

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/265164153>

A review of the health effects and uses of drugs of plant licorice (*Glycyrrhiza glabra* L.) in Iran

Article in *Asian Pacific Journal of Tropical Disease* · September 2014

DOI: 10.1016/S2222-1808(14)60742-8

CITATIONS

19

READS

506

7 authors, including:



Mahmoud Rafieian-kopaei

Shahrekord University of Medical Sciences

314 PUBLICATIONS 4,021 CITATIONS

[SEE PROFILE](#)



Zohre Eftekhari

Pasteur Institute of Iran (IPI)

34 PUBLICATIONS 261 CITATIONS

[SEE PROFILE](#)



Bahram Delfan

Lorestan University of Medical Sciences

52 PUBLICATIONS 427 CITATIONS

[SEE PROFILE](#)



Arman Zargaran

Tehran University of Medical Sciences

113 PUBLICATIONS 663 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Herbal medicines [View project](#)



The Macroscopic and Microscopic Evaluation of Hydroalcoholic Extract of *Silybum marianum*'s Effect on Intra-Abdominal Adhesion Caused by Surgery in Rat [View project](#)

All content following this page was uploaded by [Arman Zargaran](#) on 30 August 2014.

The user has requested enhancement of the downloaded file.



Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Disease

journal homepage: www.elsevier.com/locate/apjtd

Document heading

doi:

© 2014 by the Asian Pacific Journal of Tropical Disease. All rights reserved.

A review of the health effects and uses of drugs of plant licorice (*Glycyrrhiza glabra* L.) in Iran

Mahmoud Bahmani¹, Mahmoud Rafeian-Kopaei², Mahyar Jeloudari³, Zohre Eftekhari⁴, Bahram Delfan¹, Arman Zargaran⁵, Shirin Forouzan^{6*}

¹Razi Herbal Medicines Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran

²Medical Plants Research Center, Shahrekord University of Medical Sciences, Shahrekord, Iran

³Faculty of Veterinary Medicine, Urmia University, Urmia, Iran

⁴Institute of Biomedical Research, Postdoc of Veterinary Medicine, Tehran University, Tehran, Iran

⁵Pharmaceutical Sciences Research Center and Department of Traditional Pharmacy, School of Pharmacy, Shiraz University of Medical Sciences, Shiraz, Iran

⁶Food and Beverages Safety Research Center, Urmia University of Medical Sciences, Urmia, Iran

To the editor,

Liquorice or licorice (*Glycyrrhiza glabra* L.) is a perennial plant of the family Fabaceae (Figure 1) as weeds in wheat fields, cucurbits and kitchen garden, cotton, potato, sugar beet and fodder, hay, clover and sainfoin. It can lead to large reduction in farm products and gardens because of the development of roots and rhizomes[1,2]. It is called licorice, liquorice, glycyrrhiza, sweet wood, *Liquiritiae radix* in English; süssholz and lakritzenwurzel in German, réglisse and bios doux in French, shirin baian or mak in Persian (Farsi) and also liquirizia regaliz in Italian and Spanish languages[3–7]. Using licorice can be dated back to several thousand years ago[8]. It was widely used as gastritis, peptic ulcers, respiratory infections, tremor, *etc.* in traditional Persian medicine[8–10], and as the global paradigm of medicine in medieval age[11,12].

Based on current findings, it is experimented that licorice is beneficial for the growing congestion of the upper respiratory tract and gastric as well as duodenal ulcers[1]. Licorice (dried licorice root) increases secretion of serotonin and prostaglandins in the stomach, causing gastric disinflation effects[13]. Glycyrrhizinic acids (a

flavonoid) derived from licorice have anti *Helicobacter pylori* effect[14]. Other proven effects of this plant are anti-mutagenic, antioxidant, reducing cortisol and aldosterone effects as well as inhibition of thrombin and increasing bile[15–19].

Licorice helps enhancement memory, plays a role as antidepressant, and reduces blood cholesterol levels[20–22]. Also, glyderinine possesses antipyretic, anti-inflammatory and anti-vascular permeability effects[23]. Although licorice can reduce diabetes symptoms such as polydipsia and frequent urination, but cannot reduce blood glucose[24]. Licorice is a plant that is used as relief for menopausal symptoms[25]. Furthermore, it is used in renal and liver complications because of its strong anti-inflammatory effects[26,27]. Licorice is a good antioxidant agent[28]. It is reported that glycyrrhizin can play inhibitory role to control pulmonary carcinoma in mice[29]. Recent works show licorice has antiviral properties[30]. Licorice root contains a variety of components including sugars, flavonoids, sterols, amino acids, resins, starch, essential oil and saponins. It is composed mainly of saponins glycyrrhizic acid or glycyrrhizin (C₄₂ H₆₂ O₁₆; Figure 2). The root includes 6%–20% dry weight of glycyrrhizic acid[31–33].

