Prevalence of periodontal abscess among controlled and uncontrolled type 2 diabetic patients (comparative study)

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ABSTRACT
Background: The aim of this study is to compare the periodontal health status and prevalence of periodontal abscess between controlled and uncontrolled type 2 diabetic patients.

Material and Methods: sixty four type 2 diabetic patients were enrolled in this study, thirty two patients were controlled diabetic and the other thirty two patients were uncontrolled diabetic. The study was cross sectional and the diabetic patients were selected regardless the periodontal health status and sex but adjusted according type 2 diabetic mellitus. Periodontal health examination include plaque index (PLI), gingival index (GI), probing pocket depth (PPD) and teeth with periodontal abscess were recorded except third molar teeth were excluded.

Results: There was no significant difference in mean of plaque index and probing pocket depth but significant difference in mean gingival index between both groups. There was a significant difference regarding periodontal abscess per tooth between both groups with a frequency distribution showed that the lower anterior teeth were most affected followed by the upper anterior teeth then the lower posterior teeth.

Conclusion: periodontal abscesses affect more uncontrolled type 2 diabetic patient than controlled. So it is important to the diabetic patients to control their diabetic status to avoid such a decline in their periodontal health.

Key words: periodontal abscess, type 2 diabetic patient, periodontal health status, frequency distribution. (J Bagh Coll Dentistry 2011;23(3): 92-96).

INTRODUCTION
Periodontium is the general term that describes the tissues that surround and support the tooth structure. The periodontal tissues include the gums, the cementum, the periodontal ligament and the alveolar bone (1). Among several acute conditions that can occur in periodontal tissues, the abscess deserves special attention. Abscesses of the periodontium are localized acute bacterial infections which are confined to the tissues of the periodontium (1). Abscesses of the periodontium have been classified primarily, based on their anatomical locations in the periodontal tissue. There are four types (2) of abscesses which are associated with the periodontal tissues:

1) a gingival abscess which is a localized, purulent infection that involves the marginal gingiva or the interdental papilla; 2) pericoronal abscesses which are localized purulent infections within the tissue surrounding the crown of a partially erupted tooth; 3) combined periodontal/endodontic abscesses are the localized, circumscribed abscesses originating from either the dental pulp or the periodontal tissues surrounding the involved tooth root apex and/or the apical periodontium and 4) periodontal abscesses which are localized purulent infections within the tissue which is adjacent to the periodontal pocket that may lead to the destruction of the periodontal ligaments and the alveolar bone. These are also known as lateral periodontal abscesses or parietal abscesses.

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Among all the abscesses of the periodontium, the periodontal abscess is the most important one, which often represents the chronic and refractory form of the disease (3). It is a destructive process occurring in the periodontium, resulting in localized collections of pus, communicating with the oral cavity through the gingival sulcus or other periodontal sites and not arising from the tooth pulp.

The important characteristics of the periodontal abscess include: a localized accumulation of pus in the gingival wall of the periodontal pockets; usually occurring on the lateral aspect of the tooth; the appearance of oedematous red and shiny gingiva; may have a dome like appearance or may come to a distinct point. Depending on the nature and course of the periodontal abscess, an immediate attention is required to relieve pain and systemic complications (1).

Moreover, the presence of an abscess may also modify the prognosis of the involved tooth and in many cases, may be responsible for its removal. Therefore, accurate diagnosis and the immediate treatment of the abscesses are the important steps in the management of patients presenting with such abscesses. The prevalence of periodontal abscess is relatively high, which is often the reason why a person seeks dental care (1). Periodontal abscess accounts for 6% - 14% of all dental emergencies (3). It is the third most common (3) dental emergency [1st is Pulpal infection (14%-25%), followed by pericoronitis (10%-11%)]. Among all emergency dental conditions, periodontal abscesses represent
approximately 8% of all dental emergencies in the world \(^{(3)}\), and up to 14% in the USA.\(^{(4,5)}\)

Diabetes mellitus is a syndrome of abnormal carbohydrate, fat and protein metabolism that results in acute and chronic complications due to the absolute or relative lack of insulin. There are three general categories of diabetes: type 1, which results from an absolute insulin deficiency; type 2, which is the result of insulin resistance and an insulin secretory defect; and gestational, a condition of abnormal glucose tolerance during pregnancy \(^{(6)}\). The aim of this study is to compare the periodontal health status and prevalence of periodontal abscess between controlled and uncontrolled type 2 diabetic patients.

