ROLE OF PERIODONTAL THERAPY IN TYPE II DIABETES MELLITUS

SHAHIDA MAQSOOD, BDS, MPhil
MAQSOOD AHMED SOOMRO, BDS, MCPS
SAIMA AKRAM BUTT, BDS, MDS Trainee
FAIZA AMIN, BDS MDS
FAUZIA QADIR, BDS, FCPS
QURATULAIN MAQSOOD, BDS

ABSTRACT

The purpose of this study was to observe a gender based effect of periodontal therapy on glycaemic control of type II diabetes mellitus. This Interventional study was conducted on one hundred four patients suffering from type II diabetes mellitus, both gender were included from twenty five to sixty five years of age. Periodontal parameters were calculated using the community periodontal index need, bleeding on probing, tooth mobility and furcation involvement. The glycaemic status was evaluated by determining glycosylated haemoglobin (HbA1c) levels at base line before non-surgical periodontal therapy and three months after receiving the treatment. All the examination and data collection were carried out by a single examiner. The data were analysed using the SPSS version 15. It was conducted that the periodontal parameters along with the reduction in the results of glycaemic parameters significantly improved (p < 0.005) and more pronounced in female patients than male patients. It was concluded that the severity of the periodontal disease is the most important risk factor related to poor glycaemic control.

Key Words: Glycosylated haemoglobin (HbA1c), periodontal disease, diabetes mellitus, oral hygiene, blood glucose level.

INTRODUCTION

The term periodontal disease originated from Greek words peri (around) and odous (tooth). It refers to a group of inflammatory disorders having a bacterial aetiology, which causes inflammation as well as destruction of supporting tooth structures. It is known that acute viral as well as bacterial infections are often accompanied by insulin resistance in people without diabetes which may persevere for weeks, even months after the patient has clinically recovered from the illness.2 The insulin resistance increases by 33% during an acute phase of bacterial infection whereas it decreases to 28% during the convalescent period.3 The most common human endocrine disorder such as diabetes mellitus, shows a chronic hyperglycaemia, whereas periodontitis is a common oral disorder, hence inflammation elaborating as a critical factor associating these two conditions.4

Periodontitis is considered a chronically localized infection of the periodontal tissues which elicits a local as well as systemic inflammatory host-immune response, which could be a basis of bacteraemia, because of the big surface of epithelial cells that show ulcerated periodontal pockets.5

The mechanism by which diabetes mellitus interacts with periodontitis encompasses a very strong inflammatory response distinguished by inflammatory cytokine secretion that has both, local (periodontal destruction) as well as systemic (impaired glycaemic control) effects.6-10 It is well documented that periodontal therapy can have an advantageous effect on the glycaemic control.11-13 This study was designed to establish the level of improvement in glycaemic control of diabetic patients by treating periodontal disease.
Insulin resistance results in type II diabetes mellitus in which target cells do not respond to endogenously produced insulin. An absolute or relative deficiency of insulin consequentially leads to hyperglycaemia which not only leads to long term systemic complications like macro-vascular disease, myopathies, neuropathy, altered wound healing and unhealthy periodontal tissue but also causes a dysfunction of the immune system that causes compromised immune responses in a patient. On the other hand, periodontitis, especially its severe type, influences not only the pathogenesis but also increases the risk of developing some systemic diseases such as diabetes.

**METHODOLOGY**

This Interventional study was conducted on one hundred four known type II diabetes mellitus patients, belonging to a literate, middle socioeconomic class. Both the genders were included, the age ranged between twenty five to sixty five years. Patients under twenty five years of age and above the age of sixty five years of age with type 1 insulin dependent diabetes mellitus and those suffering from any other systemic diseases were excluded from this study. Patients were selected through convenience sampling. Patients were given details about the research project and consent was obtained from every patient before starting the clinical examination. Investigation and treatment were carried out in the outpatient department of Periodontology, Fatima Jinnah Dental College and Hospital, Karachi during the period of two years. A standardized evaluation form was used for all the patients recording personal history, medical and dental history.

Periodontal status of the patients was assessed using the community periodontal index of treatment need (CPI TN) to measure all four surfaces of gingiva from the gingival margin to the base of periodontal pocket. Four categories of pocket depth were used as standard which includes 1-2mm, 3-4mm, 5-6mm and ≥ 6mm. bleeding on probing, tooth mobility and furcation involvement were also recorded. After obtaining the glycaemic and periodontal parameters data, scaling was done using an ultrasonic scalar and systemic doxycycline 100mg/day for fourteen days was prescribed. Oral hygiene instructions including brushing techniques, along with the use of mouth wash for ten days were also given to the patients. Instructions were also given about control of diet and use of medication. After three months patients were recalled and again data were obtained for the periodontal and glycaemic parameters.

