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Thus, we have demonstrated the general mechanisms of free radical damage to the liver and bone tissue of experimental animals under the influence of reproduced atherosclerosis. In addition, in the bone of the alveolar process and the femur of rabbits, LPO activation and a decrease in the functioning of the FAS components were revealed as a result of this action.

The complex of PUFA with α-tocopherol showed an angioprotective effect. It has a protective effect in the bone tissue of the periodontium against free radical lipid oxidation and has antioxidant properties.

The data obtained indicate that atherosclerosis of the arteries contributes to the disruption of the antioxidant systems of the periodontal bone tissue. It can be assumed that the development of periodontitis with a known risk factor - atherosclerosis, to a certain extent, is caused by peroxide mechanisms.

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EFFECT OF A COMPLEX CONTAINING 1- α HYDROXYCHOLI-CCALCIFEROL, ANTIOXIDANTS AND CALCIUM PHOSPHATE IN AN ANTIOXIDANT-FREE DIET AND ADDITIONAL LOCAL EXPOSURE

Abstract.

In experiments on 53 white rats, the protective properties of a complex containing 1αOHD3, antioxidants and calcium phosphate were studied. Modeling of periodontal pathology was carried out under conditions of a common risk factor for the development of periodontitis - peroxidation syndrome and a local factor - dental plaque.

Keywords*: modeling, antioxidant-free diet, dental plaque, complex, 1α-hydroxycholecalciferol, antioxidants.*

The general risk factors for the development of periodontitis are currently recognized as neuropsychiatric stress, physical inactivity, unbalanced nutrition, including chronic insufficiency of antioxidants due to the significant role of free radical oxidation of lipids and biopolymers of periodontal membranes in periodontitis [1,2]. Along with the general, periodontitis-specific risk factors are known, which include dental plaque.

The aim of this study was to study the combination of antioxidants with the hormonal form of vitamin D_3

and calcium phosphate under conditions of a combination of the general peroxidation syndrome with a local factor - an effect that simulates dental plaque in rats.

Materials and research methods. The study, which lasted 100 days, was carried out on 53 male Wistar rats of herd breeding, divided into 5 groups: 1st group - 9 intact rats were kept on a standard vivarium diet (DV); 2nd - in 10 rats kept on DV, in order to simulate dental plaque (in the form of a pathogenic local effect) in the area of the cement-enamel border of the molars of rats, a layer of medical cyacrine glue (MK-2) was applied in the form of a narrow strip 3 times a week on both sides of the tooth surface (DV + cyacrine); 3rd - 8 rats were kept on a semi-synthetic antioxidant-free diet (BAR) according to O.N. Voskresensky [3].

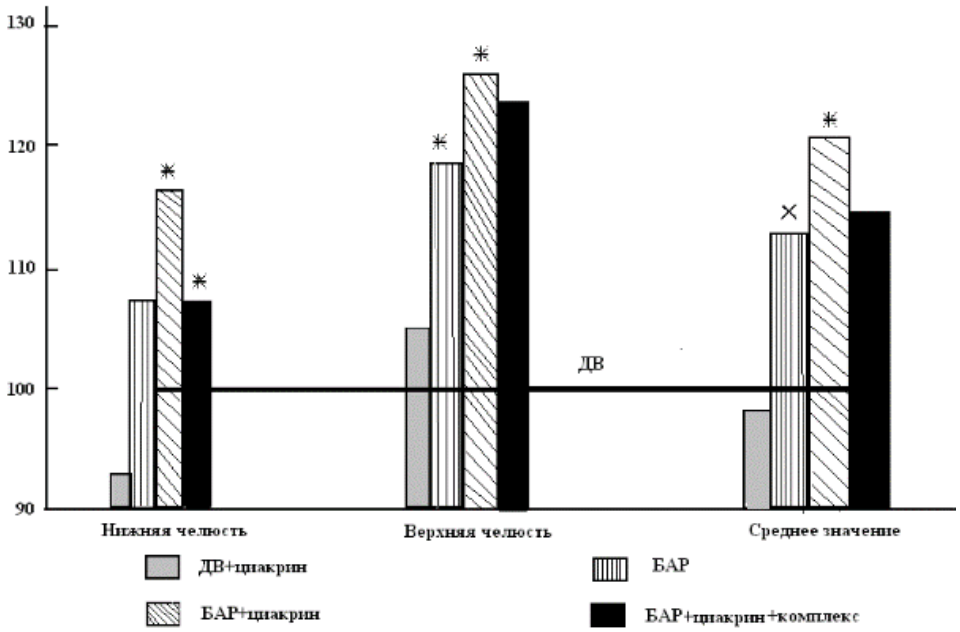
In the 4th group, 8 rats were kept on BAR with additional local exposure (BAR + cyacrine); Group 5 - 18 rats received a complex of antioxidants with 1α-hydroxycholecalciferol and disubsti-tuted calcium phosphate (BAR + cyacrine + complex) against the background of BAR and pathogenic local action [4]. The complex was administered to rats daily per os using a probe: per 1 kg of live weight - 1α-hydroxycholecalciferol - 0.0018 μg; α-tocopherol acetate 0.12 g; glutamic acid - 2.85 g; CaHPO4* H2O - 4.90 g.

