

## Assessment of Periodontal Diseases in Diabetic Patients

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### Abstract

**Background:** Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Periodontal disease is an inflammatory process that affects the protective and supportive tissues around the tooth. Presence of diabetes predisposes an individual for various pathological entities. Hence; the present study was planned for assessing presence of periodontal diseases among diabetic patients.

**Materials & methods:** A total of 200 diabetic patients were enrolled in the present study. Complete demographic and clinical data of all the patients was obtained. Also a total of 200 non-diabetic patients were enrolled of comparable age and gender. These subjects were included as control group. All the patients were recalled in the morning and thorough oral examination was carried out using mouth mirror, probe and tweezers. Periodontal pathologies were recorded in both the study groups.

**Results:** While analyzing statistically, it was seen that periodontal pathologies were more common among diabetic subjects. Among the diabetic group, mean duration of diabetes among patients with present of periodontal pathologies was 12.5 years while among patients without periodontal pathologies was 8.1 years. Significantly higher duration of diabetes was associated among diabetic patients with periodontal pathologies.

**Conclusion:** Diabetes has been associated to different periodontal pathologies. It should be kept in mind that the level of metabolic control and duration of diabetes appear to influence the risk for periodontal disease.

**Key words:** Pathologies, Periodontal, Diabetes

## Introduction

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Metabolic abnormalities in carbohydrates, lipids, and proteins result from the importance of insulin as an anabolic hormone. Low levels of insulin to achieve adequate response and/or insulin resistance of target tissues, mainly skeletal muscles, adipose tissue, and to a lesser extent, liver, at the level of insulin receptors, signal transduction system, and/or effector enzymes or genes are responsible for these metabolic abnormalities.<sup>1</sup>

The severity of symptoms is due to the type and duration of diabetes. Some of the diabetes patients are asymptomatic especially those with type 2 diabetes during the early years of the disease, others with marked hyperglycemia and especially in children with absolute insulin deficiency may suffer from polyuria, polydipsia, polyphagia, weight loss, and blurred vision. Uncontrolled diabetes may lead to stupor, coma and if not treated death, due to ketoacidosis or rare from nonketotic hyperosmolar syndrome.<sup>2,3</sup>

Periodontal disease is an inflammatory process that affects the protective and supportive tissues around the tooth. Bacterial plaque accumulation on the tooth surface leads to marginal tissue inflammation, known as gingivitis. If left untreated, gingivitis may progress to periodontitis, which is characterized by loss of periodontal attachment support (clinical attachment loss, [CAL]) and bone resorption, eventually resulting in tooth mobility and loss. Chronic periodontitis is a common disease characterized by a painless, slow progression. It may occur in most age groups, but is most prevalent among adults and seniors worldwide.<sup>4,5</sup>

Periodontal disease contributes significantly to the global burden of oral diseases and shares common risk factors with several chronic diseases. Recently, the World Health Organization (WHO) highlighted the importance of strengthening the control of periodontal disease worldwide. According to the WHO, chronic noncommunicable diseases, including cardiovascular diseases, cancer, chronic respiratory diseases and diabetes, remain the leading causes, about 70%, of death globally. In addition, periodontal disease is one of the most important oral diseases contributing to the global burden of chronic diseases and therefore represents a major public health problem.<sup>6-9</sup> Presence of diabetes predisposes an individual for various pathological entities. Hence; the present study was planned for assessing presence of periodontal diseases among diabetic patients.

## Materials & methods

The present study was conducted with the aim of assessing periodontal diseases among diabetic patients. A total of 200 diabetic patients were enrolled in the present study. Complete demographic and clinical data of all the patients was obtained. Diagnosis of diabetes was established based on criteria previously described in the literature.<sup>2</sup> Complete medical history of all the patients was recorded. Also a total of 200 non-diabetic patients were enrolled of comparable age and gender. These subjects were included as control group. All the patients were recalled in the morning and thorough oral examination was carried out using mouth mirror, probe and tweezers. Periodontal pathologies were recorded in both the study groups. Also correlation was assessed between duration of diabetes and presence of periodontal pathologies. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Chi-square test was used for evaluation of level of significance.

## Results

Among the diabetic patients, periodontal pathologies were seen in 47 percent of the patients while among non-diabetic patients, periodontal pathologies were seen in 23 percent of the patients. While analyzing statistically, it was seen that periodontal pathologies were more common among diabetic subjects. Among the diabetic group, mean duration of diabetes among patients with present of periodontal pathologies was 12.5 years while among patients without periodontal pathologies was 8.1 years. Significantly higher duration of diabetes was associated among diabetic patients with periodontal pathologies.

