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INFLUENCE OF VICASOL ON THE CONDITION OF PERIODNTAL TISSUES UNDER THE MODELING OF PERIODONTITIS

Abstarct. Vikasol in experiments on 22 white rats in the tissues of the oral cavity showed periodontoprotective, antioxidant, anti-inflammatory properties in terms of periodontitis modeling. He increased the content of hydroxyproline in the gums and glycosaminoglycans in periodontal tissues.

Key words: vikasol, model of periodontitis, lipid peroxidation, antioxidant enzymes, hydroxyproline, glycosaminoglycans.

Inflammatory periodontal diseases are accompanied by destructive changes in the intercellular matrix (MKM) of the connective tissue (ST) of the gums and periodontal bone tissue. One of the most important vitamins for CT metabolism is vitamin K, the use of which increases the collagen content, the level of hexosamine-containing biopolymers and sialoglycoproteins [1]. As a cofactor, vitamin K is involved in the post-translational carboxylation of glutamine residues (Glu) of calcium-binding proteins. The effect of this vitamin is mediated by the receptor interaction of the active metabolites of vitamin D [2].

We have proposed the use of a vitamin K antagonist, warfarin, when modeling experimental periodontitis that occurs with metabolic disorders of the MKM periodontal disease. Warfarin blocks the synthesis of vikasol-dependent blood binding factors in the liver: factors II, VII, IX and X. It is an anticoagulant of indirect action, has a slow effect, has cumulative properties.

The purpose of this study was to study the effect of Vicasol on the state of the tissues of the oral cavity of rats under conditions of periodontitis modeling.

Materials and methods

Experience held on 22 white male rats of 1.5 months. age. The intact group (I) – 6 individuals. In the 2nd group of 8 rats received per os warfarin ("Nycomed Denmark APS") in the dose of 10 mg/kg of body weight a day. Played against the background of periodontal diseases 8 rats for 50 days were administered per os menadione (vitamin K3) (" Borsasi HFZ", Ukraine) at a dose of 1.5 mg/rat per day, then taken out of the experience by total bloodletting from the heart under anesthesia (sodium thiopental 40 mg/kg). All animal experiments were performed according to European Convention for the protection of vertebrate animals used for experimental and other scientific purposes. The objects of research were the supernatant of homogenates of the liver, gums, buccal mucosa (SOS), alveolar bones. State ST was evaluated on the content of glycosaminoglycans (GAG) in periodontal tissues [3], and collagen content of hydroxyproline in the gums of rats [4]. Standardized methods using commercial kits determined the content of total protein, acid and alkaline phosphatase. The level of processes of lipid peroxidation (LPO) was evaluated by the content of malondialdehyde (MDA) [5]. We determined the activity of glutathione peroxidase (GPO) [6] and catalase [7].

The research results were processed by standard methods with the definition of the t-criteria of reliability of differences for Student.

Research results

Against the background of reproduced experimental periodontitis, the effect of Vicasol on the condition of the oral tissues was investigated. Vikasol reduced the resorption of periodontal bone structures in the lower jaw of rats by 15% ($p = 0.02$): $33.5 \pm 0.6\%$ compared with the control group (100%): $39.4 \pm 2.1\%$. In the upper jaw, no significant reduction in resorption was detected: $25.6 \pm 0.9\%$ versus $27.6 \pm 1.6\%$.

Vikasol had a positive effect on the state of the connective tissue periodontal cancer of the rats. Thus, in the gum, the content of total hydroxyproline under the action of vikasol increased 7.9 times ($p < 0.001$); free hydroxyproline - 6.7 (trend; $p = 0.09$); bound - 8.8 times ($p = 0.003$) compared with the control group (Table 1).

Table 1

The effect of Vicasol on the performance of MKM in periodontal tissues of rats (M ± m; p)

Animal groups	Content				
	GAG (mg / g)		Gum oxyproline (μmol / g)		
	gum	alveolar bone	general	free	connected
Control (K)	7,50±0,17	18,0±1,65	0,57±0,17	0,28±0,07	0,28±0,14
K + vikasol	8,52±0,012 p=0,004	35,3±1,21 p<0,001	4,51±0,48 p<0,001	1,88±0,86 p=0,09	2,47±0,39 p=0,003

Note. In tab. 1-4, the confidence index p is calculated compared to the control group.

