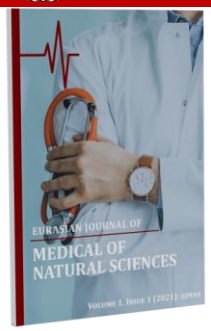
EURASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
Innovative Academy Research Support Center
IF = 7.921 www.in-academy.uz



ANALYSIS OF MEDICINAL PLANTS AGAINST DIABETES AND THEIR-BASED FORMULATIONS, AS WELL AS BIOACTIVE ADDITIVES

Jalilov Utkirbek Mamarakhimovich
Tashkent Pharmaceutical Institute, Department of drug technology, senior teacher
Qosimov Saidali Donyorbek son
Tashkent Pharmaceutical Institute, Specialty "technology of medicines and preparations" graduate student
https://doi.org/10.5281/zenodo.15088832

ARTICLE INFO
Received: 20th March 2025
Accepted: 25th March 2025
Online: 26th March 2025
KEYWORDS
Diabetes, blood sugar level, glucose, insulin, formulation, diet, metabolism, extract, phytotea, bioactive supplement, technology, medicinal plants.

ABSTRACT
This article provides information on medicinal plants used in the treatment and prevention of diabetes, as well as the remedies, formulations, biological active substances, and their technologies derived from these plants. During the research, dozens of local medicinal plant species and their specific characteristics, the properties of their formulations, indications for use, the beneficial properties of medicinal plants and formulations in the treatment of diabetes, and the results of studies on their technological properties are presented.

Introduction:

Diabetes is a metabolic disorder characterized by a decrease in insulin levels and an increase in glucose levels in the blood. In the treatment of diabetes, antidiabetic drugs play an important role. One of the key directions in medicine is the use of plant-based preparations that have a mild effect, minimal side effects, and high efficacy. For the prevention and treatment of diabetes, medicinal plants containing a range of biologically active substances have been used.

In modern advanced medicine, plant-based remedies used in the treatment of diabetes have gained significant importance due to their relative harmlessness, therapeutic properties, including the ability to normalize blood glucose levels, combat obesity, and other beneficial characteristics.

Antidiabetic plant-based remedies and formulations are used to stimulate insulin production and facilitate digestion [1]. In the field of endocrinology, various agents that reduce blood sugar levels are recommended as treatments for diabetes and related conditions caused by a decrease in insulin levels.

Antidiabetic medicinal plant preparations and formulations, depending on the extraction technology, can involve the use of ground plant raw materials to obtain various extracts. These extracts contain several therapeutic compounds isolated with the help of different separators. Additionally, when preparing formulations, the biologically active substances in the ground plant raw materials are fully preserved.

The aim of the research is to develop, analyze, and generalize antidiabetic preparations, biologically active substances, formulations, and their technologies.

Methods.

When extracting from medicinal plants, the choice of solvent depends on the type of plant, the part of the plant used, and the groups of biologically active substances it contains. Typically, processes involve using different concentrations of ethanol, water, essential oils, or other solvents. Methods such as maceration, percolation, and ultrasonic extraction are employed during the extraction process [2].

One of the promising methods involves obtaining extracts using ultrasonic extraction. In ultrasonic extraction, the plant is immersed in a solvent, and ultrasonic waves are applied. During this process, cavitation occurs, causing the plant tissues to vibrate at high speed under pressure and vacuum. As a result, organic substances in the tissues, including those that can be separated from the solvent, are released into the solvent, completing the extraction process. This method can be applied both in laboratory and industrial-scale extractions.

Below, taking into account the demand and interest in the preparations derived from medicinal plants, including antidiabetic drugs and formulations, we present information about the main antidiabetic drugs, formulations based on medicinal plants, their mechanisms of action, indications for use, properties, extraction technologies, and the use of products obtained from various medicinal plants in medical practice.

Results.

Below are several plants, formulations, and bioactive supplements used in the treatment of diabetes.

Goat's Rue (Galega officinalis) - a perennial herbaceous plant from the legume family, with a rhizome, its aerial parts are used in folk medicine for treating snake bites, infections, swelling, and also for stimulating milk production in lactating women. In modern medicine, bioactive supplements are produced from it, which have antidiabetic, diuretic, sudorific, lactogenic, and anti-inflammatory effects.

Medicinal properties of Goat's Rue: It helps reduce blood sugar levels, normalizes metabolism, restores kidney function, gently eliminates excess fluid from the body, stimulates milk production in lactating mothers, reduces inflammation, and fights infections. Therefore, Goat's Rue is included in antidiabetic formulations [5].

Beans Pods (Phaseolus) - a typical genus of annual plants from the legume family, with about 97 species found in warmer regions of the world. In addition to its blood sugar-lowering properties, it also has anti-inflammatory, anti-rheumatic, diuretic, and antibiotic effects. They help dissolve stones in the bladder and kidneys and reduce blood pressure. Due to the high content of valuable substances in the bean pods, they are widely used for medicinal purposes.

