

Periodontal Disease and Diabetes Mellitus: Disease Distribution and Severity at a Tertiary Health care Center in Bangladesh

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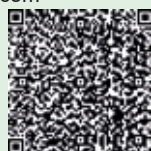
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ABSTRACT

Background: The relationship between diabetes mellitus (DM) and periodontal disease among Bangladeshis is poorly understood, despite DM being a known systemic risk factor for the condition. This study aimed to investigate the distribution and severity of periodontal disease in diabetic patients at a tertiary hospital in Bangladesh.

Materials and Methods: A retrospective cross-sectional analysis used clinical records of 100 patients where half were diabetic participants and half were non-diabetic participants from a tertiary hospital dental outpatient department. Data were collected on demographic information, diabetes diagnosis, periodontal clinical measurements and the implementation of 2018 American Academy of Periodontology (AAP) standards to classify periodontal diseases. Statistical analyses were conducted using chi-square and independent t-tests, with significance defined as $p < 0.05$.

Results: Periodontal disease was more prevalent and severe among diabetic patients. The diabetic group exhibited significantly higher mean periodontal pocket depth (4.2 ± 1.1 mm vs. 3.1 ± 0.9 mm; $p < 0.001$) and clinical attachment loss (CAL) (3.8 ± 1.0 mm vs. 2.6 ± 0.8 mm; $p < 0.001$) compared to non-diabetics. Severe periodontitis and Stage III–IV disease were more frequent among diabetics (36% and 20%, respectively), with statistically significant differences. Bleeding on probing (BOP), tooth mobility, and poor oral hygiene were also more common in the diabetic group.

Conclusion: The presence and the severity of periodontal disease were more common for those with diabetes mellitus. In the healthcare system of Bangladesh, routine screening for periodontal diseases should be stressed in protocols for diabetics so that early aid can be given to help them stay healthy.

Keywords: Diabetes mellitus, periodontal disease, retrospective study, smoking, poor oral hygiene.

INTRODUCTION

Persistent hyperglycemia and related systemic complications are hallmarks of diabetes mellitus (DM), a metabolic disorder that is common throughout the world. Periodontal disease, a chronic inflammatory condition that causes the teeth's supporting structures to deteriorate, is one of its less well-known but clinically significant manifestations. The fact that periodontitis has been identified as the sixth consequence of diabetes highlights the close connection between the two conditions.¹ Numerous studies demonstrate the reciprocal relationship between diabetes and periodontal disease. Diabetics who have poor glycemic control are more likely to experience increased periodontal breakdown, which is

characterized by deeper pockets of periodontal tissue, increased clinical attachment loss (CAL), and increased mobility of the teeth.^{2,3} The underlying mechanisms are multifactorial, involving altered host immune response, increased oxidative stress, and the formation of advanced glycation end products (AGEs), which amplify inflammatory processes and tissue destruction.⁴

Chronic periodontal infections, however, may play a role in significant deteriorating glycemic control. TNF α and IL6, proinflammatory human cytokines hosted by periodontal tissue, however, are assumed to reinforce systemic insulin resistance and sustain a vicious cycle between periodontal and metabolic health.⁵⁻⁷ Diabetic populations have been consistently found more prone to suffer from a more severe periodontitis.^{8,9} Therefore, earlier detection and intervention are important.

An increasing number of studies indicate that inflammation in the mouth due to periodontitis could indicate that diabetes is about to develop.¹⁰ Studies over time, for example with the Hisayama group, found that people with gum disease had a greater chance of developing glucose intolerance and type-2 diabetes.¹¹ In addition, it is thought that diabetes causes a higher chance of tooth loss, since it leads to increased periodontal damage.¹²

While there is a lot of international literature, relatively little is known about South Asians, including people from Bangladesh. Because a growing number of people in the region have diabetes and there is a lack of preventive oral care, exploring the relation between the two is crucial. Bangladesh's tertiary healthcare centers care for many people from different backgrounds which provide a good setting to learn more about this connection.

