A Review on Pharmacological Properties of Liquorice

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Abstract- *In recent years, consumers have paid much more attention to natural medicines and ingredients, largely due to the general feeling that natural compounds are safe. On the other hand, plants that are used in traditional medicine and can be added to foods, nutraceuticals, cosmetics and even pharmaceutical products. Glycyrrhiza glabra Linn. It belongs to the legume family and has been known since ancient times. This plant contains various phytochemicals such as glycyrrhizin, 18β-glycyrrhetinic acid, glabrin A and B, and isoflavones, which have shown various pharmacological activities.Pharmacological experiments have shown that various extracts, pure compounds of this species exhibit a wide range of biological properties, including antibacterial, anti-inflammatory, antiviral, antioxidant and antidiabetic activities. Several toxicology studies have shown some concerns. This review addresses all of these questions and focuses on the pharmacological effects reported for G. glabra.*

Keywords- Glycyrrhiza glabra, pharmacology, phytochemistry, toxicology, traditional uses

I. INTRODUCTION

Glycyrrhiza glabra is one of the most popular medicinal plants of the legume family (also called legumes) and its members are now widely used as animal feed and food. The genus Glycyrrhiza is derived from the Greek words glycol (sweet) and China (root). It is also called liquorice, liquorice, liquorice, sweet tree and radix (in English); liquorice and liquorice root (in German); liquorice and sweet organic products (in French); Shirin Bryan and MAK (in Persian); and Liquorice and Regalia (in Italian and Spanish, respectively). This species is native to the Mediterranean region, but is now also found in India, Russia and China. The extracts are currently used in the pharmaceutical and food industries, as well as in the production of functional foods and dietary supplements.

Flowers:-

G. glabra is a typical herbaceous perennial, growing to 1 m in height, presenting pinnate leaves with a length of 7 to 15 cm. The flowers are purple to pale whitish blue, being arranged in a hermaphrodite inflorescence.

Fruit:-

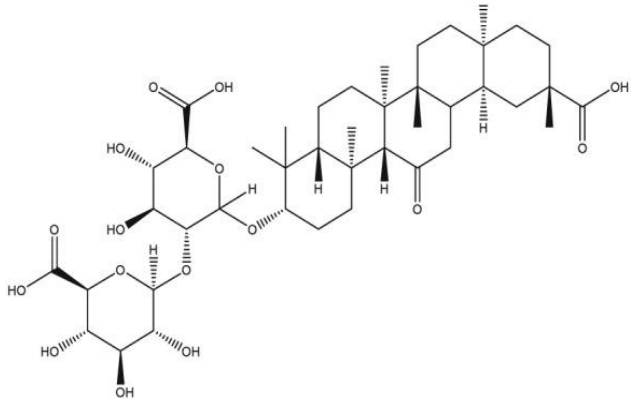
It is an oblong legume with 2 to 3 cm of length and containing several seeds.

Chemical Constituents:-

Glycyrrhizin

From a nutritional perspective, liquorice is a source of proteins, amino acids, polysaccharides and simple sugars, mineral salts (such as calcium, phosphorus, sodium, potassium, iron, magnesium, silicon, selenium, manganese,

zinc and copper), pectin, resins and starches. . sterols and rubber (Q. Wang et al., 2015). Oestrogens, tannins, phytosterols (ergosterol and stigma sterol), Coumadin, vitamins (B1, B2, B3, B5, E and C) and glycosides (Q. Wang, IAN et al.) have been reported., 2015. Many biological compounds have also been isolated, mainly terpenes, saponins (responsible for sweet taste) and flavonoids (Rizzo et al., 2017; Q. Wang, IAN et al., 2015).



Liquorice saponins occur as glucosides, while glycine's occur as oleates. The main characteristic components of liquorice are terpene saponins, which are responsible for its sweet taste. The content of these compounds can vary significantly depending on geographical origin, harvest and processing and can influence the therapeutic effects of liquorice. The main component of the roots is , a terpenoid saponin that is almost 50 times sweeter than sucrose and is its main active ingredient (J. Y. Yu et al., 2015). Glycyrrhizin makes up about 10% of the dry weight of liquorice root and is a mixture of potassium, calcium and magnesium salts of acid in a proportion of 2% to 25% (Rizzo et al., 2017). After oral administration, is metabolized by intestinal bacteria to 18-glycyrrheic acid, 3-monoglucuronide, and acid.

