



Changes in Local Immunity of the Gingi and Mouth in the Treatment of Hypertrophic Gingivitis in Adolescents

Saidova Nilufar Akhrorovna ¹, Ruziboyeva Dilobar Ilxomjonovna ²

^{1,2} Bukhara State Medical Institute

Abstract: Among dental diseases, periodontal diseases dominate in their intensity, prevalence and devastating consequences for the human dentition. In this regard, at present, the search for effective methods for diagnosing, treating and preventing inflammatory periodontal diseases remains an urgent problem.

Hypertrophic gingivitis in the general structure of periodontal diseases ranges from 5.2 to 41.6% of cases, while its frequency during the period of hormonal changes in the body is 40-100% - during puberty; 5.2-41.6% - during pregnancy, in persons taking calcium antagonists - 14.5-83%, anticonvulsants - 40-50%, immunosuppressants - 30%.

Keywords: Hypertrophic gingivitis, adolescents, periodontal disease, inflammation, chronic infection, periodontitis, hormonal disorders

Oral fluid, which characterizes the state of periodontal tissues, is also the first element of the immune defense of the tooth as an organ. Recent studies have shown that one of the important components of the development of inflammatory processes in periodontal tissues is a violation of the processes of intercellular interaction with the participation of cytokines or immunoregulatory mechanisms at the level of the dent gingival junction. It has been suggested that changes in the interaction in the local network of cytokines accompany the exacerbation of the inflammatory process in the periodontium.

In view of this, we studied the indicators of the status and reactivity of local mechanisms of oral immunity in adolescents with hypertrophic gingivitis with various degrees of severity of this pathology before and after treatment.

Material and research methods

The study used material (oral fluid, gingival blood) obtained from 50 patients aged 12-18 years with a diagnosis of moderate hypertrophic gingivitis and 20 healthy individuals.

Depending on the therapeutic and preventive measures taken, all patients were divided into 2 groups of 25 people each. In the 1st control group, traditional antiseptic treatment of the oral cavity was used for treatment using a 0.05% solution of chlorhexidine bigluconate and periodontal pockets were injected with the gel "metrogil-dent" under the bandage in the amount of 10 g for 5-7 days. In the 2nd group (n=25), patients underwent antimicrobial, local anti-inflammatory and decongestant therapy. "Traumel C" 301.5 mg in the form of a paste was injected into the interdental space under the bandage in the amount of 10 g for 5-7 days. Group 2 was taken as the main one.

The clinical state of periodontal tissues was assessed using the indices: hygienic (Green-Wermillion), PI (Russel). The state of immune resistance of the oral cavity was assessed using cytological methods (determination of the content of cellular elements in the fluid of the periodontal pocket);

assessing the absorption activity of neutrophilic leukocytes by calculating the phagocytic number during the induction of phagocytosis by latex particles, as well as the spontaneous reduction test of nitro blue tetrazolium (NCT-test).

Statistical data processing was carried out on a PVEM using MS Excel 10.0 tools.

Results and discussion

When examining patients, hyperemia of the gingival mucosa, swelling, loose consistency, bleeding on probing, a small amount of supra- and subgingival tartar, abundant soft plaque, false pockets up to 5 mm with serous exudate, papillae enlarged and deformed, hypertrophy up to 1/2 the length of the crown of the teeth, the average value of clinical indices was IG - 2.58 ± 0.5 and PI - 5.5 ± 0.4 .

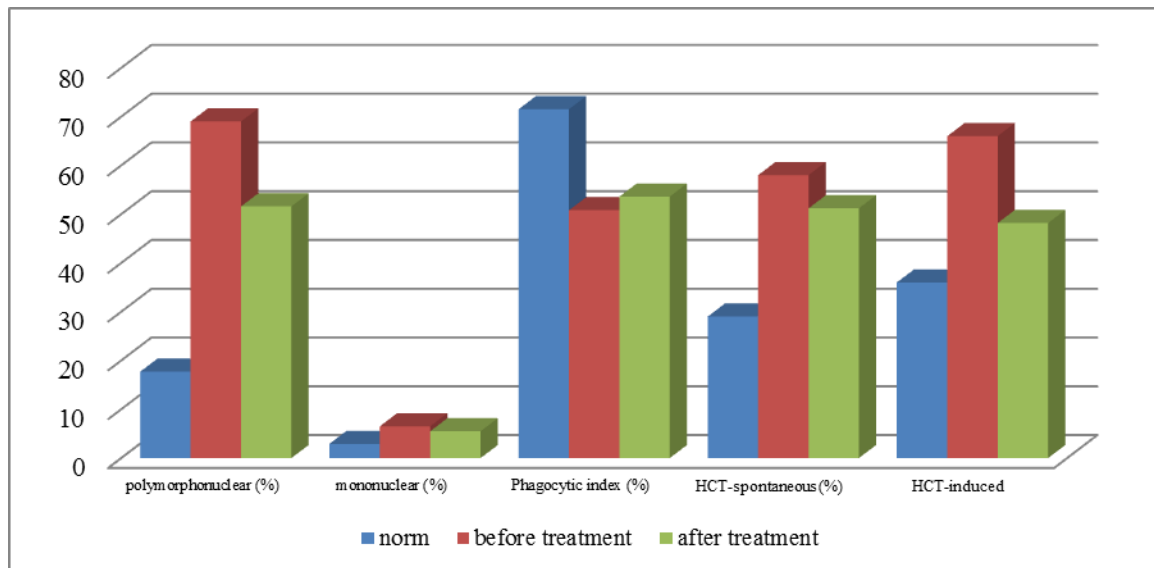
After the end of the course of therapy, patients of all groups showed improvement: thickening of the gingival margin, reduced bleeding, disappearance of false pockets. The results of treatment are presented in the table (Table 1). Positive dynamics of changes in index indicators of periodontal condition was noted. The highest results were achieved in the 2nd group, where the value of PI from 2.58 ± 0.5 points to 0.14 ± 0.1 , PI from 5.5 ± 0.4 to 2.56 ± 0.8 ($p < 0.05$).

