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THE ROLE OF OXIDATIVE STRESS AND ANTIOXIDANT DEFENCE SYSTEM IN PERIODONTITIS

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ABSTRACT

The prevalence of periodontal disease is very high in the adult population. According to research results, as much as 46% of the total population was affected by periodontal disease in the period from 2010 to 2012, which would mean that 64.7 million people had periodontitis, of which 8% had a severe form of this disease. Having in mind the clinical and socioeconomic significance of periodontitis, this review aims to present in a comprehensive way the pathogenetic aspects of periodontitis with a special emphasis on oxidative stress and antioxidant protection mechanisms as possible molecular mechanisms for the development of periodontitis in adults. Oxidation stress is involved in the progression of periodontitis as a chronic inflammatory disease of periodontium, which occurs as a result of imbalance between host response and bacterial infection. At the same time there is a decreased antioxidant activity and salivary gland capacity, which contributes to the further development of this disease. MDA is the most common lipid peroxidation derivative that occurs in periodontitis. All of the mentioned literature data suggest that the elevated MDA values may be due to both local and systemic oxidative stress as a response to inflammatory periodontal disease alone or in combination with other systemic disorders and smoking. The harmful effects of ROS during oxidative stress occur through lipid peroxidation processes and irreversible protein modification to cell apoptosis and programmed cell death. In addition to the two most important signal pathways, caspase pathway and NADPH oxidase-4 pathway, several other signaling pathways mediate in oxidative cell damage: PERK/NRF2 signal path, JNK / mitogen-activating pathway (MAP). When a clinically visible inflammatory process occurs in periodontium, this usually presents a condition that is more or less irreversible. In parodontology, therefore, the idea of introducing biochemical analyzes to diagnose the inflammatory process in parodontium is still open before it can be seen at the clinical level. For this reason, the significance of the role of oxidative stress, the antioxidant protection of the organism and the molecular mechanisms by which damage occurs is an indisputable importance. Assessment and measurement of biomarkers of oxidative stress and antioxidant enzymes can play a central role in monitoring biochemical indicators of parodontium state and even assist with various methods of treatment of periodontal disease.

Key words: *oxidative stress; antioxidants; periodontitis; lipid peroxidation; signal transduction.*

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