ABSTRACT

Aim: For a periodontal diagnosis properly determined and for the estimation of periodontal treatment efficiency, clinicians rely on periodontal indices. The aim of our study is to evaluate the correlations between two important indices: plaque index and bleeding index.

Material and method: In this study participated patients who came to the Faculty of Dentistry Timișoara, the Department of Periodontology, from December 2007 to February 2008. In our study, we used Silness and Löe plaque index (PI) and Löe and Silness gingival index (GI). The inclusion criteria specified persons with at least 10 natural teeth, with no hematologic disorders and no anticoagulant treatment.

Results and discussions: We evaluated 2316 tooth surfaces. 73.14% had plaque score with scores from 1 to 3. From those, 84.12% have bled on sampling. In 26.86% of cases, on no plaque surfaces (PI=0), BOP did not exist (GI=0), so bacterial plaque accumulation is a determining factor in periodontal inflammation. There are dental surfaces with plaque (PI=1) and with no bleeding (GI=1), so the host response plays a very important role in inflammatory process control. In 63.58% of cases there are tooth surfaces with different plaque scores (PI=2 or 3) in directly correlation with BOP severity (GI=2 or 3).

Conclusions: Bacterial plaque index and bleeding index form an important tandem in the work of the clinician and, especially, of the periodontist.

Keywords: PERIODONTAL INDICES, BACTERIAL PLAQUE, HOST RESPONSE.

INTRODUCTION

In the present, we know that the periodontal diseases are determined by bacterial plaque (1,2). But how do we establish the patient’s periodontal risk, periodontal diagnosis, how do we measure the disease? And also, how do we estimate the efficiency of the periodontal treatment and how can we determine a prognostic? The answer for all these questions is simple: using periodontal indices.

Indices represent a numerical rating scale which records different aspects: the quantity of bacterial plaque, gingival color, gingival contour, gingival bleeding and by using them we can classify the periodontal status of the patient or population (3,4). They are based on the gingival clinic aspect and on sample measurement (5-7). The ideal index is simple, easy and quick to use, accurate, reproducible so, it is useful for calibrating multiple examiners (8).

To know what you can be looking for is already a success: periodontal diseases are inflammatory diseases so, for a quick “periodontal image” of our patient we need to find two aspects: plaque level and bleeding level. Many oral indices are used for the estimation of patient’s plaque control but from these, Silness and Löe plaque index is very used (9). For the estimation of the bleeding level, we consider that the Löe and Silness gingival index is the one to be used (10,11).

The objective of this study is to present and understand the correlation between these two important indices.

MATERIAL AND METHOD

For this study we have evaluated 51 subjects, 27 males and 24 females, with ages from 17 to 82 years, who were treated in the Department of Periodontology, Faculty of Dentistry of
Timisoara, in the period December 2007-February 2008. From those, 27 patients were diagnosed with plaque gingivitis, 21 with chronic periodontitis and 3 patients, with aggressive periodontitis. The specific selection criteria were that these patients should have at least 10 natural teeth, should have undergone no hematological disorders and no anticoagulant treatment. Home oral care in 94.6% of cases was by toothbrush. In addition, 17.8% of cases were using interdental toothbrush, 36.4% dental floss and in 72.6% mouth wash. 11% of patients had brushed less than one time a day, 34% once a day, 46% twice a day, and 9% three times a day.

The quantity of plaque and gingival bleeding of patients were checked clinically. For quantitative plaque recording we used Silness and Löe plaque index (PI) and gingival bleeding was evaluated using Löe and Silness gingival index (GI).

Silness-Löe plaque index (PI) was developed in 1964 and estimates the quantity of plaque in terms of tooth area covered. According to this method, each of the four gingival areas of the tooth is assessed and marked with a score from 0 to 3.

Table 1: Silness-Löe plaque index (9).

<table>
<thead>
<tr>
<th>Score</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No plaque.</td>
</tr>
<tr>
<td>1</td>
<td>A film of plaque adhering to the free gingival margin and adjacent area of the tooth which may be seen by using the sample on the tooth surface.</td>
</tr>
<tr>
<td>2</td>
<td>Moderate accumulation of soft deposits within the gingival pocket, or the tooth and gingival margin which may be seen with the naked eye.</td>
</tr>
<tr>
<td>3</td>
<td>Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.</td>
</tr>
</tbody>
</table>

The score for the four areas of the tooth is summed up and divided by four to yield a total tooth score (vestibular, medial, oral, and distal). By adding the tooth scores together and dividing by the number of teeth examined, the patient’s PI is obtained. A PI score <0.1 means no plaque. This situation can be found only after one correct toothbrushing. A score of 0.1 to 1.0 indicates a small quantity of plaque, from 1.1 to 2.0 a moderate amount and between 2.1 to 3.0, a considerable one (9).

The Gingival Index (GI) was proposed in 1963 by Löe and Silness as a method of assessing the severity of gingival inflammation. According to this method, each of the four gingival areas of the tooth is assessed and marked with a score from 0 to 3.

Table 2: Löe and Silness gingival index (10).

