

# The Richest Licorice Medicinal Composition on the Public Health Guard

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**Abstract:-** Licorice is a national treasure of Azerbaijan, since the species growing in our country are distinguished by a high content of glycyrrhizic acid (up to 24%), which makes them indispensable in the fight against viral infections. The COVID-19 pandemic shocked the whole world, claiming hundreds of thousands lives, since traditional medicines used in the fight against it, amid which antibiotics accounted for a large percentage, were ineffective. Later it turned out that the use of antibiotics led to a deterioration in the patients' condition and an increase in mortality in the population. All the errors of medicine have been the result of a narrow approach to the problem and a lack of recognition by some doctors and researchers of the value of herbal medicines. As a result of the preferential use in the early stages of the pandemic development exclusively drugs of chemical origin, it was practically impossible to save those who fell ill in the first outbreak of the disease, especially when complications occurred; and here folk medicine comes to the rescue. Medicines developed by Azerbaijani scientists based on licorice, a natural raw material with lymphotropic and antiviral action, prevent the virus from binding to the host cell membrane, inhibit the replication of the virus that has already entered the body, thus preventing the development and spread of the disease. The research proposed by Medical University laboratories of independent Azerbaijan in this area has helped save the lives of thousands of people both at home and in neighboring countries. The goal of this work is to disclose the importance and usefulness of licorice based

**medicinal syrups in the treatment of the Covid-19 infection.**

**Keywords:-** COVID-19, Glycyrrhizaglabra, glycyrrhizic acid, independence, lymphotropic effect.

## I. INTRODUCTION

Despite the use of many drugs to treat COVID-19 infection since the early onset of the coronavirus, the scientists are still searching for effective treatments and prophylaxis of COVID-19 infection. Currently, the researchers are conducting clinical trials of three groups of drugs; these include antiviral drugs, immunomodulators and respiratory drugs. Antiviral drugs prevent the virus from entering or multiplying inside the lung cells, the second group of drugs is designed for the immune system response, and the third group includes drugs that allow the lungs to supply enough oxygen to the blood.

Since the specific treatment is not available, different methods are used to prevent the infection spread. In some countries, chloroquine, hydroxychlorine and mefloquine are among the drugs used against coronavirus. In Azerbaijan, which mostly uses the recommendations of the WHO, arbidol, koletrax, kaletra are used.

Amideffective antiviral tools, *Bald Licorice - Glycyrrhizaglabra F. (L.)* and its main useful component, glycyrrhizic acid become the subject of discussion in scientific articles of certain countries (China,

Korea, Iran, Germany, Japan, Turkmenistan, Turkmenistan, Azerbaijan, etc.).

*Bald licorice - Glycyrrhizaglabra* is one of the first medicinal plants used by the World Health Organization [1]. Its usefulness has been known for over 5000 years. Licorice is also a natural national treasure of Azerbaijan. According

to various scientists, it contains more than 200 beneficial biologically active substances. Drugs derived from this medicinal plant are used in medicine and pharmacy by 14 pharmacotherapeutic groups and have such beneficial effects as antiseptic, lymphotrop, immunomodulatory, anti-inflammatory, antiviral, antibacterial, antisclerotic,



Fig. 1: Glycyrrhizaglabra

antiallergic, antitussive, antidiabetic, expectorant, diuretic etc[2]. In addition, it is widely used in cosmetology, food and household industries [3]. Numerous scientific studies have shown that glycyrrhizin and glycyrrhizinic acid, the main ingredient of licorice root, is effective in the treatment of SARS (severe acute respiratory syndrome) [4], herpes, AIDS, hepatitis, influenza, encephalitis and

pneumonia, as well as in infections caused by respiratory syncytial virus, arboviruses, and viruses of vesicular stomatitis [5]. Since glycyrrhizic acid and glycyram are safe [6] and effective against SARS, scientists hope that these natural substances can become an important tool against COVID-19.

