ORIGINAL ARTICLE

EFFECT OF NON- SURGICAL PERIODONTAL TREATMENT ON GLYCEMIC CONTROL AMONG TYPE 2 DIABETES MELLITUS PATIENTS WITH PERIODONTITIS

Sadia Salman, Khurshid Khan, Fariha Salman, Maliha Hameed
Allama Iqbal Medical College, Jinnah Hospital, Lahore-Pakistan

Background: Periodontitis and Diabetes Mellitus are two closely, bidirectional linked disease where periodontitis is a well-known complication of diabetes it is also considered to be a cause for poor glycaemic control. The present study objective was to evaluate the glycaemic control in patients suffering from both Diabetes Mellitus and Periodontitis after non-surgical periodontal treatment. **Methods**: A comparative cross-sectional study was conducted with two groups of patients attending Diabetic Clinic, Jinnah Hospital, Lahore, during six months from September 2013 to February 2014. Forty-six diabetes mellitus subjects who were undergoing non-surgical treatment of periodontal disease that includes mechanical removal of supra- and sub gingival bacterial plaque with scalers, antibiotics and or root canal if required while 46 subjects with diabetic mellitus having periodontal disease did not had treatment for periodontal disease. HbA1c was compared at base line and at three months. Data was compiled and analysed through SPSS version 16. Quantitative variables like HbA1c was presented as mean±SD. Qualitative variables like gender, education status, economic status, treatment for diabetes mellitus and periodontal disease were described by using frequency percentages. The *t*-test was applied to assess statistical significance in mean difference HbA1c between two groups. *p*-value <0.05 was considered significant. **Results:** Forty-six subjects who received non-surgical treatment 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 treatment of periodontal disease indicating a good control of diabetes while in group without treatment there was either no change or increase in HbA1c. Mean HbA1c at baseline in group with treatment of periodontitis at baseline was 7.672±.6414 and without treatment was 6.957±.3494. (*t*= -1.008, *p*<.279). Mean HbA1c after 3 months in group with treatment of periodontitis was 6.867±.6168, and in group without treatment was 6.983±.3678. (*t*=6.641, *p*<.000). **Conclusion:** Non-surgical periodontal treatment is associated with improved glycaemic control (reduced HbA1c level) in type 2 diabetic patients.

Keywords: Diabetes mellitus; periodontitis; Dental Hygiene
J Ayub Med Coll Abbottabad 2016;28(4):742–5

INTRODUCTION

Diabetes mellitus and periodontitis are chronic diseases and are closely linked.[1] The prevalence of diabetes mellitus (DM) in Pakistan was 5.2 million in the year 2000, and cases are increasing day by day, the number is estimated to increase to 13.9 million by the year 2030.[2] Diabetes has many complications where periodontal diseases are considered as sixth complication of diabetes.[3] Periodontitis is a chronic infectious disorder affecting 10–15% of the world population.[4] In Pakistan the prevalence of periodontitis is 6–10%.[5] The goal of periodontitis treatment is to thoroughly clean the pockets around teeth and prevent damage to surrounding bone usually by non-surgical intervention like scaling antibiotics and root canal.

Treatment may be performed by a periodontitis. Diabetes Mellitus and periodontitis may be linked via dysregulated inflammatory and immune responses.[6] Diabetic patients with severe periodontitis have impaired blood glucose as compared to those who have mild periodontitis and those who do not have periodontal disease.[7] A number of case reports, cross-sectional studies, longitudinal studies, and reviews reports were conducted to see that if periodontitis is causally related to the worsening of parameters of diabetic patients, then periodontal treatment should improve glycaemic control. Current study will be an effort to determine the effect of improved periodontal hygiene on diabetic control in type 2 diabetic patients in Diabetic Clinic, Jinnah Hospital Lahore. By this study there will be awareness among people and preventive strategies will be planned.

MATERIAL AND METHODS

A comparative cross-sectional study was conducted to determine the effect of non-surgical periodontal treatment on glycaemic control in type 2 diabetic patients with periodontitis in Diabetic Clinic, Jinnah Hospital, Lahore, during six months from September 2013 to February 2014. After approval from Ethical review board a sample size of 92 (46 in each group) was calculated from win-epi ver:11.0 with 95% confidence

