Periodontitis among a Group of Type TwoDiabetic Patientsin Relation to Risk of Vascular Disease

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ABSTRACT

Background: Type two diabetic patients have higher risk of cardiovascular and periodontal disease. Furthermore, patients with more severe periodontal disease have higher incidence of cardiovascular disease. This study aimed to assess the association between periodontal health status and the risk of vascular disease in type 2 diabetic patients.
Materials and Methods: One hundred type 2 diabetes mellitus patients and fifty apparently healthy males were enrolled in this study. Oral examinations conducted were; plaque Index, calculus index, gingival index, probing pocket depth, and clinical attachment level. For the assessment of vascular risk, arterial stiffness index was used.
Results: According to arterial stiffness index, type 2 diabetic patients were categorized into two groups: Group A: type 2 diabetic patients without vascular disease risk. Group B: type 2 diabetic patients with vascular disease risk. The periodontal disease parameters including gingival index, probing pocket depth, and clinical attachment level were higher in healthy controls in comparison to diabetics and in group B in comparison to group A. The difference between group A vs. group B for probing pocket depth is of highly significant (P<0.01) and for clinical attachment level is statistically significant (P<0.05).
Conclusion: The increase in severity of periodontal disease can be used as an indicator for the increase of risk for vascular disease in type 2 diabetes patients.
Key words: Periodontal disease, type 2 diabetes mellitus, vascular risk. (J Bagh Coll Dentistry 2016; 28(2):115-118).

INTRODUCTION

Periodontitis is a common chronic inflammatory disease characterized by destruction of the supporting structures of the teeth (the periodontal ligament and alveolar bone). It is one of the most considerable health problems because periodontitis leads if not treated, in its terminal stages to loss of teeth [(1,2)].

Many studies have suggested a link between type 2 diabetes mellitus and increased risk of progressive periodontal destruction [(3-6)]. On the other hand, other studies reported an association between periodontal disease and cardiovascular disease and found a significant higher incidence of cardiovascular disease in subjects with periodontal disease compared to subjects without periodontal disease, or in subjects with more severe periodontitis compared to subjects with less severe periodontitis [(7-9)].

Type 2 diabetes patients have higher risk of cardiovascular disease compared with those without diabetes [(10)]. Arterial stiffness index (ASI) is a non-invasive and effective method for early detection of vascular disease. It is a test used to indicate the stiffness of the arteries and it describes a key aspect of cardiovascular health [(11,12)].

This study aims to provide knowledge about the risk of vascular disease in type 2 diabetic patients through studying periodontal health status as an indicator of risk for vascular disease.

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MATERIALS AND METHODS

One hundred type2 diabetes mellitus and fifty apparently healthy males were enrolled in this study recruited from National Diabetes Center, University of Al-Mustnasiriya, from January 2014 to February 2015. Type2 DM patients were on oral hypoglycemic drugs. Their age range was 45–55 years and duration of diabetes mellitus was 2-15years.

The exclusion criteria for the type 2 diabetic patients included: smokers, patients treated with insulin, patients with a concurrent acute illness or with a major liver, thyroid or other endocrine diseases, patients suffered an illness likely to prevent their involvement in the study such as the following clinical endpoints of vascular disease: Angina Pectoris, Myocardial infarction, Transient ischemic attack, Stroke.

The weight and height were taken to calculate body mass index (BMI) according to the following equation: BMI = weight (kg) ÷ [height (m)]².

The ASI was measured after training and supervision by a specialist physician in the National Diabetes Center, University of Al-Mustnasiriya by using an automated digital oscillometric device that is called commercially as (Vital vision) and which provides an indicator, the H-Value (Arterial Hardness Indicator) (figure 1), that quantifies the degree of arterial hardness depending on the variations in pulse wave amplitude obtained while measuring blood pressure[(13)].

Oral examinations included in this study were: Plaque Index of Silness and Loe [(14)], Calculus

index (according to calculus component of Periodontal Disease Index (PDI) which was introduced by Ramfjord[15], Gingival Index of Loe and Silness [16], Periodontal status was determined using measurements of Probing Pocket Depth (PPD), Gingival Recession and Clinical Attachment Level measurements (CAL) from six sites on each tooth (mesio- buccal, mid-buccal, disto-buccal, mesio- lingual, mid- lingual, disto-lingual).

Student's t- test used for the significance of differences of the quantitative data between two means and ANOVA test for more than two independent means and LSD was used to measure the precision of a variety of means between two mean values. A probability value $(P<0.05)$ was considered to be statistically significant and $(P<0.01)$ was considered to be statistically highly significant.

