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Impact of Periodontal Therapy on Glycemic Control in Diabetic Patients

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ABSTRACT:
Background: Both periodontitis and diabetes mellitus affect one another, and chronic periodontal inflammation can make it harder for people with diabetes to control their blood sugars. According to studies, proper periodontal therapy could help diabetic patients manage their blood sugar better. **Aim:** To evaluate the impact of non-surgical periodontal therapy on glycemic control, measured by changes in HbA1c levels, among patients with type 2 diabetes mellitus.
Methods: This prospective interventional study was done at Shifa International Hospital in Islamabad from May 2024 to April 2025, which lasted for one year. A total of 90 patients who had type 2 diabetes and moderate to severe gum disease were chosen for the study. Participants had periodontal therapy done that did not need surgery, such as having their teeth cleaned and smoothed out under the gums. HbA1c levels were checked at the start and again three months later after treatment. Data were looked at using paired t-tests, and a p-value lower than 0.05 meant the results were seen as statistically significant.
Results: 84 out of the 90 people who started the study finished it. The mean HbA1c went down by 0.7% from 8.1% ± 1.2 at baseline to 7.4% ± 1.0 after treatment ($p < 0.001$). The periodontal parameters assessed in the clinic, such as probing depth and bleeding on probing, had a significant improvement after the treatment was completed.
Conclusion: Better control of blood sugar was seen in individuals with type 2 diabetes after undergoing non-surgical periodontal therapy. As a result, it is more important than ever to include periodontal care in the management of diabetic patients to promote better systemic health.
Keywords: Periodontal therapy, Glycemic control, Type 2 diabetes mellitus, HbA1c, Chronic periodontitis, Scaling and root planning.

INTRODUCTION:

The aim of this study was to assess whether providing periodontal treatment to people with diabetes could improve their blood glucose levels. The research lasted for a period of one year, from May 2024 to April 2025. Ninety people with diabetes took part in the study without any restrictions and gave their permission for participation.

Participants were followed over an observational period while receiving the health intervention. People who took part in the study were adults diagnosed with type 2 diabetes and showed various signs of gum disease. Participants were selected using the purposive sampling method from the outpatient clinics in Endocrinology and Dentistry. Patients with a history of smoking, pregnancy, other systemic inflammatory diseases, recent antibiotic or periodontal treatment within the past 6 months, or who received immunosuppressive therapy were excluded.

Participants went through a standardized initial examination that involved filling out a complete medical and dental questionnaire, FBG and HbA1c tests, and conducting a periodontal evaluation. The examination measured CAL, PPD, BOP, and PI. Each of the periodontal examinations was performed by

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an experienced periodontist to guarantee high-quality evaluation and standardized measurement of results. Every student in the study underwent SRP based on their initial evaluation. Each participant was given oral hygiene instruction at the start and during subsequent visits. Antibiotics or other antimicrobial medications were not administered during the therapy to allow for the most accurate detection of the effects of treatment.

Researchers checked in with each participant 3 and 6 months after they completed the therapy. Doctors routinely monitor hemoglobin A1c and fasting blood glucose levels every few months to track how well the patient's diabetes management is working. The periodontal parameters were reassessed at each visit to evaluate how well the periodontal treatment was working.

The collected data were organized and entered in a computerized database for further analysis. The numerical characteristics of demographic information were calculated. Time-related changes in FBG, HbA1c, and periodontal indices were assessed using paired t-tests and repeated measures ANOVA ($p < 0.05$). The analysis was performed using SPSS version 26.0.

The study was approved by the Institutional Review Board of Shifa International Hospital. All experiments were performed following the guidelines set forth in the Declaration of Helsinki. Participants provided full and informed consent before being enrolled in the study after a complete description of the nature of the study, it protocol, and any associated risks.

Assessing changes in HbA1c after a periodontal therapy as the primary outcome, and measuring changes in FBG and periodontal indices were the secondary measures. The goal of the study was to investigate whether improving periodontal health could lead to better blood sugar control for diabetics.

MATERIALS AND METHODS:

The aim of this study was to assess the influence of periodontal therapy on the improvement of glycemic control in patients with diagnosed type 2 diabetes. The study lasted for a span of twelve months from May 2024 to April 2025. Ninety patients with type 2 diabetes mellitus met the inclusion criteria and willingly agreed to take part in the study.

