

## PREVALENCE OF PERIODONTITIS AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS

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### ABSTRACT

#### Background

Epidemiological data shows that diabetes is a major risk factor for periodontitis; susceptibility to periodontitis is increased by approximately threefold in people with diabetes. There is a clear relationship between degree of hyperglycemia and severity of periodontitis. Treatment of periodontitis is associated with HbA1c reductions of approximately 0.4%. Oral and periodontal health should be promoted as integral components of diabetes management. The present study was undertaken to determine the prevalence of periodontitis in type 2 diabetes.

#### Materials and Methods

Diagnosed Type 2 DM patients 18 years and above were recruited from the out-patient clinics of tertiary care center from February 2015 to January 2016. Periodontitis was evidenced by the presence of  $\geq 3$ mm probing depth and  $\geq 3$ mm periodontal attachment loss at the same site. Periodontitis severity was classified based on probing depth and furcation involvement. Glycemic control was assessed by laboratory assay for HbA1c grouped into well, moderately and poorly controlled.

#### Results

A total of 1200 subjects were analyzed. Prevalence of periodontitis among the Type 2 DM population studied was 84.5%. In this study, we found out that for those whose length of time since last dental check-up was  $>1$  year, the risk of having periodontitis is higher among subjects with poor glycemic control compared to those with well glycemic control.

#### Conclusions

People with poorly controlled diabetes must be considered at risk for periodontitis and people with diabetes should be informed of this risk.

**KEYWORDS:** Prevalence of Periodontitis among Patients with Type 2 Diabetes Mellitus

### INTRODUCTION

Periodontal disease is the most prevalent oral complication in Diabetics and has been labeled the "Sixth complication of Diabetes Mellitus"<sup>1</sup>. Periodontitis is defined as a chronic inflammatory disease of the supporting tissues of

the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession, or both, leading to tooth loss<sup>2</sup>.

High glucose levels and the accumulation of advanced glycation end products (AGEs) in the gingival tissue of individuals with diabetes are thought to be primarily responsible for oral and other complications of diabetes. Other pathophysiologic changes in diabetics that may predispose to periodontitis include reductions in leukocyte chemotaxis, phagocytosis, and bactericidal activity as well as reduced cellular immunity<sup>3</sup>.

Diabetic patients who do not maintain good oral hygiene or good metabolic control of their diabetes, those who are older, those with diabetes of long duration, or those with other complications of diabetes are particularly susceptible to periodontal diseases<sup>4</sup>. Those with poor control had more attachment loss and were more likely to exhibit recurrent disease.

Periodontitis is seen in both type 1 and type 2 diabetics. It will worsen the blood glucose control, and control of periodontal disease will improve the DM. Chronic gram-negative bacterial infections of periodontal tissues may reduce insulin-mediated glucose uptake by skeletal muscle and may produce whole-body insulin resistance. Effective treatment of periodontal disease was associated with a reduction in the level of glycated hemoglobin and a reduction in the level of AGEs in the serum, and control of periodontal infections may be an important part of the overall management of diabetic patients<sup>5,6</sup>.

Various national and international studies have shown both increased prevalence and severity of periodontal disease in patients with DM<sup>7,8,9,10,11</sup>.

Despite current knowledge on the relationship of these two diseases, information on the prevalence and extent of periodontitis and its association with glycemic control among Type 2 DM patients in this part of our country is lacking. Therefore the aim of this study was to determine the prevalence of periodontal disease in patients with type 2 DM and assess their severity in a single center in Vizag, Andhra Pradesh.

## METHODS AND MATERIALS

The present study was carried out in Gayatri Vidya Parishad Hospital, Vizag between February 2015 and January 2016. A sample population of 1200 patients (744 males and 456 females) satisfying the inclusion criteria were selected. The inclusion criteria were Type 2 Diabetes, presence of  $\geq 6$  teeth, and aged between 20 – 85 years. Patients with Type 1 Diabetes, those on prophylactic antibiotics, pregnant and lactating females were excluded from the study.

