MODERN MEDICINE AND PRACTICE
https://inovatus.es/index.php/ejmmp
EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE
Vol. 5 No. 11 (Nov - 2025) EJMMP ISSN: 2795-921X

MEDICINAL PLANTS USED IN THE TREATMENT OF DIABETES

Ostonova Gulnoza Rashidovna
Teacher of the Asia International University

Annotation: This article discusses the biological, chemical and pharmacological properties of medicinal plants widely used in folk medicine for the treatment and prevention of diabetes mellitus. Mainly, using the examples of "Momordica charantia" (bitter melon), "Trigonella foenum-graecum" (shambhala), "Gymnema sylvestre" (gymnema), "Aloe vera" and "Allium sativum" (garlic), their active bioactive substances, their effects on insulin secretion and glucose metabolism are analyzed. The results of the study show that saponins, flavonoids, polysaccharides and alkaloids contained in these plants stimulate insulin secretion, reduce glucose absorption and have an antioxidant effect. Medicinal plants play an important role in medicine as natural, inexpensive and antidiabetic agents with few side effects.

Keywords: diabetes, medicinal plants, antidiabetic, charantin, trigonelline, gymnemic acid, folk medicine.

1. Introduction

Diabetes mellitus is a chronic endocrine disease characterized by impaired glucose metabolism due to insulin deficiency or decreased sensitivity of the body to insulin. This disease causes not only metabolic problems, but also diseases of the heart, kidneys, eyes and nervous system.

According to the World Health Organization (WHO), in 2024 the number of people with diabetes in the world exceeded 540 million. More than 1.5 million people die every year from complications related to diabetes. According to the Ministry of Health of the Republic of Uzbekistan, in 2023 there were more than 270 thousand registered patients with diabetes in the country, 90% of whom had type 2 diabetes.

Although synthetic drugs used to treat diabetes (insulin, metformin, glibenclamide) are effective, their long-term use causes adverse effects such as hypoglycemia, liver damage, and weight gain. Therefore, the need for natural herbal medicines is increasing in modern medicine.

The effect of biologically active substances contained in medicinal plants on glucose metabolism has long been known in folk medicine. They stimulate insulin secretion, reduce glucose absorption, enhance antioxidant defenses, and naturally lower blood sugar levels.

The purpose of this article is to provide analytical information on medicinal plants widely used in folk medicine for the treatment of diabetes, their active components, mechanisms of action, and clinical efficacy.

2. (Materials and Methods)

2.1. Research sources

In preparing the article, international scientific articles, dissertations, pharmacognosy textbooks, and Uzbek folk medicine sources published between 2010 and 2024 were used. Data were obtained from PubMed, ScienceDirect, SpringerLink, and ResearchGate databases.

2.2. Plant selection criteria

The selected plants were selected based on the following criteria:

Widely used in folk medicine to treat diabetes;

Proven antidiabetic activity in scientific studies;

Active bioactive components were clearly studied.

2.3. Data analysis method

The plants were divided into the following groups depending on their pharmacological effects:

1. Plants that increase insulin secretion (“Momordica charantia”, “Trigonella foenum-graecum”).

2. Plants that reduce glucose absorption (“Gymnema sylvestre”).

3. Plants with antioxidant and cell-protective properties (“Aloe vera”, “Allium sativum”).

3. Results

3.1. Types and composition of antidiabetic plants

1. Momordica charantia (Bitter melon)

Momordica charantia is a medicinal plant widely distributed in Asia, Africa and South America. Its fruits and seeds contain charantin, polypeptide-P and momordicin. The effects of these substances are similar to natural hormones that replace insulin. They reduce glucose levels and increase glycogen synthesis in the liver. As a result of experiments on animals, it was found that charantin extract reduced glucose levels by up to 40% (Grover and Yadav, 2020).

2. Trigonella foenum-graecum (Shambala)

The seeds of this plant are rich in substances such as trigonelline, diosgenin, galactomannan. They stimulate insulin secretion, activate glucose-degrading enzymes and slow down glucose absorption in the gastrointestinal tract. Clinical studies conducted in India have shown that 10 g of shambhala seed powder reduced blood glucose levels by up to 25% in diabetic patients (Singh et al., 2019).

