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Evaluation of the Parameters of the Lipid Peroxidation and Blood System of Blood and Saliva in Patients with Diseases Mucous Membrane of the Oral Cavity and Periodontal Pathology of the Hepatobiliary System

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Abstract- The intensity of free-radical processes (SRP) and the activity of antioxidant systems (AOS) in the saliva and plasma of people with pathology of the pathobiliary system were studied. Significant shifts in the dynamics of the investigated parameters were observed in diseases of HBS, with more pronounced changes occurring in the saliva. The presence of the detected changes in the examined individuals in the plasma and in the saliva of the studied parameters testify to the advisability of studying saliva in diseases of HBS and the prospects of using saliva as an object for early diagnosis.

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Evaluation of the Parameters of the Lipid Peroxidation and Blood System of Blood and Saliva in Patients with Diseases Mucous Membrane of the Oral Cavity and Periodontal Pathology of the Hepatobiliary System

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Abstract- The intensity of free-radical processes (SRP) and the activity of antioxidant systems (AOS) in the saliva and plasma of people with pathology of the pathobiliary system were studied. Significant shifts in the dynamics of the investigated parameters were observed in diseases of HBS, with more pronounced changes occurring in the saliva. The presence of the detected changes in the examined individuals in the plasma and in the saliva of the studied parameters testify to the advisability of studying saliva in diseases of HBS and the prospects of using saliva as an object for early diagnosis.

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I. Introduction

The study of oral fluid in many clinical and biochemical indicators has advantages over routine methods of laboratory blood test obtained from the finger or from the vein, the use of oral liquid is safe, monitoring and use by patients for self-monitoring is possible.

Oral fluid provides the body with an external and internal environment [1,2,3,8]. The composition of oral fluid includes both organic and inorganic components of salivary glands, blood serum and tissues of the oral cavity. This makes it possible to study the exchange rates in the oral fluid during screening surveys (Noskov, 2008). Most researchers study the composition and properties of the oral fluid for various dental diseases. However, less attention is paid to changes in the biochemical parameters of the oral fluid in somatic diseases. In this regard, we had to get answers to the questions: does the biochemical composition of the oral fluid adequately reflect that in the blood serum of practically healthy individuals and whether pathology of the hepatobiliary system makes any changes to this relationship.

Gallstone disease (SCI) is a disease of the hepatobiliary system caused by a violation of cholesterol metabolism [4, 5]. The following factors can be attributed to the main factors of the risk of developing a CSW: genetic, demographic, dietary, and medical. As is known, certain changes in the internal environment and cell structures can serve as a signal for triggering a stress reaction in the body.

According to some authors, such a signal is the shift of pro-oxidant-antioxidant balance in the direction of activation of lipid peroxidation (LPO) in biological membranes and fluids [6,7,8,9,10,11]. Activation of LPO is a universal means of influencing a living system of a variety of extreme agents, and is the result of increased oxidative catabolism of complex organic structures. Thus, arose the concept of "oxidative stress", actively discussed in the literature.

To understand the development of free radical processes in the body and the functioning of antioxidant systems, the study of saliva as the most accessible for analysis of the body's biological fluid is promising. In saliva, a number of biologically active compounds have been discovered, including hormonal and mediator nature, which are regulators of the intensity of free radical processes and components of antioxidant systems, the biological role of which is largely unclear. Between saliva and blood plasma there is a close metabolic contact due to the exchange of many compounds. At the same time, the salivary glands possess a powerful own biosynthetic apparatus. We believed that the establishment of the relationship between the intensity of free radical processes and the activity of antioxidant systems in the blood and saliva will promote the wider use of saliva for their evaluation.

The purpose of this study is to assess the level of free radical oxidation (SRO) and the effectiveness of antioxidant systems (AOS) of saliva and blood of patients with diseases of the hepatobiliary system.

II. Material and Methods of Investigation

On the basis of the Department of Hospital Therapeutic Dentistry of the Tashkent State Dental

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Institute, we examined a group of patients with chronic recurrent aphthous stomatitis against the background of the pathology of the hepatobiliary system, namely chronic cholecystitis, consisting of 27 men and women aged 45 to 65 years. In the history of patients, pain in the right side was noted and ultrasonography of the study showed chronic cholecystitis. The second group consisted of 22 practically healthy people aged 25-40 years (control group).

Blood sampling was performed in the morning on an empty stomach by puncturing the ulnar vein with a needle with a wide light without a syringe, from which plasma was subsequently obtained. Saliva sampling was also performed in the morning before eating, having previously offered patients to rinse the oral cavity with a physiological solution.

Blood plasma and saliva of patients and donors were determined by the maintenance of malonicdialdehyde (MDA), catalase and a native smear of saliva. The MDA was determined by its reaction with thiobarbituric acid. The anti-radical system (AMA) includes both extracellular superoxide dismutase (SOD) and other components that eliminate the superoxide radical (steroids, catecholamines, arginine). The ASA was evaluated by the ability of the SOD to inhibit the reduction of nitrosinetetrazolium. The catalase activity was determined by the ability of hydrogen peroxide to form a colored complex with molybdenum salts. The total protein content was determined by Lowry. Due to a possible change in the water content of the saliva, the activity of the enzymes was calculated on the protein content.

The statistical processing of the results was carried out using Student's t-criterion on a computer with the use of a modern package of STATSOFT Statistica 6.0 statistical analysis.

III. Results and Discussion

At present, non-invasive methods of obtaining biological material acquire an increasing importance for diagnostics. In this regard, studies of various processes in saliva can be very promising for modern medicine and biochemical practice.

