

Licorice Root and The Use of Phytopreparations In Medicine

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Abstract

In recent years, interest in the use of medicinal plants in medicine has been increasing. One of the most studied and in-demand plants is licorice (Glycyrrhiza glabra), whose roots possess unique pharmacological properties. Licorice root is used in the treatment of various respiratory diseases, gastritis, chronic inflammatory processes, and also exhibits immunomodulatory and rejuvenating effects. The aim of this work is to systematize data on the chemical composition of licorice root, its pharmacological effects, and clinical applications, as well as to discuss modern phytopreparations based on it.

Keywords: Licorice root, phytopreparations, pharmacological action, respiratory diseases, immunity, traditional medicine.

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1. Introduction

Licorice is one of the oldest medicinal plants known to humanity since ancient times. Its roots contain more than 300 compounds, including glycyrrhizin, flavonoid glycosides, isoflavonoids, steroids, resins, coumarins, and organic acids [1], [2]. These substances account for a wide range of pharmacological effects: from expectorant and anti-inflammatory to anti-ulcer and immunostimulatory.

Special attention to licorice was given by the great scientist and philosopher Abu Ali Ibn Sina (980–1037), who described its properties in his work Canon of Medicine, which became a medical encyclopedia of the medieval world [3]. Today, interest in studying licorice persists, especially in the context of creating safe and highly effective phytopreparations for the treatment of chronic diseases.

2. Methodology

A comprehensive approach was used in preparing this work: analysis of literary sources, clinical studies, pharmacological data, and modern publications on the use of licorice root in medicine. Particular attention was paid to the chemical composition of the root, mechanisms of pharmacological action, indications for use, and modern phytopreparations based on it [4], [5].

Chemical Composition of Licorice Root

Licorice root is rich in various bioactive substances:

- Glycyrrhizin — 6–12% [6]
- Glycyrrhizic acid and its salts — exhibit anti-inflammatory and anti-ulcer effects [7]
- Flavonoid glycosides: liquiritin, liquiritigenin, liquiritin apioside — participate in the antioxidant defense of the body [8]
- Isoflavonoids: formononetin, glabrin, glabridin, glabrol, 3-hydroxyglabrol, glycyrrhizoflavon — exert

anti-inflammatory and antibacterial action [8]

- Coumarins and derivatives: liquocoumarin, herniarin, umbelliferone, glycocoumarin, licopyranocoumarin — enhance antioxidant protection [9]
- Steroids: β -sitosterol, stigmasterol — reduce cholesterol levels, strengthen the vascular system [9]
- Resins, pectins, starches, phenolcarboxylic acids, essential oils, minerals, disaccharides, organic acids, and alkaloids [10]

Pharmacological Effects

Glycyrrhizin stimulates the activity of ciliated epithelium, increases the secretion of mucus in the upper respiratory tract, facilitates expectoration, exhibits anti-ulcer and anti-inflammatory effects, and reduces platelet aggregation [11]. Phytopreparations based on licorice root have anti-inflammatory, analgesic, expectorant, antispasmodic, immunomodulatory, and rejuvenating effects [12].

Indications for Use

- Acute and chronic bronchitis, laryngitis, tracheitis
- Bacterial pneumonia
- Gastritis, duodenitis, dyspepsia
- Allergic and inflammatory skin conditions: eczema, psoriasis
- Tuberculosis, asthma
- Immune system enhancement and recovery after intoxication

Clinical Studies and Application

Numerous clinical studies have confirmed the effectiveness of licorice root in treating respiratory and gastroenterological diseases. These studies noted accelerated recovery, reduction of inflammatory processes, stabilization of immune status, and improvement of overall patient condition [1], [2], [4].

The use of phytopreparations based on licorice combines high efficacy with minimal toxicity, which is especially important in chronic diseases and in the therapy of children and elderly patients.

Traditional and Modern Medicine

Traditional medicine in Central Asia used licorice root as a primary component for treating laryngitis, bronchitis, and gastritis. Modern preparations have expanded its applications: complex herbal mixtures, syrups, extracts, and tablets with controlled active ingredient content are now developed. In Uzbekistan, special attention is given to the development of seven cluster zones for cultivating and preparing medicinal plants, including licorice root, according to the decree of President Sh. M. Mirziyoyev [3], [5].

3. Discussion

Licorice root represents a unique natural source of biologically active compounds capable of exerting multifaceted therapeutic effects on the human body. Its chemical composition is extremely diverse, including over 300 compounds, among which glycyrrhizin and its salts, flavonoid glycosides, isoflavonoids, steroids, coumarins, resins, organic acids, essential oils, and minerals stand out [1], [2]. This richness in bioactive components makes licorice root an effective remedy for various diseases, especially respiratory, gastroenterological, and inflammatory conditions.

The pharmacological activity of licorice root is determined by the synergistic action of its components. Glycyrrhizin stimulates the ciliated epithelium of the respiratory tract, enhances the secretory function of mucous membranes, facilitates expectoration, and exhibits anti-inflammatory effects [3]. These properties make licorice root indispensable in treating acute and chronic respiratory diseases, such as bronchitis, laryngotracheitis, and pneumonia. Another important aspect is the anti-ulcer activity of glycyrrhizin, which confirms its effectiveness in treating gastritis and duodenitis [4].

Flavonoid glycosides and isoflavonoids in licorice root have antioxidant properties, prevent cellular damage, stimulate the immune system, and contribute to the body's defense against oxidative stress [5], [6]. Coumarins and their derivatives provide additional anti-inflammatory and antibacterial effects, strengthen vascular walls, and reduce platelet aggregation, making them promising for chronic inflammatory processes and cardiovascular disorders [7].

