

Pleurisy Root

Species (Family)

Asclepias tuberosa L. (Asclepiadaceae)

Synonym(s)

Asclepias

Part(s) Used

Root

Pharmacopoeial and Other Monographs

BHP 1983^(G7)

PDR for Herbal Medicines 2nd edition^(G36)

Legal Category (Licensed Products)

GSL^(G37)

Constituents^(G48,G64)

Little chemical information is available for pleurisy root. Cardiac glycosides of the cardenolide type (e.g. afroside, asclepin, calactin, calotropin, gomphoside, syriogenin, syrioxide, uscharidin, uscharin and uzarigenin) have been documented for many *Asclepias* species,⁽¹⁻⁴⁾ including *A. tuberosa*.⁽⁵⁾ Concentrations of cardiac glycosides are reported to vary between *Asclepias* species⁽¹⁾ and individual plant parts,⁽⁴⁾ in descending order of latex, stem, leaf and root.⁽⁶⁾

No other data regarding constituents of the root were located.

Other plant parts Constituents documented for the herb include flavonols (e.g. kaempferol and quercetin) and flavonol glycosides (e.g. rutin and isorhamnetin), amino acids, caffeic acid, chlorogenic acid, choline, carbohydrates (e.g. glucose, fructose and sucrose), β -sitosterol, triterpenes (e.g. α -amyrin and β -amyrin, lupeol, friedelin, viburnitol), volatile oil and resin.^(7,8,G48)

Food Use

Pleurisy root is not used in foods.

Herbal Use

Pleurisy root is stated to possess diaphoretic, expectorant, antispasmodic and carminative properties. It has been used for bronchitis, pneumonitis, influenza, and specifically for pleurisy.^(G7,G42,G64)

Dosage

Dried root 1–4 g or by infusion three times daily.^(G7)

Liquid extract 1–4 mL (1:1 in 45% alcohol) three times daily.^(G7)

Tincture 1–5 mL (1:10 in 45% alcohol) three times daily.^(G7)

Pharmacological Actions

In vitro and animal studies

Low doses of extracts of *Asclepias* species including *A. tuberosa* have been documented to cause uterine contractions (*in vivo*) and to exhibit oestrogenic effects.^(5,9,10,G30) No effect was observed on blood pressure or respiration (*in vivo*), or on the isolated heart (frog, turtle).⁽⁹⁾ Various activities have been reported for related *Asclepias* species. A positive inotropic action (*in vivo* and *in vitro*) has been reported for asclepin (*Asclepias curassavica*), which was found to be more potent, longer acting and with a wider safety margin when compared with other cardiac glycosides (including digoxin).⁽¹¹⁻¹³⁾ Asclepin was also reported to exhibit a more powerful activity towards weak cardiac muscle.⁽¹³⁾ Plant extracts of *A. curassavica*, *Asclepias engelmanniana* and *Asclepias glaucescens* have exhibited a stimulatory effect on the mammalian CNS, causing an increase in serotonin and noradrenaline concentrations.⁽¹⁴⁾

Antitumour/cytotoxic activities have been documented for *A. albicans* and were attributed to various cardenolide constituents.⁽¹⁵⁾

Side-effects, Toxicity

Pleurisy root and other *Asclepias* species have been documented to cause dermatitis; the milky latex is reported to be irritant.^(G51) Large doses may cause nausea, vomiting and diarrhoea.^(G7,G42) Various *Asclepias* species, including *A. tuberosa*, are known

to be toxic to livestock, with cardenolides implicated as the toxic constituents.^(1,5) Toxic effects on the lungs, gastrointestinal tract, kidneys, brain and spinal cord have been observed in rats and rabbits following intravenous administration of an alcoholic extract.⁽¹⁰⁾

Toxicity studies involving related *Asclepias* species have also been documented. The cardenolide fraction of *Asclepias eriocarpa* is reported to contain toxic principles. The whole plant, plant extracts, an isolated and purified cardenolide (labriformin) and digoxin were all found to show qualitatively similar signs of toxicity and gross pathology in sheep and guinea-pigs.⁽¹⁶⁾ LD₅₀ values (mice, intraperitoneal injection) for cardenolides obtained from *A. curassavica* and *A. eriocarpa* were all estimated at less than 50 mg/kg body weight. Asclepin (*A. curassavica*) was reported to be safe following a three-month toxicity study in rats, using doses of 0.8, 8 and 20 mg/kg (route unspecified).⁽¹³⁾ Asclepin has also been documented to have a wider margin of safety than digoxin⁽¹¹⁻¹³⁾ (see *In vitro* and animal studies).

