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The characteristics of the medicinal plants used in the herbal medicine of type 2 diabetes

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Purpose: *consider the rational combination of the herbs in fytocomplexes applied in the rehabilitation of the type 2 diabetes.*

Material & Methods: *analysis of scientific and methodical literature on the use of herbal medicine in the complex rehabilitation for patients with diabetes.*

Results: *modern views on the necessity and the features of the use of herbal remedies especially in the diabetes type 2 are presented; the main medicinal plants used in this pathology are described. The main attention is paid to the peculiarities of forming up an integrated cure that contains a mixture of several kinds of medicinal plants. The classification of herbal drugs used for diabetes is given.*

Conclusions: *advantages of application of collection of medicinal plants over synthetic drugs in the complex treatment of the type 2 diabetes are proved.*

Keywords: *phytotherapy, diabetes mellitus type 2, medicinal plants.*

Introduction

Diabetes mellitus is one of the most widespread serious chronic illnesses. According to the International Diabetic Federation (IDF), today there are 382 million sick on DM in the world, and according to forecasts the total of sick on DM will reach 592 million to 2030. The situation is complicated also by the fact that not diagnosed cases of DM by 3–4 times exceed the number of the revealed patients on 1,1 million of the registered cases of DM of the 2nd type in Ukraine (according to the Center of medical statistics of MHC of Ukraine at the beginning of 2015). So, the prompt growth of incidence served as the reason of adoption of the Resolution of the O.U.N. 61/225 from 12/20/2006 about diabetes with the recommendation to all states «to develop national strategies of prevention and treatment of diabetes» [3; 8].

According to Institute of endocrinology and metabolism of NAMS of Ukraine, the prevalence of diabetes in Ukraine has increased by one and a half times over the last ten years, and 1 198,5 thousand patients are registered in the country as of January 1, 2015 that makes about 2,9% of all population (the data are provided without statistics of the Autonomous Republic of Crimea and occupied territories of the Donetsk and Lugansk regions). The number of patients with diabetes will increase at the expense of DM of the second type in the next years. 90–95% of all pathology makes in the structure of diabetes of DM of the 2nd type [8].

The most dangerous consequences of global epidemic of DM are its system vascular complications – nephropathy, retinopathy, defeat of the main vessels of heart, brain, peripheral vessels of the lower extremities. These complications are the main reason for invalidization and mortality of sick on DM [1; 15].

Communication of the research with scientific programs, plans, subjects

The work was performed on the priority direction, according to the law of Ukraine «About the priority directions of the development of science and equipment» on the number 3.5. «Sciences about lives, the newest technologies of prevention and treatment of the most widespread diseases» within the priority thematic direction 3.5.29. «Creation of standards and technology of introduction of a healthy lifestyle, technology of improvement of quality and safety of food».

The purpose of the research

To consider a rational combination of herbs in phyto-collecting which are applied in rehabilitation of diabetes of the 2nd type.

Research tasks.

1. To analyze modern special literature on a problem of phytotherapy of diabetes of the 2nd type.

2. To develop optimum combinations of herbs taking into account features of a course, clinical displays of diabetes and pharmacotherapeutic characteristics of vegetable means.

Material and Methods of the research

The analysis of scientific and scientific-methodical literature (theses, abstracts of theses, monographs, educational and methodical literature, articles in collections of scientific works and periodicals, and also theoretical provisions and practical recommendations which exist in medical, pedagogical and interdisciplinary sciences) concerning the application of phy-

totherapy in complex rehabilitation at diabetes.

Results of the research and their discussion

The major purposes in treatment of diabetes are: elimination of symptoms, optimum metabolic control, prevention of sharp and chronic complications, achievement of perhaps more quality life and availability to patients. Pathogenetically there are 3 options of treatment of diabetes now:

– substitutive therapy by insulin;

– substitutive therapy by oral anti-diabetic preparations;

– by preparations reducing activity of anti-insular extra-pancreatic factors [8].

However even adequate application of sugar-lowering preparations not always prevents the development of complications. Modern sugar-lowering therapy doesn't allow normalizing all types of a metabolism at sick on DM. Secondary resistance to the pelleted preparations is the consequence of decrease in mass of β-cells and/or increases in insulin-resistance. Besides, side effects of insulinotherapy at diabetes of the 2nd type are: body weight increase, frequent feeling of hunger, delay of liquid and sodium, risk of hypoglycemia, development in a number of sick allergic reactions that significantly limits the prescription of sugar-lowering preparations for sick on DM and prove the need of application of other types of therapy. The stated aims are achieved by means of the basic principles of treatment having paramount value for patients with diabetes of both types: diabetic diet, the dosed physical activity, phytotherapy, training and self-checking.