Skin inflammation and infection

Many compounds in liquorice root may help to reduce inflammation of the skin and other parts of the body. These compounds can help to treat several skin conditions. For example, one animal study showed that glycyrrhizin extract from liquorice root may relieveTrusted Source symptoms associated with eczema.

Stomach pain and ulcers:-

An infection with a bacterium called Helicobacter pylori can cause stomach ulcers in some people. A clinical trial on 120 people showed that adding liquorice extract to standard treatment significantly improved the eradication of H. Pylori. Other Reviews A reliable source has found other connections between forms of liquorice extract and anti-ulcer effects. Liquorice (DGL) is a form of processed liquorice extract that contains less. Small studies show that DGL supplements can relieve symptoms of general gastrointestinal irritation.

Hepatitis C:-

Glycyrrhizin may help treat hepatitis C, a virus that infects the liver. If left untreated, hepatitis C can cause inflammation and long-term damage to the liver. Researchers report that shows antimicrobial activity against hepatitis C in cell samples and may hold promise as a future treatment against this virus. Some research suggests that liquorice extract may help kill cavity-causing bacteria in the mouth. A 2020 review found that liquorice root extract may help reduce the growth of Streptococcus mutans bacteria in the mouth. This reduces the acidity of the tooth environment and prevents tooth decay from forming.

Sore throat:-

Various forms of liquorice can help treat sore throats and other upper respiratory illnesses. Many people say that drinking liquorice root tea helps soothe minor irritations and soothe a sore throat. However, most of these claims are anecdotal. Studies have also shown that various liquorice preparations have positive effects in clinical

Herbal remedies containing liquorice root may also help to reduce symptoms of asthma. However, only animal studies have directly assessed the effect of liquorice on asthma symptoms, and human research is necessary to confirm or disprove its efficacy

Liquorice root is used both as a flavouring agent and medicinal treatment. It comes in many forms, including teas, capsules, liquids, and even topical gels.

May aid skin conditions:-

Liquorice root contains over 300 compounds, some of which demonstrate potent anti-inflammatory, antibacterial, and antiviral effects (3Trusted Source, 7Trusted Source, 8Trusted Source).

In particular, animal and test-tube studies link glycyrrhizin to anti-inflammatory and antimicrobial benefits (1Trusted Source, 3Trusted Source, 5Trusted Source).

As a result, liquorice root extract is used to treat a variety of skin conditions, including acne and eczema.
In a 2-week study in 60 adults, applying a topical gel containing liquorice root extract significantly improved eczema (4Trusted Source).

Though topical liquorice gels have also been used to treat acne, research on its effectiveness is mixed and quite limited (9Trusted Source).

May reduce acid reflux and indigestion

Liquorice root extract is often used to relieve symptoms of indigestion, such as acid reflux, upset stomach, and heartburn.

In a 30-day study in 50 adults with indigestion, taking a 75-mg liquorice capsule twice daily resulted in significant improvements in symptoms, compared with a placebo (10Trusted Source).

Liquorice root extract may also alleviate symptoms of gastroesophageal reflux disease (GERD), including acid reflux and heartburn.

In an 8-week study in 58 adults with GERD, a low dose of glycyrrhetinic acid in combination with standard treatment resulted in significant improvements in symptoms (11Trusted Source).

Another study in 58 adults with GERD noted that the daily use of liquorice root was more effective at reducing symptoms over a 2-year period than commonly used antacids (12).

While these results are promising, larger human studies are necessary.

May help treat peptic ulcers

Peptic ulcers are painful sores that develop in your stomach, lower oesophagus, or small intestine. They're commonly caused by inflammation resulting from *H. pylori* bacteria (13Trusted Source).

Liquorice root extract and its glycyrrhizin may help treat peptic ulcers.

One study in mice found that liquorice extract doses of 91 mg per pound (200 mg per kg) of body weight protected against these ulcers better than omeprazole, a common peptic ulcer medication (14Trusted Source).