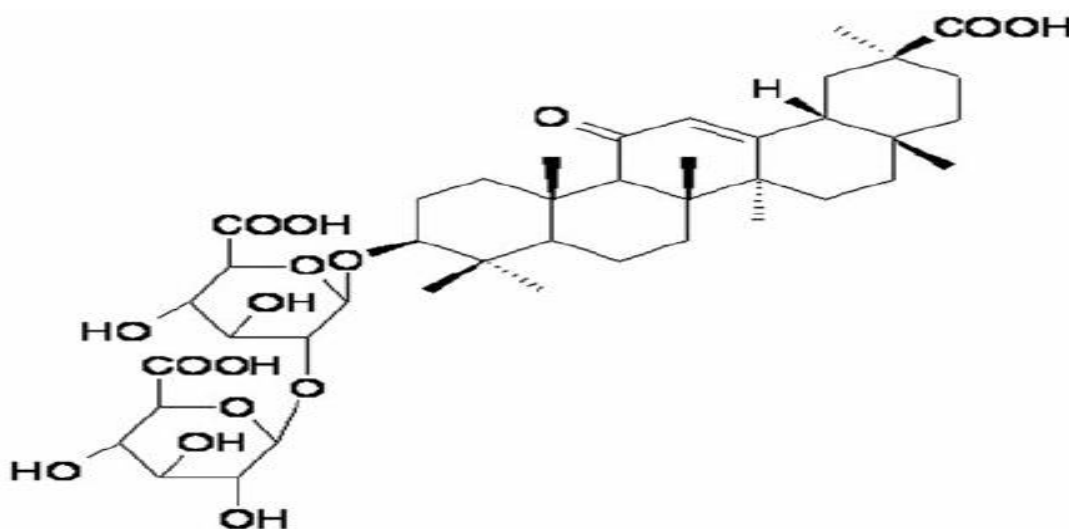


Fig. 2: The structure of glycyrrhizic acid

Licorice roots comprise triterpenoid 4–20% of saponins (mostly glycyrrhizin), a mixture of 18 $\beta$ -glycyrrhizic acid salts. Glycyrrhizic acid, the main triterpene-derived pharmacologically active substance from licorice in Azerbaijani *Glycyrrhiza glabra* content is even up to 24% [7]. In Japan and China, Glycyrrhizic acid is used as a hepatoprotective drug in chronic hepatitis. From January 2014, glycyrrhizic acid in the content of the licorice extract is approved by the FDA as a food sweetener [8]. Unlike other worldspread species, licorice spread in Azerbaijan is the richest in glycyrrhizic acid. The Azerbaijani licorice derived drugs have a wide range of pharmacological and biological activity: lymphotrop, antihemo-, lymphocoagulating, antiviral, antioxidant, antidote, anticonvulsant, antiallergic, hepatoprotective, neuroprotective, immunomodulatory, anti-inflammatory, etc. According to Cinat J., who published the results of the antiviral potential assessment for ribavirin, 6-azauridine, pyrazofurine, mycophenolic acid and glycyrrhizin against SARS, glycyrrhizin was found to be more active in inhibiting viral replication than all other compounds [9]. It should be noted, that COVID-19 is very similar to SARS appeared in 2003, and in this regard it is also termed SARS-CoV-2. Both viruses cause infection by invasion the human alveolar epithelial cells, and their genomes are 79.5% compatible [10]. It was found, that glycyrrhizin also inhibits the adhesion of the virus to the host cell membrane and its penetration into the cell [11], i.e. glycyrrhizin prevents the first stages of the virus action. It is not ruled out, that glycyrrhizin is able to stop the replication of COVID-19 and other coronaviruses, and is a powerful tool against them.

Based on in-depth scientific analysis and the results of many phytotechnological and pharmacotherapeutic studies, one may conclude that the use of licorice in viral and bacterial infections is promising, even necessary [12]. It is known that antiviral drugs are widely used in the treatment of diseases arising by invasion of following viruses: SARS; MERS - Middle East Respiratory Syndrome; HIV - human immunodeficiency; Ebola disease fever; malaria and a number of other viral diseases, - their prophylaxis and complex treatment protocols include licorice preparations, for example licorice juice and glycyram. The scientists around the world are currently offering natural remedies instead of the SARS-COV-2 coronavirus vaccine, scientists in some countries prefer non-traditional pharmaceutical products. Chinese scientists have extensively used a combination of homeopathic remedies and herbs in the treatment of COVID-19, including licorice (*Glycyrrhiza glabra* L.); Platycodon root- (*radix platycodonis*); Japanese Honeysuckle- (*Lonicera japonica*); In addition to the drugs produced and widely used in China, amid Chinese medicine tools used against COVID infection were also mentioned the *Eupatorium fortunei* [13]. The Ministry of Science and Technology of China allowed to prescribe against coronavirus plant-derived drugs that are less harmful. According to local media, those who received both synthetic & plant-derived drugs recover faster than prescribed only synthetic drugs. Beijing Chief Physician Van Ronby emphasized the high therapeutic effect of “*Qindfei Paidu*”, a drug based on licorice root and other medicinal plants.



