

Review of Glycyrrhiza glabra, Linn

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Introduction

Liquorice has been used in medicine for more than 4000 years. The earliest record of its use in medicine is found in 'code Humnubari' (2100 BC). It was also one of the important plants mentioned in Assyrian herbal (2000BC). Hippocrates (400BC) mentioned its use as a remedy of ulcers and quenching of thirsts. The drug was also mentioned by Theophrastus and Dioscorides. In traditional Siddha system of medicine, liquorice is used as a demulcent, expectorant, anti-tussive, laxative and sweetener.

Synonym

Loquiritae officinalis Moench

Classification

Kingdom: Plantae

Division: Angiospermae

Class: Dicotyledoneae

Order: Rosales

Family: Leguminosae

Genus: Glycyrrhiza

Species: glabra Linn

Vernacular names

Sanskrit: Yashti-madhuh, Madhuka

Bengali: Jashtimadhu, Jaishbomodhu

Gujarat: Jethimadhu

Hindi: Jothi-madh, Mulhatti

Kannada: Yastimadhuka, atimaddhura

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Malayalam: Iratimadhuram

Marathi: Jeshtamadha

Oriya: Jatimadhu

Tamil: Atimaduram

Telugu: Atimadhuranu, Yashtimadhukam

English: Licorice, Liquorice, Sweet wood

Arab: Aslussiesa

Persia: Ausareha mahaka

France: Boisdoux

Germany: Sussholz



Geographical distribution

Native to central and south western Asia and the Mediterranean region. It is cultivated in the Mediterranean basin of Africa, in South Europe and in India.

Genetics

Glycyrrhiza glabra is a diploid with $2n=16$.

Habitat

Glycyrrhiza glabra is a hard herb or under shrub attaining a height up to 6ft; leaves multifoliate, imparipinnate, flowers in axillary spikes, papilionaceous, lavender to

violet in colour, pods compressed, and containing reniform seeds. The dried, peeled or unpeeled underground stems and roots constitute the drug, known in the trade as Licorice. Flowers in March and fruits in August.

Part used

Root and Rhizomes

Phyto chemistry

The major bio-active constituent of rhizomes is a triterpenoid saponin glycyrrhizin, glycyrrhizic acid, glabrin A&B, glycyrrhetol, glabrolide, isoglabrolide, isoflavones, coumarins, triterpene sterols etc.

Physical properties

Total ash	Not more than 7%
Acid insoluble ash	Not more than 2%
Sulfated ash	Not more than 10%
Water soluble extractive	Not less than 20%
Diluted alcohol-soluble extractive	Not less than 25%
Moisture	5.25%
Ether extracts	16.85%
Albuminoids	37.00 % (containing nitrogen 5.92%)
Soluble carbohydrates	31.00%
Woody fiber	5.05%
Ash	4.80 % (containing sand 0.25%)

Substitutes or adulterants

Manchurian licorice is obtained from *glycyrrhiza uralensis*. Being a substitute it does not contain glycyrrhizin the active principle but very little of free sugars. The common adulterant is wild licorice also called Indian licorice, derived from the roots of *Abrus precatorius* (leguminosae). Microscopically the adulterant is characterized by stone cells.

Actions

Tonic, demulcent, expectorant, diuretic, mild laxative, anti-arthritic, anti-inflammatory, anti-biotic, anti-viral, anti-ulcer, memory stimulant (being MAO inhibitor), anti-tussive, aphrodisiac, anti-myotonic, estrogenic, anti-oxidant, anti-caries agent, anti-neoplastic, anti-cholinergic, anti-diuretic, hypolipidemic activity, etc.

Pharmacokinetic study

The bio availability of glycyrrhizin was much decreased when given in extract form with equivalent amount of compound, when compared to giving pure compound. The decoction of the dried rhizome, taken orally by 5 normal adults at a concentration of 5%, reached maximum serum concentration of glycyrrhetic glycoside at 4 hours post ingestion and was eliminated within 72 hours. Glycyrrhetic acid reached maximum serum concentration, 24 hours post ingestion. The highest concentration was 30ng/ml and excretion was not completed after 96 hours in two of the subjects. In two cases of pseudo aldosteronism the serum glycyrrhetic acid levels were as high as 70-80ng/ml while glycosides were quite low. Water extracts of the dried root, administered intragastrically to rats at a dose of 6.278gm/kg, was excreted in the bile, reaching maximum by 8 hours after dosing.