level, 10% acceptable difference and assumed 60% fall in mean HbAC1 in subjects who had treatment for periodontal disease. Type II Diabetes Mellitus patients with periodontitis of any age and either gender with HbA1C between 6–8% were enrolled in the study and an informed consent was taken. 46 diabetic mellitus subjects who had undergone non-surgical treatment of periodontal disease that includes mechanical removal of supra- and sub gingival bacterial plaque with scalers, antibiotics and or root canal if required while 46 subjects with diabetic mellitus having periodontal disease who did not had any treatment for periodontal disease were included in our study. HbA1c was compared at base line and at three months. Data was compiled and analysed through SPSS version 16. Quantitative variables like HbA1c was presented as mean±SD. Qualitative variables like gender, education status, economic status, treatment for diabetes mellitus and periodontal disease were described by using frequency percentages. *t* test was applied to assess statistical significance in change of mean HbA1c between two groups. *p*-value <0.05 was considered significant. Patients with any of any major diabetic complications, having any systemic disease other than diabetes mellitus**,** anaemic or pregnant were excluded from the study. Periodontitis was diagnosed by a dentist by the presence of plaque documented clinically by visualizing a yellow bio film over teeth & their junction with gums. HbA1c was measured at baseline and after 3 months in both groups and glycaemic control was documented as the reduction in Haemoglobin A1C from base line at 3 months. Data was compiled and analysed through SPSS version 16. Quantitative variables like HbA1c was presented as mean±SD. Qualitative variables like gender, education status, economic status, treatment for diabetes mellitus and periodontal disease were described by using frequency percentages. Independent T test was applied to assess statistical significance in change of mean HbA1c between two groups at baseline and after 3 months a *p*-value <0.05 was considered significant.

RESULTS

In this study the DM with periodontitis who received treatment consisted of 20(43.5%) males and 26(56.5%) females with age range of 39–65 (mean age 49.61±6.8) years. DM with periodontitis who did not receive treatment consisted of 26 (56.5%) males and 20 (43.5%) females with age range from 39–70 (mean age 54.20±8.4) years. (p >.05) Frequency & percentages of socio-demographic variable, dental check-up, treatment option for periodontitis & diabetes among two groups were also non-significant. (Table-1).

There was no change in the treatment of diabetes mellitus during the study period or no major complications related to diabetes mellitus were reported. DM with periodontitis those whose received treatment for periodontitis 43(93.5%) received scaling only while 3 (6.5%) received scaling plus antibiotics. Mean HbA1c at baseline in group with treatment of periodontitis at baseline was 7.672±.6414 and without treatment was 6.957±.3494. (t = -1.008, p< .279). Mean HbA1c after 3 months in group with treatment of periodontitis was 6.867±.6168, and in group without treatment was 6.983±.3678. (t=6.641, p<.000).

Table-1: Socio-demographic characteristics of group

Variable	Description	Group I (DM with periodontal disease with treatment)		Group II (DM with periodontal disease without treatment)		Chi-square *p*-value
		Frequency	Percentage	Frequency	Percentage	
Age	31–40 years 41–50 years 51–60 years 61–70	5 26 11 4	10.9 56.5 23.9 8.7	2 16 15 13	4.3 34.8 32.6 28.3	X^2 = 4.965 p= .072
Gender	Male Female	20 26	43.5 56.5	26 20	56.5 43.5	X^2 = 1.565 p= .211
Education	below 10 standard 10 standard above 10th standard graduate and above	29 11 3 3	63.0 23.9 6.5 6.5	33 9 3 1	71.7 19.6 6.5 2.2	X^2 = 1.458 p = .692
Marital status	Married Unmarried	43 3	93.5 6.5	42 4	91.3 8.7	X^2 = .155 p = .694
Socioeconomic status	lower class lower middle class	40 6	87.0 13.0	36 10	78.3 21.7	X^2 = 1.211 p = .271
Dental check up	every3- 6 month 6 months to year Never	1 3 42	2.2 6.5 91.3	0 3 43	0 6.5 93.5	X^2 = 1.012 p = .603
Treatment option for Diabetes Mellitus	oral hypoglycaemic oral hypoglycaemic plus insulin	42 4	91.3 8.7	43 3	93.5 6.5	X^2 = .155 p = .694

Table-2: HBA1c at the baseline and at 3 months

	Groups	n	Mean	SD	*t*-test, *p*-value (2-tailed)
HBA1c at the start of treatment	Group A (Treatment)	46	7.672	.6414	*t*= -1.008
	Group B (Diabetics without periodontal treatment)	46	6.957	.3494	*p*= .279
HBA1c after 3 months	Group A (Treatment)	46	6.867	.6168	*t*= -6.641
	Group B (Diabetics without periodontal treatment)	46	6.983	.3678	*p*= .000

DISCUSSION

Periodontitis and Diabetes Mellitus are two closely, bidirectional linked disease where periodontitis is a well-known complication of diabetes it is also considered to be a cause for poor glycaemic control. The present study aimed to evaluate the glycaemic control in patients suffering from both diabetes mellitus and periodontitis after non-surgical periodontal treatment. Study included only subjects of type 2 diabetes mellitus.

