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THE EFFECT OF CORVITIN ON THE IMPAIRED INDICATORS OF THE PROTEINASE-INHIBITORY SYSTEM IN THE KIDNEYS UNDER THE CONDITIONS OF THE DEVELOPMENT OF EXPERIMENTAL PNEUMONIA AND ADRENALINE DAMAGE TO THE MYOCARDIUM

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Abstract

Ischemic heart disease and pneumonia are the most common diseases among cardiovascular and respiratory diseases, which are constantly increasing.

To date, the effect of corvitin on the indicators of the proteinase-inhibitory system in the kidneys in experimental pneumonia (EP) and adrenaline damage to the myocardium (APM) has not been studied. Therefore, it became the goal of our research.

The EP was reproduced according to the method of V.N. Shlyapnikov. by infecting animals with staphylococcus. APM was modeled by a single intravenous injection of an adrenaline solution.

The work established a gradual increase in the content of azoalbumin, azocasein and azocollagen against the background of a decrease in the level of alpha1-IP and alpha2-M in the kidneys in EP and APM, which prevailed on the 6th and 14th days of comorbid pathology compared to control.

The use of corvitin led to a corrective effect on the impaired indicators of the proteinase-inhibitory system in the kidneys in EP and APM.

Key words: experimental pneumonia; adrenaline damage to the myocardium; corvitin; proteinase-inhibitory system.

Diseases of the cardiovascular system and respiratory organs are among the most common in the clinic of internal diseases, among which coronary heart disease (CHD, acute myocardial infarction) and pneumonia account for the largest share [3, 8, 9].

These diseases mostly cause various complications, have socio-economic significance, as it leads to loss of working capacity, disability and even death [3, 7].

Despite the use of a large number of drugs from different groups of action and the progressive development of pharmacology and the latest methods of therapy, the number of patients with pneumonia and coronary artery disease is not decreasing, but on the contrary, there is a certain increase. This is due to the influence of various etiological factors (stress, obesity, hypertension, diabetes, hypodynamia, hypothermia, overheating) on the human body with the subsequent gradual formation of these pathologies [3, 8].

Today, comorbid pathology is one of the most common, has a special relevance and acuteness. It is accompanied by various complications, mutually intensifies the course of the main and concomitant disease, more difficult diagnosis and treatment of such patients [5, 6, 9].

Currently, the influence of corvitin drug on disturbed markers of the proteinase-inhibitory system under the conditions of experimental pneumonia (EP) and epinephrine damage to the myocardium (APM) has not been fully studied.

Therefore, the goal of our study was to find out the effect of the drug corvitin on the imbalance of the proteinase-inhibitory system in the kidneys under the conditions of the formation of comorbid pathology (EP and APM).

Research materials and methods. Experimental studies were conducted on 56 guinea pigs (males) with a body weight of 180-210 g, which were kept on a standard ration of the vivarium of the Lviv National Medical University named after Danylo Halytskyi. Guinea pigs were divided into six groups: the first group - intact animals - control (10); second, third, fourth, fifth (experimental group) – guinea pigs with EP and APM, respectively, on the 1st, 3rd, 6th and 14th days of the experiment, 9 animals each (36) before treatment; the sixth group (10) - animals with EP and APM on the 14th day after treatment with corvitin, which

was administered intraperitoneally for 9 days (from the 6th to the 14th day) at a dose of 40 mg/kg once a day.

The EP was reproduced according to the method of V.N. Shlyapnikov. [2] by intranasal infection of animals with Staphylococcus aureus. APM was reproduced by a single intramuscular injection of 0.18% adrenaline hydrotartrate solution (Darnytsia, Ukraine), at a dose of 0.5 mg/kg [4].

The content of indicators of the proteinase-inhibitory system was carried out according to the method of K.M. Veremeyenko. [1].

Statistical processing of the obtained data was carried out according to the Student's method.

Research results and discussion. The results of biochemical studies showed that the content of azoalbumin in the kidneys gradually increased on the 1st, 3rd, 6th and 14th days of the development of comorbid pathology (EP and APM), respectively, by 68,9% ($P<0,05$) , 74,3% ($P<0,05$), 82,4% ($P<0,05$), 87,8% ($P<0,05$) against the control group of animals. The determination of other indicators of proteolysis, in particular the content of azocasein in the kidneys, also established their successive increase by 82,1% ($P<0,05$), 89,1% ($P<0,05$), 91,7% ($P<0,05$), 94,5% ($P<0,05$) and azocollagen by 100,0% ($P<0,05$) 105,2% ($P<0,05$), 110,5% ($P<0,05$) and 115,7% ($P<0,05$), respectively, on the 1st, 3rd, 6th and 14th days of development EP and APM in comparison with the first group of animals, which indicated a gradual increase in proteolytic processes, which were most pronounced on the 6th and especially the 14th day of the experiment (Fig. 1).

