

## Liquorice (*Glycyrrhiza glabra*) is used as a natural sweetener agent: A review

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### Abstract

A article on Glycyrrhiza Glabra, a plant which lost medicinal properties. Beginning of human cultivation plant have been one of the important source of medicinal liquorice is traditional medicinal plant and used in various medicine system. Glycyrrhiza presence of alkaloids, starches, flavonoids, pectin mucilage, steroids. It is mainly used in Ayurvedic medicine various chemical Constituent present in Glycyrrhiza Glabra. In liquorice study indicate antibacterial, antioxidant, Antimalarial, anti-inflammatory and anti-hyper glycemc properties. Most important side effect of liquorice is elevated to blood pressure. It is used for analysed for its total phenolic content and radical scavenging activity. Glycyrrhiza acid mainly found in root of liquorice plant. Glycyrrhiza acid was development in China or Japan as anti-inflammatory, antiviral and anti-allergic drug for lover disease. Different chemical constituent present in G.glabra glycyrrhiza like glycyrrhetic acid, isoliquiritin and isoflavanes etc. Liquorice provide significant protection again various disease and disorder [2, 3, 4, 5].

**Keywords:** liquorice, antioxidant, antiulcer, *Glycyrrhiza glabra*

### Introduction

Liquorice is the extract of glycyrrhiza glabra roots and the often in ancient siddha medicine and is approved by German commission. It is one of most popular medicinal plants which belonging to the legumino sea family. The word glycyrrhiza is derived from the Greek word 'glykos' means sweet and 'rhiza' means root. i.e. sweet root. The glycyrrhiza glabra is a well-known medicinal plant used in traditional medicinal system across the globe for its ethenopharmacological value to cure varities of aliments. Liquorice is generally used as a sweetening or flavouring agents due to the sweetness of the roots. It play important role in the siddha as well as ayurveda system. In which the glycyrrhiza glabra containing drugs are act as expectorant, protective, antitussive, ulcer, purgative, demulcent, anti-cancer, antimicrobial, cardiovascular etc.

The photochemical constituents of glycyrrhiza glabra are the alkaloids, glycoside, carbohydrates, starch, phenolic compound, tannins, pectin, proteins, flavonoids, mucilage, lipids, steroid, sterols and saponin etc.

The liquorice grows in subtropical climates in rich soil to a height of 1.4m. Below ground, it has an extensive root system with a main taproot and numerous runners. The main taproot, which is harvested for the medicinal use, is soft, fibrous and has a bright yellow interior.

It is valuable herbal drug [1, 2, 3, 4].



