

Broad spectrum activities of Glycyrrhiza Glabra in Unani system of Medicine: A Review article

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ABSTRACT

Natural Plants have the important sources of therapeutics or other human health benefits since the beginning of human civilization throughout history. Today's there is increasing awareness and general acceptability of the use of herbs, as a medicines, health products, pharmaceuticals, food supplements, cosmetics etc. From the time ancient, human civilizations have been exploring and using various plants and plant products to cure the lethal communicable and non-communicable diseases. Traditional system of medicine including Ayurveda, Unani system of medicine, and Siddha remedies etc. contributed in Health care. The Unani system of medicine is an age old system of medicine which has a holistic approach to treat various disease and disorder and most of the time the drugs mentioned in this system has tremendous effects in chronic communicable and no communicable disease. Glycyrrhiza glabra Linn. Belonging to family Fabaceae, known as mullaiti or licorice. It is used in many systems of medicines including Unani system of medicine, Ayurveda. Homeopathy, Chinese, Naturopathy and Siddha to cure various types of complications like hepatitis, ulcers, pulmonary, skin diseases STD, Heart diseases etc. Traditionally mullaiti is used as mild laxative, anti-arthritic, anti-inflammatory, anti-biotic, anti-viral, anti-ulcer, memory stimulant, anti-tussive, aphrodisiac, anti-mycotic, estrogenic, anti-oxidant, anti-neoplastic, anti-cholinergic, anti-diuretic, hypolipidemic agent. It constituted phyto-constituents such as glycyrrhizin, glycyrrhizinic acid, glabrin A&B, glycyrrhetol, glabrolide, isoglabrolide, isoflavones, coumarins, triterpene sterols. Modern botanical applications of the herb continue this tradition with recommendations including the treatment of gastric ulcers, bronchitis, cough, and dyspepsia. Glycyrrhiza glabra is a widely used herb in Unani. Although the review articles on this plant are already published, this review article is presented to comply all the updated information on its therapeutic potency based on phyto-constituents and pharmacological activities and the potency which is described by renowned Unani physicians and scholars. Further this review gives an account of the current knowledge on the morphological

characters, microscopic characters, phyto-chemistry, and pharmacological actions present in root of *Glycyrrhiza Glabra* along with its actions and therapeutic potential in the perspective of Unani system of Medicine.

Keywords: *Glycyrrhiza Glabra*, therapeutic potential, Therapeutic activities of *Glycyrrhiza Glabra*

1. Introduction:

Traditional system of medicine including Ayurveda, Unani, and Siddha etc. contributed in Health care dealing worldwide. The Unani system of medicine is an age old system of medicine which has a holistic approach to treat various kind of disease; most of the time the drugs mentioned in this system has tremendous effects in chronic disease. In Unani medicine there are three sources of drugs e.g. plant, mineral, and animal. Majority of drugs obtained from plants and their products. These crude drugs have different medicinal values.



Glycyrrhiza Glabra is a perennial plant of the family *Fabaceae* and is well known as *Asl-Us-Soos* in Unani system of medicine. *Glycyrrhiza Glabra* is an oldest medicinal plant and used in various traditional system of medicine for its medicinal values, it is widely spread in subtropical and warm regions. The drug is widely known as licorice or licorice roots. The licorice roots are thick, having many branches with red or lemon color in outside, and yellowish or pale yellow in inside, wrinkled fibrous wood, which has sweet taste due to glycyrrhizin, which is 50 time sweet than sugar.

In Unani system of medicine the *Glycyrrhiza Glabra* has been frequently used from centuries in the treatment of *Su'āl* (cough), *Dīq al-Nafas* (bronchial asthma) , *rabw* (bronchial asthma), *Hurqa al-Bawl* (Burning micturition), *sozāk* (Gonorrhea) *Qurūh al-Mathāna*, *Jara al- Mathāna*, *Buḥḥa al- Sawt* (Hoarseness) , *Qurūh-i-Huzūmi* (Peptic ulcer), *Nār farsi* (Eczema) etc. Even today *Glycyrrhiza Glabra* is widely used for antimicrobial, antioxidant, Anti-coagulative, Anti-allergic, Expectorant, Antiulcer, anxiolytic properties and for various pharmacological actions in communicable and non-communicable diseases.