The study of indicators of the antiprotease potential in the kidneys, in particular the content of alpha1-protease inhibitor (alpha1-IP) in the dynamics of the development of EP and APM (1st, 3rd, 6th and 14th days) showed a significant decrease in them by 41,9 % ($P<0,05$), 43,3% ($P<0,05$), 46,4% ($P<0,05$), 47,2% ($P<0,05$) and alpha2-macroglobulins (alpha2-M), respectively, by 36,1% ($P<0,05$), 44,7% ($P<0,05$), 45,8% ($P<0,05$), 46,8% ($P<0,05$) relative to intact groups of animals, which indicated inhibition of inhibitory potential indicators (Fig. 1).

Thus, as our biochemical studies have shown, under the conditions of the formation of comorbid pathology (EP and APM), there is an imbalance of the proteinase-inhibitory system, which is manifested by an increase in the processes of proteolysis in conditions of a significant decrease in indicators of antiprotease potential. This activates the inflammatory process in the lungs and contributes to the development of ischemia and necrosis in the heart muscle.

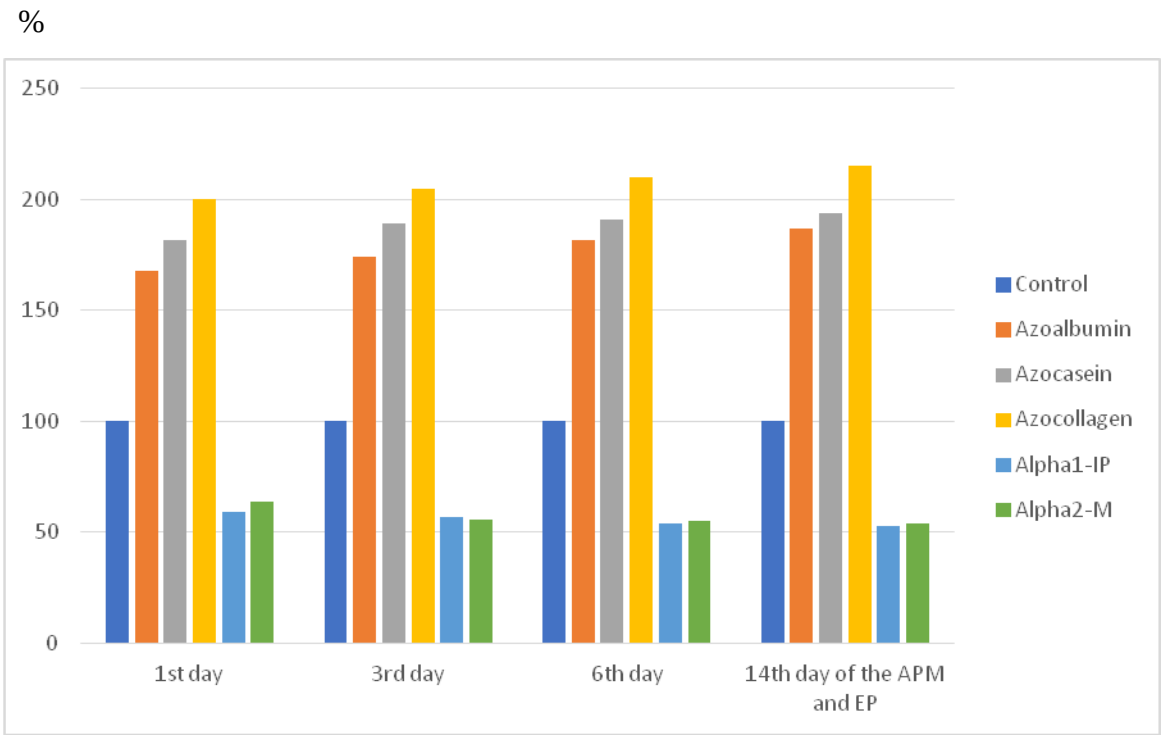

Figure 1. – The content of indicators of the proteinase-inhibitory system in the kidneys in the dynamics of the development of EP and APM (% of control).