3. Gymnema sylvestre

This plant grows in India and Sri Lanka. Its leaves are rich in gymnemic acids, which reduce glucose absorption, sensitize insulin receptors, and block sugar absorption in the gastrointestinal tract. Gymnema also temporarily blocks the perception of sugar in taste receptors. In a 2020 clinical study, 60 days of treatment with gymnema extract reduced HbA1c levels from 9.5% to 7.3%.

4. Aloe vera

Aloe vera is known for its antioxidant, immunomodulatory, and glucose-lowering properties. Its leaves contain aloin, emodin, and acemannan. These components accelerate glucose breakdown, normalize lipid metabolism, and reduce inflammation. In studies, Aloe vera juice was taken for 3 months, reducing HbA1c by 1.2 units (Boudreau and Beland, 2020).

5. Allium sativum (Garlic)

Garlic has long been used in folk medicine as a means of lowering blood pressure, improving heart function, and controlling diabetes. Its main bioactive ingredient is allicin, which increases insulin sensitivity, stimulates glucose breakdown, and activates the antioxidant defense system (Rivlin, 2022).

3.2. General description of active ingredients

Plant name	Main active ingredient	Pharmacological action
Momordica charantia	Charantin, Polipeptid-P	Insulin substitute, glucose lowering
Trigonella foenum-graecum	Trigonellin, Diosgenin	Increases insulin secretion
Gymnema sylvestre	Gymnemic acids	Reduces glucose absorption
Aloe vera	Aloin, Emodin	Antioxidant, lowers glycemia
Allium sativum	Allicin	Increases insulin sensitivity

3.3. General analysis of the research results

The antidiabetic effects of plants are closely related to their bioactive components. For example, charantin in Momordica charantia increases insulin secretion, while Gymnema sylvestre inhibits glucose absorption. At the same time, Aloe vera and Allium sativum protect cells from oxidative stress and reduce the complications of diabetes.

Studies show that when extracts from these plants are used in combination with synthetic drugs such as metformin, their effectiveness increases and adverse effects are reduced.

4. Discussion

Antidiabetic agents prepared from plants are located at the intersection of traditional medicine and modern pharmacology. They are mainly distinguished by their natural origin, safety and long-term use.

Momordica charantia and Gymnema sylvestre directly stimulate insulin secretion, while Trigonella foenum-graecum accelerates the breakdown of glucose. Together, these processes provide comprehensive control of diabetes.

The antioxidant effects of these plants are also important. In diabetes, cells are exposed to oxidative stress; the flavonoids and phenolic acids contained in Aloe vera and Allium sativum reduce this stress and protect the cells.

However, caution is required when using medicinal plants. Their dosage, extraction method, storage conditions, patient age, and interactions with other drugs should be taken into account. In some cases, plant substances can increase hypoglycemia or have an allergic effect.

5. Conclusion

Natural medicinal plants play an important role in the treatment of diabetes.

Momordica charantia, Trigonella foenum-graecum, Gymnema sylvestre, Aloe vera, and Allium sativum contain bioactive substances that regulate glucose metabolism, increase insulin secretion, and have antioxidant effects.

These plants have fewer side effects than synthetic drugs and are considered safe for long-term use.

In the future, standardized, clinically proven drugs based on these plants may play an important role in diabetes therapy.

References

1. Grover, J.K., Yadav, S. (2020). Pharmacological actions and potential uses of *Momordica charantia*: A review. *Journal of Ethnopharmacology*, 132(1), 112–127.
2. Singh, R. et al. (2019). Fenugreek (*Trigonella foenum-graecum*) and its effects on glycemic control. *Journal of Herbal Medicine*, 18, 100287.

3. Baskaran, K. et al. (2021). Effect of *Gymnema sylvestre* on blood glucose and lipid levels in diabetic patients. *Phytomedicine*, 88, 153612.
4. Boudreau, M.D., Beland, F.A. (2020). An evaluation of the biological and toxicological properties of Aloe vera. *Food and Chemical Toxicology*, 45, 170–180.
5. Rivlin, R.S. (2022). Historical perspective on the use of garlic. *Journal of Nutrition*, 136(3), 716–721.
6. Rafiq, N. et al. (2023). Herbal remedies in diabetes: Molecular insights and future prospects. *Frontiers in Pharmacology*, 14, 115–134.
7. Marles, R. J., Farnsworth, N. R. (2021). Antidiabetic plants and their active constituents. *Phytomedicine*, 91, 153–169.