Fig. 3: Licorice root, a raw material for antiviral, anti-SARS-CoV-2 glycyrrhizic acid and its syrup

According to a study Goma A. and Abdel-Wadood Y., 2021, the main component of licorice root, glycyrrhizic acid, has positive effect on people infected with the coronavirus [14].

Studies published in scientific journals have shown that the main active ingredient in licorice root, glycyrrhizic acid, effectively inhibits SARS virus clinically dangerous isolates replication [4], while other studies have shown that it inhibits adhesion of certain proteins of the pathogenic virus to host cell [15].

It should be noted that some specialists prefer non-traditional folk remedies. Chinese scientists, the first and leading experts in this field, consider phytotherapy important in the fight against coronavirus. They pay special attention to the prevention of COVID-19 platycodon root (*Radix Platycodonis*), Japanese Honeysuckle (*Lonicera japonica*), bald licorice (*Glycyrrhiza glabra*) and *Eupatorium fortunei*. Although many authors generally consider such herbal remedies to be promising in the treatment of coronavirus, more extensive research is needed to confirm the effectiveness of these drugs.

The researchers from Beijing University and the Chinese Military Medical Academy found that one of the components of licorice root in the treatment of COVID-19 helps the body fight the virus by imitating interferon [16].

The President of Madagascar Medicine Academy presented herbal preparation "COVID ORGANICS" for the prevention and treatment of COVID-19. In protocol, they mixed chloroquine and azithromycin with plant-derived from medicine emphasizing the use of medicinal plants [17].

- Iran, one of the most affected by the COVID-19 epidemic countries, has officially announced testing two herbal sprays to treat respiratory illnesses such as coronavirus [18].
- The President of Turkmenistan, Mr. Gurbanguly Berdimukhamedov claimed that licorice could cure coronavirus and instructed the Ministry of Health scientifically study to apply widely bald licorice - *Glycyrrhiza glabra* against COVID-19 [19].

- German scientists have proved the effectiveness of liquid licorice root extract and glycyrrhizic acid in the treatment of SARS-COV-2 [20].

The glycyrrhizic acid based Spanish drug "Viusid Glycyrrhizic", as well as about 20 other antiviral remedies are used in the treatment of various diseases [21].

After Azerbaijan gained independence, the scientists of the Azerbaijan Medical University have been conducting research on licorice, a natural resource of our country. The various industrial licorice syrups made in Azerbaijan according to our data in numerous research laboratories. The licorice-based drugs are termed differently in various countries: "Biyān" - in Azerbaijani; "Liquiriciae" - in Latin; "Glycyrrhiza" - in Greek; "Licorice" - in English; "Sussholr" - in German; Liquiricae - in French; Lucretius - at Ukraine; Lokritsiya - in Bulgarian; "Yatxu-matxu" - in Indian; "Gantao" - in Chinese; Gamco - in Korean; "Maduka" - in Mongolian; "Dzir-tribili" - in Georgian etc.



Fig.4. Some licorice-root based remedies produced by Azerbaijan industry

The beneficial properties of licorice root have been known since ancient times. Thousands years ago, Tibetan physicians, the genius Ibn Sina (Avisenna), treated many diseases with the licorice root [22]. Licorice root is still widely used in both folk medicine and traditional medicine. Licorice root is used in the treatment of cough, pneumonia, cardiovascular system, anemia, reduces blood clotting, it helps with digestive system, liver, treats cold, urinary tract diseases, stress and depression, strengthens the immune system, helps in infections and poisons, fights against viruses, germs, and fungi. Licorice drugs also exhibit anti-inflammatory, sedative and various other positive effects. In COVID-19 pandemic, the antitussive effect of licorice is of special interest: licorice is the only plant with a wonderful effect for both dry and wet coughs.

In 1929-1934, licorice reserves in Azerbaijan amounted to 11.86 t / ha. The supply and processing of licorice root declined sharply during the First World War and the Civil War. In 1922, with the establishment of the Licorice Joint Stock Company, the licorice industry began to recover. Studies conducted later have shown that the area where licorice is distributed has decreased 5 times, total

licorice stocks have decreased 4 times, and inspections over the next 30 years have further reduced it [23]. In Azerbaijan, the first supply of licorice root for industry was carried out by American and British companies in the 1980s. A plant for processing licorice root was built at the Ujar railway station, and also licorice has been regularly exported to the Israel [24].

The content of glycyrrhizic acid of vegetate in Azerbaijan 8 species licorice (*Glycyrrhiza glabra* L) with an antiviral effect is 24%; this is higher than in the other species (33) distributed in the world [7, 25].

