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Original Research Article

Periodontal disease status in the diabetic patients with different glycemic levels – A cross sectional study

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ABSTRACT

Background: Periodontitis is often associated with diabetes and might be considered one of the chronic complications of diabetes mellitus (DM), both in Type 1 (T1DM) and Type 2 (T2DM). This cross sectional study was designed to evaluate the possible association between clinical periodontal disease status and glycemic levels in diabetes patients (T2DM) among the population of city Hyderabad, INDIA.

Materials and Methods: A total of 200 individuals were examined and out of which 179 were enrolled fulfilling the selection criteria were initially given a health questionnaire to gather information regarding their demographic data, oral hygiene practices. Based on Fasting plasma glucose (FPG) levels, they were grouped into: Good, Moderately and Poorly controlled Type 2 Diabetic patients. Oral hygiene index-simplified, CPI and clinical attachment level (CAL), Tooth mobility and Tooth loss due to mobility were evaluated.

Results: Nearly Half the individuals have good glycemic control. (47.5% are <121mg/dl), 29.1% have moderately controlled (<121-180mg/dl), 23.5% have poorly controlled (<181-240mg/dl) plasma sugar levels. Average Patients showed 5-10 years of diabetic history with 121- 180mg/dl fasting plasma glucose (FPG) levels. Average participants had fair OHI-S scores. Patients with Good FPS levels showed fair oral hygiene status. Community periodontal index (CPI) scores showed (14.52%) Gingivitis, (20.11%) mild, (8.93%) moderate, (2.79%) severe periodontitis patients with good controlled FPS Levels. Average CAL values ranged between 3-5mm in good to moderately controlled FPS levels. Tooth mobility and tooth loss is less in over all participants.

Conclusion: Patients with high plasma sugar levels were more susceptible for severe periodontal disease. CPI values and mobility of teeth was less in subjects with FPG<126mg/dl. With Loss of attachment up to 5mm was observed. Both Periodontist and Diabetologist individually and together should improve awareness regarding periodontal health and diabetic control.

1. Introduction

In the past decade, periodontal disease has been recognized as not merely a local infectious disease, but as a chronic, subclinical, inflammatory disease for the host. Diabetic subjects appear to respond to bacterial challenge in an exaggerated manner as compared with non-diabetic subjects through several possible mechanisms and develop more severe forms of inflammatory periodontal disease. Severe periodontal disease in such subjects, in turn, acts to reduce

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insulin sensitivity known as insulin resistance, thereby contributing to the induction of hyperglycemia as well as hyperinsulinemia.[1] The relationship between periodontitis and Diabetes Mellitus (DM) is bidirectional; DM increases the risk and severity of periodontitis.[2,3] In 2000, India (31.7 million) topped the world with the maximum number of people with diabetes mellitus followed by China (20.8 million) and United States (17.7 million) in the second and third place, respectively.[4] Periodontitis is responsible for increasing insulin resistance and poor glycemic control,[5] thus worsening the condition of diabetics, and conversely, improvement in glycemic control has been advocated in several studies after periodontal therapy.[6,7] Consequently, recording prevalence and severity of periodontitis in diabetic patients is need of the hour. Therefore, the primary objective of the study was to determine the correlation between severity of periodontal destruction, oral hygiene, and glycemic status in T2DM patients of Hyderabad. (Telangana, India).