While more research is needed in humans, a 2-week study in 120 adults showed that consuming liquorice extract in addition to a standard treatment significantly reduced the presence of *H. pylori* (15Trusted Source).

May have anticancer properties

Due to its content of numerous plant compounds with antioxidant and anti-inflammatory effects, liquorice root extract has been studied for its protective effects against certain types of cancer (16Trusted Source).

In particular, liquorice extract and its compounds have been linked to slowing or preventing cell growth in skin, breast, colorectal, and prostate cancers (16Trusted Source, 17Trusted Source, 18Trusted Source, 19Trusted Source).

As research is limited to test tubes and animals, its effects on human cancers are unknown.

Yet, liquorice root extract may help treat oral mucositis — very painful mouth sores that people with cancer sometimes experience as a side effect of chemotherapy and radiation (20Trusted Source, 21Trusted Source).

A 2-week study in 60 adults with head and neck cancer revealed that a topical liquorice film was just as effective as the standard treatment for oral mucositis (20Trusted Source).

May ease upper respiratory conditions

Due to their anti-inflammatory and antimicrobial effects, both liquorice root extract and tea may aid upper respiratory conditions.

In particular, animal studies conclude that glycyrrhizin extract from liquorice root helps relieve asthma, especially when added to modern asthma treatments (22Trusted Source, 23Trusted Source, 24Trusted Source).

While limited human research shows similar results, more rigorous, long-term studies are needed (25Trusted Source).

Additionally, limited test-tube and human studies suggest that liquorice root tea and extract may protect against strep throat and prevent sore throat after surgery (26Trusted Source, 27).

Still, further research is needed.

May protect against cavities

Liquorice root may help protect against bacteria that can lead to cavities.

A 3-week study gave 66 preschool-aged kids sugar-free lollipops containing 15 mg of liquorice root twice per day during the school week. Consuming the lollipops significantly reduced the number of *Streptococcus mutans* bacteria, which are the main cause of cavities (28Trusted Source).

Test-tube studies also show liquorice root extract to be effective at protecting against bacteria commonly linked to cavities and tooth decay (29Trusted Source, 30Trusted Source).

However, more research is needed on the optimal dose and form of liquorice root.

Other potential benefits

Liquorice root extract is tied to several other potential benefits. It may:

- **Aid diabetes.** In a 60-day study in rats, daily intake of liquorice root extract resulted in significant improvements in blood sugar levels and kidney health. This effect has not been confirmed in humans (31Trusted Source).
- **Reduce menopause symptoms.** Liquorice root extract has been proposed as a treatment for hot flashes during menopause. However, the evidence on its effectiveness for this purpose is limited (32Trusted Source, 33Trusted Source).
- **Boost weight loss.** Some studies indicate that liquorice root extract lowers body mass index (BMI) and supports weight loss. Yet, other studies have not found any effects on weight (34Trusted Source, 35Trusted Source).
- **Help treat hepatitis C.** One test-tube study noted that adding glycyrrhizin to a standard hepatitis C treatment significantly reduced the virus's spread. While promising, these results have not been confirmed in humans (36Trusted Source, 37Trusted Source)
- **The antioxidant activity** of G. Glabra is one of the main reasons for its use. Phenol content is likely responsible for the high antioxidant activity observed (Rack ova et al., 2007). Marsha and Sonar (2013) attributed this effect to flavonoids, while Singh et al.(2015) reported that the responsible compounds are mainly isoflavones such as , A and 30-hydroxy-4-O-methylglabridin. Bond, Rocco, and Roberto (2003) reported the tremendous antioxidant activity of derivatives in G. Glabra leaves. G. Glabra also contains B and D, which have potent DPPH radical scavenging activity and the ability to inhibit microtonal lipid peroxidation (Bond et al., 2003; See Sharma, Katya and Agrawal, 2016). These phenolic compounds effectively protect biological systems from oxidative stress and can inhibit the formation of skin lesions (Yamaguchi et al., 1998). According to Catania et al.(2015), topical application of licorice extract formulations may be important in innovative skin care and cosmetic products as it counteracts damage caused by oxidative stress by maintaining skin homeostasis through its high antioxidant content.
- **Anti-inflammatory effect**:- Anti-inflammatory effect G. Glabra and its use in the treatment of inflammatory diseases have been documented since ancient times (R. Yang, Yuan, Ma, Zhou, camp; Liu, 2017). Shalaby, Ibrahim, Mahmoud, and Mahmoud (2004) examined the anti-inflammatory effects of G. Glabra in male rats after 4 weeks of food intake. The authors observed a significant reduction in serum levels of total cholesterol, triglycerides and liver enzymes. Harwansh, Petra, Part, Singh, and Biswas (2011) examined the beneficial effects of G. Glabra in the treatment of upper respiratory and gastric system diseases. These pharmacological effects were due to increased secretion of serotonin and prostaglandins in the stomach, resulting in a reduction in gastric inflammation (Brahmani et al., 2014). Several authors have described that the anti-inflammatory effect is mainly due to , which in vitro can inhibit factors responsible for inflammation and also promote the healing of gastric and oral ulcers (Rack ova et al., 2007; Yin et al., 2017). In fact, the anti-inflammatory effects of have been described to be similar to those of glucocorticoids and mineralocorticoids (Kageyama, Suzuki, camp; Santa, 1994). In addition, G. Glabra is used to treat kidney and liver complications due to its strong anti-inflammatory effects (Y. Xiao et al., 2010). Y. Xiao et al. (2010) reported inhibition of liver granuloma formation and inflammatory cytokine production by , while X.R. Wang, Hao, and Chu (2017) reported anti-inflammatory effects in endometriosis. Furthermore, Liu et al. (2017) demonstrated the anti-inflammatory effect of on RAW cells.