At the end of the experiment, the rats were sacrificed with total bloodletting from the heart. Having previously separated the gums and buccal mucosa, the jaws were isolated and the resorption of the periodontal bone structures was assessed [5]. The objects of biochemical studies were blood serum, liver, gums, bone of the alveolar bone of rats. The level of lipid peroxidation (LPO) was assessed by the accumulation of malondialdehyde (MDA) in all study objects [6]. In the blood serum, the content of acylhydroperoxides (AGP) of the total fraction of lipoproteins (LP) was determined [7]. The activity of the antioxidant enzyme glutathione peroxidase [8] was determined in the liver, gums, and bone of the alveolar bone.

The data obtained were processed statistically.

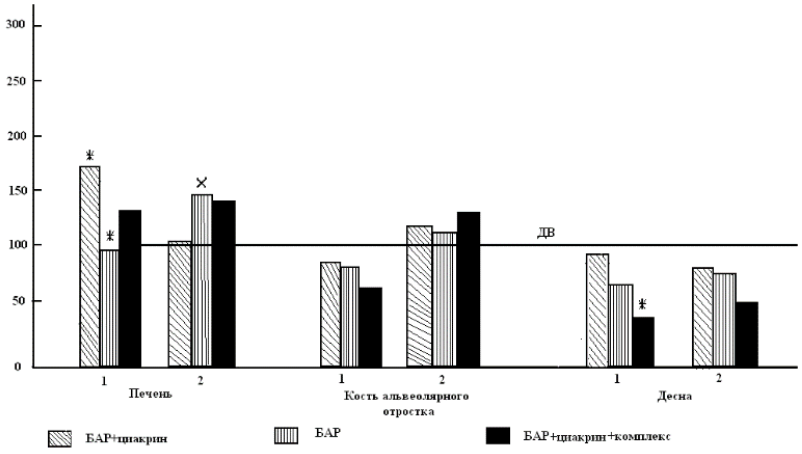
Research results and discussion

Keeping rats on an antioxidant-free diet (BAD) for 100 days increased the resorption of bone structures of the periodontium, and this effect was more pronounced on the upper jaw of rats (Fig. 1).



Additional local effects when the rats were kept on a vivarium diet did not affect the processes of osteoresorption in comparison with the data of the intact group. In rats kept on BAR with additional local exposure (BAR + cyacrine), there was a significant increase in bone resorption of the alveolar bone (on average by 22%; p1 = 0.003) compared with the group of DV + cyacrine (100%) and by 8% (p1> 0.05) compared with the group of rats kept on an antioxidant-free diet (BAD) (Fig. 1). Oral administration of the complex against the background of an antioxidant-free diet and topical cyacrine revealed a decrease (by 8%, p2 = 0.05) in bone resorption of the alveolar process of the rat mandible (Fig. 1).

The results of biochemical studies are presented in the table and in Fig. 2.



With long-term polyantioxidant deficiency (BAR - 100 days), there was an increase in LPO processes in the blood and liver of rats - a tendency to an increase in the content of acylhydroperoxides in the total fraction of blood serum lipoproteins (1.6 times; p = 0.07) (table) and an increase in the content of MDA in the liver (by 64%; p = 0.03) relative to the intact group (Fig. 2). The activity of glutione peroxidase in the studied tissues did not change significantly (Fig. 2).

Table

LPO indices in the blood serum of rats with polyantioxidant deficiency and additional local exposure (M ± m, p; p1; p2)

Experience series	MDA (nmol / l)	AGP(units ext / ml)
1. DV	548±98	2,0±0,2
2. BAR	240±26 p=0,013	3,1±0,3 p=0,07
3. BAR + cyacrine	362±28 p_1=0,006	3,4±0,2
4.BAR + cyacrine + complex	278±8,3 p_2=0,009	2,99±0,2

Note. The reliability index p was calculated in comparison with the DV group; p1 - compared with the BAR group; p2 - with BAR + cyacrine group.

With oral administration of the complex against the background of an antioxidant diet (BAR) and cyacrine (topically), a significant decrease by 23% (p2 = 0.009) in the MDA content was observed, which indicates its antioxidant effects. A significant significant decrease in the MDA content (by 28%; p2 = 0.05) when using the complex was found in the gums. In the bone of the alveolar process, a slight decrease in this indicator was revealed (Fig. 2). In the liver, a small, albeit insignificant, increase in the MDA content was observed; the activity of glutathione peroxidase did not change significantly. It can be assumed that the administration of 1α-hydroxycholecalciferol disrupted the mechanism of inductive increase in the level of glutathione peroxidase activity in the liver, which develops in the initial period of peroxidation syndrome.

Conclusion

Studies have shown that the complex of antioxidants with 1α-hydroxycholecalciferol under systemic exposure in rats with experimental peroxidation syndrome and dental plaque modeling (topically) showed periodontal protection properties. The protective effects of the complex were manifested in the gums and buccal mucosa, as well as in its bone structures. The most important component of the drug - 1α-hydroxycholecalciferol as a result of its hydroxylation in the liver and bone tissue, gradually transforming into an active metabolite of vitamin D3 - 1,25-dioxycholecalciferol, restored hormonal links of regulation and metabolism of bone tissue disturbed during reproduced periodontal pathology.

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