

Assessment of Periodontal Health Status Among Known Diabetic Population Group: An Observational Study

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ABSTRACT

Background: Periodontitis is characterized by the destruction of connective tissue and dental bone support following an inflammatory host response secondary to infection by periodontal bacteria. The present study was conducted to assess the periodontal health status among known diabetic population group.

Material and methods: This observational study was performed to assess the periodontal health status among known diabetic population group over a period of 6 months. The sample size was 240 diabetic patients. Complete medical and dental history was taken. Careful oral examination was carried out under all aseptic precautions using a mouth mirror and a World Health Organization (WHO) CPI probe to calculate community periodontal index (CPI) to assess the Periodontal Status of a study population. Analyses were performed on SPSS software, window version 17.0 (Chicago, Inc., USA). $P < 0.05$ was considered statistically significant.

Results: In the present study a total 240 diabetes mellitus patients were selected. Females (56.25%) were affected more than males with diabetes. Maximum males (44.76%) and females (41.48%) of age group 41-50yrs. Out of 240 patients, 20 patients had healthy periodontal condition, 23 had gingival bleeding on probing, 57 had supra or sub gingival calculus, 96 had pathological pocket of 4-5 mm and 44 had pathological pocket of 6mm deep or more. CPI score 2 and 3 was maximum in diabetic patients of age group 41-50 yrs and CPI score 4 was maximum in diabetic patients of age group 51-60 yrs. CPI score 2 and 3 was maximum in females and CPI score 4 was equal in both males and females.

Conclusion: The present was concluded that females were affected more than males with diabetes. Maximum males and females were of age group 41-50yrs. CPI score 2 and 3 was maximum in diabetic patients of age group 41-50 yrs and CPI score 4 was maximum in diabetic patients of age group 51-60 yrs. CPI score 2 and 3 was maximum in females and CPI score 4 was equal in both males and females.

Keywords: Periodontal condition, gingival bleeding on probing, calculus, pathological pocket CPI score.

INTRODUCTION

Diabetes is a chronic metabolic disorder causing hyperglycemia which leads to long-term damage of different organs including the heart, eyes, kidneys, nerves, and vascular system including periodontium. Its chronic nature imposes

significant increase in morbidity and mortality rates.¹ In 2000, India (31.7 million) topped the world with the maximum number of people with diabetes mellitus followed by China (20.8 million) with the United States (17.7 million) in the second

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and third place, respectively.² Periodontitis is the most common oral infection in humans and is the major cause of tooth loss in adults. It has been considered as the sixth complication of diabetes due to its signs and symptoms.¹ Periodontitis refers to an inflammatory condition of the soft tissues surrounding the teeth (i.e., gingivitis) and the destruction of the supporting structures of the teeth, including the periodontal ligament, bone, cementum, and soft tissues (i.e., periodontitis).^{3,4} Microorganisms present in the dental plaque are the main etiologic factors responsible for initiation and progression of periodontal diseases.⁵ Various risk factors are associated with periodontal disease which can be either modifiable and nonmodifiable. These include microorganisms, tobacco smoking, diabetes mellitus, cardiovascular disease, drug-induced disorders, stress, obesity, haematological disorders, host response, pregnancy, female hormonal alterations, and osteoporosis.⁶ The relationship between periodontal diseases and diabetes has become a recent focus of attention among health-care professionals because of substantial evidence supporting two-way relationship with diabetes; diabetes mellitus (DM) increases the risk of periodontitis and the periodontal inflammation negatively affecting glycemic control.⁷ The present study was conducted to assess the periodontal health status among known diabetic population group.

MATERIAL AND METHODS

This observational study was performed to assess the periodontal health status among known diabetic population group over a period of 6 months. The sample size was 240 diabetic patients. Before the commencement of the study ethical clearance was taken from the Ethical Committee of the institute and informed consent was obtained from the patients after explaining the potential risks, and benefits of their participation in the study. Patients, within the age group of 30–60 years, who have been diagnosed as T2DM with random blood sugar level ≥ 200 mg/dl, fasting plasma glucose ≥ 126 mg/dl, and 2-h postprandial glucose ≥ 200 mg/dl), non-smoker, non-alcoholic, nonpregnant, and nonlactating must not be suffering from any disease other than T2DM were including the study. Patients taking any medication other than hypoglycaemic agents, Females who were pregnant, lactating, and postmenopausal, Patients who have undergone

