Salivary osteocalcin used as potential diagnostic marker in smoker's periodontal bone damage

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OSTEOCALCIN

Various components of saliva have been studied as biomarkers for periodontitis screening in the recent past. Periodontitis is an infectious illness of the periodontium in which a series of immune-inflammatory processes cause connective tissue and alveolar bone to deteriorate. Interleukins, prostaglandins, and C-Reactive Protein (CRP) are pro-inflammatory mediators that play an important part in the pathophysiology. Salivary metabolites in gingival tissue have been shown to have a role in endothelial damage and decreased vasodilation mediated by Endothelin (ET-1) and Nitric Oxide (NO), since ET-1 dysfunction limits NO synthase. Oral dysbiosis development is also connected to substances such as antioxidants and vitamin C, which entail complicated signaling mechanisms between the immune system and bone. Various cells and biological substances are involved, including osteoblasts, receptor activator of nuclear factor kappa B ligand, osteoprotegerin, osteoclasts, bone morphogenetic proteins, organic skeletal matrix resorption products, and inorganic skeletal matrix indicators. Osteoclasts have been shown to break down various bone components during periodontal disease, culminating in the destruction of type I collagen by enzymes such as Matrix Metalloproteinases (MMPs). Thus, cross-linked telopeptides, such as C-terminal type I collagen telopeptide (β-CTX), enter the circulation as stable pieces. Periodontal disease management methods include regenerative treatments employing bone transplants, stem cells for bone remodeling/repairing, and nanotechnology-based approaches.

Although several studies have been conducted to investigate various biomarkers such as Osteocalcin (OC), Osteonectin (ON), and the deoxypyridinoline-containing degradation fragment of the C-terminal telopeptide region of type I collagen, no conclusive results regarding the most appropriate biomarker of bone turnover in adults with periodontitis have been obtained. Our recent study found that the diagnostic accuracy of these biomarkers for screening alveolar bone loss owing to periodontitis varied. While some studies showed elevated levels of CTX in gingival crevicular fluid to be of potential diagnostic use in detecting periodontal disease with good accuracy, few others found CTX to be below the detection level in the majority of individuals.

OC is one of the most prevalent proteins in human bone, and it is synthesised by osteoblasts. Not only is OC linked to bone mineralization inhibition, but also to numerous aspects of cognition, insulin sensitivity, energy metabolism, and reproduction. It is an excellent predictor of alveolar bone loss in individuals with periodontal disease, osteoporosis, and postmenopausal women. Another biomarker linked to enhanced collagen turnover is 'Secreted Protein Acidic and Rich in Cysteine' (SPARC), which has been identified at high quantities in periodontitis patients with reduced bone loss. Most of these associations, however, are contradictory, since some researchers find higher levels of salivary OC, ON, and CTX in periodontal disease while others do not.

Cigarette smoking was believed to be approximately 12.2% among people in Saudi Arabia in 2005, but it climbed to 21.4% in 2018. Cigarette smoking is a major risk factor for periodontal disease and a major public health issue in the United Kingdom. Tobacco use has a number of negative consequences, including increased oxidative stress and decreased antioxidant defenses, increased inflammatory activity, and decreased host defensive systems, all of which impede tissue reparative capacity. The malfunction in the generation and expression of Reactive Oxygen Species (ROS), as well as the repair of the ensuing damage, is referred to as oxidative stress. These might be related to the negative effects of peroxides and free radicals, which damage proteins, lipids, and DNA. Although our research group recently revealed the application of salivary biomarkers for bone turnover in diagnosing patients with alveolar bone loss in diabetic patients, there is no evidence on the practicality of salivary biomarkers in detecting periodontal disease in smokers. The work was motivated by the fact that biomarkers for bone turnover differ in health and illness. As a result, the study's goal was to see if salivary biomarkers for bone turnover could be used to distinguish between healthy and periodontitis patients. The null hypothesis stated that there is no significant difference between bone turnover biomarkers in health and illness. As a result, the goal of this study was to investigate the amounts and diagnostic accuracy of salivary OC, ON, and CTX as possible indicators of periodontal bone loss in current adult smokers in order to better understand their potential role in periodontal disease. These biomarkers' correlation and diagnostic accuracy with Bleeding On Probing (BOP) were also investigated.

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