*Corresponding author: Dr. Shirin Forouzan, Food and Beverages Safety Research Center, Urmia University of Medical Sciences, Urmia, Iran.
E-mail: mahmood.bahmani@gmail.com

Article history:

Received 18 Jun 2014

Received in revised form 22 Jun, 2nd revised form 26 Jun, 3rd revised form 2 Jul 2014

Accepted 15 Jul 2014

Available online 28 Jul 2014



Figure 1. Licorice (*Glycyrrhiza glabra* L.).

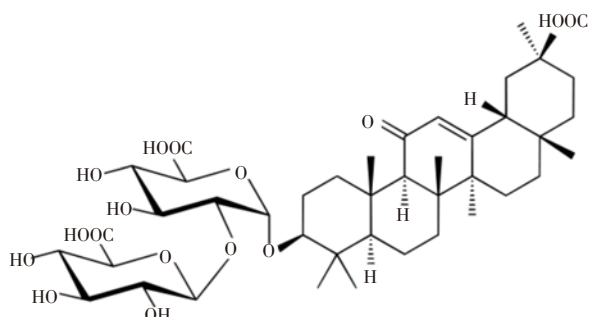


Figure 2. Chemical structure of glycyrrhizic acid.

Licorice root mainly contains acid- β -glycyrrhizic, glucuronic acid, glycyrrhetic acid (enoxolone), tannic acid, asparagine, resins, volatile oils, flavonoids such as liquiritigenin, liquiritin, isoliquiritigenin, isoliquiritin and coumarin compounds, such as herniarin and umbelliferone. The most famous flavonoids found by International Standardization Organization in licorice root are glabridin compounds, glycerin flavone, glabrene, glabryl, formononetin, isoliquiritigenin^[1,6]. Licorice leaves have rutin and isoquercetin and also dihydrostilbenes as antioxidant agent^[34,35].

In Iran, many formulations are produced from licorice nowadays. "D-Reglis" is a pharmaceutical product manufactured from licorice tablets prescribed for prevention of peptic ulcer in the concomitant use of nonsteroidal anti-inflammatory drugs. "Mentazin" pill is another drug used to relieve gastrointestinal pain, and improve gastric ulcer. It is used also as carminative and laxative agent. "Reglis" tablets are used to treat gastric and duodenal bloating, excess

acid secretion and gastric distention. "Gastrin" as another licorice preparation is anti-inflammatory and analgesic tablets prescribed for stomach pain and swelling accelerate healing of ulcers in the stomach and duodenum.

Another product is "Licophar". It is used as an anti-inflammatory pill for throat, cough, and sputum binding. "Reglisidin" is another product used as oral drug therapy for bloated stomach, duodenum and gastritis. "Altadin" chewable tablets are used for the treatment of inflammation and irritation of mucous membranes, throat, and throat painful stimulation. "Shirinnoush" as cough syrup affects on gastric ulcer, duodenal ulcer and gastritis.

Licorice is one of Iran's indigenous medicinal plants. This plant was used traditionally for centuries in Iran, and also current findings support its numerous health effects such as antioxidant, anti-cancer, anti-inflammatory, anti-microbial as well as its beneficial on immune system, skin diseases, lung, liver, heart failure, *etc*^[36-42]. Also some drugs are produced regarding to its some effects in Iran. But, it has a good potential capacity to produce more pharmaceutical products, not only as a limited local use, but for export and introduction as a valuable therapeutical remedy.

Conflict of interest statement

We declare that we have no conflict of interest.

References

- [1] Blumenthal M, Goldberg A, Brinckmann J. *Herbal medicine: expanded commission E monographs*. Boston: Integrative Medicine Communications; 2000.
- [2] Amani M, Mostoufi RS, Kashani HA. Optimal extraction of glycyrrhetic acid from licorice root. *J Food Technol* 2005; **3**(4): 576-580.
- [3] Awad V, Kuvalekar A, Harsulkar A. Microbial elicitation in root cultures of *Taverniera cuneifolia* (Roth) Arn. for elevated glycyrrhizic acid production. *Ind Crops Prod* 2014; **54**: 13-16.
- [4] Simon JE, Chadwick AF, Craker LE. *Herbs: an indexed bibliography, 1971-1980: the scientific literature on selected herbs, aromatic, and medicinal plants of the temperate zone*. Connecticut: Shoe String Press; 1984.
- [5] Evans WC. *Trease and Evans' pharmacognosy*. London: Elsevier Health Sciences; 2009.
- [6] British Herbal Medicine Association. *British herbal pharmacopoeia*. Bournemouth: Megaron Press; 1996.
- [7] Ghasemi Pirbalouti A, Momeni M, Bahmani M. Ethnobotanical study of medicinal plants used by Kurd tribe in Dehloran and Abdan Districts, Ilam Province, Iran. *Afr J Tradit Complement Altern Med* 2012; **10**(2): 368-385.
- [8] Zargarani A, Zarshenas MM, Mehdizadeh A, Mohagheghzadeh A. Management of tremor in medieval Persia. *J Hist Neurosci* 2013; **22**(1): 53-61.

