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REVIEW ARTICLE

Phyto-Pharmacological Perspective of *Yashtimadhu* (*Glycyrrhiza Glabra* LINN.) – A Review

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ABSTRACT

Glycyrrhiza glabra Linn. commonly known as Licorice/Liquorice, Sweet wood, *Mulahatti* and *Yashtimadhu*. *Glycyrrhiza glabra* is a widely used classical medicinal plant and is found in numerous traditional formulas. The root of *G.glabra* relieves thirst, cough, asthma, bronchitis, abdominal colic, eye troubles and cures ulcers. The main chemical constituent of liquorice is glycyrrhizin (about 2-9%), a triterpene saponin with low haemolytic index. Glycyrrhetinic (glycyrrhetic) acid (0.5-0.9%), the aglycon of glycyrrhizin is also present in the root. Other active constituents of liquorice include isoflavonoids, chalcones, coumarins, triterpenoids and sterols, lignans, amino acids, amines, gums and volatile oils which are found to be responsible for its various activities like wound healing activity, antiulcer activity, memory enhancing activity, hair growth promoting activity, antithrombotic effect, hepatoprotective effect, cerebroprotective effect, antidyslipidaemic activity, antioxidant activity etc. The present review study is an attempt to provide reported information on its phyto-constituents and pharmacological activities.

Key words: *Yashtimadhu, Glycyrrhiza glabra* Linn, Licorice, Pharmacological activities.

INTRODUCTION

The genus *Glycyrrhiza* belonging to the family of Fabaceae. This is an extremely important family, as from its members are obtained nutrition's foods, valuable medicines, and virulent poisons. The members exhibit most varied properties some are amylaceous, other oleaginous, many yield resins, balsams, and dyes; not a few are astringent, acrid and bitter, narcotic and poisonous, emetic and purging, tonic and restorative [1]. *Glycyrrhiza glabra* Linn. known as *Yashtimadhu* is a perennial, generally glandular herbs, with sweet root**.** Stems several from the crown, 2-4 feet or more high, erect, stiff, solid, strongly striates, shortly pubescent, branched. Leaves alternate, spreading, large, stalked, with very minute deciduous stipules, impair-pinnate, leaflets opposite in 4-7 pairs. Flowers very shortly stalked, arranged in a rather lax, erect raceme, which is 1-3 inches long and long-stalked, but falling short of the leaves; bracts linear, acute, scarious, brown [2]. Liquorice is stated to possess expectorant, demulcent, antispasmodic, anti-inflammatory and laxative properties. Traditionally, it is also reported to affect the adrenal glands. It has been used for bronchial catarrh, bronchitis, chronic gastritis, peptic ulcer, colic and primary adrenocortical insufficiency [3]. Liquorice is used in catarrh of the upper respiratory tract and gastric, duodenal ulcers (*German Commission E, ESCOP, WHO.*). The root is said to be good for sore throats. It has tonic, alexipharmic, alternative and expectorant properties. The root in combination with other drug is prescribed for the treatment of snake bite [4]. The leaves of *G.glabra* are rich in the major plant nutrients, especially nitrogen (2.91% on dry wt.). A poultice of the leaves is said to be beneficial for scalds of the head and for foul perspiration of armpits [5].

MATERIALS AND METHODS

Classical text books of Ayurvrda and other compilatory treatises are reviewed for documenting the information about *Yashtimadhu* (*Glycyrrhiza glabra* Linn.).

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The published works on various scientific journals and web pages are consulted to review for available information about *Yashtimadhu* (*Glycyrrhiza glabra* Linn.) in terms of phyto-pharmacological information.