Traditional uses

- A decoction of madhuka or its powder was prescribed with honey in anaemia.
- Yashti mixed with cow's milk was prescribed for promoting lactation.
- 10g madhuka powder mixed with 10g sugar, pounded with rice water was prescribed in men-metrorrhagia.
- A confection of rice-milk, prepared with yashtimadhu, was prescribed in hoarseness of voice.
- Charaka prescribed 10g madhuka powder mixed with honey, followed by intake of milk, as an aphrodisiac and as an intellect-promoting tonic.
- Charaka also prescribed a paste of liquorice and picrorrhiza kurroa with sugar-water as a cardiac tonic.

- Charaka datta prescribed yashtimadhu and santalum album, powdered with milk, in haematemesis.
- Sushruta prescribed the paste of yashtimadhu 10g, in intrinsic haemorrhage.
- In oedema, the paste of licorice, sesamum indicum and milk mixed with butter was prescribed.
- Warm clarified butter mixed with licorice, was applied topically on wounds, bruises and burns.
- A decoction of madhuka was applied on erysipelas.
- Yashti is an important ingredient in Narikelanjana (IMCOPS) eye-drops, prescribed in both acute and chronic conjunctivitis, and also in blepharitis.
- A decoction of the root is a good wash for falling and greying of hair.

Experimental pharmacology

Glycrrhiza has the following, experimentally proved activities:

- Anti-bacterial activity
- Anti hepato toxic activity
- Estrogenic activity
- Anti fungal activity
- Anti hemorrhoido activity
- Anti hyper glycemc activity
- Anti malarial activity
- Anti oxidant activity
- Immuno stimulatory& Anti viral activity
- Anti ulcer activity

Clinical pharmacology

Glycrrhiza has the following, clinically proved Pharmacological activities:

- Anti ulcer activity
- Anti asthmatic activity
- Anti diuretic activity
- Anti hepato toxic activity
- Eczema and psoriasis
- Herpes simplex

Side effects

The use of liquorice extract in the treatment of peptic ulcer sometimes appeared to invoke oedema and other side effects. Many investigations were carried out and it was shown that glycyrrhizin and glycyrrhetetic acid decreased the out put of ACTH, reduced urinary excretion of sodium and chloride, increased potassium excretion, reduced rennin activity and serum aldosterone, elevated blood pressure and induce metabolic alkalosis with severe hypokalaemia and hypernatremia, capable of causing cardiac arrest. Clinical investigations revealed sodium retention to be connected to an aberration in cortisol metabolism in the kidneys, which interferes with 11- β -hydroxy steroid dehydrogenase. Consumption of licorice or glycyrrhizin in excessive amounts and over a long period produces pseudo aldosteronism leading to oedemo, hypertention, and weight gain.

Caution

The intake of higher doses (above 50g/day) over an extened period (>6weeks) may cause sodium retention, potassium depletion, hyper tension, cardiac complaints, kidney disease, obesity, disorders associated with pregnancy and hypo kalaemic alkalosis. It should not be taken concurrently with cortico steroid treatment. The drug is contra indicated in patients with a history of hyper tension, renal failure and using digitalis preparations. It should not be used for longer than 4-6 weeks with out medical advice.

Drug interaction

Because it increases potassium loss, it should not be administered for prolonged use with thiazide and loop diuretics or cardiac glycosides. Because it reduces sodium and

water excretion, the effectiveness of drugs used in the treatment of hypertension may be reduced. It should not be administered in conjunction with spironolactone or amiloride.

Toxic assessment

Ethanol (30%) extract of the root, administered orally to mice of both sexes, produced LD₅₀ 32.0ml/kg. Water extract of the dried root (48-58% glycyrrhizin), administered intra peritoneally, orally and subcutaneously to mice and rats, produced LD₅₀ 1.5gm/kg, 16.0gm/kg, and 4.2gm/kg, respectively.

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