Traditionally the plant has been recommended as a prophylaxis for gastric and duodenal ulcers and in dyspepsia as an anti-inflammatory agent during allergenic reactions. It is used as a laxative, contraceptive, galactagogue, anti-asthmatic drug and antiviral agent. Glycyrrhiza also used for its demulcent and expectorant property. It is useful in anemia, gout, sore throat, tonsillitis, flatulence, sexual debility, hyper-dyspsia, fever, coughs, skin diseases, swellings, acidity, leucorrhoea, bleeding, jaundice, hiccough, hoarseness, bronchitis, vitiated conditions of vata dosha, gastralgia etc. It was an important ingredient in medicinal oils for the epilepsy, paralysis, rheumatism, hemorrhagic diseases and also used in the treatment of diarrhea, fever with delirium and anuria. Research showed that on being broken down in the gut, glycyrrhizin exerts an anti-inflammatory action similar to Hydrocortisone and other corticosteroid hormones. It stimulated manufacture of hormones by adrenal glands and reduced the breakdown of steroids by the liver and kidneys. Glycyrrhizin also showed effective in the treatment of chronic hepatitis and liver cirrhosis. For relieving pain, discomfort and other symptoms caused by acid matter in the stomach, Glycyrrhiza glabra was considered as one of the best medicines.

2. Chemical constituents Glycyrrhiza Glabra

The Glycyrrhiza Glabra (licorice root) is contains various types of chemical constituent mainly Flavonoids, sugar, amino acid, starch, resins, sterols and essential oil. Glycyrrhiza Glabra is mainly composed of triterpenes saponin 4- 20% included; glycyrrhizin or glycyrrhizic acid and licorice root also contained other triterpenes like liquiritic acid, glycyrrhetol, glabrolide, isoglabrolide and liquirce acid. Flavonoids and chalcones isolated from Glycyrrhiza Glabra are liquiritin, liquiritigenin, hamnoliquiritin, neoliquiritin, chalcones isoliquiritin, isoliquiritigenin, neoisoliquiritin, licuraside, glabrolide, licoflavonol, 5,8-dihydroxy-flavone-7- O-beeta-D-glucuronide etc. Other constituents of Glycyrrhiza Glabra are glucose 4%, sucrose 5%, resins, essential oil, sterols, steroids, amino acid, starches, pectin, mucilage, lipid, and tenninetc. The Glycyrrhiza Glabra also contain few heavy metal like; Cadmium, lead, Arsenic, Mercury and the trace elements are also present in the root powder of licorice were; Potassium:0.66%, Calcium:1.87%, Sulphur: 0.06%, Iron:0.14%, Aluminum: 0.05%, Phosphorous: 0.06%, Silicon: 0.12%, Magnesium: 0.17%, Sodium: 0.04% are present in Glycyrrhiza Glabra.

Table: List of Chemical Constituents of Glycyrrhiza Glabra and their pharmacological actions

S. No.	Active Chemical Constituents Glycyrrhiza Glabra	Therapeutic uses
1	Glycyrrhizinic acid, Glabridin, glabrene,	Antiulcer activity or Proton pump Inhibitor
2	Glabridin	Ant mycobacterial activity and Tuberculosis

3	Isoliquiritigenin, licocoumarin, Licochalcone, glabridin,	Antioxidant activity, Analgesic , anti-Inflammatory & uterine Relaxant activity
4	Glabridin	Memory enhancer activity or Brian tonic
5	18-β- glycyrrhetic acid,	Anti-allergic activity, Corticosteroid like activity
6	Glycyrrhizin	Anticancer activity hepatocellular carcinoma, Antitussive activity, Anti HIV or Anti STD, Hepato protective activity,
7	liquiritoside, Licochalcone, Glycyrrhetic acid,	Anti-inflammatory activity
8	Glycyrrhetic acid,	Anti- Tumor or Anticancer activity
9	Licochalcone A	Antimalarial activity of all type of malaria
10	Glycyrrhetic acid, licochalcones,	Antiviral activity
11	18-β-glycyrrhetic acid, glycyrrhizin	Anti-Hyperglycemic activity
12	Glycyrrhetic acid	Immune stimulating activity
13	Liquiritin	Spasmolytic activity in Dysmenorrhea and PCOD Diseases.
14	Rhamnoglucoside	Muscle relaxant
15	Glabrene, liquiritigenin	Estrogenic activity

Doses forms: The drug can be used alone in Safūf (powder) form, Joshanda (decoction), or may be used along with other ingredients. These dosage forms are administered through oral rout of administration.