<table>
<thead>
<tr>
<th>Score</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal gums.</td>
</tr>
<tr>
<td>1</td>
<td>Mild inflammation: slight change in color and slight edema; no bleeding on sampling</td>
</tr>
<tr>
<td>2</td>
<td>Moderate inflammation: edema; bleeding on sampling.</td>
</tr>
<tr>
<td>3</td>
<td>Severe inflammation: marked edema; ulceration; tendency to spontaneous bleeding</td>
</tr>
</tbody>
</table>

Bleeding is assessed by introducing a periodontal sample in gingival sulcus or in the periodontal pocket. The GI calculation is identical to the PI calculation. A GI score <0.1 means no inflammation, a score of 0.1 to 1.0 indicates mild inflammation, 1.1 to 2.0 moderate inflammation and 2.1 to 3.0 indicates severe inflammation (10).

RESULTS

From 2316 dental surfaces evaluated, 1694 (73.14%) have plaque score with values between 1 and 3. Their distribution is presented in table 3 and diagram 1.

Table 3: Distribution of dental surfaces with plaque varying with patient’s diagnosis

<table>
<thead>
<tr>
<th>PI value</th>
<th>Number of surfaces with plaque</th>
<th>Distribution of dental surfaces with plaque varying with patient’s diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI=1</td>
<td>617</td>
<td>483 (78.28%) Plaque gingivitis, 95 (15.39%) Aggressive periodontitis, 59 (6.33%) Chronic periodontitis</td>
</tr>
<tr>
<td>PI=2</td>
<td>901</td>
<td>296 (32.85%) Plaque gingivitis, 26 (2.89%) Aggressive periodontitis, 579 (64.26%) Chronic periodontitis</td>
</tr>
<tr>
<td>PI=3</td>
<td>176</td>
<td>17 (9.65%) Plaque gingivitis, 0 (0%) Aggressive periodontitis, 159 (90.35%) Chronic periodontitis</td>
</tr>
</tbody>
</table>

Distribution of dental surfaces with plaque varying with patient’s diagnosis
Out of these, 1425 surfaces (84.12%) present bleeding on sampling. The correlations between plaque score and bleeding score are as follows:

a) in 26.86% of cases, PI = 0 and GI = 0;

b) in 36.42% of cases, PI = 1 and GI = 1 or 2 (diagram 2);

c) in 36.42% of cases, PI = 1 and GI = 1 or 2 (diagram 2);

d) in 53.16% of cases, PI = 2 and GI = 2 or 3 (diagram 3);

e) in 10.42% of cases, PI = 3 and GI = 2 or 3 (diagram 4).

DISCUSSIONS

Microbial plaque is the main factor that may threaten the health of periodontal tissues and cause infections such as gingivitis and periodontitis. In conclusion, in its absence (PI=0), inflammation does not exist, so BOP does not exist (GI=0). In case of sporadic gingival bleeding and no plaque, we talk about simple errors caused by over-instrumentation, periodontal sample harming sulcular epithelium(12, 13).

Over time, plaque’s microorganisms suffer changes and this may cause different responses in periodontal tissues: studies show that small amounts of plaque, contain gram positive and a few gram negative cocciies. In large amounts of plaque, gram negative anaerobes prevail. This explains why when we have PI=1, we could have GI=1 or 2 but we do not have GI=3 and also, when we have PI=3, we could have GI=2 or 3 but we do not have GI=1.
In the next situation, PI=1 and no bleeding (GI=1), proves, in our opinion, that the host response plays a very important role in inflammatory process control (15) and is critical for the determination of patient risk for periodontal tissue breakdown. BOP gives more information concerning tissue status than the plaque quantity recording does. Also, Greene JC and co. specify that it is necessary to reinforce oral hygiene education (16). PI=1 and GI=2 also show patient’s oral hygiene deficiencies. In most of the cases, PI has the value 1 in gingivitis, aggressive periodontitis and in successfully treated chronic periodontitis (diagram 1).

In 63.58% of cases there are dental surfaces with different plaque scores (PI=2 or 3) in straight correlation with BOP severity (GI=2 or 3). These plaque values show a mature, well-organized more harmful bacterial plaque. Therefore, the higher the plaque index, the higher the gingival index. In most of the cases, PI has value 2 in chronic periodontitis and in gingivitis and less in aggressive periodontitis (diagram 1).

What we find interesting to point out is that we did not find any case of aggressive periodontitis with PI=3. Currently, we know that in case of patients with aggressive periodontitis, the plaque does not play the most important part but it creates a vulnerable environment for immune deficiencies, such as functional defects of polymorphonuclear leukocytes (PMNs), of monocytes or genetic susceptibility (17-19). PI value equal with 3 is rarely met, usually in case of high periodontal risk: old patients, psychomotor deficiencies patients, which are predisposed to gingivitis and chronic periodontitis (diagram 1).

CONCLUSIONS

1. If there is no bacterial plaque, there is no inflammation.
2. Gingival bleeding severity it is in tight correlation with the quantity of bacterial plaque.
3. In some cases (aggressive periodontitis), the relation plaque – gingival bleeding is under the major influence of the host response.
4. Bacterial plaque index and bleeding index form an important tandem for the work of clinician and, especially, of the periodontist.

REFERENCES