

IMPROVING QUALITY OF LIFE OF DIABETIC PATIENTS THROUGH NON-SURGICAL PERIODONTAL TREATMENT

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ABSTRACT

Improving the periodontal health leads to better glycemic control in type 2 diabetic patients.^{6,7} The study included known type II diabetic patients registered with the Diabetic Out Patient Department of Shaikh Zayed Hospital Lahore and Oral examinations were carried out in the Department of Oral Health Sciences of Shaikh Zayed Medical Institute. 61 subjects, 31 treatment group 30 control group. All the patients were non smokers with at least 14 teeth and showed mild to severe level of periodontal disease. Age ranged from 45-65years. HbA1c values varied from 5-8%. No history of systemic antibiotic administration in the past 3 months. Subjects with any change in oral glycemic drug or its dose altered were withdrawn from the study. Patients with gingival hyperplasia, with renal problems, using any renal medication or any antibiotics were not included in the study. Treatment group showed a statistically and clinical significant improvement of 16.25% in HbA1c values. The periodontal therapy improves quality of life of diabetic person by improving glycemic control and decreasing the patients' dosage of oral glycemic drugs. In review of this advantage periodontal therapy should be made an integral part of the regime to improve glycemic control.

Key words: Diabetes, Periodontal disease, Non surgical periodontal treatment, HbA1c, Glycemic control

INTRODUCTION

Periodontitis is a chronic infectious disorder affecting 10-15% of the world population.¹ Pakistan has a prevalence of 6-10% of the disease.²

Evidence support that systemic conditions deteriorate by sustained chronic inflammatory process anywhere in the body might further worsen in the presence of periodontal disease.³

Diabetes mellitus is one such systemic disorder which is directly influenced by level of gingival health. Hyperglycemia due to uncontrolled diabetes leads to increase in the production of advanced glycation end

products (AGEs) in blood.⁴ These AGEs lead to increase sensitivity of inflammatory cells to any stimuli thus exaggerating the inflammatory response.⁵

An improvement in periodontal health would lead to enhancement in glycemic control.^{6,7} With nearly 140 million people in Pakistan with diabetes, would reap the major benefit from a simple non-surgical periodontal therapy.

METHODOLOGY

The study included known type II diabetic patients registered with the Diabetic Out Patient Department of Shaikh Zayed Hospital Lahore with ethical approval

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from the Institutional Review Board. Study period was approximately 6 months (July 2008 to January 2009). Patients were randomly allocated to treatment group and control group using sealed envelope technique. The concealment was carried out using an third person who was not related to the study. Though the periodontal treatment was done free for all, the budget for this study was limited which only allowed two HbA1c tests per participant. Therefore the funding only inducted 70 participants with their follow-ups. All the patients age ranged from 45-65 years were nonsmokers with at least 14 teeth and mild to severe level of periodontal disease. HbA1c values varied from 5-8%. They had no active local infection (other than periodontal infection) and had not undergone any periodontal therapy in the past six months (such as scaling and root planning). There was no history of systemic antibiotic administration in the past 3 months. Any patient having oral glycemic drug changed or dose altered was withdrawn from the study in order to remove false positives. Patients with gingival hyperplasia, renal problems or using any renal medication were excluded from the study. All the patients belonged from the same socio economic status and they were matched for education. Data related to demography, medication, dosage, HbA1c values and periodontal disease were noted at baseline and at 4th months for both treatment group and control group.

Non-surgical Periodontal treatment

The treatment group was given non-surgical periodontal treatment at baseline after periodontal examination. They were recalled for reassessment at 4th month. All subjects underwent periodontal examination by a single examiner. The patients received oral hygiene instructions and full mouth scaling and root planning on a dental unit with artificial light using ultra sonic scaler. The control group received no periodontal treatment during the study period. After the completion of the study, the control group received full non surgical periodontal treatment.

Data Collection

The parameters recorded were:

- Pocket depth from four locations of each tooth present was recorded. These were coded according to WHO Community periodontal index (CPI) criteria; 0: Healthy 1: Bleeding, 2: Calculus, 3: Pocket 3.5-5.5mm and 4: Pocket \geq 6mm.

- Gingival index (GI): recordings were made from each tooth according to the criteria of (Loe and Silness).⁸
- For glycemic parameters assessment, venous blood samples were taken from each patient for the measurement of glycemic level by glycated hemoglobin (HbA1c).

