

Clinical Studies on Licorice (*Glycyrrhiza* spp.)

Ulcers

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Das <i>et al.</i> , 1989	Aphthous ulcer	O, U n=20	2 weeks	Mouthwash with 200 mg DGL extract solution, 4x/day	DGL powdered extract dissolved in 200 ml warm water (brand not stated)	15 of 20 (75%) experienced 50–75% improvement within 1 day followed by complete healing of ulcers by 3rd day.
Kassir, 1985	Chronic duodenal ulceration	Cm, R n=874 (169 in Caved-S® group)	3 months	380 mg tablet 3x/day	Caved-S® tablet (380 mg DGL extract) vs. antacid (AL-Mg hydroxide equivalent) vs. cimetidine vs. Gefarnate	At 6 weeks a highly significant difference ($p < 0.01$) in favor of antacid, but at 12 weeks no significant difference ($p > 0.05$) among the 4 groups. There were fewer relapses in the DGL group compared to the 3 other treatments.
Morgan <i>et al.</i> , 1985	Benign gastric ulcer	SB, C, R, Cm n=82	3 months healing study continued as 2-year maintenance study	Two, 380 mg DGL extract tablets plus antacid combination chewed between meals 3x/day vs. cimetidine (200 mg 3x daily and 400 mg at bedtime)	Caved-S® containing 380 mg DGL extract per tablet vs. cimetidine	No significant difference between 2 drug regimens. After ulcer healing, drug dosage was reduced. After one year of maintenance therapy, there were 4 ulcer recurrences in each group. After second year, recurrence rate was 29% in Caved-S® group and 25% in cimetidine group. Authors conclude that long-term maintenance therapy is safe and reasonably effective.

Other

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Strandberg <i>et al.</i> , 2001	Birth effects	O n=1,049 questionnaires distributed in the hospital and review of maternity records	9 months	Glycyrrhizin levels from licorice consumption grouped into 3 levels: low (<250 mg/week; n=751), moderate (250–499 mg/week; n=145) and heavy (≥ 500 mg/wk; n=110)	Brand not stated	Heavy exposure to glycyrrhizin (<500 mg/wk) did not affect birth weight, but did double the risk of birth before 38 weeks.
Armanini <i>et al.</i> , 1999	Gonadal function	O n=7 healthy men (ages 22–24 years)	1 week treatment followed by 4 days of no treatment	7 g licorice root extract/day (500 mg glycyrrhizin)	Saila licorice root tablets	Serum testosterone concentrations decreased and serum 17-hydroxy-progesterone concentrations increased during treatment period. Authors concluded that men with decreased libido or other sexual dysfunction should be cautioned about licorice ingestion.
Palagina <i>et al.</i> , 1999	Pulmonary metabolism during radiotherapy in women ages 20–40 years with breast cancer Stage I–II	Cm n=25 women with breast cancer Stage I–II	2 weeks	Not available	Ural licorice extract (brand not stated)	Administration of licorice promoted inactivation of lipid peroxidation and maintenance of most biochemical parameters on baseline level. It is speculated that this effect is due to licorice components with antioxidant and lung surfactant synthesis stimulant actions. Authors conclude that licorice extract is promising for prevention of radiation complications in lungs during radiotherapy in chest area.

KEY: C – controlled, CC – case-control, CH – cohort, CI – confidence interval, Cm – comparison, CO – crossover, CS – cross-sectional, DB – double-blind, E – epidemiological, LC – longitudinal cohort, MA – meta-analysis, MC – multi-center, n – number of patients, O – open, OB – observational, OL – open label, OR – odds ratio, P – prospective, PB – patient-blind, PC – placebo-controlled, PG – parallel group, PS – pilot study, R – randomized, RC – reference-controlled, RCS – retrospective cross-sectional, RS – retrospective, S – surveillance, SB – single-blind, SC – single-center, U – uncontrolled, UP – unpublished, VC – vehicle-controlled.

Clinical Studies on Licorice (*Glycyrrhiza* spp.) (cont.)

Other (cont.)

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Arase et al., 1997	Chemo-prevention	RS, Cm n=453 patients with hepatitis C (84 in SNMC group)	16 years (median, 10.1 years)	100 ml/day intravenous first 8 weeks, followed by 2-7x/week for 2-16 years	Stronger Neo-Minophagen-C (SNMC) providing 0.2% glycyrrhizin, 0.1% cysteine, and 2.0% glycine in physiologic saline	After 10 years, cumulative incidence of hepatocellular carcinoma (HCC) was 7% in SNMC group and 12% for non-treatment group. After 15 years, cumulative incidences were 12% and 25%, respectively. Statistically significant reduction in serum alanine aminotransferase (ALT) levels was reported in 34 of 84 patients (35.7%) in treatment group. HCC in 30 patients with normal ALT levels was slightly lower than the 54 remaining patients with higher ALT scores (p=0.08). An increase in blood pressure was noted in 3 of 84 patients. Authors concluded that long-term administration of SNMC in patients with chronic HCC is effective in reducing risk of liver carcinogenesis.
Fuhrman et al., 1997	Antioxidant action	PC (ex vivo assay) n=20 healthy male volunteers	2 weeks	100 mg DGL extract/day	DGL extract in softgel capsule (brand not stated)	In licorice group, 44% reduction in lipid peroxides formed per mg of LDL cholesterol after exposure of plasma to copper sulfate ex vivo, and 36% reduction after exposure to water-soluble free radical generator, vs. no significant changes observed in plasma of placebo group.
Armanini et al., 1996	Pseudohyperaldosteronism	O n=6 male volunteers	1 week	7g licorice root extract/day (500 mg glycyrrhizin)	Saila licorice root tablets	Pseudohyperaldosteronism occurred during treatment period. Ratio of tetrahydrocortisol + allo tetrahydrocortisol to tetrahydrocortisone in urine increased in 5 cases after 3 days without increase of plasma mineralocorticoid activity. Authors concluded that pseudohyperaldosteronism is due to decreased activity of 11-β-hydroxysteroid-dehydrogenase and in some cases a direct effect on mineralocorticoid receptors.
Acharya et al., 1993	Subacute hepatic failure	O n=18	3 months	40 or 100 ml/day intravenous first 30 days, followed by 3x/week for 8 weeks	Stronger Neo-Minophagen-C (SNMC) providing 0.2% glycyrrhizin, 0.1% cysteine, and 2.0% glycine in physiologic saline	Survival rate was 72.2% compared to reported rate of 31.1% in 98 patients who received supportive therapy (p<0.01). Authors concluded that further studies are necessary to standardize the dose and duration of therapy with SNMC in subacute hepatic failure.

KEY: C – controlled, CC – case-control, CH – cohort, CI – confidence interval, Cm – comparison, CO – crossover, CS – cross-sectional, DB – double-blind, E – epidemiological, LC – longitudinal cohort, MA – meta-analysis, MC – multi-center, n – number of patients, O – open, OB – observational, OL – open label, OR – odds ratio, P – prospective, PB – patient-blind, PC – placebo-controlled, PG – parallel group, PS – pilot study, R – randomized, RC – reference-controlled, RCS – retrospective cross-sectional, RS – retrospective, S – surveillance, SB – single-blind, SC – single-center, U – uncontrolled, UP – unpublished, VC – vehicle-controlled.