The use of corvitin for 9 days (from the 6th to the 14th day of the experiment) with EP and APM led to a decrease in the content of azoalbumin, azocasein, and azocollagen, respectively, by 37,4% ($P<0,05$), 21,9% ($P<0,05$), 34,1% ($P<0,05$) and an increase in the level of alpha1-IP by 24,5% ($P<0,05$) and alpha2-M by 72,5% ($P<0,05$) in the kidneys on the 14th day of the experiment in comparison with the group of animals with this comorbid pathology, before treatment (without correction) (Fig. 2).

Thus, the results of biochemical studies we obtained indicate that in the dynamics of development (1st, 3rd, 6th and 14th days) of comorbid pathology (EP, APM) there will be a sequential increase in proteolytic processes against the background of suppression of antiprotease potential, which was recorded at all stages of our observation with their dominance especially on the 14th day of the experiment, which indicated the formation of an imbalance between the proteinase-inhibitory system, and the latter causes the activation of the inflammatory process in the lungs and the progression of necrosis in the heart muscle and causes kidney damage before treatment. Due to the anti-inflammatory, antiprotease, antioxidant and immunocorrective properties of corvitin, the indicators of the proteinase-inhibitory system in the kidneys underwent a corrective effect in the conditions of the formation of EP and APM.

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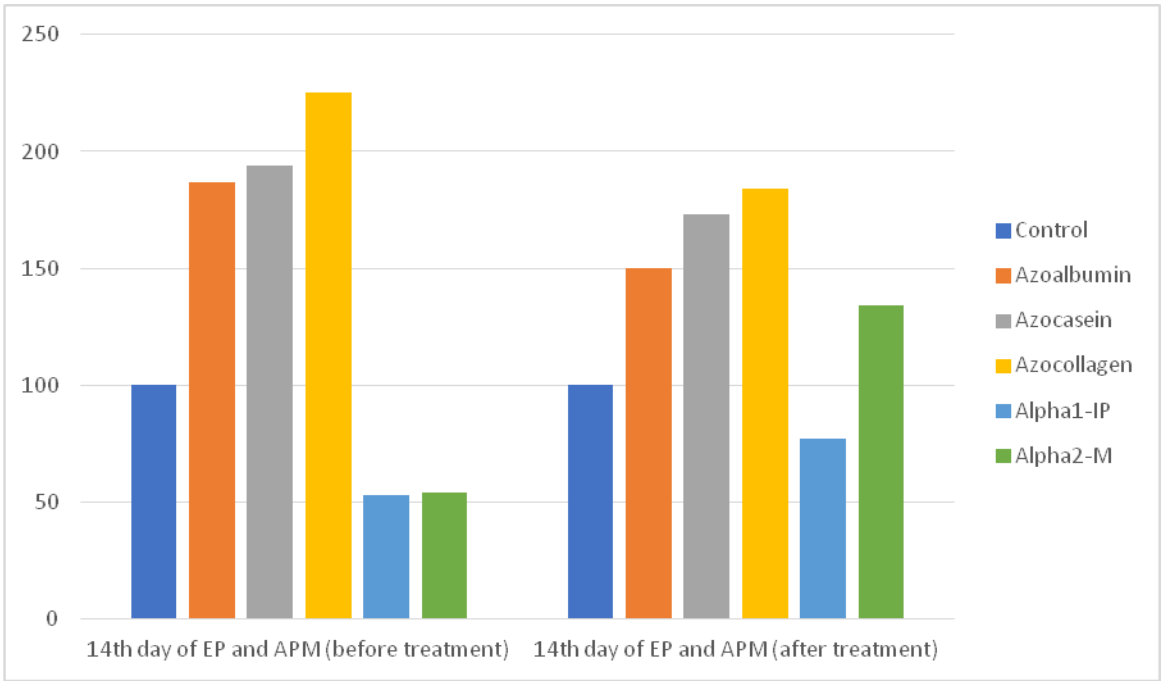

Figure 2. – The effect of the corvitin drug on the disturbed markers of the proteinase-inhibitory system in the kidneys in EP and APM on the 14th day of the experiment (% before and after treatment with corvitin on the 14th day of the experiment).

Conclusions:

1. Comorbid pathology (EP and APM) is accompanied by an increase in the processes of proteolysis against the background of a noticeable decrease in the antiprotease potential, which indicated the development of a significant imbalance of PIS, which was observed during all stages of the study with an advantage on the 14th day of the experiment compared to the control group of animals (before treatment) .

2. The use of corvitin led to the correction of its effect on the disturbed markers of the proteinase-inhibitory system in the kidneys on the 14th day of the experiment in EP and APM.

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