Fig 1: Glycyrrhiza glabra

### Future Aspect

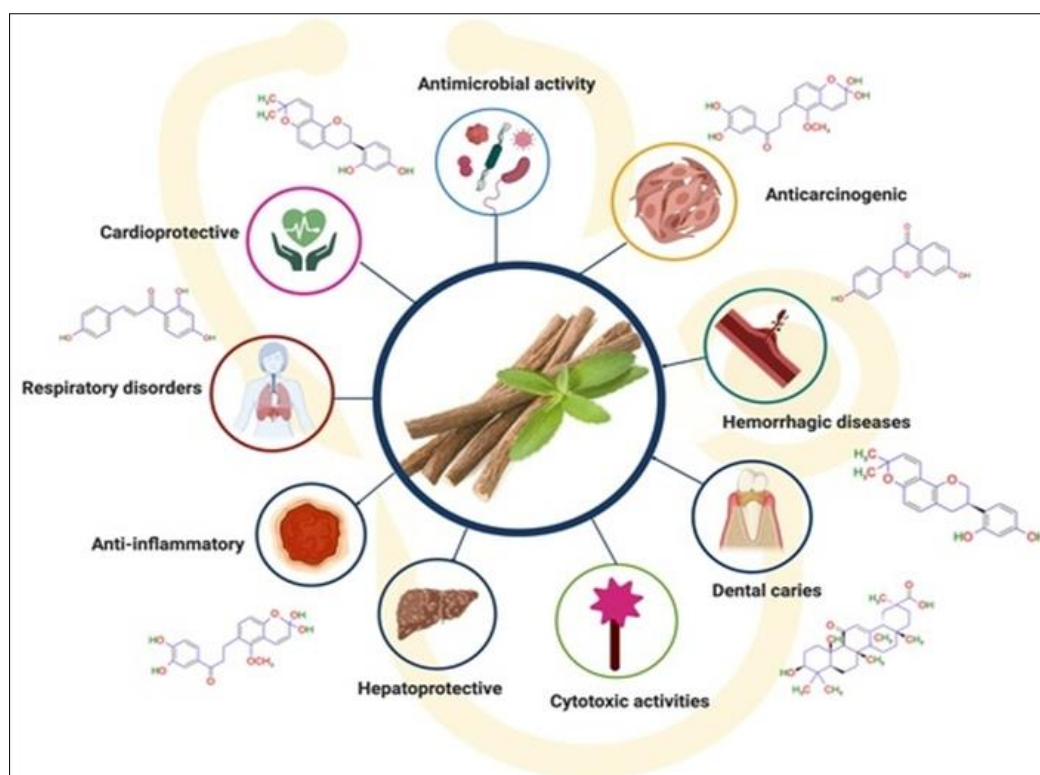
1. Glycyrrhiza glabra Linn. have a properties like antibacterial, antiviral, anti-cancer, antiulcer, antimicrobial, antidiabetic, antimutagenic.
2. The glycyrrhiza glabra linn.is affected on the cold, cough,flu, thorat pain, bronchial problems such as catarrh, bronchitis.
3. The treatment of chronic inflammation such as arthritis and rheumatic disease, chronic skin condition and autoimmune disease in general.
4. Glycyrrhiza glabra Linn. contain photochemicals are helped to the major or minor problems like people with high blood pressure, kidney disease or taking digxoin based medication.
5. The photochemicals and pharmacological activities of the liquorice is used in future for further derivatives of phytochemical compound which are helpful for us [5].

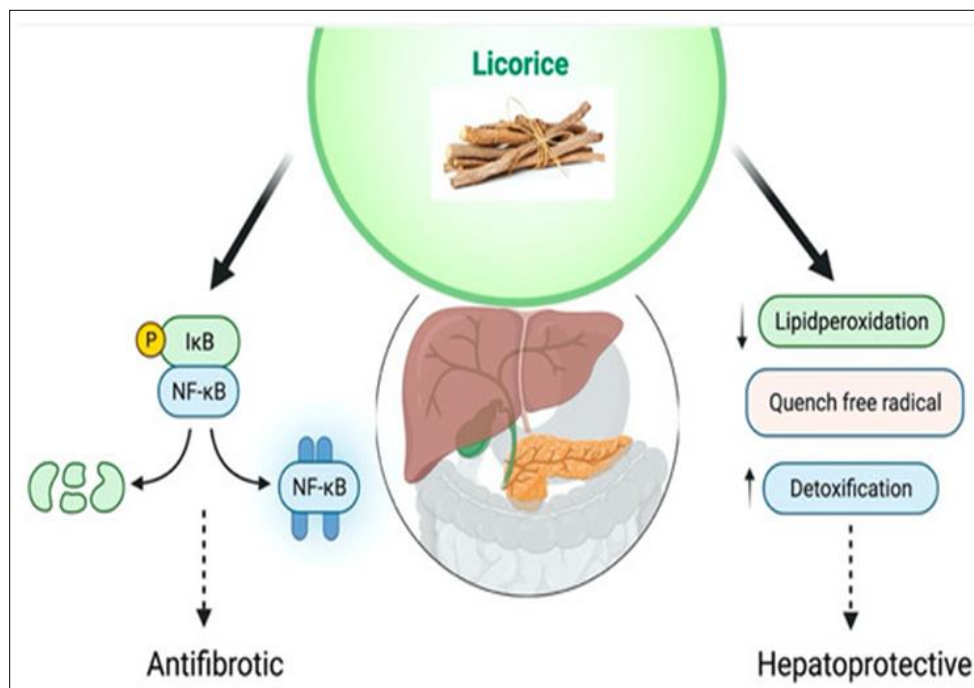
### Scientific Classification

Kingdom: plantae  
Division: Angiospermae  
Class: Dicotyledoneae  
Gens: Leguminosae  
Family: leguminosae  
Species: Glabra Linn



