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PHARMACOLOGICAL PROPERTIES OF GARLIC (ALLIUM SATIVUM L.), EXPERIENCE AND PROSPECTS OF ITS APPLICATION IN MEDICINE

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Nowadays, the search for new medicines, that are highly effective, from the one hand, and are well-tolerated, from the other hand, is still important. The interesting objects in this aspect are medicinal plants (as a source of such new drugs creation). It is well-known, that majority of medicinal plants contain a lot of active substances that are therapeutically effective and relatively safe even in case of long-term administration [1, 2, 3].

Because of this we have analyzed different scientific publications and clarified that garlic (Allium sativum L.) is a medicinal plant containing biologically active substances with different pharmacological effects which may be widely used in medicine [1, 2, 3, 4, 5, 6, 7].

Garlic is a perennial herb that is cultivated almost at all continents. That is why it is clear that there are no problems concerning the raw material source. Such a plant is used as an medicinal one for a long time. Hippocrates, Avicenna, Paracelsus mentioned about garlic in their manuscripts. Garlic contains more than 200 biologically active substances. Its composition includes proteins, carbohydrates, inulin, cellulose, volatile oils, alliinum, fat oil, phytosterins, phytoncides, pentosans, saponins, glycosides, thioglycosides, peptides, antibiotic-like substances, prostaglandins, pectines, organic acids, enzymes. Proteins of garlic contain 17 aminoacids, including 8 essential ones. Bulbs of garlic contain

vitamins (C, B1, B2, PP, E, etc.) Macroelements are presented by P, Mg, Ca, K and microelements are presented by Se, S, Cu, Fe, Ge [2, 4, 5, 8, 11].

Among the active compounds of garlic sulfur-containing substances take an important place, especially organic sulfides (such as S-alkyl-derivatives of cisteine and mainly – alliinum) [8]. The majority of investigators of chemical composition and biological activity of garlic conclude, that its effects are connected to sulfur-organic substances [9]. And they proved that the removal of these compounds from the garlic assists the decrease of biological activity of this plant [3, 4, 5, 6].

In the same time another scientists think, that all complex of biologically active substances takes part in development of its pharmacological effects.

After oral intake of garlic alliinum, which is in this plant, converts to the alkyl-alkanthi-O-sulfinates (main of them is allicine – about 80%) under the influence of alliinase enzyme in stomach and intestine. This metabolite is named by the several scientists as a main biologically active substance of garlic [10].

The results of garlic use in folk medicine show that it is effective for treatment of diseases of respiratory tract, for example, bronchitis, bronchial asthma, bronchoectatic disease; disorders of gastro-intestinal tract (colitis, enterocolitis, meteorism, dysenteria). Use of garlic for treatment of atherosclerosis and hyperlipidemia, hypertension is also interesting [1, 2, 3, 4, 6, 7].

The experiments on different animals proved that this medicinal plant causes antibacterial, antiviral, antihelminthic, anti-inflammatory, expectorant, spasmolytic effects; dilates peripheral and coronary vessels, decreases cardiac rate, blood pressure. Also it was proved that garlic assists the decrease of diuresis and stimulates gastro-intestinal motility and secretion in experimental animals. Besides, the anticoagulant and hypoglycemic activity of this plant was also found [11].

Thus, the results of the great number of both experimental and clinical investigations prove the useful properties of garlic known from the ethnomedicine. According to the data of modern scientific articles the prospective aspect of garlic use in official medicine is the application of biologically active substances from this plant for treatment and prevention of atherosclerosis and its complications [11, 12].

This fact was verified by the scientists that determined the ability of garlic to decrease the cholesterol and other lipids level in blood of experimental animals with hyperlipidemia induced by the diet rich in cholesterol. It was demonstrated that decrease of cholesterol level in blood serum occurred because of inhibition of cholesterol synthesis in liver. And this hypothesis was proved by the experiments on the cultivated hepatocytes. The inhibiting effect of garlic was explained by the suppression of the main enzyme of cholesterol synthesis in liver that is GMG-CoA-reductase [13].

The clinical practice shows that hypertension and high cholesterol level in blood are factors determining the risk of atherosclerosis development [1, 4, 14]. The investigations carried out on the isolated segments of vessels of different animals proved that garlic juice inhibits the contractility of smooth muscles cells in this organs and causes their dilation [14]. Nowadays, the mechanism of this effect was clarified. That is, the components of garlic juice, for example, allicine and adjoine, open the potassium canals and cause the hyperpolarisation of cell membranes of smooth muscles in vessels, that leads to closing of calcium canals, resulting in

decrease of calcium ions flow into the smooth muscles cells of blood vessels and, finally, in vasodilation [15].

The next important effect of garlic is its anti-aggregant effect, which assists to decrease of thrombosis. This fact was verified both in experimental animals and volunteers, that administrated orally 1 bulblet of garlic once a day within 26 weeks [12].

Thus, mentioned above useful properties of garlic may be applied for treatment and prevention of atherosclerosis because they correspond to modern treatment strategies and requirements to medicines for this disease treatment. All of this resulted in use of garlic as a capsuled product for therapeutics, that was explained by necessity of accurate dosage and increase of effectiveness [9].

For now garlic-containing pharmaceutical products are manufactured by the different companies ("Klosterfrau Berlin Gmbh", "Wakunaga companies", "Ranbaxy", "Ilja Rogoff", "Inat-pharma", "Himalaya" and others) in many countries, such as China, India, Germany, USA, Japan, South Korea, Russia, France, etc. The most known products are "Kwai-forte", "Kyolic Aged Garlic Extract", "Revital garlic pearls", "Ilja Rogoff forte", "Allicor", "Lasuna" and so on.

Named above products include both medicines and food supplements, that are presented preferably by galenic forms (such as tincture, extract, oil, powder of bulbs) containing as usual complex of different biologically active substances. Several agents are also produced in Ukraine.

The clinical trials of these products proved their high effectiveness for treatment and prevention of atherosclerosis that was manifested by the improvement of lipid profile of blood and decrease of the risk of angina pectoris and myocardial infarction development [9, 11, 12, 14].

Today, analyzing the scientific literature, we did not find enough information about extraction and application of individual active substances of garlic.

That is why, to our point of view, it is interesting to separate and study the pharmacological effects of the certain fractions and/or substances from the garlic bulbs for creation of new medicines, especially for atherosclerosis treatment. This way theoretically may improve the results of therapy.

One more prospective thing is the in-depth study of garlic (Allium sativum L.) food supplements for making medicines on their base.

Besides this, we found that the further detailed investigation of hypoglycemic effect of the garlic-containing medicines is also substantiated and has practical value, because hyperglycemia accompanies atherosclerosis and its complications very often.

Thus, taking into account the effectiveness and safety of present garlic-containing agents we may conclude that the creation of new medicines and advancing of current products including ones of Ukrainian origin (anti-atherosclerotic or others) is important for modern pharmaceutical science.

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