Information about *Yashtimadhu* available in various lexicons is tabulated here:

Name of Nighantu	*Varga*(Class)	Pharmacological actions
Dhanvantari Nighantu [6]	*Guduchayadi Varga*	*Shitapittavinashini*(cures urticaria), *Vrushya*(aphrodisiac), *Soshanashaka*(cures cachexia), *Kshayahara*(cures pthisis), *Chhardivinashini*(cures emesis)
Bhavaprakasha Nighantu [7]	*Haritakyadi Varga*	*Chakshusya*(Vision promoter), *Bala-varnakruta(*promotes physical strength, complexion) , *Shukrala*(increases semen), *Keshya*(good for hair), *Svarya*(good for voice), *Sothanashaka*(cures inflammation), Vishahara(*cures poison*), *Chhardihara*(cures emesis),*Trushnahara*(cures thirst), *Glanihara*(cures exhaustion), *Kshayapaha*(cures pthisis),*Vatapittajit* (Reduces vitiated *Vata* and *Pitta*) *Vranaropana*(cures the ulcer)
Raja Nighantu [8]	*Pippalyadi Varga*	*Chakshusya*(vision promoter), *Soshajit*(cures inflammation), *Trushnanashaka*(cures thirst), *Vranapaham*(cures ulcer)
Madanapala Nighantu [9]	*Abhayadi varga*	*Balya*(Immune booster), *Trushanashaka*(cures thirst), *Chhardihara*(cures emesis), *Pittajita*(reduces vitiated *Pitta*)
Shaligram Nighantu [10]	*Astha Varga*	-
Sodhala Nighantu [11]	*Guduchyadi Varga*	*Soshanashini*(cures cachexia)
Nighantu Adarsha [12]	*Palashadi Varga*	*Tridoshanashaka*(cures three Doshas)
Dravyaguna Vigyana (Y.T.Acharya) [13]	*Shimbi Varga* (Leguminoaceae) *Aparajita Kula* (Pappilionaceae)	-
Dravyaguna Vigyana (P.V.Sharma) [14]	*Chhedanadi Varga*	*Shleshmahara*(reduces Kapha)
Kaiyadev Nighantu [15]	*Oushadhi varga*	*Vrushya*(aphrodisiac),*Varnya*(Complexion promoter), *Svarya*(good for voice), *Keshya*(good for hair), *Chhardihara*(cures emesis),*Kshayahara*(cures pthisis), *Sofanashaka*(cures oedema), *Vrana-hareta*(cures ulcer)
Priya Nighantu [16]	*Shatapushpadi varga*	*Chakshusya*(Vision promoter), *Vrushya*(aphrodisiac),*Kanthya*(good for throat)
Shankar nighantu [17]	-	*Viryavardhaka*(increases semen), *Chakshusya*(vision promoter), *Svarya*(good for voice)
Saraswati nighasntu [18]	*Chandanadi varga*	-
Harityakadi nighantu [19]	*Harityakadi varga*	*Chakshusya*(Vision promoter), *Bala-varnakruta*(promotes Physical strength, complexion)
Guna ratnamala [20]	*Harityakadi varga*	*Chakshusya*(vision promoter), *Shukrala*(increases semen),*Keshya*(good for hairs),*Svarya*(good for voice), *Vrana-Sotha-Visha-Chhardi-Trushna-Glani-Kshayapah* (cures ulcers,edema,poison, vomiting, thirst,exhaustion and pthisis)
Madhava Dravyaguna [21]	*Vividhoushadhi*	*Raktapittagna*(cures bleeding disorders), *Vranasodhanaropanam*(cures ulcer)
Nighantu kalpadruma [22]	-	*Netrya*(good for eyes),*Varnya*(complexion promoter),*Keshya*(good for hairs), *Vranaropana*(cures ulcer)
Dravyaguna hastamalaka [23]	*Aparajitadi kula*	*Vat-pittashamaka*(reduces vitiated *Vata* and *Pitta* humors),*Snehana*(emollient), *Sothahara*(cures ulcer), *Kanthya*(beneficial for throat), *Mutrajanan*(diuretic)

Properties of *Yashtimadhu* [24]

Rasa(Taste)	*Guna*(Quality)	*Virya*(Potency)	*Vipaka*(Metabolic property)
Madhura(Sweet)	*Guru*(Heavy), *Snigdha*(Oily)	*Sheeta*(Cold)	*Madhura*(sweet)

Traditional uses [25]

- A decoction of *Madhuka* or its powder was prescribed with honey in anaemia.
- *Yashti* mixed with cow's milk was prescribed for promoting lactation.
- 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.
- *Charakadatta* prescribed *Yashtimadhu* and *Santalum album*, powdered with milk, in haematemisis.

- *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 ulcers, 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 good wash for falling and greying of hair.

Chemical constituents of *Glycyrrhiza glabra* Linn.