3. Af'āl (Action) of Glycyrrhiza Glabra.

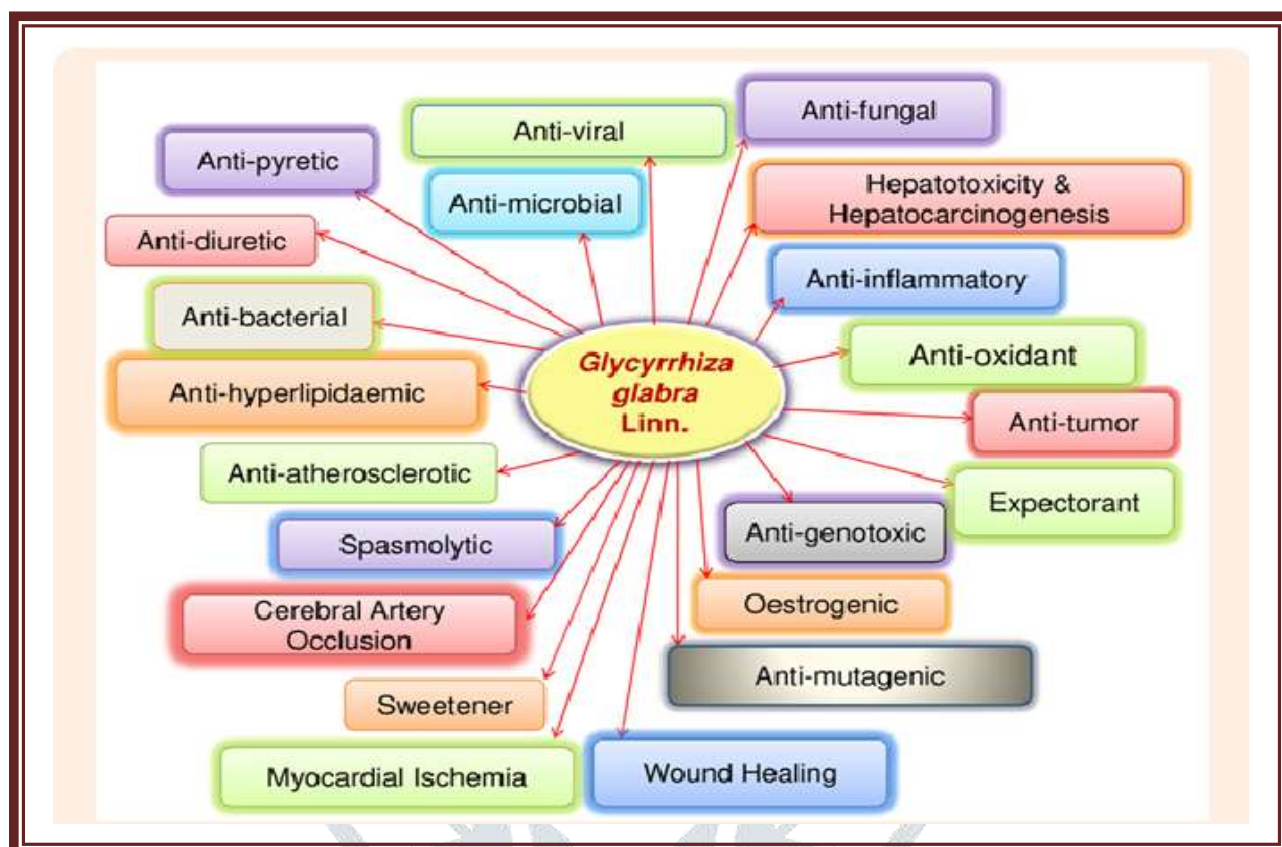
Following are the various pharmacological action of Glycyrrhiza Glabra in Unani System of medicines.