Therefore, the purpose of this study was to evaluate the relationship between the prevalence and severity of periodontal disease and diabetes mellitus in patients who visited a tertiary health center in Bangladesh. Through the analysis of periodontal clinical parameters and the classification of disease stages in accordance with established guidelines, this study aimed to highlight the importance of incorporating oral health assessment into routine diabetic care in order to improve overall health outcomes for this high-risk population.

MATERIALS AND METHODS

This retrospective study was carried out at the department of Periodontology of the Rajshahi Medical College Dental Unit in Bangladesh over the course of six months, from July 1st to December 31, 2024. Ethical approval was given by the Research Ethics Committee of Rajshahi Medical College. Before giving their written consent, each participant received comprehensive information about the study's methods and possible risks. Throughout the study and in any subsequent publications, data confidentiality was upheld. The researchers collected data from medical records from the department of Periodontology during the study period. The research included 100 patient records chosen according to the established criteria which contained 50 diabetics and 50 non-diabetic participants who had matching ages and genders.

Periodontal clinical parameters like probing pocket depth (PPD), clinical attachment loss (CAL), bleeding on probing (BOP), tooth mobility and oral hygiene status together with diabetic status data (type and duration) and demographic data (age, gender) were among the collected data. The periodontal disease assessment followed the 2018 classification system of the American Academy of Periodontology (AAP).¹³ The study analyzed data through SPSS software (version 22.0) by applying chi-square and independent t-tests. The experiment considered a p-value below 0.05 as the threshold for statistical significance.

RESULTS

The results included data from 100 people, 50 of whom had diabetes mellitus and the other 50 had not. Table 1 compares various characteristics between 50 diabetic and 50 non-diabetic individuals. The key findings included: age, gender, PPD, CAL, BOP, tooth mobility, oral hygiene, and smoking. Average age (52.4 years vs. 49.8 years; $p=0.045$) was slightly older in diabetics than non-diabetics. The gender distribution between males and females was similar in both groups (not significant, $p=0.685$). Diabetic patients had deeper pockets than non-diabetics (PPD 4.2 mm vs. 3.1 mm), which was highly significant ($p<0.001$), indicating more severe periodontal disease. More CAL in diabetics (3.8 mm vs. 2.6 mm; $p<0.001$), also pointing to more advanced periodontal destructions. BOP was significantly more prevalent in diabetics (78% vs. 42%, $p<0.001$), suggesting more active inflammation. Tooth mobility was higher among diabetic patients (52% vs. 18%, $p<0.001$) individual, again reflecting disease severity. The oral hygiene status was poor in diabetics than non-diabetics (64% vs. 36%, $p=0.008$). Similar rate of smokers was seen in both groups (40% vs. 38%, $p=0.832$), not statistically significant (table 1).

Table1: Comparison of periodontal parameters and demographic characteristics between diabetic and non-diabetic patients.

Variables	Diabetic (n=50)	Non-Diabetic (n=50)	p-value (Chi-square or t-test)
Mean Age (years)	52.4 $\pm$ 7.6	49.8 $\pm$ 6.9	0.045* ^b
Gender (M/F)	28/22	26/24	0.685 ^a
Mean PPD (mm)	4.2 $\pm$ 1.1	3.1 $\pm$ 0.9	<0.001* ^b
Mean CAL (mm)	3.8 $\pm$ 1.0	2.6 $\pm$ 0.8	<0.001* ^b
BOP (%)	78%	42%	<0.001* ^a
Tooth Mobility $\geq$ Grade 1 (%)	52%	18%	<0.001* ^a
Poor Oral Hygiene (%)	64%	36%	0.008* ^a
Smoking Status (% smokers)	40%	38%	0.832 ^a

*statistical significance; ^aChi square test; ^bt-test; M- male; F- female. PPD- probing pocket depth; CAL- clinical attachment loss; BOP- bleeding on probing.