Statistical analysis

The statistical analysis was performed using SPSS version 17 program. Student T test was used to test difference of age, sex and glycemic control. Periodontal depth and GI were analysed using Wilcoxon's sign rank test. HbA1c was analysed by Student T test and for between the group analyses repeated measures of Anova was used. The difference between the periodontal parameters and glycemic control was measured by Chi square test.

RESULTS

The treatment group consisted of 14 (45%) men and 17 (55%) women with an age range of 28-73 (mean age 53.03 ± 11.96) years. The control group consisted of 13 (43%) men and 17 (57%) women with an age range of 33-67 (mean age 52.76 ± 8.99) years.

There was no statistical difference found in treatment and control groups with respect to the age, education socio economic status at baseline.

Both groups at baseline showed periodontal depth with pockets from 3.5mm to more than 6mm in table 1. After the periodontal therapy for the treatment group showed a statistically significant improvement in the treatment group ($p < 0.001$). The control group showed minor changes in the pocket depth which was statistically not significant ($p > 0.05$).

The reduction in the level of inflammation for GI in treatment group in table 2 was highly statistically significant ($p = 0.002$).

Glycemic control

Table 3 shows the difference in the HbA1c during the follow-ups. The results show an improvement of 16.25% in mean HbA1c values in the treatment group. It was seen that the change in HbA1c values were statistically significant among the different follow ups in the treatment group ($p < 0.001$).

Periodontal Parameters

TABLE 1: PERIODONTAL HEALTH IN TREATMENT AND CONTROL GROUPS (COMMUNITY PERIODONTAL INDEX CPI)

Periodontal Status	Treatment Group		Control Group	
	Periodontal depth baseline %	Periodontal depth 4 th month %	Periodontal depth baseline %	Periodontal depth 4 th month %
Healthy	0	96.8	0	0
Bleeding	0	3.2	0	0
Calculus	41.9	0	53.3	53.3
Pocket 3.5-5.5mm	45.2	0	36.7	36.7
Pocket \geq 6mm	9.7	0	10	10

TABLE 2: PERIODONTAL HEALTH IN TREATMENT AND CONTROL GROUPS (GINGIVAL INDEX GI)

Periodontal Status	Treatment Group		Control Group	
	GI baseline %	GI 4 th month %	GI baseline %	GI 4 th month %
No Inflammation	0	96.8	0	0
Mild Inflammation	0	0	0	0
Moderate Inflammation	51.6	3.2	51.6	51.6
Severe Inflammation	48.4	0	45.2	45.2

TABLE 3: GLYCEMIC LEVELS IN TREATMENT AND CONTROL GROUP

	Treatment Group	Control Group
HbA1c baseline	5.97 \pm 1.74	6.17 \pm 1.48
HbA1c 4 th Month	5.00 \pm 1.51	6.18 \pm 1.49

DISCUSSION

Glycemic control is an important precursor of generalized nephropathy, neuropathy and other diseases.^{9,10} Any improvement in bringing the diabetes level to normal is a huge step towards improving the individual's quality of life.¹¹

Periodontal disease causes depreciation of the glycemic control.¹² Improving the periodontal health leads to enhancement in the glycemic control.¹³ The current study has shown that improving the periodontal disease decreases the glycemic level markedly.

Both periodontal parameters (CPI and GI) showed statistical and clinical significant improvement in periodontal depth. The patients in the treatment group showed 100% improvement from the 6mm pocketing in periodontal depth category.

There is no national data on GI which can be compared with the current study. Madden E.T et al in their pilot trial carried out in Oregon saw a reduction of 62.7% in GI.¹⁴ On the contrary, the current study showed a greater reduction of 96.8%. Our study had a larger sample size which could account for the variation. In the current study also showed greater reduction because of the fact that any change in glycemic drug or its dosage were excluded from the study. Therefore preventing the study results from getting masked. Another study in which Kiran et al found an improvement of 72.3% in GI values.¹⁵ This study had a shorter follow up period of 3 months as compared to 4months of the current study.

