Prevalence of Periodontitis in Dental Students in University Technology Mara

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ABSTRACT
Alveolar bone loss is one of the main features of periodontitis, bitewing radiographs has been used to evaluate the alveolar bone level. The objectives of this study were to evaluate and compare the prevalence of periodontitis in both genders of dental students in Universiti Teknologi MARA. One hundred and eighteen bite wing radiographs of 59 dental students of year 2 and 3 were collected from their previous clinical projects. Eighteen radiographs were excluded due to current active orthodontic treatment. All radiographs were scanned and uploaded to specific computer software to measure the amount of bone loss in the radiographs. The distance from cementoenamel junction to alveolar crest were measured in millimeters of each mesial and distal sites of upper and lower bicuspids, 1st molar and mesial site of 2nd molar. Measurements of 1322 sites were analyzed using students T-test to compare gender differences. All the students showed 100% prevalence of periodontitis due to more than 1mm bone loss at least in one site. High prevalence of periodontitis was found among all dental students. Males showed higher prevalence than females. Future management programs should be scheduled to prevent progression of bone loss among dental students.

Keywords: Prevalence, Periodontitis, Dental Students, Radiograph, Bone loss.

1. Introduction

Periodontitis is defined as an inflammatory disease of the supporting tissues of the teeth resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession, or both (Carranza, 2002).

The prevalence of chronic periodontal disease in adult population is high (William et al. 2001), it appears during adolescence and increases in prevalence with increasing age (Marshall-Day et al., 1955). Diagnosis of periodontal disease is still primarily based on the diagnosis of periodontal pocket, loss connective tissue attachment and / or assessment of alveolar bone loss performed on radiographs (Albandar, 2002). Dental radiographs are important in detection and
assessment of the amount of periodontal tissue break down, a valuable adjunct in treatment planning and in determination of prognosis (Mol, 2004).

It is possible to measure the alveolar bone loss by measuring the height and outline of alveolar bone on clinical radiographs due to the destructive nature of periodontitis (Hugoson and Norderyd, 2008).

The height of alveolar bone may be evaluated by intrasurgical inspection or by radiographic examination (Mehdizadeh et al., 2006).

However radiographic assessment tends to underestimate the amount of bone loss (Theilade, 1960; Tonetti et al., 1993; Eickholz et al., 1998a; Eickholz et al., 1999b). On the other hand, other studies have shown that underestimation of bone loss is common on both intra oral and panoramic radiographs when compared with direct measurements during surgery (Eickholz and Hausmann, 2000).

In addition digital processing and manipulation of radiographic images may improve diagnostic interpretation of radiographs in terms of reproducibility and validity (Wolf et al., 2001). In order to optimize diagnostic information from routine radiographic examination, appropriate radiographs of the highest quality should be used (Mehdizadeh et al., 2006).

Radiographs may be useful to detect minute changes within the alveolar bone, has led to studies on radiographic techniques such as subtraction radiography and radiometric analysis, however, most practitioners still depend heavily on routine intraoral radiographic technique for periodontal assessment. One of the most useful techniques in evaluation of periodontal disease is bitewing technique. (Mehdizadeh et al., 2006).

Many epidemiological studies have been done to assess the status of periodontal health in various parts of the world. The interpretation of epidemiological data of periodontal disease is difficult, due to inconsistencies in the methodology used. It is not possible, therefore, to accurately assess if the prevalence of the periodontal diseases shows a world-wide decline.

It has been suggested that bite – wing radiographs may provide tool for early diagnosis and selection of subjects at risk developing severe periodontitis (Jansson et al., 2002; Papapanous and Tonetti, 2000). Bite-wing technique is characterized by its simplicity and reduction of the radiation exposure since fewer films are needed than when the periapical technique is used, the distance from cement enamel junction (CEJ) to the marginal bone level (MBL) has been assessed on bit wing radiographs (Page et al., 2002; Dummer et al., 1995). The aim of this study was to screen and to evaluate the early bone loss, and compare the prevalence of periodontitis in both genders of dental students in Universiti Teknologi MARA by measuring the alveolar bone loss in available bitewing radiographs.

2. Methodology

A descriptive cross sectional study was carried out among 59 dental students in Faculty of Dentistry, University Technology MARA representing Year 2 and year 3 (females 47 and males12) with an age range of 21-23 years. Bitewing radiographs were optioned from Year 2 and year 3 dental students radiography clinical training in the Faculty of Dentistry University
Technology MARA, Malaysia. The radiographs were taken under supervision of a qualified radiographer. Available radiographs were chosen to limit unnecessary exposure of radiation to dental students.