Modern clinical studies have confirmed the effectiveness of licorice root in treating respiratory diseases. It has

been established that using licorice root extract as part of combination therapy accelerates patient recovery, reduces the severity of inflammatory processes, and normalizes mucous membrane function [8]. Additionally, studies have shown that licorice-based herbal preparations help improve immune responses, increase overall vitality, and rejuvenate cells, which is particularly important for patients with chronic diseases and weakened immunity [9].

One of the key aspects of using licorice root is its safety and low toxicity. Unlike synthetic pharmacological drugs, licorice-based herbal preparations have a mild and gentle effect, allowing their use in adults, children, and elderly patients. At the same time, side effects and body intoxication are minimized, making licorice root a promising option for long-term therapy [10].

An important direction of modern research is the standardization of licorice-based herbal preparations. Since the content of bioactive compounds in the plant may vary depending on growing conditions, collection methods, and processing techniques, standardization ensures a stable concentration of active components in the preparations, enhancing their effectiveness and safety. In Uzbekistan, measures are being taken to establish cluster zones for the cultivation and production of medicinal plants, including licorice root, which ensures quality control of raw materials and products [11].

Licorice root is also being investigated in the context of oncology. Preliminary data indicate that some isoflavonoids and coumarins possess antitumor activity, inhibit cancer cell growth, and stimulate apoptosis [12]. In combination with other herbal preparations, licorice root can be used in integrated therapy to reduce chemotherapy side effects and improve the overall condition of patients.

Furthermore, licorice root has a positive effect on the endocrine system. Studies show that licorice root extracts can improve metabolic processes, help normalize blood glucose levels, and reduce inflammatory reactions in diabetes [13]. These properties make licorice root a promising component in developing new drugs for patients with chronic metabolic disorders.

It should be noted that using licorice root in combination therapy requires an individualized approach. Considering pharmacodynamic characteristics, patient age, and the presence of comorbidities, it is necessary to

adjust the dosage and form of herbal preparations. For example, syrups and tinctures are effective for acute respiratory inflammatory diseases, while extracts and tablets are advisable for chronic gastritis and liver diseases [14].

A systematic review of modern literature confirms that licorice root combines multiple therapeutic effects: from stimulating the ciliated epithelium and facilitating expectoration to antioxidant, anti-inflammatory, and immunostimulatory activity [1], [5], [6]. Taken together, these properties make licorice root one of the most promising natural sources for developing new highly effective and safe medicinal products.

Thus, the analysis of the chemical composition, pharmacological activity, and clinical application of licorice root shows that this plant is a valuable subject for medical science and pharmacology. Modern studies demonstrate the potential use of licorice root for a wide range of diseases, including respiratory infections, chronic inflammatory processes, gastroenterological disorders, cancer, and metabolic disorders. Special attention is paid to standardizing preparations, which ensures stable concentrations of active substances and high therapeutic efficacy. In contemporary medicine, licorice root remains a promising source for creating safe and effective herbal remedies that strengthen immunity, improve overall health, and prevent chronic diseases [7], [9], [12].

One of the priority directions for further research is the detailed study of the chemical composition of red licorice root (Kizilmiya) to isolate and identify biologically active components with antitumor activity and potential applications in diabetes treatment. The main goal of the research is to create a safe and highly effective preparation based on red licorice root that could be used for cancer and diabetes therapy without the negative side effects associated with modern treatment methods [1], [2].

Currently, the treatment of oncological diseases is carried out in three main directions: surgical intervention, radiation therapy, and chemotherapy. Despite their high effectiveness in suppressing tumor progression, all these methods have significant side effects, including toxic effects on healthy tissues, immunosuppression, and the risk of fatal outcomes within 1–5 years after treatment [3]. Therefore, the development of a safe plant-based drug has become particularly relevant and represents a promising direction in pharmacology and phytotherapy.

The use of red licorice root for creating a drug offers several advantages. Firstly, plant extracts have a mild and gentle effect on the body, minimizing the risk of side effects. Secondly, due to the complex action of the bioactive compounds in licorice root, it is possible to combine anti-tumor effects with immunostimulatory and antioxidant activities, which contributes to overall strengthening of the organism [4], [5]. Thirdly, such a drug would be more affordable, as the raw materials for its production are plant-based and can be cultivated in specially established farming and cluster zones, ensuring stable quality and availability [6].

The implementation of this project will allow the creation of a safe drug capable not only of slowing the progression of cancerous tumors but also having a positive effect in diabetes, improving metabolic processes and reducing inflammatory responses. This opens opportunities for comprehensive treatment and disease prevention, reducing dependence on toxic chemical drugs and alleviating the economic burden on the healthcare system [7].

Thus, the aim of this research direction is the development of an innovative phytodrug based on red licorice root, which simultaneously possesses anti-tumor activity, metabolic and immunostimulatory effects, is safe for the body, and affordable. Achieving this goal will make a significant contribution to combating oncological and endocrine diseases, improving patients' quality of life, and opening new prospects for the pharmaceutical industry [8].

4. Conclusion

In the future, research on red licorice root will enable the creation of a drug that is both safe and highly effective in the treatment of cancer and diabetes. This approach addresses the pressing challenges of modern medicine, allowing therapeutic effectiveness to be combined with minimal side effects. Moreover, the development of an affordable drug will enable its widespread use among patients, which is especially important for countries with limited resources. The implementation of this project contributes to strengthening patients' immunity, improving overall health, and making a significant contribution to addressing global healthcare challenges.

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