

## Original Article

## EFFECT OF NON-SURGICAL PERIODONTAL THERAPY ON GLYCEMIC LEVEL IN TYPE 2 DIABETICS PATIENTS

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### ABSTRACT

**Objective:** The objective of this study was to determine the effect of non-surgical periodontal therapy on the glycemic level in type 2 diabetic patients.

**Material and Methods:** A observational clinical trial was conducted on 25 type 2 diabetic patients attending Bacha Medical college, Mardan from January 2015 to December 2016. All the participants were undergoing non-surgical treatment for periodontal disease that includes mechanical removal of supra- and a subgingival bacterial plaque with scalers, antibiotics and or root planning. HbA1c was compared at baseline and three months. Data was compiled and analyzed through SPSS version 20. Quantitative variables like HbA1c was presented as a mean and Standard deviation. Qualitative variables like gender, education status, economic status, oral hygiene methods were described by using frequency & percentages. The paired t-test was applied to assess statistical significance in a mean difference of HbA1c between baseline and after three months.

**Results:** Males were 14(56.4%) while females were 11(44%). The mean age was  $54.5 \pm 10.316$  years. Mean gain in attachment was  $0.32 \pm 0.267$ mm and mean reduction in pocket depth was  $0.268 \pm 0.1314$ mm after months of periodontal therapy. The level of HbA1c after three months of periodontal therapy was reduced significantly ( $P$  value=0.01).

**Conclusion:** Non-surgical periodontal therapy for periodontitis is significantly improved glycaemic control (reduced HbA1c level) in type 2 diabetic patients, and it should be undertaken along with the standard measures for the diabetic patients.

**Keywords:** Periodontitis, Diabetes, glycaemic control

### INTRODUCTION

Periodontal diseases are chronic and are inflammatory disorders that cause by bacteria that affect structures supporting the teeth.<sup>1</sup> There are two main types of periodontal diseases, gingivitis that is found approximately universally in all populations and severe forms of periodontitis that affect 5%–15% of the worldwide population.<sup>2</sup>

Diabetes mellitus and periodontitis are chronic disorders and are intimately connected.<sup>3</sup> Diabetes Mellitus (DM) prevalence in Pakistan was 5.2 million in the year 2000, and incidence is increasing gradually, the number is predicted to amplify to 13.9 million by

the year 2030.<sup>4</sup> Diabetes mellitus has numerous complications where periodontal diseases are considered as the sixth complication of diabetes.<sup>5</sup> Periodontitis is a chronic infectious disease found 10–15% of the world population.<sup>6</sup> In Pakistan periodontitis is present in 6–10% of the population.<sup>7</sup> The aim of periodontal therapy is to meticulously clean the pockets around teeth and avoid harm to adjacent bone usually by non-surgical intervention like scaling, antibiotics and root planning.<sup>8</sup>

Salman et al.<sup>8</sup> performed a comparative cross-sectional study in Jinnah Hospital, Lahore. DM subjects ( $n=46$ ) who were treated for periodontal disease non-surgically (scaling and root planning) and with antibiotics while 46 DM subjects ( $n=46$ ) were not treated non surgically with scaling and root planning and were included in their study. HbA1c was compared at baseline and three months. Forty-six subjects who were

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treated non-surgically for periodontitis 43 (93.5%) received scaling only while 3 (6.5%) received scaling plus antibiotics. Fall in the level of HbA1c was observed among subjects with the treatment of periodontal disease indicating a good control of diabetes while in the group who did not receive non-surgical treatment there was either no change or increase in HbA1c value. Mean HbA1c after three months in a group with the treatment of periodontitis was  $6.867 \pm 0.6168$  %, and in the group without treatment was  $6.983 \pm 0.3678$  %. ( $t=6.641$ ,  $p<.000$ ). They concluded that non-surgical periodontal treatment is associated with improved glycaemic control (reduced HbA1c level) in type 2 diabetic patients. Goel et al.<sup>1</sup> conducted a study on 41 patients in each group and glycated hemoglobin (HbA1c) level of  $6.71 \pm 0.50$ % and  $6.80 \pm 0.45$ %, in the test and control group, respectively. After three months, there was a significant reduction in HbA1c levels in the test group compared to the control group ( $p=0.029$ ). Clinical periodontal parameters of gingival index, probing depth (PD), and clinical attachment level (CAL) significantly improved in the test group ( $p<0.001$ ) with PD reduction by 0.9 mm and gain in CAL by 0.3 mm compared to the control group ( $p>0.001$ ) who showed an increase by 0.05 mm.