The patients showed an improvement of 16.25% in mean HbA1c values (from 5.97 to 5.00) after periodontal treatment. This percentage of improvement is very similar to the one achieved in Stewarts study,¹³ who also performed tooth extractions with periodontal therapy. A study by Shahida et al in Karachi showed an improvement of 10.96% with non-surgical treatment along with antibiotic administration.¹⁶ This study did not account for the change in the glycemic drugs or their dosages like the current study. A similar study by

Miller et al found an improvement of only 4.5%. The duration of this study was half as compared to our study.¹⁷ Seppala B et al reported similar findings.¹⁸

Another implication is the increase in the chance of myocardial infarctions which diabetic people may incur. Improvement in the level of Blood Sugar Level (BSL) would certainly decrease the risk of myocardial infarction. It has been seen that as little as a 1% decrease in mean HbA1c value, has been shown to reduce myocardial infarctions by 14%.¹⁵ In the current study 0.97% improvement in HbA1c values translates in to 13.58% decrease in a chance of a diabetic patient of having a myocardial infarction.

CONCLUSION

The study gives a clear indication of significant improvement in the glycemic control and decrease in cardiac risks after a simple and inexpensive periodontal treatment. In light of the evidence periodontal treatment; scaling should be made an essential part of treatment for diabetes mellitus.

REFERENCES

- Peterson P.E and Ogawa H. Prevention of Periodontal Disease: The WHO Approach. *J Periodontol* 2005;76:2187-93
- Oral health in Pakistan: A situation analysis. Ministry of health/who publication; Govt of Pakistan 2004
- Wilder R.S, Iacopino A.M, Feldman C.A, Guthmiller J, Linfante J, Lavigne S and Paquette D. Periodontal-Systemic Disease Education in U.S. and Canadian Dental Schools. *Journal of Dental Education*, 2009;73:38-52.
- Offenbacher S, Salvi GE. Induction of prostaglandin release from macrophages by bacterial endotoxin. *Clin Infect Dis* 1999;28:505-13.
- Janket S J, Wightman A, Baird A E, Van Dyke T E and Jones J A. Does periodontal treatment improve glycemic control in diabetic patients? A meta-analysis of intervention studies. *J Dent Res*. 2005; 84:1154-1159. .
- Genuth S, Eastman R, Kahn R, Klein R, Lachin J, Lebovitz H, Nathan D, Vinicor F. Implications of the United Kingdom Prospective Diabetes Study: American Diabetes Association (Position Statement). *Diabetes Care* 2003;26:28-32.
- Unger J. Current strategies for evaluating, monitoring, and treating type 2 diabetes mellitus. *Am J Med* 2008;121:3-8.
- Murshid E Z. Oral health status, dental needs, habits and behavioral attitude towards dental treatment of a group of autistic children in Riyadh, Saudi Arabia. *Saudi Dental Journal* 2005;17:132-39.
- Koopman RJ, Mainous III AG, Liszka HA, Colwell JA, Slate EH, Carnemolla MA, Everett CJ. Evidence of Nephropathy and Peripheral Neuropathy in US Adults With Undiagnosed Diabetes. *Annals Of Family Medicine* 2006;4:427-32.
- Thai AC, Yeo PP, Lun KC, Hughes K, Ng WY, Lui KF. Diabetes mellitus and its chronic complications in Singapore: an increasing healthcare problem. *Ann Acad Med Singapore* 1990;19:517-23.
- Ghanbari A, Yekta Z P, Roushan Z A and Lakeh N M. Assessment of factors affecting quality of life in diabetic patients in Iran. *Public Health Nursing*, 2005;22:311-22.
- Wah C.T, Fidelia BK T, Lum P.L, Diabetes as a Risk Factor for Periodontal Disease: Current Status and Future Considerations *Ann Acad Med Singapore* 2006;35:571-81
- 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: 306-10.
- Madden E T, Brock Herriges, L Boyd, G Laughlin, G T Chiado and DI Rosenstien. Alterations in HbA1c following minimal or enhanced non-surgical, non-antibiotic treatment of gingivitis or mild periodontitis in type 2 diabetic patients: a pilot trial. *The Journal of Contemporary Dental Practice*, 2008;9:9-16.
- Kiran M, Arpak N, U'nsal E, Erdogan MF: The effect of improved periodontal health on metabolic control in type 2 diabetes mellitus. *J Clin Periodontol* 2005; 32: 266-72.
- 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: 203-207.
- Janet H. Southerland, George W. Taylor and Steven Offenbacher. Diabetes and Periodontal Infection: Making the Connection. *Clinical diabetes* 2005;23: 171-78.
- Lucia Miralles, F. Javier Silvestre, Antonio Hernández-Mijares, Daniel Bautista, Fernando Llambes, Diana Grau. Dental caries in type 1 diabetics: influence of systemic factors of the disease upon the development of dental caries. *Med Oral Patol Oral Cir Bucal* 2006;11:256-60.