The advantage of the phytotherapeutic method of treatment of diabetes is multiple-factor positive influence on an organism. The centuries-old experience of application of phytopreparations showed their efficiency, generally for treatment of diabetes of the 2nd type. Phytotherapy can independently be applied at this type of diabetes or in combination with the pelleted preparations that allows reducing their dose [2].

Now there are rather numerous data on possibility of use at diabetes of a number of vegetable preparations, first of all, a little or almost nontoxic, softly affected. These data are based on researches of some phytopreparations, clinical supervision, the given traditional medicine and traditional medical systems (Tibetan, Central Asian and others). For example, ginseng, asparagus, cornel, astragalus are used in China for treatment of diabetes; such plants as galega, Maydis stigmatum, haricot, dandelion, etc. for treatment of easy forms of diabetes are applied in Bulgaria; in India – preparations from onions, garlic, fern, eucalyptus and other plants of national flora [4; 5].

Many of these herbs are recognized as scientific medicine as the means which are exerting positive impact on a carbohydrate exchange recently. Anti-diabetic action of plants depends on the presence of insulin-similar connections at them, derivative guanidin, arginine, levuleza. The advantage of these substances at insulin is that they are substances of the non-protein nature, aren't digested in the digestive channel and can work at intake [6].

The basic principles of phytotherapy are:

– individual selection of phyto-collecting taking into account the accompanying pathology;

– periodic substitute of one collecting by another (each 1–2 months);

– constant control of action of collecting, and their substitute, without waiting for complete cessation of medical action.

It should be noted among advantages of application of phytotherapy in rehabilitation of patients with diabetes:

– lack of sharp fluctuations of level of glucose in blood;

– lack of other by-effects from internals;

– positive influence on a carbohydrate exchange [9; 11].

Herbs have a number of advantages before synthetic preparations: they are low-toxic, have a soft effect, can be applied long without essential side effects, first of all allergic reactions, they are well combined with medicinal substances, strengthening their therapeutic effect. Herbs influence the carbohydrate exchange more physiologically, than synthetic anti-diabetic preparations. The stimulation of regeneration of β-cells of the insular device is noted at the application of some plants with insulin-similar action. The vegetable preparations, which are used at diabetes, can be applied in the form of mono- and complex preparations [13].

The following plants are used as the medicines which are applied for prevention of diabetes and treatment of its complications: Aralia tourn, Aralia mandshunca, Acorus calamus, Cydonia oblonga, Barberis vulgaris, Sambucus nigra, blackberry, Rhodiola rosea, Taraxacum officinalis, Galega officinalis, Inula helenim, Linum usitatissimum, Schisandra chinensis, Pulmonaria officinalis, Panax, Graphalium uliginosum, Helianthus tuberosus, Equisetum arvense, Cichorium intybus, Rosa majalis, Centruium erythraea, cultivated cabbage, Eleutherococcus, Callisia fragrans [10; 12; 14].

The good sugar-lowering effect at diabetes is rendered also: leaves of Betula Pendula, Vaccinium vitis-idaea, Ribes nigrum, Fragaria vesca, Mentha piperita, Orthosiphon aristatus, Urtica dioica, Circassian walnut, Plantago major; Veronica officinalis, Leonurus quinquelobatus, Thymus, Hypericum perforatum; Arctium tomentosum Mill, Leguminosae, Asparagus officinalis; Crataegus sanquinea, Rose majalis; Maydis stigmatum; Syringa vulgaris; flowers of Sambucus nigra; Linum usitatissimum; Phaseolus vulgaris [15; 16].

It is necessary to include the components possessing certain properties in the structure by drawing up the complex means containing mix of several types of medicinal plant crude drug (collecting of medicinal), for its use as hypoglycemic means:

– contributing *normalization of digestion of glucose* – leaves of fruits of Phaseolus vulgaris, sprouts (leaves) of Vaccinium myrtillus. These crude drug contain substances of group of guanidoizoamilen which promote a spontaneous transformation of glucose into fructose due to the creation in an organism of alkalescent environment and mannoze which assimilation doesn't require insulin. Besides, they, like biguanide, protect insulin from destruction of peptidase, improve glucose trans-

port in cells, suppress gluconeogenesis, and stimulate synthesis of proteins and fats;

