3. Summary

The production of ROS is inseparably connected with aerobic metabolism of all living beings. In physiological concentrations ROS act as mediators and regulators of numerous biochemical processes; however, the imbalance between the formation and disposal of ROS leads to the oxidation of important cell components (DNA, proteins, carbohydrates and lipids) and results in permanent structural and functional changes of many organs. This frequent process occurring in the human body is referred to as oxidative stress. It is believed to be one of the key factors leading to the progressive failure of salivary glands in the course of metabolic and autoimmune diseases, and is also responsible for the increased incidence of caries, periodontal disease and cancer.

Previous studies demonstrated that high-fat diet affects antioxidant systems of salivary glands, although it has not been shown whether it leads to oxidative stress in these organs.

It is assumed that similar pathological changes may result from excess protein in the diet. It is well known that chronic intake of large amounts of protein leads to increased oxidation of amino acids in the mitochondrial respiratory chain. This condition may lead not only to the raise in the production of ROS, but also RNS.

The influence of high-protein and high-fat diet on the secretory activity of parotid and submandibular glands, as well as the intensity of oxidative stress in the said salivary glands is unknown.

The performed research was aimed at assessing the parameters of oxidative stress as well as the secretory function of parotid and submandibular glands of rats fed high-protein and high-fat diet.

In both experiments, Wistar rats were divided into two groups: controls and rats fed high-fat diet in one experiment, and controls and rats fed high-protein diet in the other. After 8 weeks of the diet, the rate of unstimulated and stimulated salivation of rats from all groups was measured under phenobarbital anaesthesia. Then blood was collected from the abdominal aorta as well as submandibular and parotid glands. The salivary glands were homogenized, sonicated and centrifuged. The supernatant was preserved for further testing. The concentrations of the products of lipid peroxidation and oxidation of proteins and DNA and concentration of protein were determined in the supernatants and blood serum in the experiment involving high-fat diet, and in the high-protein diet experiment the concentrations

of selected elements of antioxidant defence were marked. The total antioxidant capacity, total oxidative status and oxidative stress index were calculated.

High-fat diet resulted in oxidative stress within salivary glands, with significantly higher intensity and a greater variety of oxidative modifications of cell elements recorded in parotid glands compared to submandibular glands. In the course of high-fat diet the salivary gland functioning was disturbed, as manifested by a significant reduction in stimulated salivary secretion. The reported lack of correlation between oxidative stress markers in blood serum and salivary glands has proven that oxidative damage in salivary glands of rats fed high-fat diet occurs irrespective of systemic oxidative stress.

High-protein diet resulted in oxidative stress within salivary glands, with significantly higher intensity and a greater variety of oxidative modifications of cell elements recorded in submandibular glands compared to parotid glands. Antioxidant systems of parotid glands have proven to be more effective in preventing oxidative modifications compared to antioxidant systems of submandibular glands of rats fed high-protein diet. In the course of the high-protein diet, the functioning of salivary glands was disturbed, as evidenced by significantly reduced secretion of unstimulated saliva. The lack of correlation between oxidative stress markers in blood serum and salivary glands has proven that oxidative damage in the salivary glands of rats fed high-protein diet occurs irrespective of systemic oxidative stress.