMMARY OF RESEARCH

Clinical Studies

Gastrointestinal Effects	In a randomised controlled trial, patients with functional dyspepsia were given deglycyrrhinised Licorice (DGL) extract 150 mg per day for 30 days. The treatment group had a significant reduction in symptom scores at day 15 and day 30 compared to the placebo group.[2]
	Several well controlled clinical trials have found that DGL extract is equally as effective as the pharmaceutical medications carbenoxolone, cimetidine and ranitidine in healing gastric and duodenal ulcers.[3-5]
Metabolic Effects	A small cross-over design trial found that DGL extract moderately reduced LDL cholesterol and triglycerides, and improved the resistance of LDL to atherogenic modification.[6]
	In a small study, healthy volunteers consumed Licorice daily for 2 months, and their anthropomorphic measurements were monitored. Participants had a significant reduction in body fat percentage, with no change in body mass index.[7] A second study found that Licorice supplementation in an overweight population prevented weight gain, specifically by preventing an increase in body fat, compared to placebo.[8]
Hyperandrogenism	A small uncontrolled trial investigated the effects of Licorice plus *Paeonia lactiflora* in eight women with hyperandrogenism, oligomenorrhoea and infertility. After eight weeks, seven of the women had normalised testosterone levels, six were ovulating regularly and two had fallen pregnant.[9]
	In an uncontrolled trial, 34 women with polycystic ovarian syndrome (PCOS) were given Licorice plus Paeonia daily for 24 weeks. After four weeks, testosterone levels were significantly reduced. After 24 weeks, LH to FSH ratio was significantly lower.[10]
Menopausal Symptoms	A comparison trial found that Licorice was equally as effective as hormone replacement therapy (HRT) in reducing hot flushes in post-menopausal women.[11]
Hyper-prolactinaemia	A crossover trial found that Licorice counteracted hyperprolactinaemia induced by the antipsychotic risperidone, with a similar efficacy to the standard treatment bromocriptine.[12]
Chronic Viral Infections	An uncontrolled study in 112 patients with HIV/AIDS found that Licorice supplementation for 3-6 months improved immunological parameters, including T4 to T8 ratios and T4 counts.[13] A second study found that glycyrryrrhizin daily for 3-7 years helped maintain white cell counts compared to controls who had significant decreases in white cell counts.[14]
	A meta-analysis involving 1093 patients with chronic hepatitis C found that treatment with an intravenous glycyrrhizin preparation significantly reduced the risk of developing subsequent hepatocellular carcinoma.[15]
Addison's Disease	Early research found that Licorice extract had a significant benefit in maintaining electrolyte balance in patients with Addison's Disease, and had a synergistic effect with cortisone when they were prescribed together.[16]