- [9] Lehtihet M, Nygren A. [Licorice—an old drug and currently a candy with metabolic effects]. *Lakartidningen* 2000; **97**(36): 3892–3894. Swedish.
- [10] Esmaili S, Naghibi F, Mosaddegh M, Sahranavard S, Ghafari S, Abdullah NR. Screening of antiplasmodial properties among some traditionally used Iranian plants. *J Ethnopharmacol* 2009; **121**(3): 400–404.
- [11] Zargaran A, Zarshenas MM, Karimi A, Yarmohammadi H, Borhani-Haghighi A. Management of stroke as described by Ibn Sina (Avicenna) in the Canon of Medicine. *Int J Cardiol* 2013; **169**(4): 233–237.
- [12] Hamed A, Zarshenas MM, Sohrabpour M, Zargaran A. Herbal medicinal oils in traditional Persian medicine. *Pharm Biol* 2013; **51**(9): 1208–1218.
- [13] Colalto C. Herbal interactions on absorption of drugs: mechanisms of action and clinical risk assessment. *Pharmacol Res* 2010; **62**: 207–227.
- [14] Fukai T, Marumo A, Kaitou J, Kanda T, Terada S, Nomura T. Anti-*Helicobacter pylori* flavonoids from licorice extract. *Life Sci* 2002; **71**(12): 1449–1463.
- [15] Alekperov UK. Plant antimutagens and their mixtures in inhibition of genotoxic effects of xenobiotics and aging processes. *Eur J Cancer Prev* 2002; **11**(Suppl 2): S8–S11.
- [16] Oganessian KR. Antioxidant effect of licorice root on blood catalase activity in vibration stress. *Bull Exp Biol Med* 2002; **134**(2): 135–136.
- [17] Al-Qarawi AA, Abdel-Rahman HA, Ali BH, El Mougy SA. Licorice (*Glycyrrhiza glabra*) and the adrenal-kidney pituitary axis in rats. *Food Chem Toxicol* 2002; **40**(10): 1525–1527.
- [18] Mendes-Silva W, Assafim M, Ruta B, Monteiro RQ, Guimarães JA, Zingali RB. Antithrombotic effect of glycyrrhizin, a plant-derived thrombin inhibitor. *Thromb Res* 2003; **112**(1–2): 93–98.
- [19] Raggi MA, Bugamelli F, Nobile L, Curcelli V, Mandrioli R, Rossetti A, et al. [The choleric effects of licorice: identification and determination of the pharmacologically active components of *Glycyrrhiza glabra*]. *Boll Chim Farm* 1995; **134**(11): 634–638. Italian.
- [20] Parle M, Dhingra D, Kulkarni SK. Memory-strengthening activity of *Glycyrrhiza glabra* in exteroceptive and interoceptive behavioral models. *J Med Food* 2004; **7**(4): 462–466.
- [21] Dhingra D, Sharma A. Antidepressant-like activity of *Glycyrrhiza glabra* L. in mouse models of immobility tests. *Prog Neuropsychopharmacol Biol Psychiatry* 2006; **30**(3): 449–454.
- [22] Visavadiya NP, Narasimhacharya AV. Hypocholesterolaemic and antioxidant effects of *Glycyrrhiza glabra* (Linn) in rats. *Mol Nutr Food Res* 2006; **50**(11): 1080–1086.
- [23] Azimov MM, Zakirov UB, Radzhapova ShD. [Pharmacological study of the anti-inflammatory agent glyderinine]. *Farmakol Toksikol* 1988; **51**(4): 90–93. Russian.
- [24] Swanston-Flatt SK, Day C, Bailey CJ, Flatt PR. Traditional plant treatments for diabetes. Studies in normal and streptozotocin diabetic mice. *Diabetologia* 1990; **33**(8): 462–464.
- [25] Geller SE, Studee L. Botanical and dietary supplements for menopausal symptoms: what works, what does not. *J Womens Health (Larchmt)* 2005; **14**(7): 634–649.
- [26] Li JY, Cao HY, Liu P, Cheng GH, Sun MY. Glycyrrhizic acid in the treatment of liver diseases: literature review. *Biomed Res Int* 2014; doi: 10.1155/2014/872139.