**MATERIALS AND METHODS**

**Human sample and design**

Type 2 diabetic patients included in this study were drawn from Al-Mustansirya University National Diabetic Center. Sixty four patients were enrolled in this study. Periodontal hygiene status was assessed by means of a self reported questionnaire (appendix) which included general information: name, age, periodontal parameters (plaque index, gingival index, probing pocket depth and number and location of teeth with periodontal abscess). Those patients were divided into two groups according to fasting blood sugar test and history \(^{(6)}\):

1) **Group 1 (controlled):** thirty two type 2 diabetic patients with fasting blood sugar between (80-120 mg/dl).

2) **Group 2 (uncontrolled):** thirty two type 2 diabetic patients with fasting blood sugar more than (120 mg/dl).

The participants should not have any other systemic diseases than diabetic mellitus and should not be under medication for other systemic diseases affecting on periodontal health. The study is cross sectional, all participants were carefully informed about the aims of the investigation and they were free to withdrawn at any time during the study. Oral examinations were done in the same visit. All participants were selected regardless the periodontal health status and sex but adjusted according to type 2 diabetic mellitus.

**Oral examination:**

Oral examination was performed in a dental clinic, on a dental chair; all periodontal variables were recorded on four sites (mesial, buccal, distal and lingual) for all teeth except the third molar which was excluded.

**RESULTS**

Sixty four type 2 diabetic patients were enrolled in this study, they divided into two groups: 1) uncontrolled group: in which 32 patients were examined, the results in this group was that 708 teeth and 2832 surfaces were examined with 8 patients suffering from periodontal abscess and 32 teeth affected by periodontal abscess. 2) controlled group: in which 32 patients were examined, the results in this group was that 728 teeth and 2912 surfaces were examined with 3 patients suffering from periodontal abscess and 9 teeth affected by periodontal abscess as shown in table 1.

Inter group comparisons between controlled and uncontrolled groups for significant difference of mean plaque index scores, mean gingival index scores, percentage of different scores of probing pocket depth, number of patients with periodontal abscess and number of teeth with periodontal abscess were carried out by statistical analysis and the results showed the following:

1- **Plaque index (PLI)**

The result of present study showed that the means of plaque index were higher in uncontrolled patients =1.375±0.690 compared with controlled patients =1.158±0.857. The inter group comparison for plaque index between both groups showed that there was a non significant difference between them where the p.value >0.05 as shown in table 2 and table 3.

2- **Gingival index (GI)**

The result showed that the means of gingival index were higher in uncontrolled patients =1.568±0.814 compared with controlled patients =1.142±0.626. The inter group comparison for gingival index between both groups showed that there was a significant difference between them where the p.value <0.05 as shown in table 2 and table 3.

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(1) Assessment of dental plaque by (plaque index system (PLI)) according to Sillness and Loe \(^{(7)}\).

(2) Assessment of gingival inflammation by (gingival index system (GI)) according to Loe and Sillness \(^{(8)}\).

(3) Probing pocket depth measurement (PPD).

The PPD measurement has been performed using William probe and use a score for ease of estimation it involve the following criteria:

Score 0: Those include depth from 0-3 mm.

Score 1: Those include depth from 4-5 mm.

Score 2: Those include depth from 6-7 mm.

Score 3: Those include depth more than 8 mm.

(4) Recording teeth with periodontal abscess
3- Probing pocket depth (PPD)
The number and percent of sites that were scored as 0 were 2756 (97.3%) in uncontrolled patients and they were 2822 (96.9%) in controlled patients. The number and percent of sites that were scored as 1 were 46 (1.62%) in uncontrolled patients and they were 63 (2.16%) in controlled patients. The number and percent of sites that were scored as 2 were 30 (1.06%) in uncontrolled patients and they were 27 (0.93%) in controlled patients. The inter group comparison between both groups was performed by using chi-square and the results showed that there was non significant differences (p. >0.05) as shown in table 4.

4- Periodontal abscess
The results showed that the number of patients with periodontal abscess was (8) with a percent (25%) and (32) teeth affected by periodontal abscess in uncontrolled group while in controlled group the number of patients with periodontal abscess was (3) with a percent (9.375%) and (9) teeth affected by periodontal abscess as shown in table (5). Inter group comparison of percent of patients with periodontal abscess between uncontrolled and controlled groups showed there was non significant differences (p. >0.05) while the comparison of percent of teeth affected by periodontal abscess between both groups was significant (p. <0.05) by using chi-square as shown in table 5.
The frequency distribution of periodontal abscess in this study showed that the lower anterior teeth were most affected followed by upper anterior teeth then lower posterior teeth.

DISCUSSION
1-Dental plaque
More plaque accumulation was found in uncontrolled group compared with controlled group with no significance difference in this study, this may be attributed to that many studies (9) suggested that the outcome of tooth brushing is dependent on many factors, and one of these factors is the skill of the individual using the brush. So the controlled group may manipulate with toothbrush better uncontrolled group.