Along with glycyrrhizic acid, licorice contains flavonoids, steroids, essential oils, vitamins, organic acids, trace elements, resins, phytosterols, lipids, pectins, carbohydrates, etc. - it is very rich in nutrients [25]. Modern methods have made it possible to obtain more than 200 biologically active substances from licorice, and the most useful of these substances is glycyrrhizic acid. Glycyrrhizic acid has become the main object of research in various fields of medicine due to its wide range of biological activity.





Fig. 5: The manufacture of plant extract & syrup on basis of licorice x established in Azerbaijan

Based on the IlhamAliyev's presidential decree №2 / 483 from May 15, 2012 addressed to Azeri scientists, the bald licorice, the national plant wealth of Azerbaijan, has been selected as the main object of research; after, the useful substances and pharmaceutical products have been brought to light from it. According to the direct instructions of President IlhamAliyev, licorice preparations start to be produced in the industry "Licorice Industry Park", and its safe medicinal syrup products are currently used as an effective drugs [26].

We note that extensive scientific research was conducted under the leadership of Professor YagubJavadogluMammadov, the scientific head of the laboratory "Research of natural lymphotropic drugs" established at the Department of Pathological Physiology of the Azerbaijan Medical University in 1990-1995. Scientific research in the laboratory was carried out in three directions. In the "Pharmacology and Pharmacy" department conducted preliminary screening of 326 medicinal plants from the flora of Azerbaijan and their impact on blood and lymph clotting; the anticoagulant andfibrinolyticeffect of 110 was confirmed. After experiments, pharmaceutical products were created on the basis of pharmacologically active substances from 46 promising medicinal plants. We have presented a list of these substances as promising drugs that affect the blood and lymph clotting.

Based on phyto-pharmacological studies, the lymphotropic activity of 12 highly effective Azerbaijan medicinal plants including licorice were first discovered in world medicine and proposed for use in the pharmaceutical industry.

In Azerbaijan, individual preparations from licorice are currently in use: glycyrrhizic acid and glyciram;dry and solid extracts of licorice containing complex licorice substances.Licorice root syrup impacton lymph has been studied in detail, and its very effective lymphotropic effect has

been confirmed and applied in medicine. This contributions into world medicine was made by Azerbaijani scientists and all these medicines are certified. They are approved by the Control-Analytical Laboratory in the "Pharmacy" Institution of the Republic of Azerbaijan Ministry of Health; their composition and purity meet the standards. These drugs were tested separately abroad, and it was confirmed that their composition corresponds to the required by Pharmacopoeia.

Their clinical researches were conducted in 4 leading hospitals and clinics of the Republic of Azerbaijan: in the United Children's Hospital named after G.Garayev; Republican Children's Hospital; Children's Clinical Hospital; At the Melikov United City Hospital.

Under the guidance of well-known scientists of Azerbaijan Medical University Pediatric Departments' located in these hospitals: academician AdilaNamazova; EyubovaA.E .; Prof. Hajiyev A.A., 12 dissertations (3 doctoral and 9 PhD) have been completed. The scientific research conducted under the supervision on 9086 patients, the results were controlled and signed by the heads of these departments and chief physicians of hospitals, and 4 important documents were approved by the Azerbaijan Republic Minister of Health. Thus in our country, the above-mentioned effects of drugs have been thoroughly approved, tested and confirmed in accordance with the Pharmacopoeia.

Significance of the of licorice plant preparationsis mainly based ontheirlymphotrop, immunotrop activities and ability to reduce blood and lymph clotting. These features of licorice finds its reflection in VeliyevaMahbubaNabigizi's doctoral dissertation defended in 1998 titled "Antihemo-, lymphocoagulation andlymphastimulant herbal medications from the flora of Azerbaijan" & prepared at the Department of Pathological Physiology under the guidance of Professor Yagub Cavadoglu Mammadov, the Corresponding Member of the Azerbaijan Academy of Sciences. The medicinal

properties of licorice are also discussed in Aliyev Mamed Haji oglu's doctoral dissertation titled "Lymphatic coagulation and the tissue lymphodrenaidisorders in the pathogenesis of post-reanimation encephalopathy, as well as their correction" (2006). The medicinal properties of licorice presented in the works carried out for the PhD degree in three dissertations listed below as well. Babayeva Svetlana Mamedgizi's dissertation titled "Lymphotropic phytotherapy in complex treatment of post-reanimation impairment" (2000), Talishinskaya Malahat Bakhtiyargizi's dissertation titled "Correction of immune and hemo-, lymphoagulation disorders in the post-resuscitation period" (2003), and prepared by Aliyeva Aida Jabbargizi PhD work titled "Disorders of the lympho drainage, immune system along with peroxidation of lipids in acute pneumonia and their correction ways" (2003).