– Eleutherococcus senticosus which is capable to strengthen physiological effect of insulin also is used for *normalization of digestion of glucose*. It makes active one of key enzymes of a metabolism of glucose – hexakinase which is necessary for glucose phosphorylation then glucose can be acquired by cells. Therefore application of preparations of Eleutherococcus in complex therapy of diabetes is justified pathogenetically;

– the plants containing chrome, for example, Phaseolus vulgaris also should be included in complex therapy of diabetes. Chrome is one of the most important factors of maintenance in an organism of normal tolerance to glucose and makes active glucose transport in cells. One more useful property of chrome – is to reduce thirst for sweet products;

– the components promoting *strengthening of regeneration of β-cells of islets of Langerhans* – sprouts of Vaccinium myrtillus, leaves of fetus of Phaseolus vulgaris. Active forms of oxygen cause violations in the structure of DNA of β-cells, and it in turn is the reason of decrease in synthesis of protein, including pro-insulin, and the subsequent death of β-cells. The antioxidants which are contained in vegetable crude drug possess protective properties in relation to β-cells of pancreas which is realized by the decrease in free radical oxidation;

– the components with *adaptogenny properties* restoring hormonal balance and normalizing metabolism – rhizomes and roots of Eleutherococcus;

– the components possessing *diuretic action*, glucose, necessary for removal of surplus, from an organism – Equisetum arvense, Hypericum, Matricāria chamomīlla, hips of Rosa;

– the components *improving work of all links of the immune system* of an organism – Matricāria chamomīlla, Hypericum, rhizomes and roots of Eleutherococcus, hips of Rosa;

– the components *preventing complications from organs of vision* at *diabetes* – fetus of Vaccinium myrtillus. Extractum of Vaccinium myrtillus have moderate vasodilating effect and improve microcirculation, especially concerning retina vessels which are surprised at diabetes. They promote restoration of photosensitivity of cells of retina. In addition preparations of bilberry are capable to block enzyme to aldose reductase which provides transformation of glucose in sorbitol, thereby slowing down the development of diabetic cataract;

– the components *interfering development of pathology of the cardiovascular system accompanying diabetes* – the chromcontaining plants (leaves of fruits of Phaseolus vulgaris). They possess hypolipidemic and hypocholesterolic action, interfere with the development of atherosclerosis and cardiovascular diseases, prevent increase and reduce the increased arterial pressure. Anti-sclerous action is noted also at hips of Rose [6; 7; 16; 18].

It is possible to recommend medicinal collecting «Arphasetin-E» which contains all listed above components as hypoglycemic means for the prevention and treatment of diabetes of easy and average weight. Collecting «Arphasetin» provides the complex impact on normalization of exchange processes at diabetes, reduces sugar level, improves functions of a liver, intestines, has the anti-inflammatory effect all-strengthening, promotes the increase of processes of regeneration of an endocrine parenchyma of a pancreas that leads to the improvement of its activity in general [7].

The analysis of literature showed that the plants possessing hypoglycemic activity are more than 150 types. These plants are on botanical signs representatives more than 50 kinds, and the active agents emitted from these plants belong to various classes of chemical compounds [17; 18].

The professor V. g. Pashinsky (1991) divided into several groups on the basis the pharmacotherapeutic characteristics, phytochemical composition all vegetable means applied in treatment of diabetes:

I. *The plants of the all-strengthening action activating the highest regulatory neuro-humoral systems, adaptogens:* liqueur of Schisandra chinensis, Oplopanax, Aralia tourn, Panax; extracts of Leuzea carthamoides, Rhodiola rosea, Eleutherococcus senticosus.

II. *The plants containing insulin-contained and other hormone-similar substances:* Urtнca diyica, roots of Arctium lбppa, roots and Taraxacum officinale, Paeonia anomala, Trifolium.

III. *Plants – metabolism regulators:* Arctostaphylos, Polygonum aviculare, Tilia, Plantбgo juice, Hypericum, Elymus repens, Gnaphalium uliginosum, Vaccinium myrtillus, Lнnum usitatнssimum.

IV. *The plants containing digestible sugar at the expense of which the general need for insulin decreases:* Fragбria, chicory, Cornelian cherries , wild Rubus idbeus, pear, pomegranate, grapes (juice of unripe berries).

V. *Plants, vitamin-rich, the organic acids and other useful substances increasing protective forces of an organism:* Rose, cowberry, mountain ash, and beer yeast cleared dry.