Glycyrrhizine, prenylated biaurone, licoagrone; 7-acetoxy- 2- methyl- isoflavone, 7- methoxy- 2-methylisoflavone and 7- hydroxy- 2 methyl isoflavone; 4- methyl coumarin, liqcoumarin; isoflavone, glyzaglabrin (7,2′-dihydroxy 3′,4′-methylenedihydroxy isoflavone); quercetin, quercetin-3-glucoside, kaempferol, astragalin, liquiritigenin and isoliquiritigenin (root). Other constituents reported include a flavanone rhamnoglucoside, chalcone glucosides, trans-isoliquiritigenin- 4′-β-D-glucopyranoside (isoliquiritin) and trans- isoliquiritigenin- 4-β-D-glucopyranoside (neoisoliquiritin); 7-hydroxy-4′-methoxyisoflavone (formetin), licuraside, liquiritoside, rhamnoliquiritin, triterpenoid, liquoric acid, 11-deoxoglycyrrhetic acid, liquiritic acid, isoglabrolide, glabrolide, deoxoglabrolide, glycyrrhizic acid, glycyrrhetol, 21α- hydroxy- 11-deoxyglycyrrhetic, and 24- hydroxyglycyrrhetic acids, 18α-hydroxy glycyrrhetic acid, olean -12-en-3β-ol-30 oic, olean- 11, 13 (18)-dien-3β-ol-30 oic acid, glabranine (5,7-dioxy-8-3 (3′, 3′-dimethylallyl- flavanone), pinocembrin, prunetin, 4- hydroxy chalcone, liquiritigenin, licoflavonol (6- γ-γ- dimethylallylkaempferol), kumatakenin, glycerol, licoricone, glabridin, glabrol, liqurazid, liquiritin, 3-hydroxyglabrol, 4′-0-methyl glabridin, 3′- methoxyglabridin, glycyrrhetinic acid; methyl olean-11,13 (18)-diene-3, 24-diol-30-oate, glabranine, formononetin, glabrene, saponaretin (isovitexin), 24-hydroxy-11- deoxyglycyrrhetic acid, methyl olean 11, 13 (18) diene-3, glycerrhetol, 21α-hydroxy isoglabrolide, licoflavonol, glyzarin, glyzaglabrin, licoisoflavones A, B and licoisoflavon, glycyrin, sugars and aspargin (root and other plant parts) [26].

Toxicology

LD_{50} of glycyrrhizin-thiamine HCL in rats is reported to be 1.94 and 0.764 g/kg s.c. respectively. Liquiritoside a root flavonoside is a low toxic substance. Consumpation of liquorice 10-45 g. / day is reported to cause raised blood pressure, together with a block of aldosterone/ rennin axis and electrocardiogram changes [27].

Substitutes and adulterants

Root of *Glycyrrhiza uralensis* Fisch. (Manchurian liquorice) and *Abrus precatorius* Linn. are often adulterated with liquorice. Stem pieces of *Glycyrrhiza glabra* are also sold in place of Root [28].

Research studies on *Glycyrrhiza glabra* Linn.

Ulcer healing activity

1. Ulcer healing activity of GA was Glycyrrhizic acid ammonium salt (GA) studied in terms of 1) % ulcer contraction, 2) epithelization, 3) ulcer breaking strength in incision and excision ulcer models (Rats). In the standard group the rats were treated with 0.0005% w/w fluticasone ointment for 10 days in incision model and for 16 days in excision model. In the test group, the rats were treated with 2% w/w GA ointment for 10 days in incision model and for 16 days in excision model. In this study we have demonstrated the effect of glycyrrhizic acid ammonium salt on excision and incision ulcer healing models that GA show increase the % ulcer contraction, epithelization and ulcer breaking strength as compared to control group [29].
2. After aseptic surgical preparations, identical (2×2cm) full thickness ulcers were created in the skin of the dorsal cervical region of 10 rats and 10 untreated control rats. Treated rats were given LPR topically daily and rinsed with sterile saline after for 5 days. Ulcers were observed for 21 days and then rats were euthanized. The rate of ulcer healing was determined planimetrically at day 0, 5, 10, 15 and 20. Histology revealed differences in re-epithelialization, inflammatory cell infiltration and tissue organization. Stiffness and ultimate strength of ulcers treated with LPR were greater than

untreated ones. It was concluded that LRP reduced number of inflammatory cells, and enhanced fibroblasts maturation and tissue alignment [30].