periodontal treatment over the preceding 6 months, Based on clinical examination (tender on percussion/grossly decayed with pulp exposure), participants with suspected periapical pathology, orthodontic appliances, and multiple systemic complications of diabetes mellitus were excluded from the study. Complete medical and dental history was taken. A careful oral examination was carried out under all aseptic precautions using a mouth mirror and a World Health Organization (WHO) CPI probe to calculate community periodontal index (CPI) to assess the Periodontal Status of a study population. The entire oral cavity was divided into six sextants; 18- 14, 13-23, 24-28, 38-34, 33-43 and 44-48. CPI Score recording was done on index teeth with tooth number 17- 16, 11, 26-26, 36-37, 31, 46-47. A sextant was only examined if two or more teeth were present. CPI Probe was used as a sensing instrument to determine pocket depth, bleeding on probing and calculus. The Probe tip was inserted gently into the gingival sulcus on the distobuccal surfaces of the indexed teeth and gentle walking of the probe in short upward and downward movements was done till the margins to the mesiobuccal surface of the index teeth readings were recorded using community periodontal index (CPI) scoring system from code 0 to code 4. (code 0: healthy periodontal condition; code 1: gingival bleeding on probing; code 2: supra or sub gingival calculus and/or overhanging of fillings or crown; code 3: pathological pocket of 4-5 mm; code 4: pathological pocket of 6mm deep or more; code X: the index cannot be recorded. For an individual the most severe score recorded amongst the 6 sextants was taken as the final CPI score.⁷ Analyses were performed on SPSS software, window version 17.0 (Chicago, Inc., USA). Quantitative data were summarized as mean $\pm$ standard, comparison was done by independent Student's *t*-test and by Chi-square test. $P < 0.05$ was considered statistically significant.

RESULTS

In the present study a total 240 diabetes mellitus patients were selected. Females (56.25%) were affected more than males with diabetes. Maximum males (44.76%) and females (41.48%) were of age group 41-50 yrs. Out of 240 patients, 20 patients had healthy periodontal condition, 23 had gingival bleeding on probing, 57 had supra or sub gingival calculus, 96 had pathological pocket of 4-5 mm and

44 had pathological pocket of 6mm deep or more. CPI score 2 and 3 was maximum in diabetic patients of age group 41-50 yrs and CPI score 4 was maximum in diabetic patients of age group 51-60 yrs. CPI score 2 and 3 was maximum in females and CPI score 4 was equal in both males and females.

Table 1: Distribution of diabetes population group according to age and gender

Age groups(yrs)	Male n(%)	Female n(%)	Total n(%)
30-40	24(22.85%)	35(25.92%)	59(24.58%)
41-50	47(44.76%)	56(41.48%)	103(42.91%)
51-60	34(32.38%)	44(32.59%)	78(32.5%)
Total	105(43.75%)	135(56.25%)	240(100%)

Table 2: Prevalence of periodontitis (periodontal disease) according to age group among diabetes population group.

Age group (yrs)	CPI score 0	CPI score 1	CPI score 2	CPI score 3	CPI score 4
30-40(n=59)	9	8	22	13	7
41-50 (n=103)	9	11	24	49	10
51-60(78)	2	4	11	34	27
Total(240)	20	23	57	96	44

Table 3: Prevalence of periodontitis (periodontal disease) according to gender among diabetes population group.

Gender	CPI score 0	CPI score 1	CPI score 2	CPI score 3	CPI score 4
Males (n=105)	7	11	23	42	22
Females(n=135)	13	12	34	54	22
Total (n=240)	20	23	57	96	44

DISCUSSION

The greatest increase in prevalence of DM is occurring in low- and middle-income countries⁸ including Asia and Africa, affecting majority of its population by 2030.⁹ In a review on relationship between diabetes and periodontal infection, the authors have concluded that periodontal disease is more prevalent and severe in diabetic than in healthy subjects and the level of metabolic control and duration of diabetes appear to influence the risk for periodontal disease, with a significant heterogeneity among diabetics.¹⁰

Accumulation of dental plaque and calculus is usually caused by improper toothbrushing techniques, failure to carry out interdental cleaning and irregular dental visits. This accumulation probably results in gingival inflammation. Faulty tooth brushing techniques, improper use of oral hygiene aids involving excessive pressure may not efficiently or effectively remove plaque but also considerably increase gingival recession and loss of tooth substance by mechanical abrasion.¹¹

In the present study a total 240 diabetes mellitus patients were selected. Females (56.25%) were affected more than males with diabetes. Maximum males (44.76%) and females (41.48%) were of age group 41-50 yrs. Out of 240 patients, 20 patients had healthy periodontal condition, 23 had gingival bleeding on probing, 57 had supra or sub gingival calculus, 96 had pathological pocket of 4-5 mm and 44 had pathological pocket of 6mm deep or more. CPI score 2 and 3 was maximum in diabetic patients of age group 41-50 yrs and CPI score 4 was maximum in diabetic patients of age group 51-60 yrs. CPI score 2 and 3 was maximum in females and CPI score 4 was equal in both males and females.