Fig 2: Liquorice





**Fig 3:** pharmacology action

### Anti-oxidant

Anti-oxidant are the substances which prevents the oxidation. anti-oxidant substance may contains the phenolic content which is responsible for the anti-oxidant action or activity. Glabridin and licochalcone compounds are presente in anti-oxidant. Glabridin is used for examination of protection of low density lipoprotein from oxidation. There are licochalcone is used for inhibition of the microsomal lipid peroxidation. The concentration of glabridin is 3.12-25 ug/ml 60 mg. and the concentration of licochalcone is 2-20 ug/ml.phenolic compound are effective in the protection of biological system against oxidation stress. Which is also capable to inhibit the onset of skin damages in according to the (Haraguchi *et al.*, 1998). Liquorice extract formulation which applied typically. They produce counteracts oxidative action. and maintaining the skin homeostasis due to the high anti-oxidant content in according to (Castangia *et al.*, 2015) <sup>[1]</sup>

### Antiulcerative Activity <sup>[1]</sup>

Antiulcerative are agent which prevents the formation of healing of ulcers. There are *G.glabra* is widely used as antiulcerative agent. *G. glabra* is used in treatment of duodenal ulcer and peptic ulcer. Glycyrrhizin also used on treatment of healing of ulcer. glycyrrhizin give there action by increasing the concentration of prostaglandina in the digestive tract. There are liquorice also used as antiulcerative agent. They increase the lifespan of stomach surface cell and give the antipepsin effect in according to the (Ram, lachake, kaushik and shreedhara 2010). effect of liquorice can study by oral administration. Deglycyrrhizinated liquorice are used in treatment of gastrointestinal ulcers. but it shows another effect in presence of other active ingredient in according to (zaden, kor and gofter 2013).

### Antitussic and expectorant activity <sup>[1]</sup>

Antitussic are agent which is used for relief the cough.

Liquorice is used as antitussic agent. It used in treatment of cough, sore throat, throat infection and bronchial catarrh in according to the (Damle, Zola; Fiore *et.*, al 2005). There are combination of liquorice and glycyrrhizin are helpful to expel congestion in the upper respiratory tract and mucus secretion by (V.sharma *et.*, al... 2016). Glycerrheticinic acid derivative which give the stimulation action on gastric mucus secretion.

There are methanolic liquorice extract which reduce capsaicin. Capsaicin are the compound which induce the cough.

### Anti-inflammatory Activity <sup>[1]</sup>

Anti-inflammatory are the agent which reduce the inflammation and it used in treatment of inflammatory disease.

Glabridin and Glycyrrhizin is used as anti-inflammatory agent.

The glabridin decrease the MIP 1 Alfa expression.

There are Glycyrrhizin may provide protection from the peroxidation of liposomal membrane and also decrease inflammation. Glycyrrhizin which reduce inflammation and and also useful in treatment of mouth ulcer by (Rackova *et al.*, 2007; Yin *et al.*..., 2017). Anti-inflammatory effect of glycyrrhizin is similar to mineralocorticoid and glucocorticoids by (Y. Xiao *et al.*..., 2010).

*G. glabra* is used in respiratory tract infections mostly used in upper respiratory tract infection. *G. glabra* produce their action by increasing serotonin and prostaglandins secretion which is useful decrease or reduce gastric inflammation according to (Batman *et al.*, 2014).

#### **Anti-cancer activity** <sup>[3]</sup>

Cancer is the second most common cause of mortality. There is a strong correlation between cancer and changes in style of living such as smoking, diet, and physical inactivity. The phyto constituents obtained in *glycyrrhiza glabra* are glycyrrhizin, glycyrrhizic acid, isoliquiritin, glycyrrhizic acid and flavonoids. The extract of *glycyrrhiza glabra* inhibit growth of cancerous cell by interfering in angiogenesis and this property proved in *In vivo* assay. The antiangiogenic and anti-cancer activity of *G. glabra* was examined on VEGF and MTA1 induced angiogenesis and confirmed by *In vivo* assays such as peritoneal and chorioallantoic membrane assay. When mice treated with *glycyrrhiza glabra* results in reduction in the levels of cytokine VEGF and microvessel density count in the peritonium of mice. It indicated that the plant extract decreased VEGF production. Results showed the extract from the roots of *G. glabra* may be a potential supplemental source for cancer therapy.