Cytological study of the native preparation in patients with the disease of the hepatobiliary system, prepared from the saliva of patients, showed a large number of flat epithelium (on average in 86% of individuals), which is associated with desquamation of the epithelium and its active regeneration. 12% of individuals in the native smear have a large number of leukocytes, apparently due to chronic inflammatory disease of the oral mucosa (chronic recurrent aphthous stomatitis) and periodontium(chronic generalized catarrhal gingivitis).

The analysis of the parameters of the LPO and AOS system in blood and saliva in the examined persons presented in Table 1 indicates an increased generation of active forms of oxygen (ROS) in saliva more pronounced than in blood plasma.

The primary molecular products of POL-DK are very unstable compounds that quickly transform into a more stable product, malonicdialdehyde (MDA), whose concentration in the blood plasma increases by 31%.In our opinion, lipid peroxidation in liver hepatocytes leads to accumulation of lipoproteins and inhibits the key enzyme of catabolism of cholesterol in the liver-microsomal 7a-hydroxylase, which disrupts the enzymatic regulation of cholesterol metabolism and leads to the maintenance of its stably high level in the blood. Under these conditions, hepatocytes can secrete very low-density lipoproteins (VLDL) into the bloodstream, including oxidized low-density lipoproteins (LDL), which undergo oxidative destruction with the formation of MDA.

The accumulation in the plasma of aldehydes - secondary products of LPO, can be evidence of enhanced generation of active forms of oxygen (ROS) and activation of LPO in the liver. Oxidative stress is developing - the most important universal pathogenetic mechanism of the course of many diseases. In this condition, AFCs are given a double blow to the focus of inflammation. On the one hand, AFC activates LPO, new AOCs are formed by the mechanism of the arachidonic cascade and MDA formed from arachidonic acid is accumulated MDA and the more toxic secondary product POL-4-hydroxynonenal exert their cytotoxic effect on the lipid layer of biomembranes, leading to a disruption of the bioenergetics of the cells, a decrease in plasticity and an increase in microviscosity, and inactivation of membrane enzymes. On the other hand, ROS (especially O^{2-} and NO) with significant cell damage can activate the nuclear protein P-53, stimulating apoptosis of the cell.

As can be seen from the results of the studies, the catalase activity based on the volume of biological fluids was significantly lower in saliva at the inverse ratio, expressed in units of activity per gram of protein. The level of SUA in saliva, both in terms of volume and per gram of protein, was significantly higher in saliva than in blood plasma. In the latter case, the indicator had a negative sign, which indicates additional generation of superoxide radicals in samples containing blood plasma in comparison with control variants in which biological material was absent. Since ASA is an integral indicator, its increase in saliva under emotional stress can occur due to the inclusion of one or more mechanisms: the biosynthesis reactions of antioxidant compounds that make up SAS directly in the salivary glands, the effect of catecholamines or glucocorticoids, and also through the exchange of ASA components between biological fluids.

Thus, as follows from our findings, with cholelithiasis (LCB), an increase in lipid peroxidation activity is observed with an increase in MDA in the

plasma and in the saliva of the patients being examined in comparison with donors. One of the real explanations of this phenomenon can be an increase in the activity of the main regulators of SRO - enzymatic and non-enzymatic antioxidants, their active work and powerful compensatory mechanisms of the body in healthy individuals. The main task of functioning of antioxidants is the maintenance of a certain balanced level of AFK, the homeostasis between pro- and antioxidant systems. A key role in the regulation of the level of ROS and, in particular, O2- and in the blood plasma is performed by an antioxidant defense enzyme-extracellular superoxide dismutase (SOD) and catalase.

Thus, the decrease in the activity of antioxidant enzymes detected by us indicates depletion of this system in the examined patients. In addition, depletion of the level of antioxidants can also be an indirect indicator of the activation of the inflammatory process, since the triggering of the generation of ROS and LPO products is the primary mediators of oxidative stress. The alternation of the processes of mutual enhancement and quenching (inflammation and activation of SRO, as well as inhibition of antioxidants) creates conditions for asymptomatic course of the CLS within 15-20 years before the first forced visit of the doctor.

Table 1: The Intensity of Free Radical Processes (SRP) and the Activity of the Antioxidant System (AOS) in the Blood Plasma and Saliva of Practically Healthy People and Patients with Heart Failure.

Investigated Indicators	Healthy Persons (Control) = 22		Patients with Chronic LCBn = 27 Cholecystitis	
	Plasma	Saliva	Plasma	Saliva
SUA U / g Protein	50,93 ± 9,51	5,35 ± 0,62	35,11± 2,84*	3,14 ± 0,21*
MDA, μm	3,74 ± 0,21	2.02 ± 0,14	4.91 ± 0,13*	2,68 ± 0.14*
Catalase, mM / g Protein	0,55 ± 0,02	0,041 ± 0,01	0,34 ± 0,07*	0,015 ± 0,02*

*Note: * The reliability of the differences P < 0.05*

The data obtained by us testify to the greater informativeness of the determination of the activity indices of SRP and antioxidant systems in saliva in comparison with blood plasma.

Taking into account the complex pathogenetic mechanism of the development of the FSW in the pathology of the hepatobiliary system, it seems to us necessary to carry out a rigorous analysis of clinical and biochemical indices, without neglecting the study of LPO intensity, as well as the level of antioxidants, while taking into account the basic mechanisms of their activation and finding out the reasons for this balancing pro-states and antioxidant systems.

Ultimately, it can help to establish a more accurate diagnosis and early detection of multiple complications of the CSF, not allowing critical states of the organism, when there is already a real threat to human health and life. The position on the protective role of antioxidant systems of saliva from active forms of oxygen and LPO for the mucous membrane of the oral cavity under pathological conditions of the organism is substantiated.

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