SUMMARY OF RESEARCH

Topical Use	Several trials have demonstrated that Licorice has a significant healing effect for apthous stomatitis/mouth ulcers when applied topically.[17-19] Some patients experienced significant improvements in as little as a single day.[17]
	A 2% Licorice topical gel significantly reduced scores for erythema, itching and oedema after two weeks in patients with atopic dermatitis.[20]
	A randomised controlled trial found that a Licorice gargle significantly reduced post-operative sore throat and cough in patients undergoing intubation during surgery compared to placebo.[21]
Experimental Studies	
Antiulcer Activity	*In vitro* studies have shown that Licorice extracts can inhibit the growth of the pro-ulcerogenic bacteria *Helicobacter pylori*,[22,23] and inhibits its adherence to gastric mucosa.[24,25]
	An animal study found Licorice was equally as effective as omeprazole and misoprostol in the treatment of aspirin-induced gastric ulcers in rats.[26]
Anti-Inflammatory Effects	*In vitro* studies show Licorice extract can inhibit the production of inflammatory mediators from both the cyclooxygenase (COX) and 5-lipoxygenase (LOX) pathways.[27]
	An animal study found that Licorice had anti-inflammatory effects comparable to hydrocortisone in rats with experimentally-induced arthritis.[28] Another study found Licorice had similar anti-inflammatory activity to diclofenac in carrageenan-induced paw oedema.[29]
	Topical application of a 5% GL solution had comparable efficacy to a 1% dexamethasone cortisone cream in an experimental study.[30]
Steroid Metabolism	Experimental studies show Licorice inhibits the enzyme 11-β-hydroxysteroid dehydrogenase, which converts cortisol into inactive cortisone. This leads to an increase in serum cortisol levels, and therefore greater stimulation of the glucocorticoid receptors as well as a mineralocorticoid effect in the kidney. GA given to healthy young adults led to a significant increase in urinary free cortisol excretion, and markedly decreased levels of plasma and urinary cortisone.[31]
Hepatoprotective Activity	Animal studies have found that Licorice can significantly attenuate toxin-induced liver damage, primarily through antioxidant and anti-inflammatory activity.[32,33]
	A review noted that intravenous GL can reduce hepatocellular damage from chronic hepatitis B and C.[34]
Antimicrobial Activity	*In vitro* and *in vivo* studies show that Licorice has antiviral activity against a range of viruses including herpes viruses, encephalitis, influenza A, human immunodeficiency virus (HIV), sudden acute respiratory syndrome (SARS) virus, arborviruses and vaccinia virus.[34] Mechanisms include induction of interferon-γ, inhibition of viral uptake, and reduced viral latency.
	Licorice and its constituents have been shown to inhibit the growth of various pathogens, including *Plasmodium falciparum*,[35] *Streptococcus mutans*,[36] *Porphyromonas gingivalis*[37] and methicillin-resistant *Staphylococcus aureus*.[38]
Neurocognitive Effects	Oral Licorice enhanced memory and learning in mouse[39] and rat[40] models.
	Licorice has been shown to reduce neurotoxicity associated with glutamate,[41] cocaine[42] and hypoxia[43] in animal studies.
	In an animal model, Licorice exerted a significant antidepressant effect comparable to imipramine and fluoxetine. Brain norepinephrine and dopamine increased, while brain serotonin levels were unchanged. This suggests that Licorice may have a monoamine oxidase inhibiting effect.[44]
Metabolic Effects	In three animal trials, Licorice supplementation significantly improved lipid parameters, reducing total cholesterol, LDL cholesterol and triglycerides and increasing HDL cholesterol in hypercholesterolaemic rodents.[45-47] Blood glucose levels and insulin resistance measures were also improved.[47]
Respiratory Effects	In a mouse model of asthma, GL significantly inhibited allergen-induced airway restriction, lung inflammation and eosinophil infiltration and allergen-specific immunoglobulin E levels.[48] In guinea pigs, constituents from Licorice significantly inhibited capsaicin-induced cough at one and four hours post administration.[49]

SAFETY PROFILE

Drug Interactions	**Contraindicated** alongside digoxin and cardiac glycosides, due to increased risk of cardiotoxicity. **Contraindicated** alongside cyclosporine due to reduced drug efficacy. Not recommended alongside any medication that increases potassium loss, including blood pressure medications, diuretics and laxatives due to increased risk of hypokalaemia. Not recommended alongside corticosteroids due to additional mineralocorticoid effects, although it may be used cautiously during corticosteroid withdrawal. Not recommended alongside lithium, due to increased risk of drug toxicity. Not recommended alongside methotrexate, due to increased risk of drug toxicity. Use cautiously alongside medications metabolised by CYP3A4, including hormonal contraceptives, due to potential reduced drug effects.
Cautions	Assess patient's blood pressure and medications prior to prescribing Licorice. Use cautiously in elderly patients. If using higher doses long term, the patient should be placed on a high potassium, low sodium diet and their blood pressure monitored regularly. High doses should be avoided long term.
Contraindications	Contraindicated in cholestatic liver disorders, liver cirrhosis, hypertension, hypokalaemia and kidney insufficiency, oedema, congestive heart failure and anorexia nervosa due to the potentiation of potassium depletion.
Adverse Events	Chronic use of high dose Licorice can cause hypokalaemia and psuedoaldosteronism, characterised by hypertension, oedema, myopathy and cardiomyopathy.
Pregnancy	High doses associated with increased risk of premature delivery, elevated cortisol in infants and poor cognitive performance in children. **Contraindicated** in women with hypertension or preeclampsia.
Lactation	Caution. Use short term, low doses only
Children (3-12 years)	Caution. Use short term, low doses only.

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