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CHARACTERISTIC PROPERTIES OF THE ANTIOXIDANT SYSTEM IN HEART DISEASE

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Introduction. In recent years, the problem of CHD has acquired not only an important medical, but also a social significance due to an increase in morbidity, high mortality, and disability of various ages [1]. At present, the world is actively discussing the issue of gender features of the course of cardiovascular diseases (CVD), which is relevant for the development of a differentiated approach to the treatment of cardiac pathology in men and women. Recent studies indicate that further study of circulatory regulation systems is necessary to understand the pathogenesis of CHD. To date, there are no differences in the approaches to the treatment of CVD in men and women in expert recommendations.

Modern measures for the prevention and treatment of CVD in Europe have contributed to a decrease in mortality in men in contrast to women [2]. Within six months after myocardial infarction (MI), it was 7.8% in men and 22.9% in women [3].

It is known that women, especially during menopause, have a significantly increased risk of developing coronary artery disease, which is accompanied by oxidative stress (OS) and a decrease in the antioxidant activity (AOA) of the body. CHD in men is more often diagnosed earlier and is also characterized by disorders in the system "lipid peroxidation - antioxidant protection" (POL-AOZ). Therefore, the study of gender features of the antioxidant status of blood plasma and tissues, its relationship with the clinical course of coronary artery disease, the state of endothelial function, the metabolism of nitric oxide (NO), which has antioxidant properties, and the content of homocysteine (Hz), which participates in oxidation processes, seems to be relevant.

Numerous studies have proven the high effectiveness of statins with antioxidant properties in the treatment of CHD with dyslipoproteinemia (DLP). Sex differences in the tolerability and efficacy of statins were noted.

The aim of the study was to assess the gender characteristics of the antioxidant status and the possibility of correcting disorders of lipid peroxidation and antioxidant protection during treatment with atorvastatin in men and women suffering from stable forms of CHD with dyslipoproteinemia.

Study materials and methods: The study included 49 patients: 39 patients with coronary artery disease and 10 relatively healthy individuals. 39 patients with stable angina pectoris II-III FC and/or post-infarction cardiosclerosis (PICS) according to the WHO classification aged 35 to 68 years, mean age 58.2±6.4 years, who gave informed consent to participate in the study, are divided into 2 groups by gender. Group 1 includes 20 men, group 2 includes 19 women. Control group 1 consisted of 6 conditionally healthy men, control group 2 consisted of 4 conditionally healthy women.

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Patients received basic therapy (B-blockers, angiotensin-converting enzyme (ACE) inhibitors, calcium antagonists, antiplatelet agents, and nitrates. The duration of the study of the effect of atorvastatin as part of cardiac therapy on the parameters of LPO-AOP, the clinical course of CHD, and endothelial function was 6 months. Patients of both groups were comparable in age and laboratory parameters, which made it possible to consider them representative for determining the effectiveness of treatment. The presence of myocardial ischemia according to ECG, endothelial function, thickness of the intima-media complex of the common carotid artery (TIM OCA), laboratory parameters were assessed before and after 6 months of treatment.

Results of the study and discussion: Significant differences in the composition of lipids Significant gender features of the intensity of LPO and the activity of tissue and plasma antioxidant enzymes were established: in men, compared to women, the levels of DC increased ($p<0.05$) by 9% and TBC-RP by 11%, decreased ($p<0.05$) AOA AOS CP/TF by 10%, SOD by 12% and GP by 19%. This indicates a more pronounced depletion of AOP reserves and intensification of LPO in the group of men and confirms the existing data on the role of OS in the pathogenesis of CHD. The highest SOD/GP in the group of men with CHD indicates a maximum imbalance in the direction of oxidative stress in the system of tissue antioxidant enzymes, which is necessary to maintain a steady state concentration of reactive oxygen species (ROS). In our study, GHz occurred in 23% of men and 8% of women with CAD. Significant sex differences in homocysteinemia ($p=0.01$) were revealed, 1.5 times higher in men than in women. The results of the correlation analysis of the level of Hz and LPO-AOP in patients with CHD show that in CHD with HCS and hyperlip peroxidemia there is a significantly higher level of Hz compared to that in healthy individuals ($p<0.05$), GHz seems to be one of the factors reducing tissue and plasma AOZ. The inverse relationship between age and Hz level in group 2 indicates the role of GHz in the pathogenesis of CHD in young women.

A close relationship between metabolism has been revealed N0 with POL-AOP parameters, especially in the group of men with CHD. A significant increase in the level of N0 metabolites in a number of women with hyperlipo peroxidemia and hyperhomocysteinemia leads to an imbalance in the relationship between N0 and the functioning of the LPO-AOP system. At the same time, N0 itself is able to act as a prooxidant. In both groups of patients with CHD compared to the controls, endothelium-dependent vasoreactivity disorders were significantly more pronounced in men ($p=0.001$), and thickening of the OSA TIM - sex differences were not significant. The number of ischemia episodes, including painless, and the duration of myocardial ischemia according to ECG data were significantly higher in men with coronary artery disease. The state of the endothelium and the clinical course of CHD in both sexes are closely related to LPO-AOP.

After 6 months of treatment in both groups of patients with CHD, the levels of TCH and LDL-C became < 4.5 and 2.5 mmol/l; the activity of antioxidant enzymes and N0 metabolites significantly increased, and the intensity of LPO decreased, approaching that in the control groups.

A more pronounced antioxidant effect of atorvastatin was revealed in the complex therapy of CHD with DLL in men.

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The percentage of changes in the activity of SOD, GP, CP, CP/TF, and N0 metabolites as a result of treatment in Group 1 was 35, 95, 30, 19, and 23%, respectively, and in Group 2 -16, 47, 16, 8, and 12%, respectively. In group 1, the content of DC and TBK-RP decreased insignificantly more (by 43 and 37%) than in group 2 (by 35 and 28%). It is possible that the different antioxidant effect of atorvastatin in men and women is explained by the sexual characteristics of the activity of the key enzyme systems NO-synthetases, NAD(F)H-oxidases, the difference in the balance of their synthesis of ROS and N0, as well as a more pronounced decrease in the blood plasma of women ubiquinone Qio - the most effective LDL antioxidant synthesized in the side chain of cholesterol synthesis.

Reducing OS and restoring NO biological activity are key mechanisms of the beneficial effects of statins on endothelial dysfunction. Over 6 months of treatment, endothelial functions and the clinical course of CHD significantly improved in both groups. Cardiac therapy including atorvastatin contributed to a more pronounced increase in EDVD in group 1 by 34%, in group 2 by 21% ($p<0.05$) and had a significantly more pronounced effect on the duration of myocardial ischemia in men ($p=0.04$), decreasing it in group 1 by 88%, in group 2 - by 81%.

Conclusion. Thus, on the basis of the studies carried out in stable forms of CHD, sex differences in the content of LPO, Hz, N0 metabolites and the activity of tissue and plasma antioxidant systems were revealed. A significant relationship between LPO-AOP, endothelial function, atherosclerotic lesions of the coronary arteries, and the clinical course of the disease was proved. endothelial function and the duration of myocardial ischemia, which emphasizes the need for a gender approach to the correction of antioxidant status disorders in CHD with DLP.

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