The cytotoxic activity of the methanolic extract of *G. glabra* was tested by using brine shrimp lethality bioassay. It exhibited cytotoxic activity with LC50 value of 0.77 ug/ml. The antineoplastic activity of licorice methanolic extract 0, 12, 5, 25, 50 and 100 ug/ml was evaluated against in intestinal carcinoma cell line (CaCO-2) and prostrate carcinoma cell line (PC-3). The growth inhibitory action of licorice methanolic extract was observed against CaCO-2 and PC-3. It could show antineoplastic activity against breast cancer, ovarian cancer and gastric cancer. The effect of ethanol extract of *G. glabra* extract (50, 100, 150, and 200 ug/ml) was tested on the expression of HSP90, growth and apoptosis in the HT-29 colon cancer cell line. Results showed that the ethanolic extract exhibits antiproliferative effect and this effect was confirmed by trypan blue and MTT assay. The hydromethanolic extract of licorice showed anticarcinogenic potential by suppressing the micronuclei formation and chromosomal aberration. As well as it suppressed thromboxane A2 in lung cancer cells. It can stop the G2/M transition in the cell cycle and induce the BCL-2 phosphorylation by using the antimicrotubule agent paclitaxel. One experiment showed that the use of licorice extract with cisplatin could reduce the cisplatin based toxicity. Another compound isolated from root of *G. glabra* is isoliquiritigenin, prevented the incidence of dimethylhydrazine induced colon and lung tumors in mice when administered at a dose of 300 mg/kg. Antineoplastic activity of licorice has been effectively utilised in the treatment of cancer. Colorectal cancer is the 4th cause of cancer related death worldwide. In colorectal cancer, several processes such as dysregulation of apoptosis, mutation in oncogenes, and morphological progression have been observed. Both *In vivo* and *In vitro* studies showed that 18-beta glycyrrhetic acid and a penta cyclic triterpenoid extracted from the licorice root, has potent inhibitory effect on colorectal cancer cell proliferation in a dose dependent and time dependent manner. Glycoumarin prevents cancer in human hepatocellular carcinoma cells both in *In vivo* and *in vitro* experiments. Glycyrrhetic acid extracted from *G. glabra*. It decreases the protein levels of p-PI3K, p-AKI, p-STAT-3, p-JNK and p-P38. Activation of p-PI3K and p-AKI signalling pathway leads to increase cell survival, outgrowth and cell migration in cancer cells, so by inhibiting these pathways downregulates the expression of MMP 1, 2, 3, 9, 12, 13 And MTI - MMP results in suppression of proliferation and invasion of cancer cells. Glycyrrhetic acid also decreases Matrix metalloproteinase (MMP) expression. Its efficacy is more potent than other clinically available anticarcinogenic agents.

#### **Anticoagulant activity** <sup>[4,5]</sup>

The major causes of death and disability that may arise from blood clotting are pulmonary emboli, cardiovascular diseases and deep vein thrombosis. Anticoagulant treatment such as vitamin k antagonist's (warfarin), unfractionated heparin, and low molecular weight heparins are used as a medical treatment approach but these can increase the bleeding risk. Factor Xa (FXa); a trypsin-like serine protease enzyme helps in fibrin and lump formation and thus acts as a component of the coagulation flow. Newly, FXa inhibitors have been used as new oral anticoagulants (NOAC). The dose of 250 mg hydromethanoic licorice abstract shows FXa inhibitory effects *In vitro*. As an inhibitor of thrombin, Glycyrrhizin has been found in *Glycyrriza glabra*. As a result, it can slow down the thrombin-fibrinogen clotting time, increases plasma recalcification period, and inhibit thrombin-induced platelet aggregation. But still collagen - induced platelet agglutination is not affected by this process.