Jāli (detergent), Muqawwi (tonic), Kāsir-i-Riyāh (carminative or Anti flatulence), mudirr-i-

Bawl (diuretic in Kidney diseases), mudirr-i-Hayd (emmenagogue), Su'āl (cough), Muqawwi-i-Bāh, Dāfi'-i-Khushūna al-Halaq, Dāfi'-i-Humūzat-i-mi'da, Muqi, Mugharrī, Dāfi'-i-Tip hā-i-Muzminā, Ghāsil-i-āzā-i-Bātina, Musakkin-i-Tishnagi, Muqawwī-i-A'sāb (nervine tonic for Brain), musakkin (analgesic or Anti-inflammatory), Mulayyin (laxative or purgative), Muhallil (resolvent), Munaffith-i- Balgham wa Mukhrij-i-Balgham (Antitussive or expectorant),

4. Therapeutic uses Glycyrrhiza Glabra

In Unani system of medicine, the Asl-us-Soos used in Qurūh-i- Huzūmi (peptic ulcer), Waj'ul-Mafasil (arthritis), Amrāz-i- Kabid (liver diseases), Su'āl (Cough), Dīq al-Nafas (bronchial asthma), Rabw



(Bronchial asthma), Hurqa al-Bawl (Burning micturition), sozāk (Gonorrhea) Qurūh al-Mathāna, Jara al- Mathāna, Buḥḥa al-Sawt (hoarseness), Bayad al-‘ayn (Corneal opacity). In traditional system of medicine Asl-us-Soos is recommended for the treatment of epilepsy. It is used in sex hormone imbalance condition, and also used in early menopausal condition in women. Asl-us Soos content flavonoids-Isoliquiritin with antigastric effect so used in peptic ulcer in form of deglycyrrhized liquorice, in the presence of glycyrrhithinic acid it is employed in place of corticosteroids for the treatment of rheumatoid artharitis, inflammation and addision's disease, glycyrrhizinic acid is also used for the common cold, viral hepatitis, viral infaction, externally it is applied with honey for treatment of Dākhis (paronychia), honey and ghee for cuts and wounds. Topically, Asl-us-Soos powder used in Namla (Herpes), nār farsi (Eczema) and Dā'ssadaf (Psoriasis). Glycyrrhiza Glabra in bulk amount increase fluid and sodium retention and promoted potassium depletion, therefore it should be used carefully in patient with cardiac problem and hypotension.

5. Pharmacological activities Glycyrrhiza Glabra.

The anti-inflammatory activity similar to cortisone and has been found useful for arthritis and allergies, used for mild Addison's disease and other adrenal insufficiencies, such as hypoglycemia. It was also acted like adrenocorticotrophic hormone, caused sodium and water retention & potassium depletion. Excess consumption of licorice can lead to the classic symptoms of hypertension, with edema, increased blood pressure, potassium loss, and muscular weakness. The de-glycyrrhizinated form was most often used to avoid the hypertensive side effects of the glycyrrhetic acid in whole licorice. Licorice and de-glycyrrhizinated licorice have a mild laxative effect and can protect the intestinal lining by increasing the production of mucus, thus alleviating heartburn and ulcers.

According to Ibn Baitar, Glycyrrhiza Glabra is the drug of choice for respiratory and bladder diseases, such as burning micturition and burning sensation in the chest due to ulceration or constipation. Glycyrrhiza Glabra also used in treatment of cold-tempered ailments; Amrāḍ-i Balghamiyā and Sawdāwīā (phlegmatic and melancholic disorders), such as Sar' (Epilepsy), Fālij (hemiplegia), Laqwa (facial palsy), Qabūs (nightmare), Tawahhush (Anxiety or Depression), Mālikholia (Melancholia), Khushunat-i Halaq (sore throat), Boḥat al-Sawt Hād (Acute hoarseness of voice), Warm-i Luhāt (uvulitis), Warm-i Sho'ba al-Riyā (Bronchitis), Dīq al-Nafas (Asthma), Sū'al-i Yābis (Dry or productive cough). Glycyrrhiza Glabra has experimentally been proved for various pharmacological actions, such as anti-bacterial, anti-hepatotoxic, anti-fungal, and anti-oxidant; anti-hyper-glycemic, anti-viral, anti-ulcer, estrogenic, anti-diuretic, and immuno-stimulant activities. Glycyrrhiza Glabra also was found effective in cure of Psoriasis, eczema, herpes simplex and skin diseases.