- [27] Ye S, Zhu Y, Ming Y, She X, Liu H, Ye Q. Glycyrrhizin protects mice against renal ischemia-reperfusion injury through inhibition of apoptosis and inflammation by downregulating p38 mitogen-activated protein kinase signaling. *Exp Ther Med* 2014; **7**(5): 1247–1252.
- [28] Chin YW, Jung HA, Liu Y, Su BN, Castoro JA, Keller WJ, et al. Anti-oxidant constituents of the roots and stolons of licorice (*Glycyrrhiza glabra*). *J Agric Food Chem* 2007; **55**(12): 4691–4697.
- [29] Kobayashi M, Fujita K, Katakura T, Utsunomiya T, Pollard RB, Suzuki F. Inhibitory effect of glycyrrhizin on experimental pulmonary metastasis in mice inoculated with B16 melanoma. *Anticancer Res* 2002; **22**: 4053–4058.
- [30] Fiore C, Eisenhut M, Krausse R, Ragazzi E, Pellati D, Armanini D, et al. Antiviral effects of *Glycyrrhiza* species. *Phytother Res* 2008; **22**: 141–148.
- [31] Caballero B, Trugo L, Finglas PM. *Encyclopedia of food science and nutrition*. 2nd ed. Maryland: Academic Press; 2003.
- [32] Ibanoglu E, Ibanoglu S. Foaming behavior of licorice (*Glycyrrhiza glabra*) extract. *Food Chem* 2000; **70**: 333–336.
- [33] Wang ZH, Hsieh CH, Liu WH, Yin MC. Glycyrrhizic acid attenuated glycolytic stress in kidney of diabetic mice through enhancing glyoxalase pathway. *Mol Nutr Food Res* 2014; **58**: 1426–1435.
- [34] Hayashi H, Hattori S, Inoue K, Khodzhimatov O, Ashurmetov O, Ito M, et al. Field survey of *Glycyrrhiza* plants in central Asia (3). Chemical characterization of *G. glabra* collected in Uzbekistan. *Chem Pharm Bull* 2003; **51**(11): 1338–1340.
- [35] Biondi DM, Rocco C, Ruberto G. New dihydrostilbene derivatives from the leaves of *Glycyrrhiza glabra* and evaluation of their antioxidant activity. *J Nat Prod* 2003; **66**(4): 477–480.
- [36] Kim YM, Ki SH, Lee JR, Lee SJ, Kim CW, Kim SC, et al. Liquiritigenin, an aglycone of liquiritin in *Glycyrrhiza radix*, prevents acute liver injuries in rats induced by acetaminophen with or without buthionine sulfoximine. *Chem Biol Interact* 2006; **161**: 125–138.
- [37] Fu B, Liu J, Li H, Li L, Lee FS, Wang X. The application of macroporous resins in the separation of licorice flavonoids and glycyrrhizic acid. *J Chromatogr A* 2005; **1089**: 18–24.
- [38] Li S, Zhu JH, Cao LP, Sun Q, Liu HD, Li WD, et al. Growth inhibitory *in vitro* effects of glycyrrhizic acid in U251 glioblastoma cell line. *Neurol Sci* 2014; **35**: 1115–1120.
- [39] Bahmani M, Qorbani M, Hosseini SR, Najafzadeh-Varzi H, Mehrzadi S. Traditional application of medicinal plants in southern area of Ilam province for treatment diseases and clinical syndromes in small ruminants. *J Herbal Drugs* 2011; **2**: 52–60.
- [40] Bahmani M, Rafieian-Kopaei M. Medicinal plants and secondary metabolites for leech control. *Asian Pac J Trop Dis* 2014; **4**(4): 315–316.
- [41] Bahmani M, Rafieian-Kopaei M, Avijgan M, Hosseini S, Golshahi H, Eftekhari Z, et al. Ethnobotanical studies of medicinal plants used by Kurdish owners in south range of Ilam province, west of Iran. *Am-Euras J Agric Environ Sci* 2012; **12**(9): 1128–1133.
- [42] Bahmani M, Eftekhari Z. An ethnoveterinary study of medicinal plants in treatment of diseases and syndromes of herd dog in southern regions of Ilam province, Iran. *Comp Clin Path* 2012; **22**: 403–407.