One hundred and eighteen bite wing radiographs of 59 dental students collected. Bite-wing radiographs were taken with the kwibite film holder for subjects of the study materials one for the right and one for the left posterior teeth. The radiographs were developed under standardized condition using an automatic film processor. All radiographs were taken by paralleling technique. Eighteen radiographs were excluded due to active orthodontic treatment. Overall one hundred bitewing radiographs were collected, scanned and uploaded into Microtek Scan wizard Pro V7.041.

Planmeca Romexis 2.1.1.R computer software was used to measure the radiographic alveolar bone loss which is defined as the distance from cementoenamel junction (CEJ) to alveolar bone crest (ABC) up to a fraction of millimeters (mm). 1322 sites were measured, included the mesial and distal sites of upper and lower teeth first premolars, second premolars, first molars and the mesial site of upper and lower second molars. Bone loss was considered to be present when the distance between CEJ-ABC exceeds 1 mm. All data were analyzed by using the Statistical Package for Social Science (SPSS) Version 17.0. Statistical significance of differences between means was tested with the Student T-Test. Significance was accepted at the probability level P < 0.005.

3. Results

Out of 1322 sites measured 764 sites were found to have bone loss. The prevalence of bone resorption of more than 1 millimeter from CEJ-ABC of at least one site among dental students of University Technology MARA was 100%. The percentage of alveolar bone sites involved by bone resorption was 38.8% in female and 19% in male. Male have a higher mean alveolar bone loss of 0.427mm compare to females with a mean alveolar bone loss of 0.296mm. Statistical analyses revealed a significant difference between males and females (p>0.05) (Fig. 1).

The distribution of mean bone loss measurements (mm) in females and males in both maxillary and mandibular sites was shown in table 1 and 2. Comparison of mean alveolar bone loss measurement in upper teeth in females and males for each tooth showed non-significant differences table 1. While statistical analyses revealed a significant difference in bone loss measurement in lower teeth for the 2nd lower molar and non significant differences for 1st lower premolar, 2nd lower premolar and 1st lower molar.

Fig. 2 demonstrates the percentage of alveolar bone loss in the total sites sample according to the amount of bone loss measured by the software. The percentage was 91.9 % for 0.1 - 1 mm. While it was 7.6 %, 0.3%,0.1% for 1.1 - 2 mm , 2.1 - 3 mm and 3.1-4mm respectively.
Table 1: Comparison of mean alveolar bone loss (mm) in the upper teeth in female and male for each tooth

<table>
<thead>
<tr>
<th>Tooth No.</th>
<th>Gender</th>
<th>Mean</th>
<th>Sd</th>
<th>T-Test</th>
<th>P.Sig. 2 tailed</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Upper premolar</td>
<td>male</td>
<td>0.25</td>
<td>0.286</td>
<td>-0.16</td>
<td>0.987</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>0.251</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd Upper premolar</td>
<td>male</td>
<td>0.866</td>
<td>0.444</td>
<td>1.727</td>
<td>0.087</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>0.695</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Upper molar</td>
<td>male</td>
<td>0.713</td>
<td>0.522</td>
<td>2.80</td>
<td>0.006</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>0.43</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2nd Upper molar</td>
<td>male</td>
<td>0.201</td>
<td>0.359</td>
<td>0.782</td>
<td>0.436</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>0.149</td>
<td></td>
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</tbody>
</table>

Table 2: Comparison of mean alveolar bone loss (mm) in the lower teeth in female and male for each tooth

<table>
<thead>
<tr>
<th>Tooth no.</th>
<th>Gender</th>
<th>Mean</th>
<th>Sd</th>
<th>T-Test</th>
<th>P.sig. 2 tailed</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st lower premolar</td>
<td>male</td>
<td>0.403</td>
<td>0.431</td>
<td>0.043</td>
<td>0.43</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>0.256</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2nd lower premolar</td>
<td>male</td>
<td>0.59</td>
<td>0.361</td>
<td>0.02</td>
<td>0.02</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>0.358</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st lower molar</td>
<td>male</td>
<td>0.292</td>
<td>0.240</td>
<td>0.094</td>
<td>0.094</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>0.207</td>
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<tr>
<td>2nd lower molar</td>
<td>male</td>
<td>0.1</td>
<td>0.073</td>
<td>0.060</td>
<td>0.008</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>0.02</td>
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</table>
4. Discussion

In order to obtain a reproducible epidemiological data suitable for the prevalence of periodontitis, it is necessary to establish a set of criteria for the clinical and radiological diagnosis of gingivitis and periodontitis. Thus, essentially, diagnosis of periodontal disease is still primarily based on the diagnosis of periodontal pocket, loss of connective tissue attachment and/or assessment of alveolar bone loss performed on radiographs (Albandar, 2007). Radiographic methods are frequently used in epidemiologic studies on periodontitis. Intraoral bitewing radiographs were used to provide information about severity of periodontal disease. While clinical measures of inflammation, including assessments of gingival index and bleeding, probing depths, and clinical attachment levels are commonly used in clinical practice, such assessments only provide information of the condition at the time of examination (Persson et al. 1998).