3. The healing potential of aqueous LE on dermal ulcers was evaluated. The study was carried out on 45 male Spragne-Dawly rats. Two uniform 7mmdiameter skin defects were created on the back of each animal by 7mm skin punch (total of 90 ulcers). LE was applied once daily on half of the ulcers for 7 days, after which the animals were sacrificed for histopathological, biochemical (hydroxyproline content) and biomechanical studies. The ultimate surface area of the ulcers was also measured. LE caused a significant increase in the number of fibroblasts and capillary buds, collagen contents and tensile strength of the ulcers. The ulcer surface area in the treatment group was also significantly less than the control group. It can be concluded that LE is an effective herbal remedy in ulcer healing [31].

Antithrombotic effect

Here we report the in-vivo effects of extract of *Glycyrrhiza glabra* and also the combined effect with Vitamin K and Heparin in Sprague Dawley Rats. Extract of *G.glabra* increased the bleeding time when given in the doses of 180 mg/kg and 360 mg/kg. Blood loss was evaluated 60 minute later as a function of absorbance at 540 nm due to hemoglobin content in water solution. Altogether data indicates that *Glycyrrhiza glabra* is an effective anti thrombotic agent in vivo [32].

Antiulcerogenic and toxicological studies

In antiulcerogenic assay *G. glabra* was tested and compared with Cimetidine as positive control and physiological saline as negative control, using standard method. In this study, ethanol induced ulcers were developed in albino rats which were treated for 30 days. The ulcer indices were measured after 24 hours, 15 days and 30 days. The values calculated after 30 days of treatment. Comparison shows that *G. glabra* possesses a very significant antiulcerogenic activity i.e. 77.7% after 15 days and 90% after 30 days of therapy. The results suggest that *G. glabra* could be a good source of alternative medicine for ulcer therapy [33].

Anti-ulcer and antioxidant activity

The present study was undertaken to determine the anti-ulcer and antioxidant potential of GutGard™, a standardized extract of *Glycyrrhiza glabra* commonly known as licorice. Effect of various doses (12.5, 25, and 50 mg/kg, po) of GutGard™ was studied on gastric ulcers in pylorus ligation-cold-restraint stress- and indomethacin induced gastric mucosal injury in rats. Anti-ulcer activity was evaluated by measuring the ulcer index, gastric content, total acidity, and pH of gastric fluid. GutGard™ dose dependently decreased gastric content, total acidity, ulcer index and increased pH of gastric fluid in pylorus ligation ulcer model. In cold-restraint stress- and indomethacin induced ulcer models all the doses of GutGard™ decreased the ulcer index and increased the pH of gastric fluid. The antioxidant activity was evaluated by the oxygen radical absorbance capacity (ORAC) assay. GutGard™ exhibited potent antioxidant activity with high hydrophilic and lipophilic ORAC value. GutGard™ possessed anti-ulcerogenic properties that might be afforded via cytoprotective mechanism by virtue of its antioxidant properties. These results supported the ethnomedical uses of licorice in the treatment of gastric ulcer [34].

Choleretic effects

Licorice extract, when administered per os or i.v., causes an evident choleretic effect in rats. The quali-quantitative analysis of umbelliferon (7-idroxycoumarin), was at first performed by a fluorimetric method, subsequently by a more selective HPLC method. Moreover, this HPLC method allows the determination of glycyrrhizin, an important licorice constituent. Unlike the glycyrrhizin, which is present in a fairly large amount, umbelliferon resulted to be present at a very low concentration (at trace level), both in licorice and in bile. Research is in progress, aiming to determine the substances, beyond glycyrrhizin, which are responsable for the choleretic effect of licorice [35].

Memory enhancing activity

Elevated plus-maze and passive avoidance paradigm were employed to test learning and memory. Three doses (75, 150 and 300 mg/kg p.o.) of aqueous extract of Glycyrrhiza glabra were administered for 7 successive days in

separate groups of animals. The dose of 150 mg/kg of the aqueous extract of liquorice significantly improved learning and memory of mice [36].