Any improvement in bringing the diabetes level to normal is a huge contribution towards improving the individual's quality of life as chances of complications reduces with controlled glycaemic level.[8] Improvement in the periodontal health of the diabetic patients leads to enhancement of the glycaemic control.[9] The underline mechanism by which periodontal disease and its treatment affects glycaemic level is not fully known. Periodontitis, a chronic inflammatory disease may lead to insulin resistance thus its treatment leads to glycaemic control.[10]

In our study subjects 20 (43.5%) were males and 26 (56.5%) females with age range of 39–65 (mean age 49.61±6.8) years. The control group consisted of 26 (56.5%) males and 20 (43.5%) females with age range from 39–70 (mean age 54.20±8.4) years. Similar age and gender distribution was found in a previous study.[11]

There was no change in the treatment of diabetes mellitus during the study period & there was no major life style modification reported. None of the patient visited for dental hygiene one month prior to study as in previous studies.[11,16]

Factors contributing to periodontitis and poor glycaemic control are low education status, low socioeconomic status and lack of dental hygiene. All these factors contributed towards periodontitis in diabetic patients. In my study those who received treatment for periodontitis 43 (93.5%) received scaling only while 3 (6.5%) received scaling plus antibiotics similar to previous studies.[11,16]

Studies conducted on the relation of diabetes and periodontitis giving almost similar results.[1,2] The study conducted by Mirza *et al* 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.[11]

In a study conducted by Correa FOB *et al* on type 2 diabetic patients with periodontitis and it was found that after treatment of periodontitis HbA1c reduce.[12]

Wijnand *et al* conducted a study suggesting that periodontal treatment leads to an improvement of glycaemic control in type 2 patients for at least 3 months.[13]

Another study conducted by Singh S *et al* showed that non-surgical periodontal treatment is associated with improved glycaemic control in type 2 diabetic patients. The results of this study show that, following periodontal therapy, there is a statistically significant improvement in glycaemic control in individuals with type 2 DM when compared with a non-treatment control group. At baseline, metabolic-matched diabetic patients showed similar levels of plaque accumulation, gingival inflammation, and periodontal breakdown.[14]

Wang *et al* found that Periodontal treatment along with the improvement of periodontal status leads to the modest reduction in HbA1c in diabetic patients for 3 months but the effect of periodontal treatment on HbA1c cannot be observed at 6-month after treatment.[15]

Steven *et al* conducted a multicentre, single mask, randomized clinical trial of nonsurgical periodontal treatment for type 2 diabetics having periodontitis that opposed finding of current study. They did not find any benefit for measures of glycaemic control. Their findings were improved clinical measures of periodontitis by giving periodontal treatment in patients with diabetes but they did not support the use of nonsurgical periodontal treatment for the purpose of achieving better glycaemic control by lowering levels of $HbA_{IC.}$[16]

In the present study fall in the level of HbA1c was reported that is a good control of diabetes in treatment group while in control group there was either no change or increase in HbA1c reported. Treatment group showed a 10.5% improvement in mean HbA1c values (from 7.6–6.8) after periodontal treatment, in control group mean HbA1c at the start of study was 6.9 & after 3 months it was again 6.9. A study conducted in Karachi by Shahida *et al* showed similar results that is improvement of 10.96% with non-surgical treatment.[17]

Another study showed 16.25% improvement in mean values from (5.97–5.00). In a study conducted by Stewart *et al* percentage of improvement was found 17. 1 in treatment group following non-surgical treatment for periodontitis, study showed improvement in level of HbA1c of control group, it was considered to

be due to change of diabetic control during study period.[18]

In a study by Corbella *et al* a total of 15 studies were included in meta-analysis. A reduction of -0.38% (95% confidence interval [CI] -0.23 to -0.53) after 3–4 months (p<0.001) and of -0.31% (95% CI 0.11 to -0.74) after 6 months (p=0.15) of follow-up was found for HbA1c, favouring the treatment group. Similarly, in treated patients, a significantly greater decrease in FPG was observed in respect to control participants. Such difference amounted to -9.01 mg/dL (95% CI -2.24 to -15.78) after 3–4 months (p=0.009) and -13.62 mg/dL (95% CI 0.45 to -27.69) after 6 months (p=0.06) from treatment, respectively.[19]

In my study Mean fall in the level of HbA1c was reported that is a good glycaemic control of diabetes in subjects who had treatment while in control group there was no change or increase in HbA1c reported. Mean HbA1c in group with treatment at baseline was 7.6 & after 3 months 6.8, in control group mean HbA1c at the start of study was 6.9 & after 3 months 6.9. (t=19.947, p< .000).