Medicinal and beneficial properties of Bean Pods: They help reduce blood sugar levels, fight excess weight, eliminate hypertension, have anti-inflammatory effects, act as a diuretic, dissolve kidney stones, treat skin diseases, and help in the treatment of chronic pancreatitis and cardiovascular pathologies. Bean pods are used to prepare decoctions and infusions, and they are also included in antidiabetic formulations.

In cases of diabetes (when blood sugar levels rise), they can be used at home. The pods are ground to a powder using a coffee grinder, and 400 ml of boiling water is poured over 50 g of raw material. After infusing for 12 hours, 120 ml is taken before meals.

Sage (Salvia) - a large genus of perennial herbaceous plants and shrubs from the Lamiaceae family. Preparations made from the aerial parts of medicinal sage (leaves and flowers) have blood sugar-lowering, anti-inflammatory, antispasmodic, antiseptic, hemostatic, emollient, and diuretic effects, and they reduce sweating. Sage is also used in the form of decoctions or infusions for stomatitis, bleeding gums, sore throat (as a mouthwash), and in gynecological diseases in the form of douches.

Medicinal sage plants can inhibit lactation in nursing mothers and have a positive effect in treating gastritis, colitis, stomach ulcers, bloating, and inflammation of the gallbladder.

Sage extract has been found to help reduce blood glucose levels in rats with type 1 diabetes by activating a specific receptor. When these receptors are activated, the blood can be cleared of excess free fatty acids, which improves insulin sensitivity. Another study conducted on rats with type 2 diabetes showed that sage tea has an effect similar to that of metformin, a drug commonly used to control blood sugar levels in people with the same condition [4].

Dandelion (Taraxacum) is the most well-known species of the dandelion genus in the Asteraceae family. It is a perennial herb that grows to a height of 10-40 cm. It is widespread across the entire CIS region, except for the far north. The flower, leaves, and roots of the dandelion are used as medicinal remedies in traditional medicine. It has been found that the root contains bitter glycosides, taraxerol compounds, and other substances. Additionally, dandelion root is included in herbal teas used to lower blood sugar, promote bile secretion, stimulate appetite, and treat stomach disorders.

The antidiabetic, antioxidant, and anti-inflammatory properties of dandelion help in treating people with type II diabetes. The roots of the plant contain soluble fiber (inulin), which, in its undigested form, moves through the body and helps improve long-term blood sugar control by slowing down the absorption of sugar into the bloodstream [3].

Stevia (Stevia) is a genus of perennial plants in the Asteraceae family, which includes about 260 species of herbs and shrubs primarily found in the Americas. The dried leaves of honey stevia have been used since ancient times as a natural sweetener, and nowadays, due to the growing demand for low-carbohydrate and low-sugar diets, it is used as a sugar substitute.

As sweeteners, the plant leaves, their aqueous extracts, and isolated glycosides (steviosides and rebaudiosides) are typically used. Stevia leaves are 30 times sweeter than sucrose, while isolated steviosides are 250-300 times sweeter. Unlike artificial sweeteners (such as cyclamate and saccharin), stevia is not only non-carcinogenic but is also highly beneficial. Stevia is low-calorie, contains no glucose, and therefore is absorbed without the need for insulin, which is particularly important for diabetics [6].

Ginkgo biloba is the only modern representative of the Ginkgoaceae family in the division of gymnosperms. The tree grows up to 40 meters in height and 1 meter in diameter; young saplings resemble some species of broad-leaved trees. It grows wild in some parts of

China, and is cultivated in the southern Crimea and the Black Sea coast of the Caucasus. The extract obtained from the leaves of Ginkgo biloba is used in medicine to improve the function of small blood vessels. It is also widely used to enhance brain function, in the treatment of diabetes, and for other purposes [7-8].

Chicory (Cichorium intybus) is a perennial herb with a thick root, belonging to the Asteraceae family. It is used as a medicinal plant and, in folk medicine, as a spice, as well as in the preparation of drinks that serve as substitutes for coffee. The famous physician Avicenna (Abu Ali ibn Sina) used chicory to treat gastrointestinal diseases, eye conditions, eye inflammation, and gout.

In modern medicine, chicory is widely used for its beneficial medicinal properties, including calming, blood sugar-lowering, binding, bile-secreting, diuretic, anti-inflammatory, and fever-reducing effects. Chicory's effectiveness in combating diabetes and obesity is especially valuable due to the high content of the high molecular weight polysaccharide inulin in its roots. Inulin helps reduce blood sugar levels, improves metabolism, and enhances digestion, making it crucial for both the prevention and treatment of diabetes. Chicory is also used in the comprehensive treatment of skin diseases. Products made from chicory roots are included in various infusions, drinks, teas, and dietary supplements [9].

Phytodiabetol Syrup 250ml is manufactured in Russia by **Bioinventika LLC**.

Usage: For diabetes, as a source of vitamins.

Composition: Common bilberry branches, common bean pod, medicinal Galega herb, bird's foot trefoil herb, large burdock root, cinnamon apple fruit aqueous extract, E420, E440, 9-14 vitamin premix (Vitamin C, Vitamin B1, Vitamin B6, Vitamin B3, Vitamin B5, Vitamin B9, Vitamin H, Vitamin B12), E202.