Table 2 lists the different kinds of periodontal diseases and contrasts their prevalence in the two groups. The prevalence of gingivitis was significantly higher in non-diabetics (44%) compared to diabetics (20%) ($p = 0.010$). Although not statistically significant, mild periodontitis was marginally more common in non-diabetics (28% vs. 16%) ($p = 0.158$). Diabetics had a significantly higher prevalence of moderate periodontitis (36% vs. 20%) ($p = 0.048$). Diabetics had much higher rates of severe periodontitis (28% vs. 8%), and the difference was statistically significant ($p = 0.006$).

Table 2: Prevalence of periodontal disease types in diabetic and non-diabetic groups.

Periodontal Condition	Diabetic (n=50)	Non-Diabetic (n=50)	p-value (Chi-square)
Gingivitis only	10 (20%)	22 (44%)	0.010*
Mild Periodontitis	8 (16%)	14 (28%)	0.158
Moderate Periodontitis	18 (36%)	10 (20%)	0.048*
Severe Periodontitis	14 (28%)	4 (8%)	0.006*

* statistical significance.

Table 3 uses the American Academy of Periodontology (AAP) 2018 classification (Stages I–IV) to categorize the disease's severity. In non-diabetics, the stage I (initial) was marginally higher (20% vs. 12%) but not statistically significant ($p = 0.267$). Additionally, non-diabetics were more likely to have stage II (moderate) diabetes (40% vs. 32%) ($p = 0.402$). Stage III (severe with bone loss) was more common in diabetics (36% vs. 16%), and the difference was statistically significant ($p = 0.019$). Stage IV (Advanced with tooth loss/mobility) was more common in diabetics (20% vs. 4%), and this difference was statistically significant ($p = 0.007$).

Table 3: Severity Grading of Periodontitis According to AAP 2018 Classification¹³

Severity Grade	Diabetic (n=50)	Non-Diabetic (n=50)	p-value (Chi-square)
Stage I (Initial)	6 (12%)	10 (20%)	0.267
Stage II (Moderate)	16 (32%)	20 (40%)	0.402
Stage III (Severe with bone loss)	18 (36%)	8 (16%)	0.019*
Stage IV (Advanced with tooth loss or mobility)	10 (20%)	2 (4%)	0.007*

*statistical significance.

DISCUSSION

This study aimed to evaluate the association between DM and the prevalence and severity of periodontal disease among patients attending a tertiary healthcare center in Bangladesh. The findings demonstrate a strong relationship between DM and deteriorated periodontal health, with significantly worse clinical parameters, including deeper PPD, increased CAL, higher rates of BOP, and greater tooth mobility observed in diabetic patients compared to non-diabetics.

Table 1 shows that the mean PPD (4.2 ± 1.1 mm) and CAL (3.8 ± 1.0 mm) of diabetics were significant ($p < 0.001$). These findings are consistent with earlier research suggesting that inadequate glycemic control in diabetes exacerbates the destruction of periodontal tissue by compromising the host's ability to respond to periodontal pathogens.^{3,14} Chronic inflammation and attachment loss are facilitated by hyperglycemia, which also damages neutrophil function and contributes to the production of advanced glycation end products (AGEs).^{4,7}

Additionally, compared to participants without diabetes (42% and 18%, respectively), diabetic patients in this study (table 1) showed noticeably greater rates of BOP (78%) and tooth mobility (52%). These results support the findings of Preshaw et al.⁵, who observed that diabetic individuals with periodontal disease frequently have elevated pro-inflammatory cytokines and impaired wound healing. They also confirmed the active inflammatory status and compromised periodontal support among diabetics.