Vikasol in the tissues of the oral cavity showed an anti-inflammatory effect: the activity of the pro-inflammatory enzyme acid phosphatase (pH 4.8) in SOCH decreased by 1.6 times (p = 0.06), and in the gum - 4 times (p = 0.02; Table 2).

Table 2

The effect of Vicasol on acid phosphatase activity and MDA content in the tissues of the oral cavity of rats (M ± m; p)

Animal groups	Activity ACP (μmol / g)			Content MDA (nmol / cm3; nmol / g)		
	Oral mucosa	gum	alveolar bone	Liver	Oral mucosa	alveolar bone
Control (K)	2,36±0,16	7,74±1,60	2,98±1,06	153±10,8	5,58±0,53	13,1±0,65
K + vikasol	1,46±0,40 p=0,06	1,88±0,99 p=0,02	1,38±0,21	104±4,17 p=0,004	5,39±0,56	11,4±0,93

In the bone of the alveolar process, the ACP activity was 2.2 times lower than in the control group (p> 0.05; Table 2). It is known that ACP in bone is a marker enzyme of osteoclast action. The activity of alkaline phosphatase - marker enzyme osteoblasts under the action of vikasol increased 1.6 times: 0.28 ± 0.013 nmol / s · g versus 0.18 ± 0.013 nmol / s · g (p <0.001) relative to the control group.

Vikasol in the liver normalized lipid peroxidation processes at the level of the organism of rats - the content of MDA decreased in the liver by 32% (p = 0.004); in SOSH and in the bone of the alveolar process, the level of MDA was not significantly decreased (by 4% and by 13%, respectively, Table 3).

Table 3

The effect of Vicasol on the antioxidant enzyme's activity in the tissues of the oral cavity of rats (M ± m; p)

Animal groups	Activity			
	catalases (mkat / g)		GPO (μmol / s · g)	
	Gum	Oral mucosa	Oral mucosa	Alveolar bone
Control (K)	20,4±1,07	14,8±2,84	12,9±7,13	6,49±3,02
K + vikasol	24,1±1,65 p=0,08	15,9±3,76	32,5±4,22 p=0,04	41,1±4,76 p<0,001

Catalase activity in the gum under the action of Vicasol tended to increase (p = 0.08; Table 3). The activity of another antioxidant enzyme - GPO in the SOC increased by 2.5 times (p = 0.04); in the periodontal bone tissue - more significantly, 6.3 times (p <0.001; table 3).

The content of soluble non-collagen protein was increased compared with the control groups (warfarin): in the liver 2.8 times (p <0.001); in the spring 2.5 times (p = 0.004) and 5.2 times (p = 0.05; Table 4) in the periodontal bone tissue, which is understandable due to the anabolic properties of vitamin K3 (vikasol).

Table 4

The effect of Vicasol on the content of soluble protein in the tissues of rats (M ± m; p)

Animal groups	Protein content (mg / g)		
	liver	gum	alveolar bone
Control (K)	0,28±0,050	0,22±0,051	0,17±0,088
K + vikasol	0,77±0,051 p<0,001	0,55±0,064 p=0,004	0,89±0,29 p=0,05

Conclusion

In the course of the research, vikasol showed periodontoprotective, antioxidant, anti-inflammatory properties under conditions of periodontitis modeling. Thus, parodontoprotective effect of vikasol was expressed in a decrease in resorption of periodontal bone by an average of 11% (100% in the control group), which was consistent with the activation of alkaline phosphatase, a marker enzyme of osteoblasts. Anti-inflammatory effects are found in the oral mucosa. The antioxidant properties of vikasol were manifested by a decrease in the level of POL processes on the background of the organism and, locally, by the activation of antioxidant enzymes in rat periodontal tissues.

The previously known anabolic properties of vitamin K were confirmed by a significant increase in the content of hydroxyproline in the gum, as well as glycosaminoglycans in periodontal tissues under its influence.

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