To best of our knowledge, no study has been conducted on KPK population to know whether the non-surgical periodontal therapy improves the glycaemic level or not. The ethnic, genetic and environmental variations can affect the glycaemic level and response to periodontal therapy.

## MATERIALS AND METHODS

This experimental controlled trial was carried out in the Department of Bacha Khan Medical College, Mardan from January 2015 to December 2016. The study was reviewed and approved by the Institutional Review Board of the hospital. Informed consent was obtained from all patients after giving a detailed explanation of the risks and benefits of the study.

A sample of 35 patients was selected by convenient consecutive non-probability technique. Only 25 patients completed the study while the remaining 10 did not. Age range between 35 and 70 years, type 2 DM with HbA1c values in the range of 8%–10%, having moderate to severe generalized chronic periodontitis as was determined from the measurement of CAL in the range of 3mm to more than 5 mm using the William's probe, with at least one tooth having a probing depth

(PD) of 4–8 mm in each quadrant (either anterior or posterior) and presence of more than 16 teeth in the mouth, excluding third molars, were included. Patients having systemic diseases (other than DM), using calcium channel blockers, smokers or alcoholics, having diabetic complications, using systemic antimicrobial drugs in the last three months, periodontal treatment three months before the study, pregnant adults and failure to give an informed consent were excluded from this study. Baseline data that recorded were demographics, oral hygiene index (OHI), diabetes duration, HbA1c and Periodontal probing depth and Clinical attachment loss before treatment and after three months. Superficial scaling was done, and in some cases, antibiotics were prescribed because of the extremely poor oral hygiene and traumatic nature of tissue. Patients were recalled after two weeks, and deep scaling was done. After 3rd months the patients were recalled, and gingival index (GI), Clinical attachment loss (CAL) and HbA1c were recorded. OHI score was recorded as 0; No debris or stain present, 1; Soft debris covering not more than one third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered, 2; Soft debris covering more than one third, but not more than two thirds, of the exposed tooth surface, and 3; Soft debris covering more than two thirds of the exposed tooth surface. GI was recorded as by Silness and Loe (1976) as: good (0-1.0); fair(1.1-2.0); poor (2.1-3.0). CAL was by using William probe.

Data analysis was done using statistical package for social sciences (SPSS) version 20.0. Mean, and the standard deviation was calculated for numerical variables like age, GI, CAL, and HbA1c. Percentages and frequencies were calculated for categorical variables like gender, duration of diabetes, oral hygiene status, and socioeconomic status. Paired t-test was applied to compare baseline HbA1c level to after three months.  $P < 0.05$  as considered significant.

## RESULTS

A total of 25 patients fully participated in the study. Males were 14(56.4%), and females were 11(44%). The mean age was  $54.5 \pm 10.316$  years. The age ranged was from 38 to 68 years. Most of the socio-economic status were satisfactory, more than Rs 50,000/- per month, ( $n=13$ , 52%), followed by poor, less than Rs 20,000 per month ( $n=9$ , 36%) and middle class, between Rs 20,000 – Rs 50,000 per month

(n=3, 12%). Most of the patients were illiterate (56%) followed by matric/FA (24%) and bachelors (20%). (Table 1). The most prevalent method of oral hygiene was miswak (n=11) followed toothbrush (n=6). Eight (32%) patients were not doing any oral hygiene method. The percentages are shown in Fig 1. Mean gain in attachment was  $0.32 \pm 0.267$  mm and mean reduction in pocket depth was  $0.268 \pm 0.1314$  mm after months of non-surgical periodontal therapy. The details of descriptive statistics are given in table 2.

The level of HbA1c after three months of periodontal therapy was reduced significantly (P value=0.000). The detailed inferential statistics are given in table 3. Glycemic control was worse in low economic individuals statistically significantly (P value=0.000). The details are given in table 4.

But the effect of the gender was not statistically significant (P-value>0.05). (Table 5).

Glycemic control was poor in illiterate and low education patients statistically significantly (P-value=0.006). (Table 6).