Glycaemic level in the blood was evaluated at the base line and after three months. Blood sample was taken for assessing the blood glucose level HbA1c (Well controlled metabolism 4.5-7%) using fast ion exchange resin separation method, fasting blood glucose level (< 126 mg/dl) and random glucose level (> 140 mg/dl) were screened using a glucometer. (ACCU CHECK, Advantage system/sensor Comfort strips, Roche diagnostics, Mannhem, Germany). Blood samples were analysed in the same laboratory to standardize the results and minimize the error in two measurements.

All the examination and data collection was carried out by a single examiner. The data were analysed using the SPSS version 15. Paired t-test was applied for fasting and random glucose levels. Wilcoxon sign ranked test was applied to compare the results of HbA1c. All the dental parameters were computed by frequency and percentages.

**RESULTS**

This Interventional study was carried out on total of one hundred four diagnosed type II diabetes mellitus included 70 males and 34 females.

The overall mean age of patients was 47.72± 9.82. Pre-treatment glycaemic status was observed as normal, controlled and uncontrolled in both sexes. Among the males, 15% had normal glycaemic status, 40% showed controlled diabetes and 45% suffered from uncontrolled diabetes. However among females 19% had normal blood glucose level, 35% showed controlled levels and 46% were patients with uncontrolled diabetes (Fig 1).

Among the males showing normal glycaemic status, the percentage increased from 15% to 29%, whereas percentage of controlled diabetes was increased from 40% to 49%. The percentage of patients with uncontrolled diabetes decreased from 45% to 22% after periodontal treatment showing a significant improvement. While among the females, the percentage of patients with normal blood glucose level increased from 19% to 30%, with controlled diabetes from 30% to 50% and with uncontrolled diabetes decreased from 40% to 19%. (Fig 2)

For males p-value for the difference in pocket depth before and after treatment was 0.05 which is just marginally significant, but for females p-value for the difference in pocket depth was 0.01 which shows statistically significant reduction in pocket depth after treatment. (Table 1)

Bleeding on probing, tooth mobility and furcation involvement parameters also statistically were more significant in females than males. (Table 2)

**DISCUSSION**

A distinct increase in the inflammatory response to bacterial invasion was reported in diabetic patients in comparison to the normal category patients. An increase in the plasma concentrations of pro-inflammatory cytokines was noticed and periodontal pathogens were also detected in the blood. Type 2 is the more prevalent
Periodontal therapy in Type II diabetes mellitus

Countries with the highest rates of diabetes in the Eastern Mediterranean region and the Middle East are the United Arab Emirates, Saudi Arabia, Bahrain, Kuwait and Oman. A study also presented periodontitis to be a well-known complication of diabetes and more communal in persons with raised glucose levels. This study concentrated on the analysis of different parameters in association to gender which resulted in significant results. The results of the study show a higher prevalence in the male population. The normal group was predominated by the female population in comparison to the males. The controlled group, however, was more prevalent in the males than females where as in uncontrolled group; the females were more than males. After periodontal treatment, males having normal glycaemic status shows increase percentage whereas percentage of controlled diabetes was also increased in males after treatment. However, the percentage of patients with uncontrolled diabetes was decreased markedly after periodontal treatment showing a significant improvement. While among the females, the percentage of patients with normal blood glucose level and with controlled diabetes was increased whereas the percentage was decreased in uncontrolled diabetic patients. Almost similar results were obtained in a controlled clinical trial of 13 patients with diabetes mellitus type II carried out in Japan, which showed a noteworthy reduction in the HbA1C levels in plasma from 8.0 to 7.1 % (mean reduction of 0.8%). This suggests that if periodontal inflammation