Kumar *et al* also reported prevalence of periodontitis 91.7% among diabetic participants in Bareilly region.¹³

Similar results were reported in the trial of Mansour and Abd-Al-Sada¹⁴ and Zhang *et al*.¹⁵ who reported prevalence of 95.9% and 96.7% of periodontitis in type 2 diabetic populations, respectively.

Taylor *et al* described that diabetic subjects had 4 times more risk for severe alveolar bone loss.¹⁶

A study conducted by RG Nelson in 1990 on 2273 pima Indians aged 15 years and above from Gila river Indian community in USA which concluded that the rate of PD in study participants with non insulin dependent diabetes is 2.6 times (95%, CI, 1.0-6.6, controlled for age and sex) against healthy controls.¹⁷

Schulze *et al* investigated gender dependent differences by the comparison of periodontal status and oral hygiene between diabetic and non-diabetic 517 patients and concluded that periodontitis was more severe in males than in females, with exception of patients using insulin.¹⁸

Grossi et al in 1994 conducted a study to compare the response of periodontal therapy in diabetic and nondiabetic subjects, according to them, age was the single most important factor most associated with severity of attachment loss.¹⁹

CONCLUSION

The present was concluded that females were affected more than males with diabetes. Maximum males and females were of age group 41-50yrs. CPI score 2 and 3 was maximum in diabetic patients of age group 41-50 yrs and CPI score 4 was maximum in diabetic patients of age group 51-60 yrs. CPI score 2 and 3 was maximum in females and CPI score 4 was equal in both males and females.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Loe H. Periodontal disease. The sixth complication of diabetes mellitus. *Diabetes Care*. 1993;16:329-34.
2. Kaveeshwar SA, Cornwall J. The current state of diabetes mellitus in India. *Australas Med J* 2014;7:45-8.
3. Position paper: epidemiology of periodontal diseases. American Academy of Periodontology. *J Periodontol*.1996; 67: 935-945.
4. Kinane DF (2001) Causation and pathogenesis of periodontal disease. *Periodontol* 2000 25: 8-20.
5. Zambon JJ. Periodontal diseases: Microbial factors. *Ann Periodontol* 1996;1:879-925.
6. AlJehani YA. Risk factors of periodontal disease: Review of the literature. *Int J Dent*. 2014;2014:182513.
7. Oral health surveys basic method, World Health Organization. Available at <https://apps.who.int/iris/handle/10665/41905>.
8. World Health Organization. Global Report on Diabetes. Geneva: World Health Organization; 2016.
9. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care*. 2004;27:1047-53.
10. Llambés F, Arias-Herrera S, Caffesse R. Relationship between diabetes and periodontal infection. *World J Diabetes*. 2015;6:927-35.
11. Kumar A, Pandey MK, Singh A, Mittra P, Kumar P. Prevalence and severity of periodontal disease in type 2 diabetes mellitus of Bareilly region (India). *Int J Med Sci Public Health* 2013;2:77-83.
12. Bizhang M, Schmidt I, Chun Y-HP, Zimmer S. Tooth brush abrasivity in long term stimulation on human dentin depends on brushing mode and bristle arrangement. *PLoS ONE* 2017; 12 (2); e0172060.
13. Kumar A, Pandey MK, Singh A, Mittra P, Kumar P. Prevalence and severity of periodontal disease in type 2 diabetes mellitus of Bareilly region (India). *Int J Med Sci Public Health* 2013;2:77-83.
14. Mansour AA, Abd-Al-Sada N. Periodontal disease among diabetics in Iraq. *MedGenMed* 2005;7:2.
15. Zhang JQ, Pan YP, Ma L, Tan LS, Liu JB, Wei JJ, et al. A survey on the periodontal status in type 2 diabetic patients. *Zhonghua Kou Qiang Yi Xue Za Zhi* 2009;44:668-71.
16. Taylor GW, Burt BA, Becker MP, Genco RJ, Shlossman M, Knowler WC, et al. Non-insulin dependent diabetes mellitus and alveolar bone loss progression over 2 years. *J Periodontol*. 1998;69(1): 76-83.
17. Nelson RG, Shlossman M, Budding LM, Pettitt Dj, SaadMF, Genco RJ, et al. Periodontal disease and NIDDM in pima Indians. *Diabetes Care*. 1990;13 (8):836-40.
18. Schulze A, Busse M. Gender differences in periodontal status and oral hygiene of non-

- diabetic and type 2 diabetic patients. Open Dent J. 2016; 10:287-97.
19. Grossi SG, Zambon JJ, Ho AW, Koch G, Dunford RG, Machtei EE, et al. Assessment of risk for periodontal disease, Risk indicators for attachment loss. J Periodontol. 1994;65(3):260-7.