Dosage: 15 ml, three times a day [10].

Diabefit Herbal Tea: Supports the function of the pancreas, improves metabolism, and enhances mood.

Composition: Dandelion root, peppermint leaves, chamomile flowers, plantain herb, valerian root, lion’s tail herb, flaxseed, bean pods.

Usage: Place 1 tea bag (2g) into a cup (200 ml), pour boiling water over it, and let it steep overnight. Drink 200 ml of the infusion three times a day after meals. The duration of use is between 15 to 30 days [11].

STOP Diabet Elixir, 300 mg, 180 soft capsules. The composition includes plant extracts of field tea, fenugreek, and bean pods based on unrefined flaxseed oil, omega-3, and gelatin mass [12].

PHYTO TEA GLUNORM. Filter packs of 1 gram, 25 pieces. Produced by Zamona Rayno Corporation.

Tea Properties: It is recommended for normalizing carbohydrate metabolism, supporting the activity of the pancreas, preventing the development of metabolic disorders, especially carbohydrate metabolism disorders (diabetes), and as an additional source of biologically active substances.

Composition: Nettle (Folia urticae) leaves, blueberry (Myrtilliherba) young shoots, field tea (Herba hyperici), predatory bedstraw (Herba hypericiscabri, dagaldalachoyoti), field

horsetail (Herbaequisetiarvensis), bident (Herba bidentis), chamomile (Flores chamomillae), blueberry fruits (Myrtilli fructus), rose hip fruit (Fructus Rósae), high andrographis (Rhizomata et radices Inulae), and large andrographis (RhizomataetradicesInulaegrandis, andrographis yellow root).

Preparation and Dosage: Pour 500 ml of boiling water over 2 g of phyto tea (2 packs for one brew), and let it steep for 10-15 minutes. The prepared tea should be consumed 3-5 times a day. The duration of intake is 1-2 months [13].

CONCLUSIONS. Medicinal plants, herbal mixtures, and biologically active supplements are important in the treatment of diabetes. Their mild and non-toxic nature, as well as the fact that they do not harm the body, make them a suitable option for patients who require long-term medications like those with diabetes. In diabetes treatment, it is possible to use either a single plant product or a combination of several plant-based products. However, some of the recommended phytotherapeutic agents for treating diabetes have certain drawbacks. Their mild effects and limited efficacy in acute conditions necessitate their use in conjunction with other treatment methods when needed. Phytotherapy is continuously evolving, and due to accumulated experience and positive treatment outcomes, the scope and interest in its use are steadily increasing.

References:

1. https://med24.uz/uz/bolezn/sakharnyy-diabet
2. Hasanov, J.K., Usmonov, K.I., Avezov, T.A. "Using Neural Networks for Predicting the Process Time in High-Critical Extraction" // Uzbekistan Pharmaceutical News // 2017, No. 1, pp. 25-31. Tashkent.
3. I.D. Karmatov, M.S. Davlatova. "Healing Properties of the Medicinal Plant, Common Comfrey" in *Biology and Integrative Medicine*, No. 9, October (26), 2018, pp. 147-156.
4. Kianbakht, S., Nabati, F., Abasi, B. "Salvia officinalis (Sage) Leaf Extract as an Add-on to Statin Therapy in Hypercholesterolemic Type 2 Diabetic Patients: A Randomized Clinical Trial" *Antioxidants* (Basel), 2021 Aug 26; 10(9):1362. doi: 10.3390/antiox10091362.
5. Hachkova, H., Nagalievska, M., Soliljak, Z., Kanyuka, O., Kucharska, A.Z., Sokół-Łętowska, A., Belonovskaya, E., Buko, V., Sybirna, N. "Medicinal Plants Galega officinalis L. and Yacon Leaves as Potential Sources of Antidiabetic Drugs."
6. Ajami, M., Seyfi, M., Abdollah pouri Hosseini, F., Naseri, P., Velayati, A., Mahmoudnia, F., Zahedi, M., Hajifaraji, M. "Effects of Stevia on Glycemic and Lipid Profile of Type 2 Diabetic Patients: A Randomized Controlled Trial" *Avicenna Journal of Phytomedicine*, 2020; 10(2): 118-127.
7. Kudolo, J.B. "Effect of Ginkgo biloba Extract (EGb 761) on Insulin-Independent Glucose Response and Pancreatic β-Cell Activity in Type 2 Diabetic Patients" *Journal of Clinical Pharmacology*.
8. https://uz.wikipedia.org/wiki/Ginkgo
9. Annaeva, G.B. "Healing Properties of Chicory and its Role in Preparing Beverages" *Herald of Science*, No. 4(61), Vol. 4, April 2023.
10. https://www.asna.ru/cards/fitodiabetol_sirop_250ml_bioinventika

11. https://tea-kavkaz.ru/1-gornye-chai-i-travyanye-napitki/celebnye-travyanye-sbory/diabefit-20-filtr-paketov
12. https://o-zd.ru/catalog/popravit_zdorove/kapsuly_drazhzhe_tabletki/9760/
13. http://apteka999.uz/ru/catalog/2572-fitachay-glyunorm-(zamona-rano)