Table 1: Comparison of prevalence of periodontal pathologies among diabetic and non-diabetic patients

Periodontal pathologies	Diabetic group		Non-diabetic	
	Number	Percentage	Number	Percentage
Periodontal pockets	53	26.5	34	17
Periodontal Bone loss	35	17.5	23	12.5
History of periodontal abscess formation	24	12	10	5
Others	12	6	8	4
Absent	86	43	154	77
p- value	0.000 (Significant)			

Table 2: Correlation of duration of diabetes and periodontal pathologies

Periodontal pathology	Mean duration of diabetes	p- value
Present	12.5 years	0.001 (Significant)
Absent	8.1 years	

## Discussion

Periodontal diseases are collectively the most common diseases known to mankind. Their classification is complex and takes into account the clinical presentation, age at diagnosis, rate of disease progression, and systemic and local factors that may increase risk. Periodontal diseases include gingivitis (in which the inflammation is confined to the gingiva, and is reversible with good oral hygiene) and periodontitis (in which the inflammation extends and results in tissue destruction and alveolar bone resorption). Tissue destruction in periodontitis results in breakdown of the collagen fibres of the periodontal ligament, resulting in the formation of a periodontal pocket between the gingiva and the tooth. Diabetes has been unequivocally confirmed as a major risk factor for periodontitis. The risk of periodontitis is increased by approximately threefold in diabetic individuals compared with non-diabetic individuals. The level of glycaemic control is of key importance in determining increased risk. For example, in the US National Health and Nutrition Examination Survey (NHANES) III, adults with an HbA1c level of >9% had a significantly higher prevalence of severe periodontitis than those without diabetes (OR 2.90; 95% CI 1.40, 6.03) after controlling for age, ethnicity, education, sex and smoking.<sup>9- 12</sup>

In the present study, among the diabetic patients, periodontal pathologies were seen in 47 percent of the patients while among non-diabetic patients, periodontal pathologies were seen in 23 percent of the patients. While analyzing statistically, it was seen that periodontal pathologies were more common among diabetic subjects. Ummadisetty T et al assessed the levels of awareness about the mutual relationship between diabetes and periodontitis among high-risk age group of the general population. A structured, closed-ended questionnaire either in English or in local language (Telugu) was distributed and collected from 203 patients who were willing to participate in the study. Only 49.8% of the sample population knew about the mutual relationship between diabetes and periodontitis and only 46% of the diabetic study population was suggested to visit a dentist by the physician. There is an insufficient knowledge among the diabetic population regarding the mutual relationship. Only few physicians have suggested their diabetic patients to visit a dentist.<sup>10</sup>

In the present study, among the diabetic group, mean duration of diabetes among patients with present of periodontal pathologies was 12.5 years while among patients without periodontal pathologies was 8.1 years. Significantly higher duration of diabetes was associated among diabetic patients with periodontal pathologies. Baeza M et al evaluated the effect of scaling and root planing (SRP) on the metabolic control and systemic inflammation of patients with type 2 diabetes (T2D). A literature search was conducted using the MEDLINE database via PubMed and the Cochrane Central Register of Controlled Trials, from their oldest records up to July 2018. Only randomized clinical trials (RCT) were considered eligible for evaluating the effect of periodontal treatment on markers of metabolic control [glycated hemoglobin (HbA1C)] and systemic inflammation [C-reactive protein (CRP)] in patients with T2D. The quality of the studies was evaluated using the Cochrane Collaboration risk assessment tool. Meta-analyses were performed for HbA1c and CRP using random effects models. The size of the overall intervention effect was estimated by calculating the weighted average of the differences in means (DM) between the groups in each study. Heterogeneity was assessed using the Q-statistic method ( $\chi^2$  and  $I^2$ ). The level of significance was established at  $p < 0.05$ . Nine RCT were included. SRP was effective in reducing HbA1c [DM=0.56 (0.36-0.75);  $p < 0.01$ ] and CRP [DM=1.89 (1.70-2.08);  $p < 0.01$ ]. No heterogeneity was detected ( $I^2=0\%$ ,  $p > 0.05$ ) SRP has an impact on metabolic control and reduction of systemic inflammation of patients with T2D.<sup>13</sup>

## Conclusion

Diabetes has been associated to different periodontal pathologies. It should be kept in mind that the level of metabolic control and duration of diabetes appear to influence the risk for periodontal disease.

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