The healing effect of licorice is reflected in the work of the Pediatrics Department dissertant Valiyev Parviz Mustafa oglu, who defended his dissertation in 1996. In 2009, Mirzazadeh Elmar Soltanalioglu defended his dissertation on "Application of licorice in the complex treatment of herpetic stomatitis in children" at the Pediatric Dentistry Department of Azerbaijan Medical University. He proved antiviral and immune system strengthening effect of licorice. In 1998 based of this work, Mahbuba Nabigizi Valiyeva defended her doctoral dissertation on "Antihemo-, lymphoagulative and lymphostimulant herbal medicines derived from the flora of Azerbaijan" and earned the title of professor.

Since 1997, Professor M.N. Valiyeva has been leading the Department of Pharmaceutical Technology and Management of Azerbaijan Medical University. Under the leadership of Professor M.N. Valiyeva, 3 doctoral dissertations on pharmacy are being prepared, 24 PhD dissertations on pharmaceutical sciences, 50 master's dissertations have been defended. 565 scientific works were published, including 65 patents, 22 rationalization proposals, 7 monographs, 17 textbooks and manuals, 7 methodical instructions, 14 teaching aids, 28 technical conditions, 7 articles for pharmacopoeia. Professor M.N. Valiyeva is the first inventor scientist in Azerbaijan pharmacy. She participated in the Women's Exhibition, and Competition for the International Patents for the Assessment of the Innovative Development. As the author of the most Inventions and Patents from Azerbaijan, she deservedly represented our country at this exhibition and delivered to our country 2 gold, 1 silver, 2 bronze medals and an honored Special Prize established by these organizations. These awards and prizes were given for 1 patent, 36 medicinal syrups applied to the "Biyon Industrial Park" and are currently produced.

On October 28, 2019, President Ilham Aliyev inaugurated this Industrial Complex. Such a magnificent industrial complex has been established in our country for the first time, and it is gratifying that our state supports and appreciates these innovations. Because the products are 100% herbal, there are no side effects.



Fig. 6: M.Valiyeva, academician of AS&IAS (on left) and president I. Aliyev at the opening ceremony of "Biyon Production Park"

"Licorice Production Park" has been established on 1,539 hectares of land in Agdash region under "Licorice Products LLC". Planting supplies 1539 ha of licorice, 11 ha is taken by following Industrial complexes. The "Licorice

Plant Supply"; "Licorice Plant Processing"; "Plant Extracts and Plant Medicinal Syrups" has been launched to produce drugs that meet modern requirements.



Fig. 7: Licorice medications stored in factory warehouses

It is gratifying that therapeutic syrups produced at “Biyann Industrial Park”, such as “Biyann Syrup”, liquorice “Immunovit” Syrup; Licorice “Broncho” syrup, licorice “Gripson” syrup proved itself in the Covid-19 pandemic. Many patients recovered in Covid-19 pandemic by taking only these drugs. In addition, the following therapeutic syrups helped to eliminate the complications of COVID-19: Licorice “Sed”; liquorice “Hem”; Licorice Syrup, Licorice “Cardio”.

## II. CONCLUSIONS

- Since 1990, as soon as Azerbaijan gained its independence, scientists of the Azerbaijan Medical University Departments have conducted in-depth scientific research on 12 promising medicinal plants of the Azerbaijan flora including licorice.
- The properties of licorice drugs disclosed by our researchers: lymph cleansing, antiviral, reducing clotting and enhancing the activity of the immune system have been proven in the treatment of bronchial diseases.
- Therapeutic syrups produced in the “Biyann Industrial Park” of Azerbaijan: “Biyann syrup”; Licorice “Immunovit”; “Biyann Broncho”; Licorice “Gripson”; “BiyannSed”; Licorice “Hem”; Licorice “Cardio” have proved effect in Covid - 19 pandemic.

## III. DECLARATION OF COMPETING INTEREST

The authors declare no conflict of interest.

## IV. ACKNOWLEDGEMENTS

The Republic of Azerbaijan is developing as a building an independent, democratic, modern, legal, civil country. Started on 27.09.20 and ended on 08.11.20 the Second National Patriotic War has been written in golden letters into the history of the world. Those who fell in this war cleared the way for the free development and achievement of the intended purposes. We became a new, Integrated, National, Free, Independent Republic of Azerbaijan. Therefore, we express our gratitude to our President IlhamAliyev and sincerely congratulate him and all people contributed on the above-mentioned scientific achievements.

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