Following are the important activities and action of Glycyrrhiza Glabra in Unani system of medicine.

A. Effect Glycyrrhiza Glabra on blood coagulation.

The thrombin induced platelet aggregation activity inhibited by glycyrrhizin but Platelet Aggregating Factor or Collagen induced agglutination was not affected by glycyrrhizin. Glycyrrhiza Glabra in vitro and in vivo studies, glycyrrhizin isolated from the Glycyrrhiza Glabra has been identified as a thrombin inhibitor and showed an antiplatelet aggregation effect. Glycyrrhiza Glabra accelerated the metabolism of cells in the bone marrow erythroid stem and increased the animal's resistance to stress.

B. Effect Glycyrrhiza Glabra on Ulcer.

Glycyrrhizinic acid showed antiulcer activity by increasing the prostaglandins concentrations that promote mucous secretion and cell proliferation in the stomach. The *in-vitro* activity was carried out against 29 *Helicobacter pylori* strains & found that the minimum inhibitory concentration of *Extractum liquiritiae*, glycyrrhizic acid, glycyrrhetic acid and a novel lipophilic derivative of glycyrrhetic acid monoglucuronide and acetylated by using agar dilution method. In an experimental study, Carbenoxolone a glycyrrhetic acid derivative with a steroid like structure, found in root of liquorice plant, was effective in the treatment of gastric and duodenal ulcer at the medium

dose of 100 mg three times a day. Liquorice can raise the concentration of prostaglandins in the digestive system that promote mucus secretion from the stomach, it was also prolonged the life span of surface cells in the stomach and has an anti-pepsin effects.

Glycyrrhiza Glabra in a clinical study, 40 patients treated either 3.0 or 4.5 g deglycyrrhized licorice daily for eight weeks, were assessed for relief from epigastric pain, nausea, vomiting, x-ray of ulcer craters to determine changes in size of ulcer, and frequency of relapse. All patients showed significant improvement after 5-7 days. In another clinical study, larger trial carried out on 874 patients with chronic duodenal ulcers.



C. Skin lightening and skin tightening activity

The extract of Glycyrrhiza Glabra is reported to be an effective pigment lightening agent. It is the safest pigment-lightening agent known with least side effects. Glabridin in the hydrophobic fraction of liquorice extract inhibits tyrosinase activity in cultured B16 murine melanoma cells. It does not affect DNA synthesis. Some other active compounds in Glycyrrhiza Glabra extract like glabrene, Licochalcone A, Isoliquiritin are also responsible for inhibition of tyrosinase activity. Liquiritin present in liquorice extract disperse melanin, thereby inducing skin lightening. *In vitro* tyrosinase enzyme inhibition studies has showed that 21.2 µg/ml of methanolic extract of Glycyrrhiza Glabra caused 50% tyrosinase enzyme inhibition. The inhibition of tyrosinase enzyme and reduction in enzyme activity is caused due to

modification of action site of the enzyme. Due to good tyrosinase inhibition activity, Glycyrrhiza Glabra extract can be used to formulate cosmetic formulations with depigmenting activity. Ethanolic extract of Glycyrrhiza Glabra is reported to show improvement in the viscoelastic and hydration properties of the skin. Synergistic effect of Ultra Violet protective, antioxidant and anti-inflammatory properties of Glycyrrhiza Glabra extract might be responsible for giving beneficial effects on skin

D. Antitussive or Expectorant action of Glycyrrhiza Glabra.

The study on glycyrrhizin was found to be effective in the treatment of sore throat, cough, bronchial infections. Glycyrrhiza Glabra also used as an antitussive and expectorant. In clinical study, Glycyrrhiza decreased irritations in the throat and produced expectorant effects. It was assumed that Glycyrrhiza was able to motivate tracheal mucus secretions and produce demulcent and expectorant effects. Its powder and extract was useful for the treatment of sore throat, cough and bronchial catarrh. It also possessed antitussive and expectorant.



E. Anti oxidant activity of Glycyrrhiza Glabra.

Glycyrrhiza has significant free-radical sifting activity and also described that glabridin has potent antioxidant towards low density lipoprotein oxidation. Chalcone derivative, a novel group of neolignan lipid esters, and seven known phenolic compounds (formononetin, glabridin, hemileiocarpin, hispaglabridin B, isoliquiritigenin, 4'-O-methylglabridin, and paratocarpin B) isolated from the roots and stolons of *Glycyrrhiza glabra* were tested in an authentic peroxynitrite anti-oxidant assay. Of these compounds, hispaglabridin B, isoliquiritigenin, and paratocarpin B were found to be the most potent anti-oxidant agents.