Diagnosis of Type 2 DM was based on the American Diabetes Association<sup>12</sup> criteria and clinical history as follows: 1) FBS  $\geq 126$ mg/dl on 2 determinations, 2) symptoms of hyperglycemia and RBS  $\geq 200$ mg/dl, 3) 2-hour plasma glucose  $\geq 200$ mg/dl after a 75 grams oral glucose tolerance test (performed as described by the World Health Organization), 4) on oral hypoglycemic agents.

An informed written consent was obtained from all the participants. All relevant history was obtained. The HbA1C levels were obtained from the laboratory reports. The depth of the periodontal pocket was assessed using a periodontal probe (William's probe). Based on the Glycated Hemoglobin values, the study group was divided into well, moderate and poorly controlled Diabetes as follows<sup>13</sup>:

- $<7\%$  - Well Controlled
- $7-8\%$  - Moderately Controlled

- >8% - Poorly Controlled

As proposed by the American Academy of Periodontology, patients with loss of tooth attachment by at least greater than 2mm were considered as having Periodontitis<sup>14</sup>. The individuals were classified according to severity of periodontitis using the following criteria<sup>15</sup>:

**Advanced periodontitis:** 1) two or more teeth (or 30% or more of the teeth examined) having  $\geq 5$ mm probing depth, or 2) four or more teeth (or 60% or more of the teeth examined) having  $\geq 4$ mm probing depth, or 3) one or more posterior teeth with grade II furcation involvement.

**Moderate Periodontitis:** 1) one or more teeth with  $\geq 5$ mm probing depth or 2) two or more teeth (or 30% or more of the teeth examined) having  $\geq 4$ mm probing depth, or 3) one or more posterior teeth with grade I furcation involvement and accompanied with  $\geq 3$ mm probing depth.

**Mild Periodontitis:** 1) one or more teeth with  $\geq 3$ mm probing depth or 2) one or more posterior teeth with grade I furcation involvement.

**No Periodontitis:** persons with 6 or more teeth present who did not fulfill any of the above criteria.

Categorical variables were summarized as percentages. MS Excel was used for the analysis.

## RESULTS

1217 diagnosed Type 2 DM patients consecutively seen at the out-patient department of General Medicine were screened for this study. Out of these patients, 17 were not enrolled because they have less than 6 teeth present.

Baseline characteristics of the 1200 subjects included in the study are presented in Table 1. The mean age of participants was  $56 \pm 12.4$  years SD, with age range of 20-83 years old. Majority of subjects (61.08%) belong to the 40-60 years age group. There were 537 (44.75%) female and 663 (55.25%) male participants. Six hundred fifty three patients (54.5%) had high school education or lower while 547 (45.5%) had some college education or higher. Frequency of tooth brushing of at least twice/day was noted in 387 (32.25%) subjects.

**Table 1: Baseline Characteristics of the Study Subjects**

Parameter		
Age	< 60	846 (70.5%)
	>60	354 (29.5%)
Sex	Male	663 (55.25%)
	Female	537 (44.75%)
Education	High school or low	547 (45.5%)
	College education or higher	653 (54.5%)
Oral hygiene habits	Tooth brushing at least 2x/day with or without dental flossing	387 (32.25%)
	Tooth brushing less than 2x/day with or without dental flossing	813 (67.75%)
Length of time since last dental check-up	< 1 year	392 (32.66%)
	> 1 year	808 (67.3%)
Number of teeth present (half-mouth count)	Mean $\pm$ SD	10.2 $\pm$ 2.7
Duration of Diabetes Mellitus	< 10 years	925 (77.08%)
	> 10 years	275 (22.86%)

Of the 1200 patients included in the study, 565 (47%) had poor glycaemic control, 427 (35.58%) had moderate glycaemic control and 208 (17.35%) had good glycaemic control.

A total of 1014 patients (84.5%) had periodontitis. Among the 565 with poorly controlled Diabetes, 559 (98.94%) had periodontitis. Of the 427 with moderately controlled Diabetes, 344 (80.56%) had periodontitis. Of the 208 with well controlled diabetes, 111 (33.37%) had Periodontitis.

