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THE EFFECT OF CORVITIN ON THE INDICATORS OF THE NITRIC OXIDE SYSTEM IN THE KIDNEYS UNDER THE CONDITIONS OF THE DEVELOPMENT OF EXPERIMENTAL PNEUMONIA AND ADRENALINE DAMAGE TO THE MYOCARDIUM

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Abstract

Currently, the effect of corvitin on the indicators of the nitric oxide system in the kidneys in experimental pneumonia (EP) and adrenaline damage to the myocardium (APM) is not studied. The aim of our study was to find out the effect of the corvitin drug on the disturbed markers of the nitric oxide system in the kidneys in EP and APM.

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 scientific work revealed an increase in the content of stable metabolites of nitric oxide and total NOS activity against the background of a decrease in the level of L-arginine in the kidneys in EP and APM, which dominated on the 14th day of comorbid pathology versus control.

The use of corvitin caused a corrective effect on the disturbed markers of the nitric oxide system in the kidneys in EP and APM.

Key words: experimental pneumonia; adrenaline damage to the myocardium; corvitin; nitric oxide system.

Ischemic heart disease (CHD), namely acute myocardial infarction and pneumonia, occupy one of the leading places among cardiovascular and respiratory diseases that are permanently progressive [4, 6, 7, 9].

This pathology ranks first in terms of mortality [4, 9].

Currently, comorbid pathology is one of the most common diseases of internal organs. It causes various complications, aggravates the course of the main disease, complicates the diagnosis and therapy of such patients [4, 9].

It is known from the literature that the nitric oxide system plays an important role in the pathogenesis of the development of inflammatory processes in the body [2].

To date, the influence of the drug corvitin on the changed indicators of the nitric oxide system under the conditions of the development of experimental pneumonia (EP) and adrenaline damage to the myocardium (APM) has not been fully studied.

The purpose of our study was to find out the effect of corvitin on the disturbed indicators of the nitric oxide system in the kidneys under the conditions of the formation of EP and APM.

Research materials and methods. For this, 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. The animals were divided into six groups: the first group (control, 10) – intact animals; 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 correction; the sixth group (10) - animals with EP and APM on the 14th day after therapy 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.

EP was modeled according to the method of V.N. Shlyapnikov. [1] by intranasal infection of animals with Staphylococcus aureus. APM was modeled by a single intramuscular injection of 0,18% adrenaline hydrotartrate solution (Darnytsia, Ukraine), at a dose of 0,5 mg/kg [5].

The content of total products of the nitrogen oxide (NO) system was determined by the method of Shmidt H.H. [10]. The total activity of NOS synthases according to the method of V.V. Sumbayev. [8]. L-arginine content according to the method [3].

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 at all stages (1st, 3rd, 6th and 14th days) of the development of comorbid pathology (EP and APM) there was an increase in the level of stable NO metabolites by 71,4%, respectively (P<0,05), 80,5% (P<0,05), 85,7% (P<0,05), 90,4% (P<0,05) relative to the control. We established a consistent increase in NOS activity by 33,3% (P<0,05), 50,0% (P<0,05), 41,6% (P<0,05), 58,3% (P<0,05) on the 1st, 3rd, 6th, and 14th days of EP and APM development, respectively, against the intact group of animals (Fig. 1).

Determination of the content of L-arginine in the kidneys during EP and APM (1st, 3rd, 6th and 14th days) showed a gradual decrease of it by 27,5% (P<0,05), 32,5% (P<0,05), 35,0% (P<0,05), 45,0% (P<0,05) compared to the first group of animals (Fig. 1).

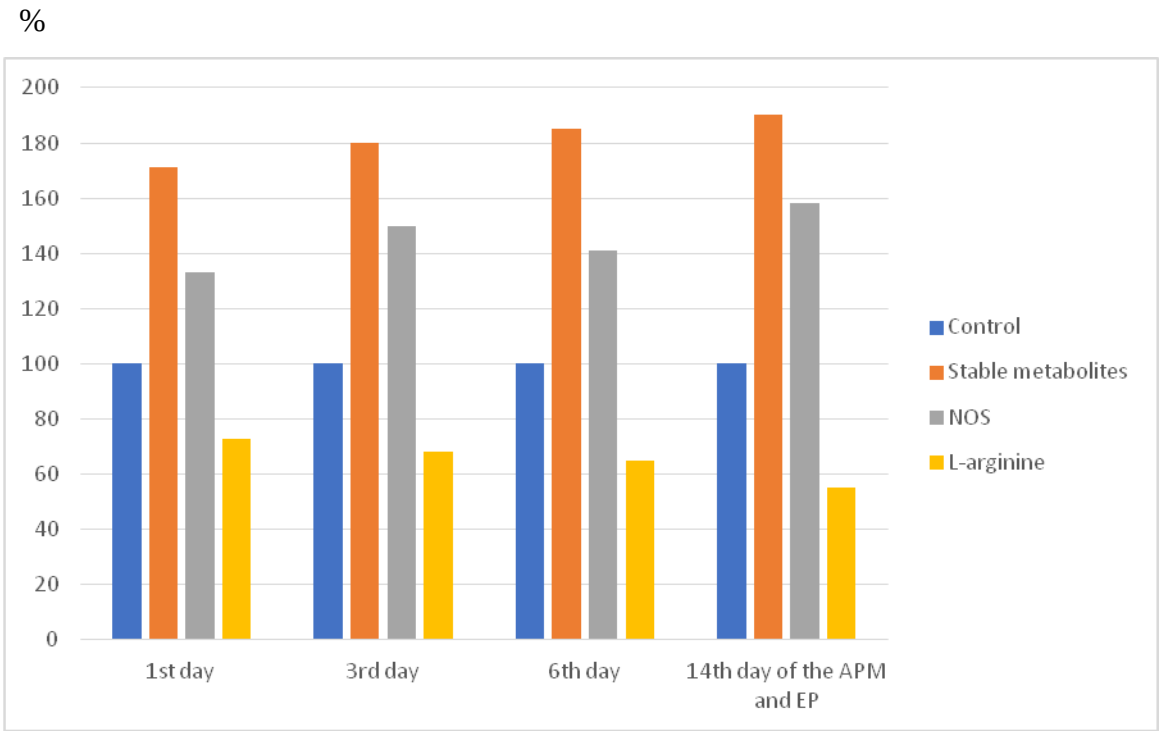

Figure 1. – The content of indicators of the nitric oxide system in the kidneys in the dynamics of the development of EP and APM (% of control).