F. Antibacterial and antifungal activity of Glycyrrhiza Glabra.

The antibacterial effect of alcoholic extract obtained by percolation from roots of *Glycyrrhiza glabra* was tested against *Escherichia coli*, *Pseudomonas fluorescens*, *Enterococcus faecalis*, *Bacillus cereus*, and *Staphylococcus Aureus*, the extract showed the strong antibacterial activity against all bacterial strains tested. The maximum inhibition diameter was 15 mm against *E. coli*, *E. faecalis*, *B. cereus*, whereas *P. fluorescens* showed the lowest sensitivity, with an inhibition zone of 9 mm.

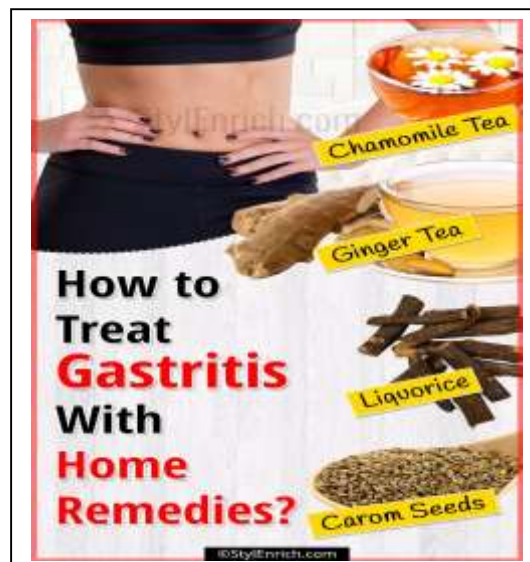
The antibacterial activities of mullati root extract in organic solvents like ether, chloroform and acetone found that it showed significant antibacterial activities against *Bacillus subtili* and *Staphylococcus aureus* and *E. coli* and *P. aeruginosa*. Investigated that oil based mullaithi extract contain glabridin which showed high fungicidal activity against *Arthrrium sacchari* and *Chaetomium funicola*, and reduced microorganism contamination in polyethyleneterephthalate, it means glabridin had been used for the prevention of beverage and food spoilage due to microorganisms.

G. Anti-inflammatory activity of Glycyrrhiza Glabra.

Glabridin was effective in melanogenesis and inflammation by inhibiting the tyrosinase activity of melanocytes. Glycyhrritinic acid exhibits anti-inflammatory activity by inhibiting glucocorticoid metabolism. *Glycyrrhiza Glabra* in experimental study, the anti-inflammatory activity of hydro alcoholic extract of *Glycyrrhiza Glabra* root was evaluated against carrageenan induced rat paw Edema at dose levels of 100, 200, and 300 mg/kg orally. The hydro alcoholic extract of *Glycyrrhiza Glabra* showed a maximum inhibitory action on carrageenan induced paw edema at the dose of 200 mg/kg and inhibited the leukocyte migration in a dose dependent manner. In another activity, the anti-inflammatory activity was comparable to indomethacin. Several secondary metabolites isolated from rhizomes of *Glycyrrhiza Glabra* were investigated for the COX-2 inhibitory activity using Cayman COX inhibitory screening assay. A few molecules showed potent COX-2 inhibitory activity which may be beneficial as anti-inflammatory agents.

H. Hepato-protective Activity of Glycyrrhiza Glabra.

The carbon tetrachloride induced hepatotoxicity and retrorsine induced liver damage, respectively, in mice and rats, glycyrrhizin and glycyrrhetinic acid was showed Hepato protective activity. The Hepato protective activity of glycyrrhizin showed that by preventing changes in cell membrane permeability, inhibiting phospholipase and increasing survival rate of hepatocytes.