Liquorice root may have potent antioxidant, anti-inflammatory, and antimicrobial effects. Early research suggests that, as a result, it may ease upper respiratory

infections, treat ulcers, and aid digestion, among other benefits.

Potential side effects and precautions:-

The Food and Drug Administration (FDA) has deemed liquorice root to be generally recognized as safe for use in foods (2Trusted Source).

However, the FDA does not currently evaluate or verify supplements for purity, effectiveness, or accuracy of ingredient labelling.

Additionally, the short-term use of liquorice root supplements and teas is widely considered safe. However, large doses may produce adverse effects, and individuals with certain health conditions may wish to avoid it.

Liquorice root overdose

Both chronic use and large doses of liquorice root products may lead to glycyrrhizin accumulation in your body.

Elevated levels of glycyrrhizin have been shown to cause an abnormal increase in the stress hormone cortisol, which may cause imbalances in your fluid and electrolyte levels (38Trusted Source).

As a result, chronic and large doses of liquorice root products may trigger several dangerous symptoms, including (2Trusted Source, 38Trusted Source, 39Trusted Source):

- low potassium levels
- high blood pressure
- muscle weakness
- abnormal heart rhythms

While rare, liquorice poisoning can occur. It may result in kidney failure, congestive heart failure, or excess fluid accumulation in the lungs (pulmonary edema) (2Trusted Source).

Thus, individuals with high blood pressure, congestive heart failure, kidney disease, or low potassium levels are encouraged to avoid glycyrrhizin-containing liquorice products altogether.

Pregnancy and breastfeeding

Consuming lots of liquorice — and glycyrrhizin in particular — during pregnancy may negatively affect your baby's brain development.

In one study, children born to mothers who ate large amounts of glycyrrhizin-containing liquorice products during pregnancy were more likely to have brain impairments later in life (40).

Therefore, pregnant women should avoid liquorice supplements and limit their intake of liquorice in foods and beverages.

Due to a lack of research, children and breastfeeding women should also avoid liquorice products.

Drug interactions

Liquorice root has been shown to interact with several medications, including (2Trusted Source):

- blood pressure medications
- blood thinners
- cholesterol lowering medications, including statins
- diuretics
- estrogen-based contraceptives
- nonsteroidal anti-inflammatory drugs (NSAIDs)

People taking any of these medications should avoid liquorice root products unless their healthcare provider instructs otherwise.

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