<table>
<thead>
<tr>
<th>Pocket depth</th>
<th>Pre-treatment Males %</th>
<th>Post-treatment Males %</th>
<th>Pre-treatment Females %</th>
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<tbody>
<tr>
<td>1-2 mm</td>
<td>32.86</td>
<td>51.43</td>
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<td>40</td>
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<td>5-6 mm</td>
<td>22.86</td>
<td>14.29</td>
<td>8.82</td>
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<tr>
<td>&gt;6 mm</td>
<td>5.88</td>
<td>2.86</td>
<td>4.29</td>
<td>2.94</td>
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<table>
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<tr>
<th>Dental Parameters values</th>
<th>Pre-treatment Males %</th>
<th>Post-treatment Males %</th>
<th>Pre-treatment Females %</th>
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<tr>
<td>Bleeding on probing</td>
<td>48</td>
<td>20</td>
<td>52</td>
<td>8.82</td>
</tr>
<tr>
<td>Tooth mobility</td>
<td>Normal 65.71</td>
<td>Normal 84.29</td>
<td>Normal 67.65</td>
<td>Normal 88.24</td>
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<tr>
<td></td>
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<td>&lt; 1mm 14.29</td>
<td>&lt; 1mm 32.35</td>
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<tr>
<td>Furcation Involvement</td>
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<td>Normal 48.57</td>
<td>Normal 50</td>
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<td>&gt; 2mm 12.86</td>
<td>&gt; 2mm 17.65</td>
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is reduced, there will be a decreased serum inflammatory mediators level associated with insulin resistance, thereby consequently improving glycaemic control. In the present study, any probable difference in healing of periodontium between pre and post groups could be attributed to baseline differences in disease levels, as the periodontal examination at the first visit showed a significantly higher percentage of periodontal pockets and probing depth, in the diabetic patients.

Certain studies have shown that, if scaling and root planning are combined with systemic doxycycline, there is a marked improvement in the periodontal status of the patient, that significantly improves the glycaemic control, as can be monitored by the glycylstated haemoglobin assay (HbA1c). The reviewed literature also suggest a likelihood of treating with full-mouth ultrasonic debridement in combination with systemic tetracycline to improve the diabetic condition. An meta-analysis study also demonstrated glycaemic control improved after periodontal therapy. Current study shows an improvement in clinical periodontal parameters in diabetic patients with periodontal problems, with statically significant result.

For gender based comparison of the periodontal parameters male and female groups this study further divided into different categories: For comparisons of pocket depth in both genders, more female were found to have 1-2 mm depth pockets than males in patients with 3-4mm deep pockets, again the females were more prevalent than males. The patients with 5-6 mm deep pockets showed a male preponderance over females and subjects with > 6 mm pockets, females were more than males. A dental examination carried out three months after non-surgical periodontal therapy revealed that the percentage in both the genders showed an increase towards normality.

Thus it is evident from the present study that more male patients improved in comparison with females in all groups (pre and post) except within >6 mm pocket depth group where females showed more improvement than males. In both sexes, bleeding on probing also showed significant pre and post treatment results. A pronounced improvement was observed in females. Tooth mobility was further classified in to three groups, as normal, <1mm and >1mm horizontal mobility. After therapy both genders showed an increase in normal group and a decrease in other two groups. This shows that the female patients improved more than the males in normal group as well as in < 1mm mobility group where improvement was seen more in female than males.

In furcation involvement in both genders more improvement was observed in female than in male patients, in normal and in <2mm furcation involvement while on the other hand males percentage increased and females percentage remained unchanged in the >2 mm furcation involvement. A research was conducted to study the effects of mechanical debridement with and without systemic antibiotics, on patients suffering from diabetes together with periodontal disease. A group of 15 type II diabetic patients received mechanical debridement together with amoxicillin/clavulanic acid for a period of 2 months, while a similar group received only mechanical debridement. Although both groups showed a marked improvement in all periodontal variables, a significant reduction in HbA1C was only significant (P ≤ 00.05) in the latter group, demonstrating a less-favourable response in the group receiving adjunctive treatment with systemic antibiotic.

Available data on the effectiveness of periodontal care and treatment on improving the glycaemic control in poorly controlled diabetes is, however, evasive. A study perceived hyposalivation as the most common oral manifestation, seen in 68%, followed by halitosis in 52%, periodontitis in 32%, burning mouth sensation in 32%, candidiasis, and taste alteration in 28% of cases with controlled Diabetes Mellitus. Current study affirms this two way affiliation between periodontitis and diabetes has been proposed. In a study it was advised that the frequency and severity of periodontitis are influenced by the presence or absence of Diabetes Mellitus. These studies also indicate that the existence of severe periodontitis may adversely influence the control of Diabetes Mellitus.

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The chronic nature of infections of the periodontium is considered to be a contributing factor in worsening the diabetic status and a successful periodontal treatment has been suggested to improve metabolic control in diabetes. Current study affirms this two way relationship that is periodontal treatment results in better control of glycaemic status which in turn leads to improvement in the periodontal disease status.

CONCLUSION

The results obtained from this study prove that after a periodontal therapy, the patient experiences a considerable improvement in glycaemic levels in patients with type II Diabetes Mellitus. When the incidence of the pre and post changes in treatment in glycaemic control was examined among diabetics, it appeared that frequency differences represented observed overall
changes among the groups as a whole and not among a few subjects.

REFERENCES