I. Anticancer activity of Glycyrrhiza Glabra

Glycyrrhiza Glabra extract has been used in herbal formulations for combating cancers like PC-SPES, a polyherbal composition used for prostate cancer. The licorice extract induced the Bcl2 phosphorylation and G2/M cycle arrest in tumour cell lines as done by clinically used anti-microtubule agent Paclitaxel. 1-(2,4-dihydroxyphenyl)-3-hydroxy-3-(4'-hydroxyphenyl)-1-propanone (β -hydroxy – DHP) was identified in the licorice extract, which induced Bcl2 phosphorylation in breast and prostate tumour cells, G2/M cell cycle arrest, apoptosis demonstrated by Annexin V and TUNEL assay, decreased cell viability demonstrated by tetrazolium (MTT) assay, an altered microtubule structure. 70% Methanol soluble fraction of licorice acetone extract was found to induce apoptosis in human monoblastic leukaemia U937 cells.

J. Anti-diabetic Effect Glycyrrhiza Glabra.

Glycyrrhiza Glabra has also been traditionally used as an artificial sweetening agent and could be helpful in insulin resistance syndrome prevalent in the modern society. Glycyrrhiza Glabra shows the anti-diabetic effects of glycyrrhizin were investigated by using genetically non-insulin dependent diabetic Mellitus model mice, through a long-term feeding of glycyrrhizin treatment on diabetic symptom. The rise of blood glucose concentration was almost prevented in mice fed the 0.41% glycyrrhizin diet 9 weeks after the beginning of test feeding, although it was not suppressed in mice fed the control diet or the 0.27% glycyrrhizin diet. Water intake in the control and 0.27% glycyrrhizin diet groups increased gradually, whereas, this was not true in the 0.41% glycyrrhizin diet group. Glycyrrhizin treatment suggestively lowered blood insulin level. It did not affect the food intake or body weight among the groups. 0.41% glycyrrhizin diet in mice also better their tolerance to oral glucose loading 9 weeks after the beginning of test feeding.

K. Antidepressant activity of Glycyrrhiza Glabra.

The aqueous extract of root of Glycyrrhiza glabra showed anti-depressant effects in mice by using forced swim test (FST) and tail suspension test (TST). The extract of *Glycyrrhiza glabra* (75, 150, and 300mg/kg) was administered orally for 7 successive days in separate groups of male mice. The

dose of 150 mg/kg of the extract significantly reduced the immobility times of mice in both FST and TST, without any significant effect on locomotor activity of mice. The efficacy of extract was found to be comparable to that of imipramine (15 mg/kg ip) and fluoxetine (20 mg/kg ip). Glycyrrhiza Glabra extract reversed reserpine-induced extension of immobility period of mice in FST and TST.

L. Smooth muscles activity of Glycyrrhiza Glabra.

The effect of hydro-alcoholic extract of Glycyrrhiza Glabra is studied on mechanical activity of isolated colon in male rats. The mechanical activity of tissue in presence of extract and Epinephrine was expressively decreased compared to the control group. While the mechanical activity in the presence of extract and Propranolol HCL was significantly increased compared to the control group. However, no significant modification was observed in the mechanical activity of the tissue in the presence of phenylephrine and extract compared to the control group. According to the result, it appeared that hydro-alcoholic extract of licorice had modifying effect on colon motility via synergist effect with beta adrenergic receptors and independent of the alpha adrenergic receptors.

M. Anti-Hyperlipidemic activity Effect Glycyrrhiza Glabra.

In an experiment, the Ethanolic extract of root of Glycyrrhiza glabra and its fractions were showed its anti-hyperlipidemic activity. Ethanolic extract and its ethyl acetate soluble, water soluble and hexane soluble fractions decreased serum level of total cholesterol by 25.9, 38.0, 39.0 and 26.3%, respectively in high fructose diet induced anti-hyperlipidemic activity in Syrian golden hamsters. Furthermore, they also increased the serum HDL-cholesterol level by 14.8, 34.3, 27.3 and 17.2%, and decreased triglyceride level by 31.3, 37.2, 41.2 and 28.9%, respectively.

N. Aphrodisiac activity of Glycyrrhiza Glabra.

In the experimental study, the effect of aqueous extract of Glycyrrhiza Glabra roots and rhizomes showed aphrodisiac activity in male wistar rats. 150 mg/kg & 300 mg/kg/day were administered orally by gavage for 28 days. Mount latency, intromission latency, mounting frequency, intromission frequency observed before and during the study at day 0, 7, 10, 14, 21, and 28. The extract reduced significantly mount latency and intromission latency. The extract also increased significantly mounting frequency and intromission frequency.