2-Gingival index
Significant difference was found between uncontrolled group and controlled group with elevated gingival index in uncontrolled group compared with controlled group, one explanation for our results that these alterations of gingival index follow physiologic changes related to the disease process (more plaque accumulation uncontrolled group lead to more gingival inflammation than controlled group), additionally recent studies suggested that uncontrolled diabetes is associated with an increased susceptibility and severity of infections including periodontal disease in which it alters the response of periodontal tissue to local factors (10,11).

3-Probing pocket depth
There was no significant difference between uncontrolled and controlled groups regarding the percent of sites with probing pocket depth despite of more gingival inflammation in uncontrolled group. This can be explained by that the number of uncontrolled group (20) was equal to the number of controlled group but the number of teeth in uncontrolled group (708) was less than that in controlled group (728) which might be lost due to periodontal disease, so the number of surfaces in uncontrolled group (2832) was less than that in controlled group (2912) which may affect statistic analysis regarding probing pocket depth.

4-Periodontal abscess
There were more teeth affected with periodontal abscess in uncontrolled group than in controlled group with significant difference, this is explained by that the recent studies suggested that uncontrolled diabetes is associated with an increased susceptibility and severity of infections including periodontal disease in which it alters the response of periodontal tissue to local factors (10,11).

The frequency distribution of periodontal abscess according to teeth in this study is agreed with a study of Jaramillo et al (12).
Table 1: Descriptive of controlled and uncontrolled groups

<table>
<thead>
<tr>
<th></th>
<th>Uncontrolled group</th>
<th>Controlled group</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>No. of teeth</td>
<td>708</td>
<td>728</td>
</tr>
<tr>
<td>No. of surfaces</td>
<td>2832</td>
<td>2912</td>
</tr>
<tr>
<td>No. of patients with periodontal abscess</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>No. of teeth with periodontal abscess</td>
<td>32</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 2: Mean plaque index and mean gingival index for both groups

<table>
<thead>
<tr>
<th></th>
<th>Uncontrolled group</th>
<th>Controlled group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaque index</td>
<td>Mean: 1.375</td>
<td>1.158</td>
</tr>
<tr>
<td></td>
<td>SD: 0.690</td>
<td>0.857</td>
</tr>
<tr>
<td>Gingival index</td>
<td>Mean: 1.568</td>
<td>1.142</td>
</tr>
<tr>
<td></td>
<td>SD: 0.814</td>
<td>0.626</td>
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Table 3: Inter groups comparison of mean plaque index and mean gingival index between uncontrolled and controlled groups

<table>
<thead>
<tr>
<th></th>
<th>t-test</th>
<th>P-value</th>
<th>Sig</th>
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<tbody>
<tr>
<td>Plaque index</td>
<td>1.027</td>
<td>0.312</td>
<td>NS</td>
</tr>
<tr>
<td>Gingival index</td>
<td>2.164</td>
<td>0.038</td>
<td>S</td>
</tr>
</tbody>
</table>

*P<0.05 Significant
**P>0.05 Non significant

Table 4: Inter groups comparison of percents of scores 0,1,2,3 of probing pocket depth between uncontrolled and controlled groups

<table>
<thead>
<tr>
<th></th>
<th>Uncontrolled group</th>
<th>Controlled group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score 0</td>
<td>2756</td>
<td>97.3</td>
<td>2822</td>
</tr>
<tr>
<td>Score 1</td>
<td>46</td>
<td>1.62</td>
<td>63</td>
</tr>
<tr>
<td>Score 2</td>
<td>30</td>
<td>1.06</td>
<td>27</td>
</tr>
<tr>
<td>Score 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>2832</td>
<td>100</td>
<td>2912</td>
</tr>
</tbody>
</table>

* Chi-square, P>0.05 Non Significant

Table 5: Inter groups comparison of percent of patients with periodontal abscess and of surfaces affected by periodontal abscess between uncontrolled and controlled patients

<table>
<thead>
<tr>
<th></th>
<th>Uncontrolled group</th>
<th>Controlled group</th>
<th>Chi-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>32</td>
<td>25.0</td>
<td>9.375</td>
<td>1.003</td>
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<tr>
<td>P-value</td>
<td>0.021</td>
<td>0.132</td>
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<tr>
<td>No. of patients with periodontal abscess</td>
<td>8</td>
<td>3</td>
<td>1.23</td>
<td>2.025</td>
</tr>
<tr>
<td>P-value</td>
<td>0.0032</td>
<td>0.042</td>
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<tr>
<td>No. of teeth</td>
<td>708</td>
<td>4.51</td>
<td>728</td>
<td>4.51</td>
</tr>
<tr>
<td>P-value</td>
<td>0.0032</td>
<td>0.042</td>
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REFERENCES