Table 2 indicates that gingivitis was more common in non-diabetic patients (44%) than in diabetic patients (20%) ($p = 0.010$). On the other hand, the percentage of moderate (36%) and severe (28%) periodontitis was significantly higher in the diabetic group than in the non-diabetic group (20% and 8%, respectively). In diabetic populations, periodontitis is more common and more severe, according to previous meta-analyses.^{8,9}

Patients with diabetes were more likely to have advanced stages of periodontitis when it came to disease staging (table 3). Diabetics had a significantly higher prevalence of stage III and IV disease (36% and 20%, respectively) than non-diabetics (16% and 4%; $p = 0.019$ and 0.007 , respectively). These results are consistent with a previously published article that categorized periodontitis as the "6th complication" of diabetes because of its progressive and frequently severe presentation in diabetics.¹

Diabetes and periodontal disease have a well-established reciprocal relationship.⁵ By raising systemic cytokine levels, especially those of IL-6 and TNF α , periodontal infection may worsen systemic inflammation and have a detrimental effect on glycemic control.^{5,6} Since better periodontal health may lead to better glycemic control, this reciprocal relationship is important for both diabetes management and periodontal health.⁷

Periodontal disease may even be able to predict the onset of type-2 diabetes and glucose intolerance, according to studies like the Hisayama study.^{10,11} As a result; one of the most important indicators of general systemic health in people with or at risk for diabetes is their periodontal health.

Public health policy must address the oral complications linked to systemic diseases, given the rising prevalence of diabetes in Bangladesh and other low- and middle-income nations. The results of this study highlight the importance of routine periodontal screening, especially in tertiary care settings, as part of comprehensive diabetes management. The severity of periodontal destruction may be lessened and overall patient outcomes may be enhanced with early detection and intervention.¹⁵

Additionally, there is a greater need for focused oral hygiene education and behavioral intervention because diabetics are more likely to have poor oral hygiene (64%) than non-diabetics (36%). Despite being a recognized risk factor, smoking was not the primary differentiator in this population, as evidenced by the similar rates of smoking in the two groups (40% vs. 38%).

This study supports the body of evidence demonstrating a strong link between diabetes mellitus and increased prevalence and severity of periodontal disease. Higher inflammatory indices, more advanced disease stages, and more severe periodontal breakdown were all seen in the diabetic group. These findings validate the inclusion of periodontal assessment in diabetes care protocols and corroborate earlier findings that diabetes negatively impacts periodontal health.^{2,5,8} In diabetic populations, incorporating oral health into systemic disease management may lower complications and enhance long-term health outcomes.

CONCLUSION

This study demonstrates that diabetes mellitus and worsening periodontal diseases are statistically correlated. Patients with diabetes showed poor dental hygiene practices, advanced periodontal pockets, greater attachment loss, and tooth mobility when compared to non-diabetic patients. Patients with diabetes were more likely to have advanced Stages III and IV as well as moderate to severe periodontal diseases than non-diabetic participants, who had greater rates of gingivitis and milder stages of periodontitis. This study emphasizes the necessity for coordinated medical-dental treatment by showing how diabetes negatively impacts periodontal health. Diabetes management should include routine periodontal examinations, especially in tertiary healthcare settings. Early detection and timely intervention are essential to reduce oral complications and improve overall health outcomes.

ETHICAL STATEMENT

The interviewer obtained informed assent from participants before commencing the interviews and examinations. Participation was voluntary, and participants were informed that they have the right to withdraw at any point without any negative

consequences. Ethical approval was obtained from the 'Research Ethical Committee' of Rajshahi Medical College, Rajshahi, Bangladesh. All procedures were conducted according to the guidelines of the Declarations of Helsinki. (Reference: Memo no.150/320(49/1AMEBBC/IBSc)

CONFLICT OF INTEREST

The authors claimed no conflict of interest.

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This research received no external funding.

DATA AVAILABILITY STATEMENT

The data presented in this study are available on reasonable request from the corresponding author.