VI. *Garden cultures as sources of vitamins, digestible organic acids therefore they possess ability to regulate exchange processes:* peas, haricot, beet red, carrots sowing campaign, pumpkin, salad garden, girasol, potatoes, sowing campaign onions, garlic, wild garlic, cabbage, celery, spinach, oats, barley [13].

Thus, taking into account features of course, clinical displays of diabetes and pharmacotherapeutic characteristics of vegetable means, the following phyto-collecting is recommended:

- Leaves of Rubus caesius – 20 g, leaves of Ribes nigrum – 20 g, leaves of Mentha piperita – 20 g, leaves of Arctostбphylos uva-ursi – 20 g, leaves of Vaccinium myrtillus – 20 g. One tablespoon of mix is filled in with a glass of boiled water and insisted 30 min. Accept 1/2 glasses 3 times a day.

- Roots of Oplopanax – 10 g, Equisetum arvense – 10 g, Rosa majalis – 10 g, Bidens tripartita – 10 g, roots of Inula helenium – 10 g, leaves of Vaccinium myrtillus – 20 g, Hypericum perforatum – 10 g, Matricaria chamomilla – 10 g, Mentha piperita – 10 g. One tablespoon of mix is filled in with a glass of

boiled water and insisted 30 min. Accept 1/3 glasses to food 3 times a day.

- Walnut leaves – 20 g, leaves of Vaccinium myrtillus – 20 g, leaves of Phaseolus – 20 g, roots of Arctium – 20 g, roots or flowers of Sambucus – 20 g. Mix is filled in with 2 glasses of boiled water; to insist 5 hours, filter. Accept 1/2 glasses after food 3 times a day.

- leaves of Vaccinium myrtillus – 25 g, leaves of Rubus caesius – 25 g, leaves of Fragaria vesca – 25 g, berries of Rosa– 25 g. One tablespoon of the crushed mix is filled in with a glass of boiled water and insisted 30 min., filtered. Accept 1/2 glasses 3 times a day to food.

- leaves of Vaccinium myrtillus – 20 g, leaves of Phaseolus – 20 g. One tablespoon of mix is filled in with a glass of boiled water, boiled 15 min. and insisted 30 min. Accept 1/2 glasses 3–4 times a day to food.

- leaves of Vaccinium myrtillus – 20 g, roots of Taraxacum – 20 g, leaves of Urtнca diyica – 20 g, and Hypericum perforatum – 20 g, Equisetum arvense – 20 g. One tablespoon of the crushed mix is filled in with a glass of boiled water and insisted 30 min. Accept 1/3 glasses 3 times a day before food.

- Fetus of Juniperus – 25 g, Linum seeds – 25 g, leaves of Vaccinium myrtillus – 25 g, leaves of Vaccinium vitis-idaea – 25 g. All mix is crushed in the Mixer. One teaspoon of the crushed mix is filled in with boiled water and boiled at the closed cover of 5 min. Insist 30 min., filter. Accept 1/3 glasses 3 times a day before food.

Thus, it should be noted the validity of application of phytotherapy in rehabilitation of patients with diabetes of the 2nd type of easy and moderate severity in a complex with dietotherapy and drug treatment. Phytotherapy isn't applied at a heavy course of DM of the 2nd type [5; 8].

Conclusions

1. The analysis of literature showed that plants which possess hypoglycemic activity are more than 150 types. These plants are on botanical signs representatives more than 50 kinds, and the active agents emitted from these plants belong to the different classes of chemical compounds (glycosides, saponin, alkaloids: etc.) which have a therapeutic effect at diabetes.

2. Herbs have a number of advantages at synthetic preparations in treatment of diabetes: they are low-toxic, have a soft effect, can to be applied long without essential side effects, first of all allergic reactions, they are well combined with medicinal substances, strengthening their therapeutic effect; synthetic anti-diabetic preparations influence a carbohydrate exchange more physiologically, than; stimulation of regeneration of β-cells of the insular device is noted at application of some plants with insulin-similar action.

3. It is recommended to apply combinations of herbs taking into account features of course; clinical displays of diabetes and pharmacotherapeutic characteristics of plant means in phytotherapy of diabetes of the 2nd type.
Studying of activity of application of sugar-lowering mono - and complex plant preparations at diabetes according to the basic principles of chromotherapy, taking into account the time of natural rise in level of glucose in blood that will allow to reduce a dosage of sugar-lowering preparations and, thereby, to reduce risk of emergence of complications of treatment is **the prospect of further researches** in this direction.

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