INTRODUCTION

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

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

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. These AGEs lead to increase sensitivity of inflammatory cells to any stimuli thus exaggerating the inflammatory response.

An improvement in periodontal health would lead to enhancement in glycemic control. 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.
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 with drawn 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 ultrasonic 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 >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 Annova 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 follows up in the treatment group (p< 0.001).
Periodontal Parameters

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

<table>
<thead>
<tr>
<th>Periodontal Status</th>
<th>Treatment Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Periodontal</td>
<td>Periodontal</td>
</tr>
<tr>
<td></td>
<td>depth baseline</td>
<td>depth 4th month</td>
</tr>
<tr>
<td>Healthy</td>
<td>0 %</td>
<td>96.8 %</td>
</tr>
<tr>
<td>Bleeding</td>
<td>0 %</td>
<td>3.2 %</td>
</tr>
<tr>
<td>Calculus</td>
<td>41.9 %</td>
<td>0 %</td>
</tr>
<tr>
<td>Pocket 3.5-5.5mm</td>
<td>45.2 %</td>
<td>0 %</td>
</tr>
<tr>
<td>Pocket ≥6mm</td>
<td>9.7 %</td>
<td>0 %</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Periodontal Status</th>
<th>Treatment Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GI baseline %</td>
<td>GI 4th month %</td>
</tr>
<tr>
<td>No Inflammation</td>
<td>0 %</td>
<td>96.8 %</td>
</tr>
<tr>
<td>Mild Inflammation</td>
<td>0 %</td>
<td>0 %</td>
</tr>
<tr>
<td>Moderate Inflammation</td>
<td>51.6 %</td>
<td>3.2 %</td>
</tr>
<tr>
<td>Severe Inflammation</td>
<td>48.4 %</td>
<td>0 %</td>
</tr>
</tbody>
</table>

TABLE 3: GLYCEMIC LEVELS IN TREATMENT AND CONTROL GROUP

<table>
<thead>
<tr>
<th></th>
<th>Treatment Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c baseline</td>
<td>5.97± 1.74</td>
<td>6.17± 1.48</td>
</tr>
<tr>
<td>HbA1c 4th Month</td>
<td>5.00± 1.51</td>
<td>6.18± 1.49</td>
</tr>
</tbody>
</table>

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 valves.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.\textsuperscript{17} Seppala B et al reported similar findings.\textsuperscript{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%.\textsuperscript{15} In the current study 0.97% improvement in HbA1c values translates into 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**

2. Oral health in Pakistan: A situation analysis. Ministry of health/who publication; Govt of Pakistan 2004