EVALUATION OF THE EXPRESSION OF ORAL LIQUID BIOMARKERS IN DIAGNOSTICS OF CHRONIC PERIODONTITIS

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Introduction: Endogenous antimicrobial peptides (AMPs) and proteolytic enzymes, which are an important component of the innate immune system play important part in the modern concepts of the pathogenesis of inflammatory periodontal diseases [1].

The aim of the study was to determine the level of expression of oral fluid biomarkers (beta-1-defensin (HBD-1), alpha-defensins (HNP 1-3), DL-BAPNA amidase and elastase activity) and the possibility of their use in the diagnosis of chronic periodontitis.

Materials and methods: PI Silnes-Loe, SBI, PI Pussel, indexes were used to estimate the extent of inflammatory process in periodontal tissues, the state of oral hygiene, and also the depth of periodontal pockets.

To determine BAPNA-amidase and elastase activity, the level of beta and alpha defensins in the oral fluid, 89 people with chronic periodontitis (CP) and 25 people without periodontium pathology were included in the study.

Level of alpha and beta-1-defensins in the oral fluid was determined by ELISA with use of HUMAN HNP 1-3, ELISA Kit (Elabscience) and Human DEFb1, ELISA Kit (Houston, USA). Elastase activity in biological fluids was determined with modified Bailey J.’s method [2]. Determination of DL-BAPNA amidase activity in the oral fluid was carried out according to the procedure of O. Zharkova et al. [3].

Results. Patients with chronic periodontitis have significantly lower oral hygiene indices (PI Silnes-Loe index), high indicators characterizing the condition of periodontal tissues (SBI, PI Pussel, depth of the periodontal pocket) than in the control group.

When studying the level of beta-1-defensin in the oral fluid, the following results were obtained: the concentration of beta-1-defensin in the saliva in the control group was 2.48; 1.9-3.9 ng / ml, the indices in patients with CP before treatment 4.14; 3.4-5.3 ng / ml, and after - 3.4; 3.1-4.28 ng / ml.

When analyzing the level of alpha defensins (HNP 1-3), the following
results were obtained: the concentration of HNP 1-3 in the oral fluid in the control group was 358.9; 290.5-450.8 ng / ml, the indices in patients with CP before treatment, 2595.1; 1693.3-4732.7 ng / ml, and after - 703; 404-1122.2 ng / ml.

It was found that DL-BAPNA-amidase activity of oral fluid in patients with CP of mild severity on the day of treatment was 2.96; 2.58-3.56 pkat, average - 4.43; 3.45-6.22 pkat and heavy - 5.84; 3.4-8.93 pkat. In the control group this indicator was 2.6; 1.59-3.79 pkat. After treatment, the level of DL-BAPNA-amidase activity in patients with CP of mild severity was 2.95; 2.34-3.55 pkat, average - 3.1; 2.72-4 pkat, heavy - 3.79; 2.72-5.79 pkat.

Activity of oral fluid elastase in patients with CP of mild severity on the day of treatment was 0.0012; 0.00057-0.0028 pkat, average - 0.0079; 0.0033-0.015 pkat, heavy - 0.025; 0.0094-0.034 pkat. In the control group, the indicator was 0.0009; 0.0002 - 0.0013 pkat. After completion of the treatment, the activity of the oral fluid elastase in patients with CP of mild severity was 0.0011; 0.00027-0.002 pkat, average - 0.0012; 0.00053-0.0022 pkat, heavy - 0.0011; 0.00014-0.0064 pkat.

ROC analysis of the obtained data of DL-BAPNA-amidase and elastase activity was carried out. In all cases of using ROC analysis for DL-BAPNA-amidase activity, either low specificity or low sensitivity of the method was determined.

There was a positive correlation between dental indices (PI Silnes-Loe, SBI, PI Pussel, Depth of periodontal pockets) and DL-BAPNA-amidase and elastase activity of oral fluid. It has been established that BAPNA-amidase and elastase activity of the oral fluid was in the direct correlation with each other (r = 0.596, p <0.05). When studying the relationship between the level of beta-1-defensin and BAPNA-amidase and elastase activity of the oral fluid, a weak negative correlation was found: r = -0.25 and r = -0.237, p <0.05, respectively. In the analysis of the correlation of alpha defensins with DL-BAPNA-amidase and elastase activity of the oral fluid, a positive correlation was established (r = 0.54, p <0.05).

Conclusions and prospects for further research:

1. With the development of the inflammatory process in the periodontal tissues, a statistically significant (p <0.05) increase in the level of alpha and beta-1-defensins in the oral fluid occurs in comparison with the values of these parameters in the control group.
2. DL-BAPNA-amidase and elastase activity of the oral fluid increases with the development of CP. When the inflammatory process in periodontal tissues is eliminated, the activity of these enzymes was reduced to levels, typical in healthy individuals, which makes it possible to assess the degree of effectiveness of the treatment.

3. Significant (p <0.05) dependence of the level of DL-BAPNA-amidase and elastase activity of the oral liquid on the severity of CP progression was revealed. However, activity of elastase is more pronounced in CP than in DL-BAPNA-amidase, therefore, it is more rational to use elastase activity indices to diagnose and assess the severity of the course of the inflammatory process in CP. This criterion, in the absence of the possibility of taking blood for a general clinical blood test, can be used as an alternative.

4. Indices of activity of oral fluid elastase higher than 0.019 pkat characterize groups of patients with severe CP, and at these values above 0.0015, but below 0.019 - groups of patients with moderate severity of CP. Decrease in the elastase activity index in patients with a severe degree of more than 0.0065 pkat, and with an average degree of severity - more than 0.0016 pkat can be considered as criterion of recovery.

References:

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