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Periodontitis among a group of Type 2 Diabetic Patients in Relation to Selected Salivary Biomarkers and Risk of Vascular Disease

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Abstract

Background: Patients with type 2 diabetes mellitus have higher risk of cardiovascular and periodontal disease. Also, an association between periodontal disease and higher incidence of cardiovascular disease has been reported. Oxidative stress, inflammation and adiponectin level have all been involved in development of cardiovascular disease and periodontal disease and several biomarkers have been suggested to have associations with both type 2 diabetes mellitus and cardiovascular disease.

Aim of study: to assess the association between periodontal health status and selected salivary biomarkers and the risk of vascular disease in type 2 diabetes mellitus patients

Materials and methods: One hundred type 2 diabetes mellitus and fifty apparently healthy males were enrolled in this study (aged 45-55 years). Measurements of vascular disease risk were conducted by using arterial stiffness index and ankle brachial index. Periodontal parameters in this study included gingival Index, probing pocket depth and clinical attachment level measurements. Unstimulated saliva samples were collected and salivary flow rates and pH values were recorded. To assess oxidative stress, measurements of salivary malondialdehyde as thiobarbituric acid-reactive substances, uric acid and total antioxidants capacity were done. To assess inflammatory status, salivary levels of highly sensitive C-reactive protein, sialic acid and nitric oxide were measured. To assess adipokines, salivary adiponectin level was measured.

Depending on arterial stiffness index, type 2 diabetes mellitus patients were categorized into two groups, group A(non-risky): type 2 diabetes mellitus patients with normal arterial stiffness index (without vascular

disease risk) and group B(risky): type 2 diabetes mellitus patients with abnormal arterial stiffness index (with vascular disease risk).

Type 2 diabetic patients with vascular disease risk (abnormal arterial stiffness index) were categorized into two groups according to a particular risk of peripheral arterial disease by using ankle brachial index, Group C: type 2 diabetes mellitus patients with normal ankle brachial index (without peripheral arterial disease risk) and Group D: type 2 diabetes mellitus patients with abnormal ankle brachial index (with peripheral arterial disease risk)

Results: Measurements of periodontal parameters among studied groups revealed that in group B(risky), they were higher compared to group A(non-risky) and differences reached statistical significance in many occasions.

Salivary flow rate and pH shows a highly significant increase in type 2 diabetic patients when compared to controls for both parameters ($P < 0.01$). On the other hand, salivary flow rate and pH mean values showed no statistical significant difference ($P > 0.05$) concerning the comparison of group A (non-risky) vs. group B(risky).

 Comparison of oxidative stress markers between group A and group B showed that salivary thiobarbituric acid-reactive substances and uric acid of group B were higher compared to group A and reached statistically highly significant elevation ($P < 0.01$). Mean value of total antioxidant capacity of group B showed a statistically highly significant decrease when compared to group A ($P < 0.01$).

Comparison of salivary inflammatory markers in this study showed higher mean values of highly sensitive C-reactive protein and sialic acid of group B(risky) when compared to group A(non-risky) and differences were statistically highly significant ($P < 0.01$) while mean values of nitric oxide level showed no significant difference ($P > 0.05$). Mean values of

adiponectin levels showed that the difference between group A(non-risky) and group B(risky) was statistically non-significant (P >0.05).

The area under the receiver operator characteristic (ROC) curve was used to discriminate between type 2 diabetes mellitus patients with and without vascular disease risk and showed that the area under the curve for salivary thiobarbituric acid-reactive substances, uric acid, total antioxidants capacity highly sensitive C-reactive protein and sialic acid were of high significance (P <0.01).

Correlations of salivary thiobarbituric acid-reactive substances, highly sensitive C-reactive protein, sialic acid and nitric oxide levels with gingival index, probing pocket depth and clinical attachment level were positive and reached statistical significance in many occasions while correlations of salivary uric acid, total antioxidant capacity and adiponectin levels with gingival index, probing pocket depth and clinical attachment level were negative and reached statistical significance in many occasions in type 2 diabetes mellitus patients with and without vascular disease risk and in controls. In current study, type 2 diabetes mellitus patients having risk of vascular disease, whether diagnosed by arterial stiffness index or ankle brachial index, showed no significant differences concerning periodontal status, oxidative stress, inflammatory markers and adiponectin level.

Conclusion: The increase in severity of periodontal disease, the higher levels of salivary thiobarbituric acid-reactive substances, uric acid, highly sensitive C-reactive protein and sialic acid and the lower salivary values of total antioxidant capacity could be used as indicators for an increased risk for vascular disease in type 2 diabetes mellitus patients.