Table 1. Dynamics of changes in the values of index indicators of the state periodontal before and after treatment

Indices	Groups	Before treatment	After treatment
hygiene index	Control I gr. n=25	$2,57 \pm 0,8$	$0,14 \pm 0,1^*$
	Main II gr. n=25	$2,58 \pm 0,5$	$0,12 \pm 0,1^*$
periodontal index	Control I gr. n=25	$5,5 \pm 0,4$	$2,56 \pm 0,8^*$
	Main II gr. n=25	$5,5 \pm 0,4$	$0,88 \pm 0,6^*$

Note: * - differences relative to data before treatment are significant ($P < 0.05$)

When conducting a cytological study, it was revealed that after the complex treatment we carried out, the percentage of cell integrity increased significantly. The number of epithelial cells increased by three times, and the number of PMNL and mononuclear cells decreased by half (Fig. 1), which may indicate the relief of the inflammatory process and the induction of periodontal tissue regeneration. Indicators of the absorption activity of phagocytes of the peripheral blood of the gums in patients with hypertrophic gingivitis were significantly reduced in comparison with normal ones. After treatment, these indicators also remained reduced. Indicators of spontaneous activation of oxygen-dependent metabolism of leukocytes according to the spontaneous HBT-test were 2-2.5 times higher than normal. Under conditions of stimulation with latex, the level of activation of oxygen-dependent metabolism of phagocytic cells in patients with hypertrophic gingivitis significantly exceeded normal values, but was slightly higher than in the spontaneous NBT test. After traditional treatment, there were no significant changes in the level of spontaneous and induced activation of oxygen-dependent phagocyte metabolism.



Picture1. Cellular composition and activity of phagocytic cells in the contents of the gingival pocket of patients with hypertrophic gingivitis before and after complex treatment

When studying the concentration of cytokines in saliva (table 2), it was found that in patients with hypertrophic gingivitis it was higher than normal, but the degree of such an increase for different mediators varied significantly. The content of TNF-a, the leading pro-inflammatory immunocytokine of the acute phase, increased 6-10 times in hypertrophic gingivitis. The amount of IL-1b and IL-4 in patients with hypertrophic gingivitis was increased by 2-2.5, respectively, and did not differ significantly.

Tab 2. The content of some cytokines in the saliva of patients with hypertrophic gingivitis before and after treatment

Index	Control	Traditional treatment		Complex treatment	
		Before treatment	After treatment	Before treatment	After treatment
TNF-a (pkg/ml)	124,3±78,2	976,8±18,7*	417,5±80,6*	934,8±17,6*	264,4±38,2*
IL-1b (pkg/ml)	97,6±11,2	196,3±26,6*	160,2±47,3*	189,5±26,7*	128,3±36,2*
IL-4 (pkg/ml)	12,7±3,25	28,6±1,78*	17,7±3,2*	29,9±1,89*	20,3±7,77*

Note: Differences in indicators in groups are significant at $p < 0.05$ in relation to control data.

As a result of treatment in the saliva of patients, a decrease in the content of the leading pro-inflammatory cytokine TNF-a, which sharply increases during the disease, was noted.

At the end of treatment, patients showed a significant increase in the content of the leading anti-inflammatory cytokine - IL-4.

Based on the foregoing, it can be concluded that the development of hypertrophic gingivitis is accompanied by significant changes in the state of the immune mechanisms of protection of the oral cavity, manifested in local changes in the composition of gum blood cells, as well as in the content of immunoglobulins and cytokines in saliva [2.4.6.8].

These changes vary depending on the degree of periodontal damage and reflect the processes of local inflammation and activation of immune defense mechanisms (the predominance of polymorph nuclear and mononuclear leukocytes migrating into the focus in the cellular composition, increased activity of phagocytes in a spontaneous NBT test, an increase in the content of pro-inflammatory cytokines, primarily TNF -a and IL-1b, as well as cytokines with a support profile of the cellular (IF-

4) and humoral (IL-4) immune response. an indicator of the absorption activity of phagocytes, a reduced ability to activate oxygen-dependent metabolism in the induced NST-test).

Successful treatment of hypertrophic gingivitis is accompanied by normalization of the cell composition of the periodontal pocket (the predominance of epitheliocytes over leukocytes, a decrease in the number of degraded cells and changes in the manifestations of inflammation and the activity of local immunity mechanisms: an increase in the absorptive capacity of phagocytes and a decrease in their activity indicators in a spontaneous with an increase in an induced HBT test, a decrease in the content of pro-inflammatory cytokine with an increase in anti-inflammatory IL-4. At the same time, despite the positive clinical results of treatment, the studied indicators show a number of residual signs of the inflammatory process and the existing insufficiency of local immunity mechanisms. indicators of the absorption activity of phagocytes and increased activity - when setting NBT-tests, the content of TNF-a continues to be increased in comparison with the norm [1.3.5.6.7.9].

Thus, the effectiveness of local application of the drug "Traumeel S" is confirmed by the results of clinical and laboratory studies.

The study of the cellular composition of the periodontal pocket, the functional activity of phagocytes and the population composition of peripheral blood lymphocytes of the gums and the concentration of immunoglobulins and cytokines in saliva allow us to assess the degree of effectiveness of therapy in patients with varying severity of periodontal tissue damage.

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