Hair growth promoting activity

Female wistar rats were used for the hair growth promotion studies. They were divided into three groups (n = 6) and their dorsal skin was completely denuded to completely remove hair. Paraffin oil (control), 2 % minoxidil solution (reference) or petroleum ether (60 – 80 0C) root extract of *G. glabra* (2 %), was applied to the denuded skin once daily for 30 days. During this period, they were observed visually for hair growth and thereafter skin biopsy was taken for evaluation of follicular density and cyclic phases of hair growth. The results suggest that animals treated with petroleum ether extract of *G. glabra* roots showed longer hair than those treated with either minoxidil or control [37].

Anti-asthmatic activity

The crude extract was obtained from the parts of *Glycyrrhiza glabra* by the process of cold percolation and Soxhlet method. Its different fractions were purified by column chromatography and thin layer chromatography. The purified samples were identified by spectral analysis including HNMR, CNMR and Mass spectroscopy. The swiss variety of albino rats were induced asthma by triple antigen. Purified saponin fraction of the extract of *Glycyrrhiza glabra* was injected to the infected rats. The result obtained shows that the saponin fraction is effective in triple antigen sensitized albino rats as anti-asthmatic agent. The inhibition on mast cell degranulation took place up to 62% at 25 mg/Kg body weight [38].

Hepatoprotective effect

Aqueous extract of *Glycyrrhiza glabra* roots in rabbit models with acute liver injury induced by Carbon tetrachloride at a dose of 1.25 ml/kg as a mixture with olive oil. Aqueous extract of *G. glabra* was administered in a dose of 2gm/kg/day orally for 7 days. Results demonstrate that the aqueous extract of *G. glabra* had a significant effect in amiolerating liver functions as well as restoring hepatic tissue in acute liver diseases when it was given in a single dose per day of 2gm/kg body weight. Therefore the aqueous extract of *G. glabra* roots can be used for prevention and treatment of liver disorders [39].

Chronic fatigue stress

Hydroalcoholic extract of *Glycyrrhiza glabra* on chronic fatigue stress (CFS) induced behavioral alterations in mice. The exposure of mice to chronic fatigue stress for 15 days demonstrated an increased immobility time, increased anxiety, impaired memory, reduction in muscle co-ordination, reduced activity and increased pain perception. The altered behavioral parameters were attenuated significantly by the treatment of *Glycyrrhiza glabra* (100 and 200 mg/kg *p.o*) comparable to fluoxetine (10 mg/kg). The study concludes that *Glycyrrhiza glabra* could be used as an alternative to conventional medicines for the treatment of chronic fatigue stress [40].

Anticonvulsant effects

Aqueous extract *G. Glabra* extract, diazepam and normal saline were injected intraperitoneally at 50-300 mg Kg^{-1}, 0.5-1 mg Kg^{-1} and 10 ml Kg^{-1}, respectively, 30 min before pentylenetetrazole (90 mg Kg^{-1}, i.p.) in mice. Aqueous extract at a dose of 300 mg Kg^{-1} delayed the onset time of the seizure and decreased the duration of the seizure significantly compared to the control. The duration of the seizure was also significantly decreased at doses 60-200 mg Kg^{-1}. The Aqueous extract of *G. Glabra* root possesses anticonvulsant activity which may be effective in the management of petit mal seizure [41].

Cerebroprotective effect

Aqueous extract of the roots of *Glycyrrhiza glabra* Linn. (250 and 500 mg/kg) in hypoxic rats. Hypoxia was induced by providing sodium nitrite drinking water to rats for 14 days. Extract at the tested doses promoted the locomotor activity and spatial behavior significantly, which was impaired in hypoxic rats. The extract administration restored the decreased levels of brain enzymes such as glutamate and dopamine and decreased acetylcholinesterase (AChE) activity significantly. Levels of antioxidant enzymes such as superoxide dismutase, glutathione peroxidase, glutathione reductase and catalase were reduced due to hypoxia and were restored to near normalcy by administration of ethanol extract of *G. Glabra* [42].