Researchers found that the CEJ-MBL distance for the various posterior surfaces averaged 0.5-1.0 mm (Dummer, 1995). Most previous studies of radiographic bone loss have been cross sectional in design, the distances between the alveolar crest and the cemento-enamel junction seem to be the most widely used and accepted criterion.

Lindhe and Karring (2003) considered that this distance is normally 1mm. Some authors claim that the ideal distance, in health should be 1mm. (Lindhe and Karring, 2003; Paulander et al., 2004). However, these radiographs provide only 2 dimensional images of 3-dimensional structures. Hence, the radiographic image of interproximal bone loss may change with changing projection geometry. Additionally, evaluation of radiographs tends to underestimate the extent of alveolar bone loss as compared to the gold standard of intrasurgical measurements (Theilade, 1960; Tonetti et al., 1993; Eickholz et al., 1998a, 1999a; Eickholz & Hausmann, 2000).

Although standard radiographs are limited in their ability to assess three dimensional relationships and rarely can depict midbuccal and midlingual bone levels they constitute a
permanent record and can be studied repeatedly. Recent studies have shown that standardized intraoral radiographs can be used to measure vertical defects. They may, however, underestimate the depth of the vertical defect by approximately 1 mm as compared with findings at surgery (Kaimenyi and Ashley, 1988); therefore it is possible that the actual distance CEJ-ABC may be somewhat greater than assessed from the radiographs.

In an attempt to delineate the potential risk indicators for periodontal disease, we measure the alveolar bone loss; the measurement of alveolar bone loss represents a greater cumulative record of the periodontal destruction experienced by the individual. The present study was carried out to screen and evaluate the prevalence of early periodontitis by measuring the bone loss in both genders of dental students in University Technology MARA. Participation rate was 84.7 % whereby students who are undergoing active orthodontic treatment are excluded as bone resorption may not be a justified representative of an underlying periodontitis. In this study, the distance from the cementoenamel junction (CEJ) to the alveolar bone crest (ABC) has been assessed on bite wing radiographs using software. The diagnostic parameter of amount of bone loss which indicates periodontitis, however, varies. Periodontitis is diagnosed when the normal radiographic distance between CEJ and ABC is more than one millimeter. According to (Lindhe and Karring, 2003; Paulander et al., 2004), the ideal distance in health should be 1 mm. In the present study, we consider the normal distance between the CEJ and ABC is 1 mm and distance that exceeds that parameter is considered as bone loss which is one of the most important diagnostic criteria of periodontitis.

The prevalence of periodontitis in which the amount of bone resorption is more than 1 millimeter from cementoenamel junction of at least one site among dental students of University Technology MARA was 100%. This is not consistent with the authors’ expectations and hypothesis. Dental students are representative of the educated, urbanized, influential, and motivated class of individuals. However, an early study has indicated that the effect of joining a dental profession and its relationship with the personal level of oral health has not shown any correlation (Maatouk, 2006).

It is clearly demonstrated from the current results that male have a higher mean alveolar bone loss of 0.427 mm (p>0.05) compared to females with a mean alveolar bone loss of 0.296 mm (p>0.05). There is a significant difference between males and females (p>0.05). These findings were in consistent with other studies conducted by several researchers (Albandar et al., 1999; Krstrup and Erik Petersen, 2006; Harlan and Reynolds, 2010). The fact that women had substantially less documented periodontal disease might be due to differences in periodontal risk factors, socio-cultural determinants, or differences in dental and general health behaviour. Smoking patterns, for example, were different across genders, favoring males (ever smokers: 59.5% versus 52.5% in adults and 61.4% versus 35.9% in seniors). (Paulander et al., 2004). Results showed that 91.9 % of the total sample affected with bone loss of 0.1 - 1 mm followed by low percentage 0.4% for 2.1 4 mm. In this young adult age group, none of the subjects had a mean bone loss value that exceeded 4, 0 mm. This suggests that despite the high prevalence of early periodontitis in the dental students, the amount of alveolar bone loss is still minimal. Future
management programs should be scheduled to prevent progression of bone loss among dental students.

5. Conclusion:

High prevalence of early periodontitis was found among all dental students. Males showed higher prevalence than females. Future management programs should be scheduled to prevent progression of bone loss among dental students. New study after two or three years needed to evaluate the progression of the alveolar bone loss.

References


