ТЕРАПІЯ

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THE STATE OF PROOXIDANT AND ANTIOXIDANT SYSTEMS IN PATIENTS WITH SHINGLES

The activity of lipid peroxidation and enzymatic antioxidant defense system in patients with shingles. It is established that in the acute period of the disease there is an increase in the serum concentration of products of lipid peroxidation (diene conjugates and malondialdehyde) and activity of antioxidant enzymes. In the acute period of the disease activity of lipid peroxidation prevails over the antioxidant protection system. The period of convalescence of the concentration of products of lipid peroxidation and activity of antioxidant enzymes in serum are reduced, but not normalized.

Keywords: *shingles, lipid peroxidation, antioxidant protection system.*

In recent decades, herpes viral diseases have acquired a significant epidemiological role and social significance [1, 2]. One of the nosological units of the herpes viral infection is herpes zoster (shingles), which is a recurrent form of varicella. Both diseases are caused by the same pathogen of the subfamily of alpha-herpes viruses, the varicella zoster virus [1]. In primary infected body this virus causes chickenpox, affects the nerve cells in the spinal ganglia area, and stores its DNA for a person's entire life [1].

The main reason for the exacerbation of infection and the onset of symptoms of shingles is a weakened immune system [3, 4]. Due to immunodeficiency, the factors of cellular and humoral immunity have not been able to destroy all viral particles, causing the development of recurrence of herpes viral infection [5].

Along with immunodeficiency a significant role in the pathogenesis of herpes zoster (shingle) is played by inflammation in the development of which are involved not only the classic proinflammatory mediators, interleukins, prostaglandins and leukotrienes, but also the metabolites of lipid peroxidation (LPO) [2].

Activation of LPO in cell membranes is initiated by the hypoxia and intoxication that take place during inflammation. Intermediate and final metabolites of LPO have the potential to affect the structure of cell organelles and their function negatively. The control of LPO activity is a system of antioxidant protection (AOP), one of which links is a set of specialized enzymes [6]. The condition of LPO and the AOP system in patients with shingles has not been studied thoroughly.

The aim of the investigation was to study the condition of prooxidant and antioxidant systems in the dynamics of the disease in patients with shingles.

Materials and methods. The study was conducted on 32 patients with shingles including 13 women (40.6 %) and 19 men (59.4 %) aged from 51 up to 74 years old, mean age of (62.6±3.1) years old. The disease was in the moderate formin all patients. The blood was tested in the acute period of the disease before treatment, and in the phase of convalescence during discharging from the hospital.

The control group consisted of 32 healthy individuals (17 men and 15 women) aged 50–

73 years old, mean age of (61.5±3.0) years old, without a previous history of herpes zoster (shingles), but who suffered chickenpox in the childhood.

The determination of serum diene conjugates (DC) was carried out according to [7], malondialdehyde (MDA) according to [8], catalase activity (CAT) according to [9], activity of superoxide dismutase (SOD) according to [6]. Integral coefficient K was calculated with the formula: K = (DC + MDA) / (CAT + SOD), and expressed in arbitrary units (a. u.).

Statistical processing of obtained data was carried out by the methods of variation statistics [10], using STATISTICA V. 6.0 (Statsoft Inc., USA), license № AJAR909E415822FA. A statistically significant difference between the indicators considered at a probability of null hypothesis less than 5 % ($p<0.05$).

Results and their discussion. It is established that the concentration of LPO products and activity of enzymes of the AOP system is significantly increased in the serum of patients examined in the acute period of herpes zoster (shingles), table.

of the studied parameters, however, the complete normalization did not occur.

In comparison with similar indices in the acute period of herpes zoster (shingles), the level of DC in the blood serum was decreased by 1.72 times, while the MDA level was decreased by 1.41 times in phase of convalescence. Similar degree of lowering of the activity of CAT and SOD was 1.3 and 1.17 times respectively. In all these comparisons, the differences are statistically significant.

However, in comparison to the control group, the levels of DC in the blood serum of convalescents remained 1.46 times increased ($p<0.001$), MDA level remained 1.29 times increased ($p<0.001$), and the indices of activity of enzymes CAT and SOD remained increased, by 1.6 and 1.17 times respectively ($p<0.05$ for both comparisons). Besides, the coefficient K in the phase of convalescence, that was (0,439±0,021) arbitrary units in average, did not have significant differences with the K coefficient in the control group, that testified to the normalization of the balance of the system LPO/AOP in blood serum.