#### **Antimalarial Activity** <sup>[4,5]</sup>

In Asia, Africa, and Latin America malaria is one of the most severe health problems. In the year 2012, the World Health Organisation (WHO) evaluated the 219 million global cases of malaria and 660000 deaths due to this disease. *Glycyrriza glabra* is considered as an essential component that can decrease the risk of malaria. An *In vitro* study showed that 13 ug/ml ethyl acetate and 9.95 ug/ml water - methanol fractions extracted from root of licorice have good antiplasmodial activity against *P. Falciparum* strain with low toxicity against HeLa cells. On-the-other-hand, the *In vivo* study showed that administration of these fractions of licorice root abstract inhibits 72.2% and 65% growth of *P. Berghei* in mice. Antimalarial activity is due to presence of licochalcone in licorice. An oral dose of 1000 mg/kg in mice has completely eliminated malarial parasites.

**Antidepressants effect** <sup>[3, 5]</sup>

Glycyrrhizin is a component of the aqueous glycyrrhiza root abstraction showed anti-depressants effects. This effect was investigated in mice using Forced Swim Test (FST) & Tail Suspension Test (TST). The abstraction of glycyrrhiza glabra was given orally for 7 consecutive days in separate groups of male mice at a dose of 75, 150 & 300 mg/kg. The dose of 150 mg/kg of the abstraction significantly showed decreased immobility time without compromising locomotor activity in both FST & TST.

The advantage of abstraction was found to be similar to that of "imipramine" (15 mg/kg ip) & "fluoxetine" (20 mg/kg ip). Liquorice abstraction altered reserpine induced extension of immobility span of mice in FST & TST. Prazosin (62.5 ug /kg ip, an alpha 1- adrenoceptors antagonist) & Sulpiride (50 mg/kg ip, a selective D2-receptor antagonist). Significantly reduced the abstract-induced anti-depressant like effects in TST. Besides, p-chlorophenyl alanine (100 mg/kg ip, an inhibitor of serotonin synthesis) did not alter anti-depressants like effects on liquorice extract. It appeared that the anti-depressants like effects of Liquorice abstract was not mediated by increase of serotonin, but was mediated by increase of brain norepinephrine & dopamine.

**Effects on Diabetes** <sup>[3, 5]</sup>

Type-2 diabetes mellitus is a common metabolic disorder that display increase in blood glucose level due to deficiency of insulin & inactivity. Specific transcription components are involved in glucose and lipid metabolism. In association with Peroxisome Proliferation Activated Receptor (PPAR's) are one of them. These PPAR receptors are communicate mostly in liver, muscle & kidney tissues. These PPAR can be categorized into alpha, gamma & delta. The insulin-stimulate drugs mainly target this PPAR gamma receptor, several components were procured from Glycyrrhiza glabra root & crude abstracts that are Glycycoumarine, glycyrin, glyasperin - D, dehydroglyasperin, glyasperin - B & iso- glycyrol ethyl solution can significantly bind to PPAR gamma finally leading to decreased blood glucose level. Chalcone & amorfrutin procured from Glycyrrhiza helps in adipocyte distinction & improvement of glucose & lipid metabolism. Amorfrutin can enhance insulin reactivity & enhance glucose tolerance and make sure maximal glucose used by translocation of GLUT-4 using Adenosine Mono Phosphate Protein Kinase (AMPK). Glycyrrhizin increases the extent of glycohaemoglobin, cholesterol & triglycerides by inhibiting serum insulin level and pancreatic cell numbers. Hence, Liquorice can play a critical roles in diabetic condition.

**Authors Contributions**

Analyzed search result and wrote the initial and middle draft of this manuscript. All authors provided review other informative related to liquorice.

All authors equally contributed the final draft for submission.

**Conclusion**

We have obtain most important and useful knowledge about liquorice. Liquorice is as natural sweetener agent. The present review concludes that the Liquorice (Glycyrrhiza Glabra): is a used as a natural sweetener agent: A Review. Which is various treatment available for patients.

**Acknowledgement**

We would like to thank all supportive team, friends, teachers, for the great support of Liquorice (Glycyrrhiza Glabra): is a used as a natural sweetener agent: A Review.

Their contribution are very sincerely appreciated and gratefully acknowledged. The completion of article undertaking could not have been possible without the coauthors. And assistance of so many advisor. Thanks to Leena Narute

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