O. Corticosteroid activity of Glycyrrhiza Glabra.

Glycyrrhiza Glabra showed mineralocorticoid properties due to the presence of glycyrrhizin and its metabolite 18 β -glycyrrhetic acid, which was an inhibitor of cortisol metabolism. It was suggest the mineralocorticoid properties of Glycyrrhiza Glabra, agonist of mineralocorticoid receptors and mild inhibitor of androgen synthesis, can reduce the prevalence of side effects related to the diuretic activity of spironolactone in patients with Polycystic Ovarian Syndrome. Originally the structure and activity of 18 β -glycyrrhetic acid were thought to be similar to adrenal steroid hormones, such as aldosterone and cortisol, since ingestion of Glycyrrhiza Glabra mimicked hyper aldosteronism and was suggested as a treatment for Addison's disease. It is now thought that the presence of intact adrenals is required for Glycyrrhiza Glabra ingestion to cause sodium retention, leading to subsequent hypertension.

P. Estrogenic Activity of Glycyrrhiza Glabra.

Glycyrrhiza glabra showed high estrogenic activity reflected by uterine Retention response and vaginal opening. Based upon the mouse uterine weight method, three doses of 25 mg of the alcoholic extract showed an estrogenic activity 1:4716980 of estradiol monobenzoate.

Q. Immunological activity Glycyrrhiza glabra.

The alcoholic extracts of root of *Glycyrrhiza glabra* were showed the effect on immune modulator activity. Neutrophils when treated with alcoholic extract of Glycyrrhiza Glabra showed increase in phagocytic Activity. The effect of Glycyrrhiza Glabra root extract was investigated on the performance and some immunological parameters of broiler chickens. *Glycyrrhiza glabra* root extract had no significant effect on immunological parameters including antibody titers against Newcastle disease and Influenza viruses, heterophil and lymphocyte percentages and heterophil to lymphocyte (H/L) ratio as well as liver and lymphoid organ weights.

R. Antiprotozoal activity of Glycyrrhiza Glabra:

In in vitro studies, the root of Glycyrrhiza glabra were found to be potentially inhibits the growth of Plasmodium. falciparum and Leishmania donovani, and possess anti- plasmodial activity with IC50 values between 4.5 and 0.6 mg/mL.

6. Marketed Product of Glycyrrhiza Glabra:

The drug Glycyrrhiza Glabra used along with other ingredient in the following Unani formulation, Sufuf-i- asl-us-soos, Lauq-e-Shamoon, Lauq-e-Zeequn Nafas, Jwarish-e- asl us soos, Majoon Mundi, Qairooti-e-Aard-e-karsana, Raughan-e-Sanan, Habb-e- banafshā, Habb-e-ghāriqoon, Habb-e-surfa, Habb-e-surfā qawi, Qurs-e-zarishk, Sharbat-e-aijaz, Sharbat-e-Sadar, Dayaqooza, Lauq-e-Hulba, Lauq-e-Amaltas, Lauq-e-Khiyar shambar, Lauq-e-Nazli, Lauq-e-Sapistan.

7. Conclusion

Glycyrrhiza glabra is one of the most important plants which has been used by Unani system of medicine for the treatment of various diseases. The modern experimental and clinical pharmacological studies confirmed also anti-inflammatory, immuno-modulatory, antiulcer, anticonvulsant, memory-enhancing activities etc. Glycyrriza Glabra and its extract has been used in Unani System of Medicine since a long for the treatment of various ailments like pulmonary diseases, hepatitis, gastro- intestinal ulcers, skin diseases etc. It is used as common ingredient in many Unani compound formulations along with other ingredients effectively. Traditionally it is used as mild laxative, anti-arthritis, anti-inflammatory, anti-ulcer, anti-tussive, aphoridisiac, antioxidant, anti-diuretic etc. The pharmacological and clinical studies reported in the present review confirm the therapeutic value of *Glycyrrhiza glabra* in Unani prospective also. From this evidence-based review it can be concluded that new research avenues may validate scientifically the use of Glycyrrhiza Glabra in amelioration of various diseases as described by Unani scholars.

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