

Possible pathogenetic mechanisms of medicinal plants' hypoglycemic action in diabetes mellitus (literature review)

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Introduction. Diabetes mellitus (DM) is a complex medical and social problem not only on a national scale but also worldwide. The number of patients with diabetes on the globe exceeds 366 million people, and by 2030, according to some forecasts, they are expected to increase to 550 million. For 1.264 million registered cases of diabetes in Ukraine, approximately 90-95% are patients with Type 2 diabetes. The situation is further complicated by the fact that the number of people with undiagnosed pathology 3-4 times exceeds the number of detected patients [7].

To date, a special protocol involving insulin preparations is carried out for the treatment of Type I diabetes mellitus, and in the treatment of Type II diabetes, synthetic antidiabetic drugs are mainly used, such as sulfonylurea derivatives, biguanides, alpha-glucosidase inhibitors, etc. Despite their therapeutic benefits, they are not without certain side effects, which significantly limits the possibility of long-term use and glycemic control in Type 2 diabetes [2].

In the prevention and treatment of Type 2 diabetes, along with synthetic drugs, the importance of herbal medicine is constantly increasing, due to the low toxicity and biological safety for the body of most herbal remedies, relatively infrequent manifestations of allergic reactions, which makes it possible to use them in the treatment of both early stages and patients with chronic forms of the disease [4, 6].

The purpose of this work is to summarize the data of scientific sources on possible mechanisms of hypoglycemic action of medicinal plants.

Results. In scientific and folk medicine, more than 150 plants are known to have an anti-diabetic effect. The use of these plants in combination with diet, insulin therapy, dosed physical activity, allows reducing the daily need for insulin or reducing the doses of synthetic hypoglycemic drugs [5].

The effects of plants in diabetes mellitus can be conditionally distributed as follows:

- *Plants of tonic action* (adaptogens, immune modulators) – Rhodiola rosea, Eleutherococcus senticosus, Panax ginseng, Rhaponticum carthamoides, Aralia elata, Schisandra chinensis, Glycyrrhiza glabra, Inula helenium. Not only do they show an immunomodulatory effect, but also activate the endocrine function of the pancreas and regulatory neurohumoral systems, stimulate metabolism. Adaptogenic triterpenes as a secondary effect exhibit antidiabetic activity: ginseng, Aralia, Eleutherococcus; less active are Rhaponticum carthamoides, licorice, birch leaves.

- *Plants rich in vitamins, organic acids, and other biologically active substances* that increase the body's defenses in diabetes: leaves and fruits of currants, lingonberries; fruits of rosehip, Mountain Ash.

- *Detoxifying plants, metabolic regulators in diabetes, as well as those that have an antisclerotic effect:* bearberry, knotweed, blueberry, St. John's wort, Linden, Fragaria, wheatgrass, burdock, onion, dandelion, licorice, chicory, flax, rosehip.

- *Plants that contain easily digestible carbohydrates:* Fragaria, Dogwood, blackberries, raspberries, pears, grapes, etc. Fructose, which is contained in these plants, requires less insulin for

its assimilation, and some sugars are absorbed without it at all. This makes it advisable to use them instead of glucose in case of insulin deficiency.

- *Medicinal plants with diuretic action*, which in diabetes contribute to the elimination of excess salts and glucose from the body (birch leaves, *Orthosiphon stamineus*; herb of Horsetail, *Polygonum aviculare*), show bactericidal and astringent effects (birch leaf and buds, bearberry leaf, *Aerva lanata* herb).

- *Plants containing many trace elements, in particular zinc and chromium*. It is known that chromium increases the activity of insulin because it is the central atom in the molecule of a hormone-like substance - glucose tolerance factor (GTF). Medicinal raw materials that contain chromium contribute to the contact of insulin with tissue receptors (arnica montana flowers, ginseng rhizome, rhizome with roots of *Rhaponticum*, common sage leaf). Plants that contain zinc stimulate the synthesis of insulin, activate immune processes (knotweed herb, Canadian goldenrod, corn stigmas, medicinal sage leaves).

- *Plants that contain insulin-like or other hormone-like substances (phytohormones)*: blueberry leaves, nettle, elecampane, burdock roots, dandelion, common beans, Clover, flax seeds, licorice root, etc. [1, 3].

Conclusions. So, the review of scientific sources shows that medicinal plants have various mechanisms of influence on most pathogenetic links of diabetes, which can significantly improve the results of treatment, reduce the level of burden with hypoglycemic agents, and prevent organ lesions due to diabetes. It is advisable to take into account the conditional division of medicinal plants by pharmacotherapeutic properties when creating new multidirectional herbal remedies for the treatment of this ailment.

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