Indices of LPO and enzymatic AOP system in blood serum in patients with shingles

Parameters	Control group (n=32)	Patients with shingles	
		acute period (n=35)	reconvalescence (n=35)
DC, μmol/ml	1,25±0,06	3,13±0,15@	1,82±0,09@
MDA, μmol/ml	7,33±0,35	13,37±0,64@	9,45±0,47@
CAT, mkat/hЧl	12,94±0,62	13,37±0,64@	14,96±0,72*
SOD, IU/mgHb	9,15±0,44	12,52±0,57@	10,74±0,54*
K, a. u.	0,388±0,019	0,516±0,025@	0,439±0,021

Note. Pis calculated according to the indicators of control group: * p<0,05; @ p<0,001.

The content of the intermediate product of lipid peroxidation – DK in the acute period of the disease was 2.5 times higher than in the control group ($p<0.001$), and the content of the final product LPO – MDA were 1.82 times increased ($p<0.001$). In the acute period of the disease the activity of key enzymes of the antioxidant defense system – the CAT and SOD were higher than in the control group, respectively, 1.5 ($p<0.001$) and 1.37 times ($p<0.001$). The coefficient K, which characterizes the balance in the system LPO/AOP, was 1.33 times increased against the similar index in the control group ($p<0.001$).

Re-investigation of LPO and enzymatic activity of the AOP system in the phase of convalescence showed a significant improvement

Discussion of the results of the study. The results of this study showed that during the development of herpes zoster (shingles) the intensity of LPO processes in the affected tissues increases, thus in the blood serum there is an increase in the concentration of intermediate and final LPO products, as well as the activity of enzymes of the AOP system of superoxide dismutase and catalase increases. In the acute period of the disease the processes of lipid peroxidation prevail over the enzymatic activity of the AOP system, as evidenced by the increase of the integral coefficient K. As a result of treatment disappearance of clinical symptoms was accompanied by an improvement of the studied parameters of lipid peroxidation and the activity of antioxidant enzymes, with the balance in the

system LPO/AOP. However, the residual negative changes of the studied indices evidences a partial incompleteness of the pathological process that is the basis for the developing of the method of their medical treatment.

Conclusions

1. In the acute period of herpes zoster (shingles) in the serum of patients there is an increase of the concentration of the intermediate (DC) and terminal (MDA) metabolite lipid peroxidation, and the increased activity of key enzymes of the antioxidant protection system – catalase and superoxide dismutase. The lipid peroxidation activity prevails over the activity of the antioxidant protection system.

2. In the phase of convalescence lipid peroxidation and activity of enzymes of the antioxidant protection system is reduced without full normalization, but with the restoration of balance in the system lipid peroxidation / antioxidant protection.

The viability of the research. The revealed changes are the basis for the development of methods of pharmacological correction by using antioxidants in patients with shingles, which will contribute to the acceleration of the processes of sanogenesis.

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СТАН ПРООКСИДАНТНОЇ Й АНТИОКСИДАНТНОЇ СИСТЕМ У ХВОРИХ НА ОПЕРІЗУВАЛЬНИЙ ЛИШАЙ

Вивчали активність перекисного окиснення ліпідів та ферментативної системи антиоксидантного захисту у хворих на оперізувальний лишай. Встановлено, що в гострому періоді захворювання має місце збільшення в сироватці крові концентрації продуктів пероксидації ліпідів (дієнових кон'югат і малонового діальдегіду) та активності ферментів антиоксидантного захисту. У гострому періоді захворювання активність пероксидації ліпідів переважає над системою антиоксидантного захисту. У періоді реконвалесценції концентрація продуктів пероксидації ліпідів і активність ферментів антиоксидантного захисту в сироватці крові знижуються, але не нормалізуються.

Ключові слова: *оперізувальний лишай, перекисне окиснення ліпідів, система антиоксидантного захисту.*

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СОСТОЯНИЕ ПРООКСИДАНТНОЙ И АНТИОКСИДАНТНОЙ СИСТЕМ У БОЛЬНЫХ ОПОЯСЫВАЮЩИМ ЛИШАЕМ

Изучали активность перекисного окисления липидов и ферментативной системы антиоксидантной защиты у больных опоясывающим лишаем. Установлено, что в остром периоде заболевания имеет место увеличение в сыворотке крови концентрации продуктов пероксидации липидов (диеновых конъюгат и малонового диальдегида) и активности ферментов антиоксидантной защиты. В остром периоде заболевания активность пероксидации липидов преобладает над системой антиоксидантной защиты. В периоде реконвалесценции концентрация продуктов пероксидации липидов и активность ферментов антиоксидантной защиты в сыворотке крови снижаются, но не нормализуются.

Ключевые слова: *опоясывающий лишай, перекисное окисление липидов, система антиоксидантной защиты.*

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