Borage

Species (Family)

Borago officinalis L. (Boraginaceae)

Synonym(s)

Beebread, Bee Plant, Burrage, Starflower (oil)

Part(s) Used

Herb

Pharmacopoeial and Other Monographs

Martindale 32nd edition[G43]
PDR for Herbal Medicines 2nd edition[G36]

Legal Category (Licensed Product)

Borage is not included in the GSL.[G37]

Constituents[G22,G64]

Alkaloids Pyrrolizidine-type. Lycopsamine, intermedine, acetyllycopsamine, acetylintermedine, amabiline, supinine and thesinine (unsaturated).[1,2] Concentrations reported as 0.01% and 2–10 ppm for commercial dried samples. Alkaloid concentrations reportedly the same for fresh and dried samples; fresh samples revealed alkaloids as the free base in the roots and mainly as *N*-oxides in the leaves.

Mucilages 11.1%. Yielding glucose, galactose and arabinose.

Oil Rich in fatty acids, in particular gamolenic acid.

Other constituents Acids (acetic, lactic, malic, silicic), cyanogenetic compounds and tannins (up to 3%).

Food Use

Borage is occasionally used in salads and soups.

Herbal Use[G64]

Borage is stated to possess diaphoretic, expectorant, tonic, anti-inflammatory and galactogogue properties.[3] Traditionally, borage has been used to treat many ailments including fevers, coughs and depression.[3,G42] Borage is also reputed to act as a restorative agent on the adrenal cortex.[3] Borage oil (starflower oil) is used as an alternative source to evening primrose oil for gamolenic acid.

Dosage

Infusion Two 5-mL spoonfuls of dried herb to one cup boiling water three times daily.[3]

Tincture 1–4 mL three times daily.[3]

Pharmacological Actions

In vitro and animal studies

Borage oil has been reported to attenuate cardiovascular reactivity to stress in rats.[4]

Clinical studies

The effect of borage seed oil on the cardiovascular reactivity of humans to acute stress has been studied in 10 individuals, who each received a total daily dose of 1.3 g for 28 days.[4] The individuals were required to undertake an acute psychological task requiring sensory intake and vigilance (Stroop colour test). Borage oil was found to attenuate cardiovascular reactivity to stress, indicated by a reduction in systolic blood pressure and heart rate and by increased task performance. The specific mechanisms by which borage exerts this effect were unknown but a central mechanism of action of the fatty acids was suggested in view of the simultaneous reduction in heart rate and blood pressure.[4]

Side-effects, Toxicity

No side-effects of borage have been identified. Borage contains low concentrations of unsaturated pyrrolizidine alkaloids, which are known to be hepatotoxic in both animals and humans (*see* Comfrey).[5]

Contra-indications, Warnings

Evening primrose oil is recommended to be used with caution in epileptic patients, especially in those with schizophrenia and/or those taking phenothiazines (*see* Evening Primrose); as borage oil is used similarly it should also be used with caution. In view of the known toxic pyrrolizidine alkaloid constituents,

excessive or prolonged ingestion of borage should be avoided. In particular, infusions (e.g. herbal teas) containing borage should be avoided.

Pregnancy and lactation In view of the documented pyrrolizidine constituents and lack of toxicity data, borage should not be used during pregnancy or lactation.

Pharmaceutical Comment

Limited information is available on the constituents of borage. No documented pharmacological data were located to support the traditional uses, although the mucilage content supports the use of borage as a demulcent. Interest has focused on the volatile oil as a source of gamolenic acid. Borage contains known toxic pyrrolizidine alkaloids, although at concentrations considerably lower than comfrey for which human toxicity has been documented. However, it would seem wise to avoid excessive or prolonged ingestion of borage. It is unclear whether borage oil, currently available in food supplements, contains any pyrrolizidine alkaloids.

References

See also General References G18, G20, G22, G31, G32, G36, G42 and G43.

1 Luthry J *et al.* Pyrrolizidin-Alkaloide in Arzneipflanzen der Boraginaceen: *Borago officinalis* and *Pulmonaria officinalis*. *Pharm Acta Helv* 1984; 59: 242–246.

2 Larsen KM *et al.* Unsaturated pyrrolizidines from Borage (*Borage officinalis*) a common garden herb. *J Nat Prod* 1984; 47: 747–748.

3 Hoffman D. *The Herb Users Guide, the Basic Skills of Medical Herbalism*. Wellingborough: Thorsons, 1987.

4 Mills DE. Dietary fatty acid supplementation alters stress reactivity and performance in man. *J Hum Hypertens* 1989; 3: 111–116.

5 Mattock AR. *Chemistry and Toxicology of Pyrrolizidine Alkaloids*. London: Academic Press, 1986.