

PANORAMIC DENTAL X-RAY AND PERIODONTITIS: A RETROSPECTIVE ANALYSIS OF RADIOGRAPHIC-BASED PERIODONTAL BONE LOSS (R-PBL)

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ABSTRACT

Aim of the study: The main goal of this study is to analyze a group of panoramic X-rays using the resorption periodontal bone loss (R-BL) in order to diagnose periodontitis. **Materials and methods:** 65 of panoramic X-rays were included in this analysis. The measurements of the root length and total bone height were done on mesial and distal surfaces, using a special software processor specifically designed and used for radiographic measurements. The R-PBL scores were analyzed for every surface (mesial and distal), on the entire sample and on gender subgroups. **Results:** The mean R-PBL score for the entire sample was 14.32%. The highest scores were observed around first molars and central incisors. It seems like men tend to have/ have higher values of R-PBL. **Conclusions:** R-PBL was a good instrument to analyze panoramic X-rays related to diagnosis of the periodontitis.

Key words: calculus; toothpaste; oral health

INTRODUCTION

Periodontitis is usually defined as an inflammatory disease of periodontal tissues due to bacteria (specific microorganism). It is a progressive destruction of periodontal ligaments and alveolar bone which leads to periodontal pockets, recession or both, tooth mobility, even tooth loss. There are many risk factors that can cause exacerbations of the periodontal diseases such as genetic condition, systemic diseases like diabetes, dental calculus or smoking [1].

Radiological signs are very suggestive for periodontitis. First, there are early radiographic changes such as crestal bone irregularities, triangulation or interseptal

bone reduction. Then, horizontal bone loss appears and periodontal pockets develop, and finally, most of the bone tissue around the teeth is destroyed [2].

Panoramic X-ray is not the most accurate method for periodontal diagnosis. The X-ray beam angulation is not parallel, having usually an 8° angulation relative to teeth and periodontal structures. So, in the premolar area for example, periodontal space or any signs of bone loss for periodontitis are not so clearly visible [3]. However, panoramic X-rays are very common and easy to use for diagnostic or survey purposes. They can provide important and additional information

to a regular dental check-up or for patient monitoring. In particular, they are very useful for the *radiographic periodontal bone loss* (R-PBL) protocol and algorithm [4].

R-PBL is one of the criteria used in the last algorithm for staging and grading periodontitis according to the 2017 World Workshop of the Classification of Periodontal and Peri-implant Diseases and Conditions [5-7]:

- Stage I: RBL < 15% (coronal third);
- Stage II: RBL 15-33% (coronal third);
- Stage III and IV: RBL extending

MATERIALS AND METHODS

The study was conducted on 65 panoramic radiographs belonging to patients aged 15 to 76 years, who visited a dental clinic in Bucharest. The clinical diagnosis of periodontitis was put before the study according to toothmobility and measurements of the periodontal pockets. The teeth were analyzed on radiographs using the latest version of MicroDicom DICOM viewer software (MicroDicom Ltd, Sofia, Bulgaria).

Only bone areas around teeth were analyzed. The R-PBL method and x-rays examination followed the protocol exposed by Rydén et al. [14] and cited by Machado et al [15]. The measurements, performed on mesial and distal surfaces of the root length (distance between apex and cemento-enamel junction - CJ) and total bone height (distance between apex and alveolar marginal bone crest) were considered for analysis— figure 1. R-PBL was calculate for every eligible tooth surface as an arithmetic mean between the yellow line and the blue line and used as a measure of the proportion [14,15].

All the radiographic data were entered into a computer and analyzed using the SPSS processor, version 16 (SPSS Inc., Chicago,

to middle third of root and beyond.

Chronic periodontitis in Romania is widespread; 65% of people older than 31 years and 48% younger than 31 have periodontitis [8]. Gingivitis (91%) [9] and caries (75%) [10] are also very common. All of these have high prevalence especially due to oral hygiene habits or eating behavior [11-13].

This study is a retrospective analysis of 65 panoramic X-rays belonging to healthy patients or patients presenting with different stages of periodontitis.