So, our biochemical studies showed a gradual increase in the content of stable metabolites of NO and the total activity of NOS against the background of a noticeable decrease in the level of L-arginine in the kidneys at all periods (1st, 3rd, 6th and 14th days) of

the development of EP and APM with a special predominance of them on the 14th day of the experiment against the control, which indicated significant violations of the nitric oxide system and their active participation in the pathogenesis of comorbid pathology.

The use of corvitin for 9 days (from the 6th to the 14th day of the experiment) in EP and APM caused a decrease in the content of stable metabolites by 22,5% (P<0,05), NOS by 26,3% (P<0,05) and an increase in the level of L-arginine by 45,5% (P<0,05) in the kidneys on the 14th day of the experiment compared to the group animals with this comorbid pathology, before correction (Fig. 2).

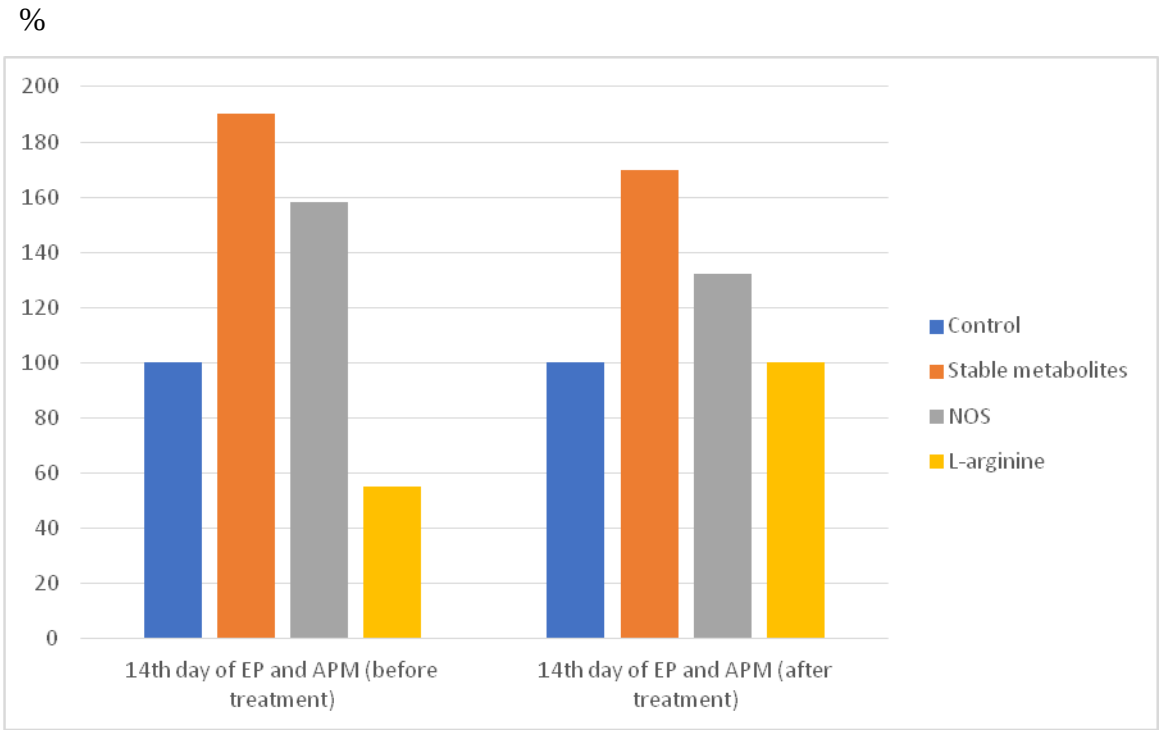

Figure 2. – The effect of the corvitin drug on the disturbed indicators of the nitric oxide system in the kidneys in EP and APM on the 14th day of the experiment (% before and after treatment with corvitin on the 14th day of the experiment).

Thus, our biochemical studies allow us to assert that comorbid pathology (EP, APM) is caused by a gradual increase in the content of stable NO metabolites and NOS activity against the background of suppression of the L-arginine level, which was detected at all stages of our observation with an advantage of 14 - on the day of the experiment. The research results obtained by us indicate significant disturbances of metabolic processes in relation to changes in the NO system in the kidneys in EP and APM. The use of corvitin led to a corrective effect

on markers of the NO system in EP and APM, which is obviously explained by the anti-inflammatory, antioxidant and cardioprotective effect of this drug [6, 7].

Conclusions:

1. Combined EP with APM leads to noticeable violations of the indicators of the NO system, which are manifested by an increase in the level of stable NO metabolites and NOS activity and a decrease in the content of L-arginine in the kidneys at all stages of their development, with a predominance on the 6th and 14th days of the experiment against the control.

2. The use of corvitin led to the correction of its effect on the changed indicators of the nitric oxide system in the kidneys on the 14th day of the experiment in EP and APM against this comorbid pathology before correction.

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