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The effect of biomays on the content of oxidized low density lipoprotein in the dynamics of the development of experimental atherosclerosis

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Abstract: Our previous studies have found that wheat processes reduce cholesterol in rabbits that develop hypercholesterolemia [1], but the main molecular mechanisms have not been determined. It has been found that the combination of biomays and ultrox with oxidized LDL is most beneficial than the separate administration of ultrox and biomass. Biomays supplementation reduced the development of atherosclerosis with little effect on plasma lipid levels. These observations are consistent with our previous studies. In animals receiving both statins and Biomays, the development of atherosclerosis was suppressed by reducing oxidative modification of LDL.

Keywords: atherosclerosis, lipoproteins

Oxidized LDL plays a critical role in atherogenesis. It affects several cell types such as endothelial cells, VSMC, fibroblasts, macrophages and platelets in the atherosclerotic pathway, promoting endothelial dysfunction, apoptosis, monocyte migration and macrophage differentiation, proliferation and migration of smooth muscles and plaque instability - some of the critical steps for atherosclerosis [2].

Cholesterol is the main component of cell membranes and serves as a precursor to the synthesis of bile acids and steroid hormones [3,4]. Most of the cholesterol in the body is produced by the liver and delivered to other organs through the forms of low-density lipoprotein (LDL) particles that pack cholesterol. Because high cholesterol LDL (HS LDL) in plasma, called hypercholesterolemia, is a significant risk factor for atherosclerotic cardiovascular disease (SSC) [5] Reducing serum LDL levels has traditionally been seen as a therapeutic strategy to treat this disease.

Material and Methods: Experiments were conducted on 30 male rabbits, which were divided into 5 groups depending on the treatment method. The influence of the domestic drug "Biomays" in the treatment of experimental hypercholesterolemia has been studied. The study involved five groups of rabbits: 1st intact (normal), 2nd hypercholesterolemia rabbits, 3rd ultrox treatment, 4th biomays treatment, 5th mixed therapy.

Biomays is a powder produced from dried wheat processes. The treatment was carried out within 2 months. The concentration of low density lipoprotein oxidized lipoprotein (LDL) on the 60th, 70th, 80th and 90th days of hypercholesterolemia was studied. Experimental hypercholesterolemia was reproduced by daily intragastric cholesterol administration (0.2 g per kg body weight for 2 months). Ultrox (Nobel Farm, Turkey) was used as statin and was administered at 0.6 mg/kg. Biomis (OOO ORION-SKORPION, Uzbekistan) was injected at 142 mg/kg twice a day.

In the development of experimental hypercholesterolemia, the concentration of oxidized LDL was determined by the immunotherapy method of RayBio® ELISA

Kit (USA) at the Institute of Biophysics and Biochemistry at the Mirzo Ulugbek National University of Uzbekistan.

The mathematical and statistical processing of the obtained data was carried out using the STATISTICA 7.0 package. Quantitative data are presented as median (Me) and upper and lower quartile (25%; 75%). Qualitative variables were compared using the chi-square criterion or the exact Fisher method. The comparison of quantitative variables in the normal distribution of a topic was made using the t-Student criterion, and in the case of difference of distribution from the normal, using the Wilcoxon rank criterion for dependent variables and the 18 Mann-Whitney U-test for independent groups. Several independent groups used the Kruskal-Wallis test. Correlation analysis using the non-parametric Spearman criterion and linear regression analysis were used to study the relationships between the features.

The purpose of the work: to study the influence of biomays and statin on the concentration of oxidized LDL in animals with experimental atherosclerosis.

The results of the study and their discussion: the results of the study of the concentration of oxidized LDL in the development of experimental atherosclerosis are given in table 1**.**

Table 1

The concentration of oxidized LDL (pg/ml) in the blood serum of rabbits with experimental hypercholesterolemia (n=12)

Index	Intact group	Research day			
		60-	70-	80-	90-
Oxidized LDL	75,4±2,3	64,2±2,1	51,5±1,2	44,3±1,45	36,6±0,64

Note: in all cases $p<0.05$ relative to intact group

The concentration of oxidized LDL in experimental hypercholesterolemia development is lower than in the intact animal group. While in the 1960s and 1970s it decreased by 14.86 and 31.7 per cent, respectively, compared with intact animals, in the 80s and 90s the decrease in oxidized LDL was 41.25 and 51.46 per cent, respectively.

It turns out that oxidized LDL is an excellent diagnostic test in atherosclerosis prediction. They have high sensitivity (SE) of 0.84, specific (SP) 0.9 diagnostic efficiency (AUC) 0.85. This test can become a good predictor in the development of atherosclerosis (table.2).

Table 2

Indices of marker LOX-1 in dynamics of atherosclerosis development and forecasting of dynamics of disease course

Index	SE	SP	AUC	RR	95%CI
LOX-1	0,84	0,9	0,85	5,5	1,5-19,7

Table 3

Content of LOX-1(pg/ml) and pLPNP after treatment with biomays and ultrox of rabbits with experimental atherosclerosis, pg/ml (n=30)

Index	Normal	Control	Group		
			3	4	5
LOX-1	75,4±2,3	36,6±0,64	45,2±1,45	46,5±1,09	59,3±1,2

Note: In all cases $p<0.05$ relative to control group

The increase in LDL from biomays and ultrox treatment was 27.04% and 23.5% respectively compared to the control group. The combination of biomays and ultrox resulted in the most pronounced increase in LDLR, 62.02% over the control group.

Thus, the combination of biomays and Ultrox for oxidized LDL is more beneficial than the separate administration of Ultrox and biomays.

Biomays supplementation reduced the development of atherosclerosis with little effect on plasma lipid levels. These observations are consistent with our previous studies [6]. In animals receiving both statins and Biomays, it is thus assumed that the antioxidant action of these agents suppressed the development of atherosclerosis by reducing the oxidative modification of LDL.

Conclusion: LDL receptors remove LDL from the blood and transport it to the inner cell where LDL is digested and its released cholesterol becomes available for metabolic purposes. The effect of polyconozole is that the amount of cholesterol in the liver is maintained at a normal level, while cholesterol in the blood is maintained at a low level. Fortunately, LDL receptors do not bind HDL, so the protein of this useful lipoprotein does not fall.

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