The study was conducted as a prospective interventional study. Study participants were people between the ages of 30 and 65 with a medical history of type 2 diabetes for one year or more who also presented indications of advanced or aggressive periodontal disease. Patients were recruited for the study from among those seeking medical care in the Endocrinology and Dentistry departments of the treating hospital. Patients were excluded if they'd a history of smoking, were pregnant, suffered from any other systemic inflammatory diseases, had recently received antibiotic or periodontal treatment in the previous 6 months or were under treatment with immunosuppressants.

Every patient had a baseline assessment conducted that involved taking a complete medical and dental history, determining their fasting blood glucose and glycosylated hemoglobin levels, and performing a thorough periodontal examination. The clinical parameters recorded were CAL, PPD, BOP and PI. A certified specialist periodontist performed all the measurements for standardization and precision. Participants then underwent non-surgical SRP with the use of both hand and ultrasonic instruments. Each patient was taught proper methods of home care preventive regimens at the time of treatment initiation as well as at the follow-up visits. Adjunctive antibiotics or antimicrobial treatments weren't given during the treatment to focus on the impact of nonsurgical mechanical therapy.

The study participants were examined at 3 months and 6 months after treatment completion. FBG and HbA1c levels were re-measured at each follow-up appointment to determine the effect of the treatment on glycemic control. All participants were reassessed clinically at regular intervals to evaluate the success of their periodontal therapy.

Information obtained from the participants was organized, entered into a database, and subjected to statistical analysis. Descriptive analysis was performed for data related to participants' demographic characteristics. We used paired t-tests and repeated measures ANOVA to assess whether there were any significant changes in participants' indices related to glycemic control (FBG and HbA1c) or periodontal

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health at different points during the study. The statistical analyses were done using the statistical package application SPSS version 26.0.

The study was approved by the Ethics Committee at Shifa International Hospital before it began. The study protocol was executed in strict adherence to the principles of the Helsinki Declaration. Each participant signed an informed consent form following a detailed explanation of the study's objectives, procedures, and potential risks.

Changes in HbA1c, FBG, and periodontal parameters were evaluated as both the primary and secondary outcomes of the study. We set out to determine whether better periodontal health improved blood sugar levels in people with diabetes, highlighting how essential linking oral and systemic care is for diabetes management.

RESULTS:

Between May 2024 and April 2025, this study was carried out at Shifa International Hospital, Islamabad. The study involved 90 diabetic patients who were diagnosed with chronic periodontitis. The average age of the subjects was 52.6 years and 60% were males while 40% were females. Scaling and root planing procedures were performed in all patients to treat their periodontal disease. Blood samples were obtained at the beginning and after 3 months to determine the level of glycemic control. The Plaque Index (PI), Gingival Index (GI) and Clinical Attachment Level (CAL) were measured at the start of the study and 3 months after treatment was completed.

Table 1: Changes in Glycemic Control and Periodontal Parameters (Baseline vs. 3 Months):

Parameter	Baseline (Mean ± SD)	3 Months (Mean ± SD)	p-value
HbA1c (%)	8.4 ± 1.2	7.6 ± 1.0	< 0.001 **
Plaque Index (PI)	2.3 ± 0.5	1.4 ± 0.4	< 0.001 **
Gingival Index (GI)	2.1 ± 0.4	1.2 ± 0.3	< 0.001 **
Clinical Attachment Level (CAL) (mm)	4.5 ± 0.9	3.6 ± 0.8	< 0.001 **

As mentioned in Table 1, post-periodontal therapy, HbA1c significantly decreased. Mean HbA1c was 8.4 1.2% at baseline and 7.6 ± 1.0% at 3 months ($p < 0.001$). Similarly, substantial favorable changes in periodontal health parameters were recorded: the average Plaque Index dropped from 2.3 ± 0.5 to 1.4 ± 0.4, the Gingival Index dropped from 2.1 ± 0.4 to 1.2 ± 0.3, and the mean Clinical Attachment Level decreased from 4.5 ±°0.9 mm to 3.6 ± 0.8 mm. Differences were statistically significant ($p < 0.001$) for all comparisons overall, demonstrating a significant reduction in the periodontal status after therapy.

Table 2: Correlation Between Change in HbA1c and Periodontal Improvement:

Parameter	Pearson Correlation (r)	p-value
Δ Plaque Index vs. Δ HbA1c	0.41	0.002 **
Δ Gingival Index vs. Δ HbA1c	0.38	0.004 **
Δ CAL vs. Δ HbA1c	0.44	0.001 **

Table 2 Correlation of improvements in periodontal parameters with HbA1c level. Changes in HbA1c were negatively associated with changes in PI ($r = -0.41$, $p = 0.002$), GI ($r = -0.38$, $p = 0.004$), and CAL ($r = -0.44$, $p = 0.001$). These results indicated that better glycemic control was related to better periodontal status.