## DISCUSSION

Diabetes mellitus has been unambiguously established as a chief risk factor for periodontitis.<sup>9</sup> The risk of periodontitis is amplified by about threefold in diabetic patients compared with non-diabetic individuals.<sup>10</sup> The level of glycaemic control is of paramount importance in determining increased risk. For example, in the USA National Health and Nutrition Examination Survey-III, adults with an HbA1c level of more than 9% had a significantly higher prevalence of severe periodontitis than those without diabetes (Odds Ratio= 2.90; 95% CI 1.40, 6.03) after controlling for age, education, ethnicity, gender and smoking.<sup>11</sup>

In recent times there has been much stress on the 'two-way' link between diabetes mellitus and periodontitis.<sup>12</sup> That is, not only is diabetes mellitus a risk factor for periodontitis, but periodontitis could have an inverse effect on glycaemic control. The foremost obvious evidence to sustain this hypothesis came from research of individuals in the Gila River Indian community. Severe periodontitis at baseline was associated with an increased risk of poor glycaemic control (HbA1c level greater than 9%) at follow-up of minimum 2 years, suggestive of that severe periodontitis was a risk factor for ill-management of diabetes.<sup>13</sup> Many investigators have reported that the prevalence

and severity of non-oral diabetic complications, like retinopathy, diabetic neuropathy, proteinuria, and cardiovascular complications are related to the severity of periodontitis.<sup>14,15</sup>

To bring the glycaemic level to normal is an enormous contribution towards improving the quality of life of patients risk of complications decreases with controlled glucose level.<sup>16</sup> Improvement in the health of periodontium of the diabetic patients leads to improvement of the glycaemic control. The underlying mechanism by which periodontal disease and its treatment affects glycaemic level is not fully understood.<sup>8</sup>

In the current study factors contributing to periodontitis and poor glycaemic control were low education status, low socioeconomic status and lack of dental hygiene. Very similar results were reported by Salman et al<sup>8</sup> in a study on Karachi population.

The current showed that with non-surgical periodontal therapy the glycaemic could be controlled. The difference (decrease) in HbA1c level statistically significantly ( $p < 0.05$ ). The study conducted by Mirza et al.<sup>17</sup> gives a clear indication of significant improvement in the glycaemic control after a simple and inexpensive periodontal treatment, suggesting that scaling should be made an essential part of treatment for diabetes mellitus.

Similar results were reported by Salman et al<sup>8</sup> in a study on Karachi population. However, the sample size of Salman et al<sup>8</sup> was larger, and they include control group as well. Due to limited availability of facilities in Bacha Medical college, we include only 25 patients.

**Table-1: Distribution of education of the patients**

	Frequency	Percent	Cumulative Percent
Illiterate	14	56.0	56.0
matric/FA	6	24.0	80.0
Bachelors	5	20.0	100.0
Total	25	100.0	

**Table-2: Descriptive statistics of gain in attachment and reduction in pocket depth three months of non-surgical periodontal therapy**

	N	Minimum	Maximum	Mean	Std. Deviation
Gain in attachment(mm)	25	.00	1.00	.3200	.26771
Reduction in pocket depth after three months(mm)	25	.10	.50	.2680	.13140

**Table-3: Effect of non-surgical periodontal therapy on glycemic level (HbA1c)**

	Paired Differences					t	df	Sig.2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% CI				
				Lower	Upper			
HbA1c at first visit - HbA1c after 3 months	.2000	.17321	.03464	.12850	.27150	5.774	24	.000

**Table-4: Effect of socioeconomic status on glycemic control**

Socio-economic status		Glycemic difference					Total
		-.10	.10	.20	.30	.50	
Poor	satisfactory	0	0	6	3	0	9
	middle class	4	3	3	0	3	13
		0	0	0	3	0	3
Total		4	3	9	6	3	25

$\chi^2=23.932$ ,  $df=8$ ,  $P\text{-value}=0.000$

**Table-5: Frequency of Glycemic level in both gender**

Gender		Glycemic difference					Total
		-.10	.10	.20	.30	.50	
Male		2	0	6	3	3	14
Female		2	3	3	3	0	11
Total		4	3	9	6	3	25

$\chi^2=6.737$ ,  $df=4$ ,  $P\text{-value}=0.15$

**Table-6: Effect of education on glycemic control**

education		Glycemic difference					Total
		-.10	.10	.20	.30	.50	
Illiterate		2	3	3	6	0	14
matric/FA		0	0	3	3	0	6
Bachelors		2	0	3	0	0	5
Total		4	3	9	6	3	25

$\chi^2=21.310$ ,  $df=8$ ,  $P\text{-value}=0.006$

Another study conducted on Nepal population showed that non-surgical periodontal therapy could decrease HbA1c level ( $P<0.05$ ).<sup>1</sup>

## CONCLUSION

Non-surgical periodontal therapy for periodontitis is significantly improved glycaemic control (reduced HbA1c level) in type 2 diabetic patients, and it should be undertaken along with the standard measures for the diabetic patients. However it is an uncontrolled and small sample study, further large sample and studies having control groups are required on this population.

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