Aphrodisiac activity

The extract (150mg/kg & 300mg/kg body wt./day) was administered orally by gavages for 28 days in male wistar rats. Mount latency (ML), intromission latency (IL), mounting frequency (MF), intromission frequency (IF), weight of

animals (gm) were the parameters observed before and during the sexual behavior study at day 0, 7, 10, 14, 21, and 28. The extract reduced significantly ML & IL ($p < 0.05$). The extract also increased significantly MF & IF ($p < 0.05$). These effects were observed in sexually active male rats [43].

Antidyslipidaemic activity

Ethanolic (95%) extract of root of *Glycyrrhiza glabra* and its fractions were investigated for its antidyslipidaemic activity on HFD induced dyslipidaemic hamsters. 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. On the other hand ethanolic extract, ethyl acetate soluble, water soluble and hexane soluble fraction increased the serum HDL-cholesterol level by 14.8, 34.3, 27.3 and 17.2%, respectively. Ethanolic extract, ethyl acetate fraction, aqueous fraction and hexane fraction decreased triglyceride level by 31.3, 37.2, 41.2 and 28.9%, respectively. The reduction in LDL-cholesterol level by ethanolic extract, ethyl acetate soluble fraction and water soluble fraction were 43.9, 31.0, 33.4 and 24.6%, respectively [44].

Antioxidant activity

The rats were given 300mg/kg of DCB then treated with *Glycyrrhiza glabra* Linn. leaf extract. The level of malindealdehyde (MDA), an end product of lipid peroxidation, markedly increased in the 1,4 DCB treated rats, after treating with *Glycyrrhiza glabra* Linn., extract it level returned to its original level. Thus *G.glabra* exhibits its best antioxidant potential and liver protective effects like strand drug – silymarin [45].

Anticonvulsant action and amelioration of oxidative stress

The aqueous and ethanol extract of *Glycyrrhiza glabra* was tested at three doses *viz.* 100, 200, and 400 mg/kg i.p. for its anti-convulsant activity using pentylenetetrazole (PTZ)-induced seizure in rat. The effect of EEGG (400 mg/kg, i.p.) on oxidative stress markers like malondialdehyde (MDA), superoxide dismutase (SOD), and catalase (CAT) of rat brain tissue homogenate was tested. The onset of seizure was delayed ($P < 0.01$) by all the three doses of EEGG, but the duration of convulsion was reduced ($P < 0.01$) only in higher dose level (200 and 400 mg/ kg), whereas AEGG up to 400 mg/kg did not alter any of the parameters significantly. Biochemical analysis of rat brain tissue revealed that MDA was increased ($P < 0.01$), whereas SOD and CAT were decreased ($P < 0.01$) in PTZ-induced seizure rat, whereas pre-treatment with EEGG (400 mg/kg) decreased ($P < 0.01$) the MDA and increased ($P < 0.01$) both SOD and CAT, indicating attenuation of lipid peroxidation due to increase in antioxidant enzymes [46].

Anxiolytic activity

Mice received varying doses (10-300mg/kg i.p.) of hydroalcoholic extract of *Glycyrrhiza glabra* and anxiolytic activity was assessed using different paradigms like elevated plus maze, foot shock-induced aggression, and amphetamine-induced stereotypy. Diazepam orondansetron served as standard anxiolytic agents. In all the animal models of anxiety, lower doses of hydroalcoholic extract were more effective in alleviating anxiety. The extract and standard anxiolytic agents increased duration of occupancy of mice in open arm, increased latency to foot shockinduced aggression and reduced number of fighting bouts and delayed the onset of amphetamineinduced grooming, biting, sniffing and repetitive head movements. Finally the hydroalcoholic extract of roots and rhizomes of *Glycyrrhiza glabra* possesses anxiolytic activity [47].

CONCLUSION

The overall results reveal that *Glycyrrhiza glabra* have been evaluated number of times for different pharmacological activities like ulcer healing, anti-ulcerogenic, choleretic effects, anti-bacterial, hepatoprotective, antioxidant potential activity**,** anti-asthmatic activity, hair growth promoting activity and memory enhancing activity with good convincing results. Its traditional uses claim also suggests its use in hoarseness of voice, haematemisis, intrinsic haemorrhage, ulcers, bruises and burns, falling and greying of hair aphrodisiac and intellect-promoting tonic. The study would further help for the renaissance of other pharmacological activities on the plant.

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