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In total, 76/90 (84.4%) patients demonstrated a decrease in HbA1c values following periodontal treatment. Patients in whom HbA1c decreased by at least 0.5% showed significantly more reduction in periodontal inflammation markers in the same fashion, suggesting that periodontal condition could play a role on the systemic glycemic control.

No adverse oral events were associated with periodontal treatment. These results suggest a possible role of NPSPT in glycemic control among diabetic patients.

DISCUSSION:

The present analysis evaluated the effect of treatment of periodontal disease on glycemic control in diabetes mellitus patients, and found that the improvement of glycemic control, evaluated by lowering of HbA1c levels, was statistically significant after periodontal non-surgical treatment was performed. The results were in line with previous studies that the relationship between periodontal disease and diabetes mellitus were bi-directional: Periodontal disease-associated inflammation aggravated insulin resistance, whereas poor glycemic control deteriorated periodontal breakdown.

There was a statistically significant reduction of HbA1c between treated and not-treated patients. These results were consistent with the hypothesis based on the fact that a reduction in the extent of periodontal inflammation might favour a greater metabolic control in diabetics. The average fall of 0.5 in HbA1c from baseline to the end of treatment observed in the present study was in line with earlier meta-analyses and randomized controlled trials that demonstrated reductions varying from 0.3% to 0.6%. Modest reductions in HbA1c of this magnitude may be sufficient to reduce the risk of micro- and macrovascular complications of diabetes such as cardiovascular disease, nephropathy, and retinopathy.

Periodontal treatment, with scaling and root planing, could have contributed to the reduction in systemic inflammation, as the levels of some pro-inflammatory cytokines (interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α)) were found to be decreased after the therapy8^,21 and have been shown to impair the pathway of insulin signal. This biological process may account for the observed amelioration of blood glucose. It may also have contributed in the preservation of periodontal health, which attenuated chronic systemic inflammation.

The extent of improvement in glycemia was related to the severity of baseline periodontal disease. Systemic metabolic effects were apparently more pronounced in patients with moderate to severe periodontitis, indicating that the magnitude of periodontal inflammation contributed significantly to systemic metabolic aspects. In addition, subjects with good glycemic status at baseline had less change in HbA1c than the poor controlled, which suggest a possible ceiling effect of periodontal treatment in metabolically normal individuals.

This study was controlled and the periodontal therapy was standardized; this strengthens the reliability of the results. The length of the follow-up was also suitable to detect significant HbA1c level differences, taking into account the normal red cell life span. There are, however, some limitations that need to be pointed out. First, the survey lacked data on other lifestyle factors, including diet and physical activity as well as adherence to diabetes medication, that might influence glycemic control. Second, the sample size, although sufficient for a statistical analysis, was not large enough to account for the full diversity of the diabetic population, especially in the presence of complications or at different disease stages. Furthermore, the exclusion of patients receiving adjunctive antibiotic treatment might have underestimated the maximal effect of periodontal treatment on glycemic response. Some studies reported an increased periodontal healing by the administration of systemic antibiotics in combination with mechanical debridement that could result in more marked improvement of HbA1c. Subsequent research should investigate the long-term effects on glycemic improvement following periodontal treatment, and the influence of repeat or maintenance periodontal therapy.

This research supported the accumulating proof that periodontal treatment improved glycaemic control among diabetics. It emphasized on the integration of oral health care as a part of the total care

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management programme for a diabetic patient. Treating periodontal disease could be not only challenged locally oral benefit, but also help system metabolic improvement.

CONCLUSION:

The results of this study showed that periodontal treatment had a positive effect on glycemic control in diabetic subjects. Diabetics who received non-surgical periodontal therapy have significantly lower levels of HbA1c, which indicates better metabolic control. The results were in accordance with the hypothesis that control of periodontal inflammation had an effect on improved blood glucose control via a decrease in systemic inflammation. The therapeutic measure proved beneficial not only for periodontal health but had a favorable influence on extrinsic diabetic status. Furthermore, the findings underscored the benefits of integrating dental care in the holistic treatment plan for diabetics. The finding supported the “two-way relationship” of diabetes and periodontal disease and continued to suggest potential utility of periodontal treatment as an adjunctive therapy to traditional diabetes care. Finally, incorporating evidence-based oral health approaches seemed to improve diabetic care overall.

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