For this reason, in the present study, there was no change in the treatment of diabetes mellitus, no major life style modification reported and we did not give any additional instructions for better glycaemic control during study period.

CONCLUSION

The results of our study showed that non-surgical periodontal treatment 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.

AUTHORS' CONTRIBUTION

All the authors contributed equally in the preparation of manuscript.

REFERENCES

1. Kiran M, Arpak N, Unsal E, Erdogan MF. The effect of improved periodontal health on metabolic control in type 2 diabetes mellitus. J Clin Peridontol 2005;32(3):266–72.
2. Tanwir F, Tariq A. Effect of Glycemic Conrol on Periodontal Status. J Coll Physicians Surg Pak 2012;22(6):371–4.
3. Shlossman M, Knowler WK, Petit DJ, Genco RJ. Type 2 diabetes mellitus and periodontal disease. J Am Dent Assoc 1990;121(4):532–6.
4. Peterson PE, Ogawa H. Prevention of Periodontal Disease: The WHO Approach. J Periodontol 2005;76(12):2187–93.
5. Khan AA, Sharea I, Ayma S, Ambreena Q, Inayatullah P, Sofia S. Oral health in Pakistan: a situation analysis. Dev Dent 2004;5(2):35–44.
6. Taylor GW, Burt BA, Becker MP, Genco RJ, Shlossman M, Knowler WC, *et al*. Severe periodontitis and risk for poor glycemic control in patients with non insulin dependent diabetes mellitus. J Periodontol 1996;67(10 Suppl):1085–93.
7. Löe H. Periodontal disease the sixth complication of diabetes mellitus. Diabetic Care 1993;16(1):324–34.
8. Ghanbari A, Yekta ZP, Roushan ZA, Lakeh NM. Assessment of factors affecting quality of life in diabetic patients in Iran. Public Health Nurs 2005;22(4):311–22.
9. Stewart JE, Wager KA, Friedlander AH, Zadeh HH. The effect of periodontal treatment on glycemic control in patients with type 2 diabetes mellitus. J Clin Periodontol 2001;28(4):306–10.
10. Mealey BL, Oates TW. Diabetes Mellitus and Periodontal Diseases. J Periodontol 2006;l77(8):1289–303.
11. Mirza BA, Syed A, Izhar F, Khan AA. Improving Quality of Life of Diabetic Patients Through Non-Surgical Periodontal Treatment. Pak Oral Dent J 2012;32(2):288–91.
12. Correa FO, Goncalves D, Figueredo CM, Bastos AS, Gustafsson A, Orrico SR. Effect of periodontal treatment on metabolic control, systemic inflammation and cytokines in patients with type 2 diabetes. J Clin Periodontol 2010;37(1):53–8.
13. Teeuw WJ, Gerdes VE, Loos BG. Effect of Periodontal Treatment on Glycemic Control of Diabetic Patients: a systematic review and meta-analysis. Diabetes Care 2010;33(2):421–7.
14. Singh S, Kumar V, Kumar S, Subbappa A. The effect of periodontal therapy on the improvement of glycemic control in patients with type 2 diabetes mellitus: A randomized controlled clinical trial. Int J Diabetes Dev Ctries 2008;28(2):38–44.
15. Wang X, Han X, Guo X, Luo X, Wang D. The Effect of Periodontal Treatment on Hemoglobin a1c Levels of Diabetic Patients: A Systematic Review and Meta-Analysis. PLoS One 2014;9(9):e108412.
16. Masood S, Qureshi MA, Soomro MA. The effect of periodontal therapy on probing pocket depth and glycemic changes in type 2 diabetes patients. J Pak Dent Assoc 2010;19(4):203–7.
17. Southerland JH, Taylor GW, Offenbacher S. Diabetes and Periodontal Infection: Making the Connection. Clin Diabetes 2005;23(4):171–8.
18. Engebretson SP, Hyman LG, Michalowicz BS, Schoenfeld ER, Gelato MC, Hou W, *et al*. The effect of nonsurgical periodontal therapy on haemoglobin A1c levels in persons with type 2 diabetes and chronic periodontitis: a randomized clinical trial. JAMA 2013;310(23):2523–32
19. Corbella S, Francetti L, Taschieri S, De Siena F, Fabbro MD. Effect of periodontal treatment on glycemic control of patients with diabetes: A systematic review and meta-analysis. J Diabetes Investig 2013;4(5):502–9.

Received: 24 December, 2015	*Revised: 24 March, 2016*	*Accepted: 15 November, 2016*

Address for Correspondence:

Dr Sadia Salman, House No.165 F2, Wapda Town, Lahore-Pakistan
Cell: +92 334 409 0140
Email: doctorsadia@gmail.com