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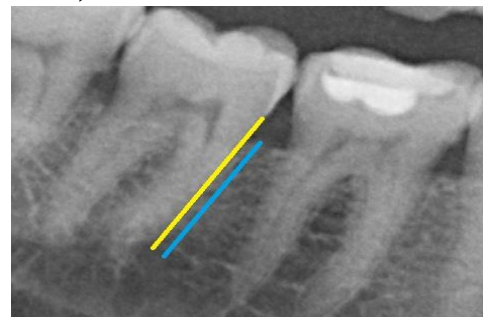


Figure 1: Scheme: Measurement of R-PBL: distance between apex and alveolar marginal bone crest – the blue line; distance between apex and CJ – the yellow line.

In case the CJ was not visible because the teeth were covered by dental crowns, the cervical margins of the crowns were considered landmarks for measurement. The following bone areas were excluded:

- areas that were not clear on the panoramic x-rays;
- around third molars;
- arounds dental implants;
- around teeth surfaces which were near to missing teeth (bone resorption may not be only due to periodontitis);
- teeth destroyed by caries when CJ was not visible.

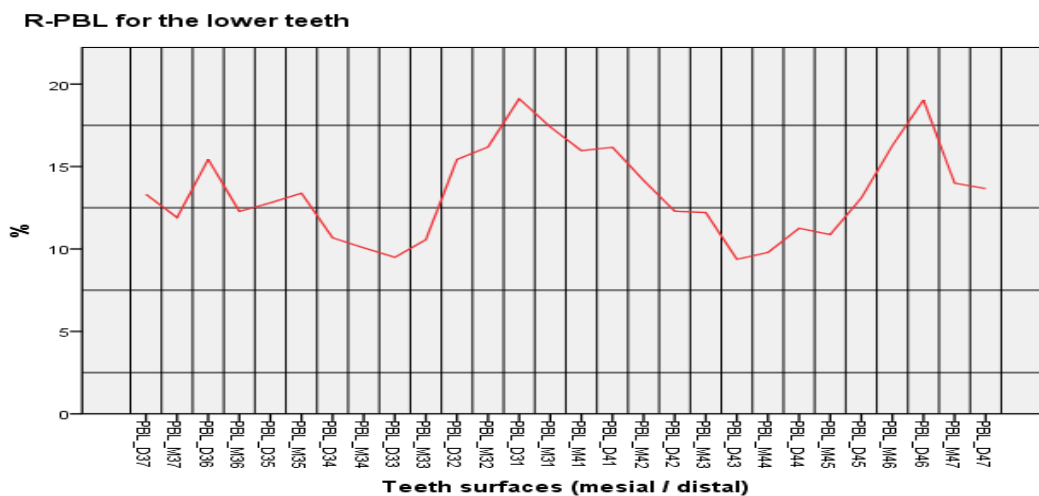


Figure 4: The R-PBL medium values for the lower teeth (mm)

DISCUSSIONS

R-PBL was a very good instrument for analyzing periodontitis on panoramic X-rays; patients with a clinical diagnosis of periodontitis disposed higher R-PBL score. Our measurements showed that the highest bone resorption for the upper arch was for the second molars, around central incisors and left first premolar. For the lower arch the higher scores were around the first molars and central incisors. Zardawi for example, also found more bone resorption around first molars and incisors [16].

Men presented higher R-PBL in our study. However, we could not find any relevant differences for the R-PBL total score between women and men. There are studies that also found more bone resorption for men. Stănescu et al. for example, found 16% more moderate and severe form of periodontitis in case of men. This could be due to a high frequency of

smoking and oxidative stress in men which periodontitis seems to be related to [17].

Bone resorption is a complex process. Both, bacteria and host factors are part of this mechanism, such as enzymes, cytokines, mediators and others [18]. Bone resorption is also a key-element in the new classification of periodontal diseases. So, for finding out what stage of periodontitis patients have we need first to investigate the R-PBL on X-rays. It is also an important element for choosing the right periodontal therapy, including surgery and bone grafting.

CONCLUSIONS

R-PBL was a good and efficient tool for analyzing periodontitis on X-rays and confirmed the clinical diagnosis. It should be used anytime for a good diagnose and treatment of different forms of periodontitis.

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