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:

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

Mahmoud Bahmani¹, Mahmoud Rafieian-Kopaei², Mahyar Jeloudan³, Zohre Eftekharì, Bahram Delfan¹, Arman Zargaran⁵, Shirin Forouzan⁶

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, reglisse 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, glycerodine possesses antipretic, 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*
Licorice root mainly contains acid–2-beta-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]. Liquorice leaves have rotine 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, antimicrobial 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 glycyrrhetinic acid from licorice root. J Food Technol 2005; 3(4): 576–580.
[3] Awad V, Kuvalekar A, Harssulkar 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 pharmacopeia. Bournemouth: Megaron Press; 1996.
[7] Ghaseemi Pirbalouti A, Momeni M, Rahmani. Ethnobotanical study of medicinal plants used by Kurd tribe in Dehloran and Abdanan Districts, Ilam Province, Iran. Afr J Tradit Complement Altern Med 2012; 10(2): 368–385.
[8] Zargaran 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 2008; 97(36): 3892–3894. Swedish.

[10] Esmaeili S, Naghibi F, Mosaddegh M, Sahranavard S, Ghafari S, Abdullah NR. Screening of antiplastomodial 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] Hamedi A, Zarshenas MM, Sohrabpour M, Zarsharan 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: 207–217.

[14] Fukai T, Marumo A, Kaitou J, Kanogami K. Antioxidant effect of licorice root on blood catalse activity in vibration stress. Bull Exp Biol Med 2002; 134(2): 135–136.

[15] Al–Qarawi AA, Abdel–Rahman HA, Ali BH, El Mougy SA. Liquorice (Glycyrrhiza glabra) and the adrenal-kidney pituitary axis in rats. Food Chem Toxicol 2002; 40(10): 1525–1527.

[16] Mendes–Silva W, Assafim M, Ruta B, Monteiro RQ, Guimaryes JA, Zingali RB. Antithrombotic effect of glycyrrhizin, a plant–derived thrombin inhibitor. Thromb Res 2003; 112(1–2): 93–98.

[17] Raggi MA, Bugamelli F, Nobile L, Curcelli V, Mandrioli R, Rossetti A, et al. [The choleretic effects of licorice: identification and determination of the pharmacologically active components of Glycyrrhiza glabra]. Boll Chim Farm 1995; 134(11): 634–638. Italian.

[18] Parle M, Dhinera D, Kulkarni SK. Memory–strengthening activity of Glycyrrhiza glabra in exteroceptive and intuitive behavioral models. J Med Food 2004; 7(4): 462–466.

[19] Dhinerga D, Sharma A. Antidepressant-like activity of Glycyrrhiza glabra L. in mouse models of immobility tests. Prog Neuropsycho Pharmacol Biol Psychiatry 2006; 30(3): 449–454.

[20] Visvadiya NP, Narasimhacharya AV. Antioxidant and antiinflammatory activities of Glycyrrhiza glabra (Linn) in rats. Mol Nutr Food Res 2006; 50(11): 1080–1086.

[21] Azimov MM, Zakirov UB, Radzhapova ShD. [Pharmacological study of the anti–inflammatory agent glyderinine]. Farmakol Toksikol 1988; 51(4): 90–93. Russian.

[22] 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.

[23] 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.

[24] 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.

[25] 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.

[26] Chin YW, Jung HA, Liu Y, Su BN, Castoro JA, Keller WJ, et al. Anti–oxidative constituents of the roots and stolons of licorice (Glycyrrhiza glabra), J Agric Food Chem 2007; 55(12): 4691–4697.

[27] 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.

[28] Fiore C, Eisenhut M, Krauss R, Ragazzi E, Pollati D, Armanini D, et al. Antiviral effects of Glycyrrhiza species. Phytother Res 2008; 22: 141–148.

[29] Caballero B, Trugo L, Finglas PM. Encyclopedia of food science and nutrition. 2nd ed. Maryland: Academic Press; 2003.

[30] Ilamoglu E, Ilamoglu S. Foaming behavior of licorice (Glycyrrhiza glabra) extract. Food Chem 2000; 70: 333–336.

[31] Wang ZH, Hsieh CH, Liu WH, Yin MC. Glycyrrhizic acid attenuated glycative stress in kidney of diabetic mice through enhancing glyoxalase pathway. Mol Nutr Food Res 2014; 58: 1426–1435.

[32] 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.

[33] 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.

[34] Kim YM, Ki SH, Lee JR, Lee SJ, Kim CW, Kim SC, et al. Liquiritigenin, an acyclic–cone 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.

[35] 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.

[36] Li S, Zhu JH, Cao LP, Sun Q, Liu HD, Li WD, et al. Growth inhibitory in vitro effects of glycyrrhiczic acid in U251 glioblastoma cell line. Neurol Sci 2014; 35: 1115–1120.

[37] 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.

[38] Bahmani M, Rafieian–Kopaei M. Medicinal plants and secondary metabolites for leech control. Asian Pac J Trop Dis 2014; 4(4): 315–316.

[39] Bahmani M, Rafieian–Kopaei M, Avijan M, Hosseini S, Golshahi H, Eftekhar Z, et al. Ethnobotanical studies of medicinal plants used by Kurdish owner’s in south range of Ilam province, west of Iran. Am–Euras J Agric Environ Sci 2012; 12(9): 1128–1133.

[40] Bahmani M, Eftekhar 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.