REFERENCES

1. Tomic D, Shaw JE, Magliano DJ. The burden and risks of emerging complications of diabetes mellitus. *Nat Rev Endocrinol.* 2022;18(9):525-39. doi: 10.1038/s41574-022-00690-7.
2. Enteghad S, Shirban F, Nikbakht MH, Bagherniya M, Sahebkar A. Relationship between diabetes mellitus and periodontal/peri-implant disease: a contemporaneous review. *Int Dent J.* 2024;74(3):426-45. <https://doi.org/10.1016/j.identj.2024.03.010>.
3. Sanz M, Ceriello A, Buysschaert M, Chapple I, Demmer RT, Graziani F, et al. Scientific evidence on the links between periodontal diseases and diabetes: consensus report and guidelines of the joint workshop on periodontal diseases and diabetes by the International Diabetes Federation and the European Federation of Periodontology. *Diabetes Res Clin Pract.* 2018;137:231-41. doi: 10.1016/j.diabres.2017.12.001.
4. Graves DT, Levine MA, Aldosary S, Demmer RT. Understanding the periodontitis–diabetes linkage: mechanisms and evidence. *J Dent Res.* 2026; 105(1):21-30. doi: 10.1177/00220345251388340.
5. Preshaw PM, Alba AL, Herrera D, Jepsen S, Konstantinidis A, Makrilakis K, et al. Periodontitis and diabetes: a two-way relationship. *Diabetologia.* 2012;55(1):21-31. doi: 10.1007/s00125-011-2342-y.
6. Alwithanani N. Periodontal diseases and diabetes mellitus: a systematic review. *J Pharm Bioallied Sci.* 2023;15(Suppl 1):S54-S63. doi: 10.4103/jpbs.-jpbs_515_22.
7. Preshaw PM, Bissett SM. Periodontitis and diabetes. *Br Dent J.* 2019;227(7):577-84. doi: 10.1038/s41415-019-0794-5.

8. Coronel-Zubiate FT, Becerra-Atoche EG, Terrones-Campos W, Herrera-Plasencia PM, Seminario-Trelles OA, Ortega-Gallegos RE. An umbrella review of the association between periodontal disease and diabetes mellitus. *Healthcare (Basel)*. 2024 Nov 19;12(22):2311. doi: 10.3390/healthcare12222311.
9. Tooi M, Matsuda Y, Zhong H, Arakawa S. Association between clinical periodontal features and glycated hemoglobin in patients with diabetes and controlled periodontitis: a cross sectional study. *Healthcare*. 2023; 11(7):1035. doi: 10.3390/healthcare11071035.
10. Saito T, Shimazaki Y, Kiyohara Y, Kato I, Kubo M, Iida M, et al. The severity of periodontal disease is associated with the development of glucose intolerance in non-diabetics: the Hisayama study. *J Dent Res*. 2004;83(6):485-90. <https://doi.org/10.1177/154405910408300610>.
11. Aizenbud I, Wilensky A, Almozni G. Periodontal disease and its association with metabolic syndrome- a comprehensive review. *Int J Mol Sci*. 2023;24(16):13011. doi: 10.3390/ijms241613011.
12. Weijldijk LP, Ziukaite L, Van der Weijden GA, Bakker EW, Slot DE. The risk of tooth loss in patients with diabetes: a systematic review and meta-analysis. *Int J Dent Hyg*. 2022;20(1):145-66. doi: 10.1111/idh.12512.
13. Marini L, Tonetti MS, Nibali L, Rojas MA, Aimetti M, Cairo F, et al. The staging and grading system in defining periodontitis cases: consistency and accuracy amongst periodontal experts, general dentists and undergraduate students. *J Clin Periodontol*. 2021;48(2):205-15. doi: 10.1111/jcpe.13406.
14. Stoicescu M, Calniceanu H, Ţig I, Nemeth S, Tent A, Popa A, et al. Significant aspects and correlation between glycemic control and generalized chronic periodontitis in type 2 diabetes mellitus patients. *Exp Ther Med*. 2021;22(1):671. doi: 10.3892/etm.2021.10103.
15. Shinjo T, Nishimura F. The bidirectional association between diabetes and periodontitis, from basic to clinical. *Jap Dent Sci Rev*. 2024;60:15-21. doi: 10.1016/j.jdsr.2023.12.002.

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