Studies in cats have reported asclepin to be less cumulative compared to digoxin.⁽¹³⁾

Contra-indications, Warnings

Pleurisy root may interfere with existing cardiac drug therapy. Excessive doses of pleurisy root may interfere with drug therapies that affect amine concentrations in the brain (e.g. antidepressants) and with hormonal therapy.

Pregnancy and lactation Uterotonic activity (*in vivo*) has been reported for pleurisy root.^(5,G30) In view of this and the potential toxicity of pleurisy root, it is best avoided during pregnancy or lactation.

Pharmaceutical Comment

The chemistry of pleurisy root is poorly documented, but phytochemical studies on pleurisy root and related *Asclepias* species have identified many cardiac glycoside constituents. No scientific evidence was found to justify the herbal uses. In view of the potential toxicity of pleurisy root, excessive use is not recommended.

References

See also General References G7, G30, G36, G37, G42, G48, G51 and G64.

- 1 Seiber JN *et al.* New cardiac glycosides (cardenolides) from *Asclepias* species. *Proceedings of the Australia/USA Poisonous Plants Symposium. Plant Toxicol* 1985; 427-437.
- 2 Radford DJ *et al.* Naturally occurring cardiac glycosides. *Med J Aust* 1986; 144: P540-544.
- 3 Jolad SD *et al.* Cardenolides and a lignan from *Asclepias subulata*. *Phytochemistry* 1986; 25: 2581-2590.
- 4 Seiber JN *et al.* Cardenolides in the latex and leaves of seven *Asclepias* species and *Calotropis procera*. *Phytochemistry* 1982; 21: 2343-2348.
- 5 Conway GA, Slocumb JC. Plants used as abortifacients and emmenagogues by Spanish New Mexicans. *J Ethnopharmacol* 1979; 1: 241-261.
- 6 Duffey SS, Scudder GGE. Cardiac glycosides in North American Asclepiadaceae, a basis for unpalatability in brightly coloured Hemiptera and Coleoptera. *J Insect Physiol* 1972; 18: 63-78.
- 7 Nelson CJ *et al.* Seasonal and intraplant variation of cardenolide content in the California milkweed *Asclepias eriocarpa* and implications for plant defense. *J Chem Ecol* 1981; 7: 981-1010.
- 8 Pagani F. Plant constituents of *Asclepias tuberosa* (Asclepiadaceae). *Boll Chim Farm* 1975; 114: 450-456.
- 9 Costello CH, Butler CL. The estrogenic and uterine-stimulating activity of *Asclepias tuberosa*. *J Am Pharm Assoc Sci Educ* 1949; 39: 233-237.
- 10 Hassan WE, Reed HL. Studies on species of *Asclepias* VI. Toxicology, pathology and pharmacology. *J Am Pharm Assoc Sci Educ* 1952; 41: 298-300.
- 11 Patnaik GK, Dhawan BN. Pharmacological investigations on asclepin - a new cardenolide from *Asclepius curassavica*. Part I. Cardiotoxic activity and acute toxicity. *Arzneimittelforschung* 1978; 28: 1095-1099.
- 12 Patnaik GK, Koehler E. Comparative studies on the inotropic and toxic effects of asclepin, g-strophanthin, digoxin and digitoxin. *Arzneimittelforschung* 1978; 28: 1368-1372.
- 13 Dhawan BN, Patnaik GK. Investigation on some new cardioactive glycosides. *Indian Drugs* 1985; 22: 285-290.
- 14 Del Pilar Alvarez Pellitero M. Pharmacological action of medicinal plants in the nervous system. *An Inst Farmacol Espan* 1971; 20: 299-387.
- 15 Koike K *et al.* Potential anticancer agents. V. Cardiac glycosides of *Asclepias albicans* (Asclepiadaceae). *Chem Pharm Bull* 1980; 28: 401-405.
- 16 Benson JM *et al.* Comparative toxicology of cardiac glycosides from the milkweed *Asclepias eriocarpa*. *Toxicol Appl Pharmacol* 1977; 41: 131-132.