2. Materials and Methods

This cross-sectional study was conducted on patients who were regularly attending the Endocrine and Diabetic center, Hyderabad. Informed consent was obtained from the patients, and the study was conducted following the Helsinki Declaration of 1975, as revised in 2013. The duration of study was 3 months. Patients, within the age group of 30–65 years, have been diagnosed as T2DM for at least 2 years based on criteria given by the WHO[8,9] with a minimum of 20 teeth were included in this study. Patients with known systemic diseases and conditions, pregnant and lactating mothers, patients with an acute condition that contraindicates a periodontal examination, patients who received systemic antibiotic therapy in past 6 months, patients who received periodontal therapy (scaling and root planing or flap surgery) within the year were excluded from the study. In this study, 179 T2DM patients were selected, based on the above mentioned inclusion and exclusion criteria. Diabetic status of the study group was obtained from the hospital records with consent from the patients. Based on fasting plasma glucose (FPG) levels, they were grouped into: Good, Moderate, Poorly controlled Diabetic patients**.** Patients were evaluated using a detailed questionnaire about their socio demographic characteristics, medical history, oral hygiene practice, history of DM and drug allergy. The oral and periodontal examination included Oral hygiene index-Simplified (OHI-S).[10] Severity and degree of periodontal disease (Gingivitis, Periodontitis) individuals were assessed, according to WHO-recommendation, by the CPI (Community Periodontal Index)[8] taking three basic features: Bleeding, Dental calculus, and Periodontal pocket depth (PPD). Clinical examination was done with a Community Periodontal Index (CPI) probe. 109 Male and 70 Female subjects aged between 30-65 years subjects were assessed for clinical periodontal status, clinical attachment level (CAL), Tooth mobility and Tooth loss due to mobility.

2.1. Statistical analysis

Mean ± SD was calculated for quantitative variables, and frequency was calculated for qualitative variables. An independent t-test was used to compare the quantitative variables between THREE GROUPS. Quantitative data (CPI, CAL, OHI-S, Fasting plasma glucose (FPG)) between groups were analyzed by analysis of variance. The $\chi 2$ test analyzed qualitative data such as gender, socioeconomic status, and the proportion and severity of periodontitis. Correlation between OHI-S and FPG levels, CAL and FPG levels was done by Pearson correlation test.

3. Results

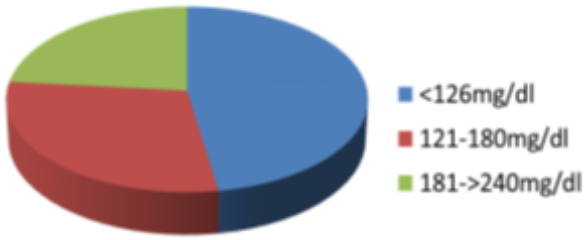

Fig. 1:

3.1. Distribution of diabetic patients

3.1.1. OHI and FPG levels

Figure 2 illustrates the association between OHI-S scores and blood FPG levels. Better scores of OHI were seen in participants with normal sugar level followed by moderately controlled diabetics and poorly controlled diabetic populations.

3.1.2. CPI and FPG levels

Table 1 shows Participants with normal FPG levels showed low CPI scores stating that normal FPG levels are appreciable. Poorly controlled Diabetic group on the other hand show HIGH CPI scores in all three categories stating that high FPG levels are not ideal.

3.1.3. CAL and FPG levels

Figure 3 illustrates more number of participants have loss of attachment <3mm. Participants with good controlled FPG levels showed least CAL scores. In all three categories stating that normal FPG levels are appreciable. Poorly controlled Diabetic people on the other hand show more loss

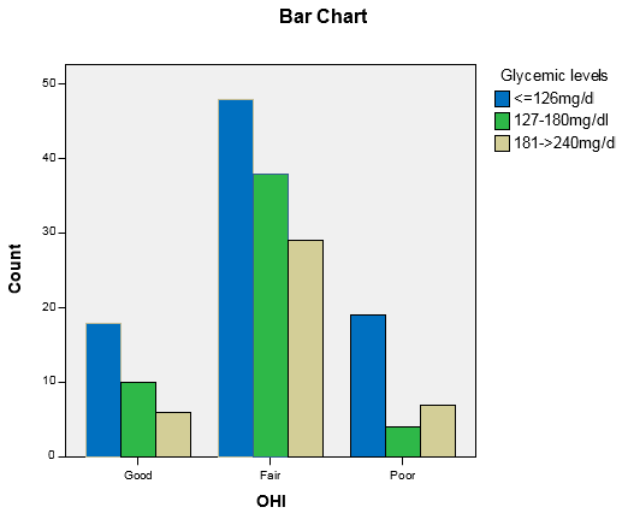

Fig. 2:

Table 1:

Periodontal disease	<126mg/dl	127>180mg/dl	180->240mg/dl
Gingivitis	5.58%	11.73%	14.52%
Mild periodontitis	12.84%	12.84%	20.11%
Moderate periodontitis	5.02%	3.55%	8.93%
Severe periodontitis	0%	1.11%	2.79%

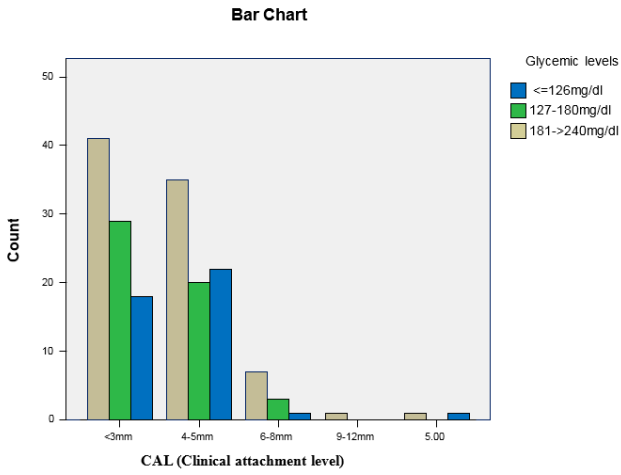

Fig. 3:

of attachment in all three categories stating that high FPG levels are not ideal.

3.1.4. Mobility and FPG levels

Figure 4 illustrates increased absence of tooth mobility in participants with normal FPG levels. Participants with higher FPG levels show more tooth mobility as compared to normal FPG level participants indicating the role of FPG as a causative factor for tooth mobility.

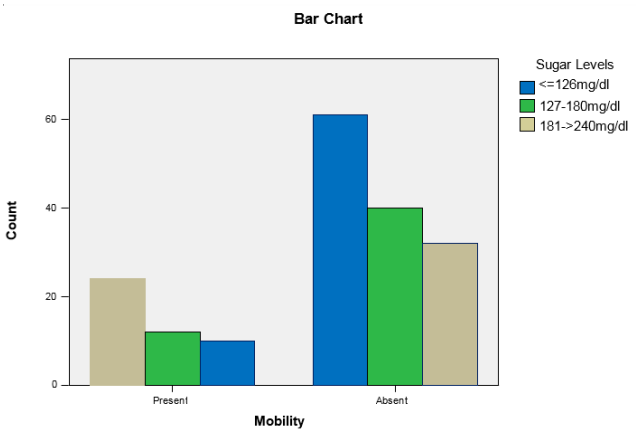

Fig. 4:

3.1.5. Tooth loss and FPG levels

Very similar depiction has been seen in Figure 5 that illustrates an increased absence of tooth loss in participants with normal FPG levels.

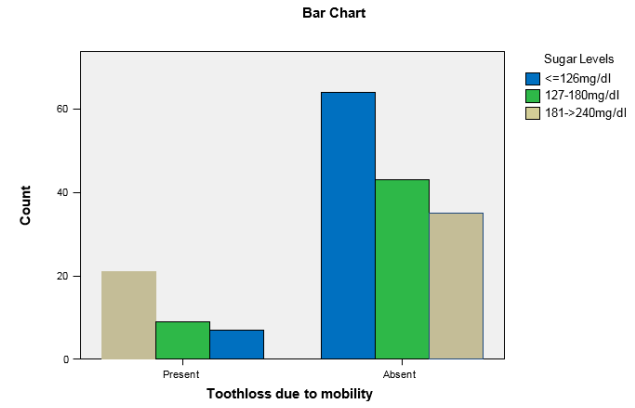

Fig. 5:

4. Discussion

Dentists have long been aware about the importance of diagnosis of Diabetes in their patients. Impairment of glycemic control in Diabetic patients can cause a decline in polymorphonucleate leukocytes activity. It can also damage

the micro vascular endothelium which as a result can cause periodontal disease.[9] Diabetic patients with severe periodontitis have six times poor glycemic control than patients with healthy periodontium.[10] However, improved glycemic control has been postulated to reduce the severity of periodontal disease.[11]

The present study was aimed to see the severity of periodontal status in Type 2 diabetics of Hyderabad (Telangana, India) region. Periodontal examination was done by a single examiner to eliminate the inter-examiner variability. After periodontal examination of patients, appropriate periodontal treatment was advised. In the present study, 47.5% have <121mg/dl, 29.1% have <121-180mg/dl, 23.5% have <181mg/dl FPG levels. This may suggest good periodic FPG levels. Most of the patients participated in the study are of 5-10years diabetic history and OHI-S scores of the average patients were fair with normal FPG levels.[12] Better scores of OHI were seen in participants with normal sugar levels followed by moderately controlled diabetics and poorly controlled diabetic populations. Similar to the present study, Ueno et al.[13] also reported the highest proportion of normal sugar participants with fair oral hygiene. Similar results were also reported in an epidemiologic study.[14] Periodontal disease status (Table 1) shows (14.52%) Gingivitis, (20.11%) mild periodontitis, (8.93%) moderate periodontitis, (2.79%) severe periodontitis patients with poor controlled FPS Levels. Increased periodontal destruction were seen with elevated plasma glucose levels compared to study done in the year 1999.[15]

Participants with normal FPG levels showed highest CPI scores in all three categories stating that normal FPG levels are appreciable. Poorly controlled Diabetic group on the other hand show least CPI scores in all three categories stating that high FPG levels are not ideal. As in the present study, Kumar et al[16] also reported periodontitis among diabetic participants in Bareilly region. Similar results were reported in the trial of Mansour and Abd-Al-Sada[17] and Zhang et al[18] who reported high levels of periodontitis in type 2 diabetic populations, Participants with normal FPG levels showed least CAL (<3mm) scores. Poorly controlled Diabetic people on the other hand show more loss of attachment, Awartani[19] also showed higher mean CAL for poor glycemic control.

Mobility and FPG levels: Figure: 4 illustrates increased absence of tooth mobility in participants with normal FPG levels. Participants with higher FPG levels show more tooth mobility as compared to normal FPG level participants indicating the role of FPG as a causative factor for tooth mobility.

Tooth loss and FPG levels: Very similar depiction has been seen in Figure 5, that illustrates an increased absence of tooth loss in participants with normal FPG levels. Study recruits with higher FPG levels show more tooth loss as compared to good controlled diabetic and moderately controlled diabetics, indicating high FPG levels to be a associative factor for tooth loss.

4.1. Clinical significance

Results of the present study drew attention on the periodontal status of diabetes in population. Early diagnosis and prevention are of fundamental importance to avoid the irreversible tissue destruction that occurs in periodontitis. Periodontal therapy in patients with diabetes is associated with improvement in glycemic control that may be clinically relevant in the management of Diabetes. Oral health should be promoted in people with Diabetes as an integral component of their overall Diabetes management. Closer collaboration between medical and dental clinical teams is necessary for the management of people with diabetes and periodontitis.

5. Conclusion

This cross-sectional study examined 179 diabetic patients and revealed that more than 95 % of total T2DM patients finally recruited had some periodontal destruction. Therefore, their periodontal management should be an important part of diabetic patient management protocol. Severity of periodontitis reported in T2DM participants is strongly associated with worsening of glycemic control. These results may act as baseline alarming signs to promote the collaborative integrated management of diabetes for reducing its burden on population.

6. Conflict of Interest

None.

7. Source of Funding

None.

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