Mild periodontitis was noted in 614 (51.12%) of the participants, moderate periodontitis was seen in 274 (22.86%), while 126 (10.5%) subjects had advanced periodontitis. (Refer Table 2)

**Table 2: Peridontitis According to Severity**

Severity of Peridontitis	No. of Patients
Normal	186 (15.5 %)
Mild	614 (51.2%)
Moderate	274 (22.8%)
Advanced	126 (10.5%)

Using Pearson chi square, we found a significant association with glycaemic control and periodontitis with p-value of 0.001. The odds of having periodontitis in patients with HbA1c  $\geq 7\%$  was 1.97 times greater compared to patients with HbA1c of  $<7\%$ .

The following variables found to be potential risk factors that may be associated with periodontitis: HbA1c  $\geq 7\%$ , younger age category (age  $< 60$  years), male gender, lower educational attainment (high school or less), longer length of time since last dental check-up ( $>1$  year) and shorter duration of DM ( $\leq 10$  years). Oral hygiene habits did not demonstrate statistically significant association with periodontitis. In this study, we found out that age is also a significant independent risk factor for the development of periodontitis among patients with Type 2 DM. as the age increases the chances of periodontitis also increases.

## DISCUSSIONS

The prevalence of diabetes is rapidly rising all over the globe at alarming rate. Type 2 diabetes mellitus is the commonest form of diabetes & its prevalence is 2.4% in rural population & 11.6% in urban population. The most disturbing trend is the shift in age of onset of diabetes to a younger age in recent years<sup>16</sup>.

Of our patients, 95.9% had some periodontal disease. The present study indeed shows that South Indian subjects with Type 2 Diabetes Mellitus have significantly increased prevalence of periodontitis. In a nationwide study among Finnish adults 30 years and older, 77% had pathologic pockets<sup>17</sup>. One study from Ninevah, Northern Iraq, showed that periodontal disease was seen in 87.5% of persons<sup>18</sup> and in the Eastern Mediterranean Region, in Lebanon, the prevalence of periodontal disease reaches as much as 94.5%<sup>19</sup>.

Furthermore, this increase seemed to be more with presence of other confounding factors, i.e., age, sex, education, blood glucose control, oral hygiene habits, and Length of time since last dental check-up. Duration of diabetes is also influences the prevalence of periodontitis. The education level of our patients was low and the oral hygiene was not very good.

Syrj and colleagues reported a 50% rate for brushing twice daily, daily interdental cleaning in 15%, and dental attendance at least annually in 54%<sup>20</sup>. Bartold and colleagues concluded that improved oral hygiene has little effect on the incidence of severe periodontal disease, and successful management of the disease relies on the continuous assessment of at-risk patients and regular, thorough sub gingival debridement<sup>21</sup>.

Numerous reports documenting that diabetes mellitus, especially poorly controlled is associated with significant periodontal disease and tooth loss<sup>22,23</sup>.

With pocket depth as a marker of periodontal disease in this study, periodontal disease was more common among the diabetics when compared with other disease. However, diabetes has been found to be significantly correlated with the number of lost teeth in various studies<sup>24,25</sup>. In Brazil, comparing the diabetic and the control groups as a whole, significance was observed for attachment loss<sup>26</sup>. In a large cross-sectional study, Grossi and colleagues showed that diabetic patients were twice as likely as no diabetic subjects to have attachment loss<sup>27</sup>.

Our study had its limitations. We used only pocket depth as a marker of disease, but attachment loss and number of missed teeth may correlate more with periodontal disease. Furthermore, it was a single-center experience and could not represent the whole population in South India.

Smoking was not taken into account in our study which is again a drawback of the present study because Smoking increases the risk of periodontal disease by nearly 10 times in diabetic patients<sup>28</sup>. Smoking may not only be associated with the development of periodontitis, but it may affect the successful outcome of periodontal treatment<sup>29</sup>.

Larger studies with pocket depth, attachment loss with radiologic evaluation for bone loss, are needed to assess the periodontal disease among diabetics, other systemic disease, and the general population.

## CONCLUSIONS

With increasing prevalence of type 2 diabetes in India, patients with diabetes should be screened for periodontitis and preventive oral health care should become part of the regular diabetes care for improvement of overall quality of life in these patients.

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