Pattern 1:

1 to 3 bars appear when the cardiovascular system is normal

Pattern 2:

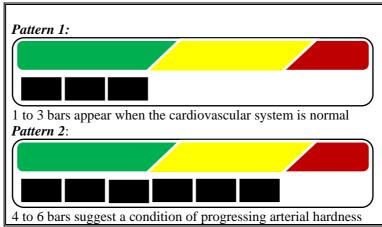4 to 6 bars suggest a condition of progressing arterial hardness

Figure 1: H-Value measurement result on the LCD Display of ASI measuring device

RESULTS

According to arterial stiffness index, type 2 diabetic patients were categorized into two groups:
- Group A: Type 2 diabetic patients with normal ASI (without vascular disease risk)
- Group B: Type 2 diabetic patients with abnormal ASI (with vascular disease risk)

The mean ages of group B patients were significantly greater than both group A and controls $(P<0.05)$. The mean values of BMI in study groups showed no statistical significant difference. The mean durations of diabetes in Group A and Group B appeared to have no statistical significant difference $(P>0.05)$ (Table 1).

Concerning oral cleanliness, this study showed that the mean values of plaque index and calculus index among groups and between each two groups were statistically non-significant $(P>0.05)$ (Table 2).

The mean values of gingival index showed that the differences between group A and group B vs. controls were significant $(P<0.05)$ and highly significant $(P<0.01)$ respectively. On the other hand, gingival index mean values showed no statistical significant difference $(P>0.05)$ concerning the comparison of group A vs. group B (Table 2).The mean values of probing pocket depth showed that the differences between group A and group B vs. controls were statistically highly significant $(P<0.01)$.In regard to CAL the mean values showed that the differences between group A and group B vs. controls were statistically highly significant $(P<0.01)$ and the difference between group A vs. group B was statistically significant $(P<0.05)$ (Table 2).

DISCUSSION

In this study, type 2 diabetic patients have significantly higher periodontal disease parameters including: gingival index, probing pocket depth, and clinical attachment level than healthy controls. This finding is in line with other studies which proved and confirmed that type 2 diabetes mellitus has been unequivocally considered as a major risk factor for periodontitis and the risk of progressive periodontal destruction in subjects with diabetes has been demonstrated in many studies in comparison with controls [3-6]. In contrast to above findings only few reports showed either no relation or weak significant relation between periodontal disease and type 2 diabetes [17,18].

In type 2 diabetics, it was found that the risk of cardiovascular disease mortality more than double compared with that in age-matched subjects [10], this makes the identification of type 2 diabetic patients with a higher risk to vascular disease is a priority need. In this study, type 2 diabetes

mellitus patients who were diagnosed by arterial stiffness index with higher vascular disease risk proved to have higher periodontal disease parameters including: gingival index, probing pocket depth, and clinical attachment level. These results are in compatible with various studies reported a relation between prevalence and severity of non-oral diabetes-related complications, including cardiovascular disease complications with the severity of periodontitis [19,20].

In conclusion, the increase in severity of periodontitis in type 2 DM patients is an indicator of risk for vascular disease, and these patients will be priority target for any preventive program conducted to protect them from vascular disease outcome leading to a decrease in morbidity and mortality of type 2 DM patients.

Table 1: Clinical characteristics of type 2 diabetic patients according to arterial stiffness index (ASI) in comparison with controls

Variables	Study groups			ANOVA-test		LSD-test P-value		
	Control Mean ±SD N=50	Group A Mean ±SD N=50	Group B Mean ±SD N=50	F-value	P-value	Control vs. Group A	Control vs. Group B	Group A Vs. Group B
Age (year)	50.6±3.50	50.42±3.70	51.88±3.72	3.50	0.033	0.62	0.014	0.047
BMI	27.97±4.59	28.81±5.23	28.59±2.25	0.52	0.593	0.326	0.465	0.800
				t-test P-value				
Duration of DM (year)		6.90±4.45	8.58±4.14	0.274				

Table 2: Clinical periodontal parameters of type 2 diabetic patients according to arterial stiffness index (ASI) in comparison with controls

Variables	Study groups			ANOVA-test		LSD-test P-value		
	Control Mean ±SD N=50	Group A Mean ±SD N=50	Group B Mean ±SD N=50	F-value	P-value	Control vs. Group A	Control Vs. Group B	Group A Vs. Group B
PLI	1.45±0.82	1.32±0.79	1.40±0.61	0.36	0.697	0.399	0.728	0.619
CI	0.87±0.54	0.99±0.61	1.02±0.43	1.18	0.310	0.262	0.144	0.732
GI	1.18±0.78	1.51±0.53	1.62±0.67	5.81	0.003	0.014	0.001	0.419
PPD	2.18±0.53	2.63±0.54	3.10±1.11	17.38	0.000	0.004	0.000	0.003
CAL	2.57±1.27	3.44±1.29	4.05±1.68	13.73	0.000	0.003	0.000	0.033

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