Research Article

Prevalence of Periodontal Bone Loss in Brazilian Adolescents through Interproximal Radiography

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Purpose. The aim of this study was to verify the prevalence of alveolar bone loss in Brazilian adolescents through the interproximal X-rays analysis.

Methods. Bilateral and standardized interproximal (bitewing) X-rays were performed in 15-year-old adolescents (n = 326), and the processing of films and measurements of alveolar bone levels were accomplished by a single examiner. A distance between the cementoenamel junction (CEJ) and the alveolar bone crest more than 2 mm was considered as periodontal bone loss.

Results. The results showed percentage of bone loss of 10.4% with predominance of horizontal defects (8.9%) over the vertical types (1.5%). It was verified higher individual distribution of one lesion (67.6%) than two (26.5%) or three lesions (5.6%), and higher occurrence was detected in men (14.95) than in women (8.21).

Conclusion. It can be concluded that the interproximal radiography was an efficient method for the detection of alveolar bone loss, revealing low prevalence in adolescents and predominance of horizontal bone defects.

1. Introduction

Periodontal diseases are among the most frequent diseases that may affect children and adolescents [1]. Epidemiological studies have been supporting that the gingivitis is practically universal in children and adolescents, but destructive forms of periodontal disease may also occur although this is lower in young people than in adults [2, 3]. Thus, the American Academy of Periodontology withdrew the age factor of the classification system of periodontal disease [2]. Although previous data revealed a more surface problem in children and adolescents, some studies pointed out the presence of more advanced forms of periodontal disease, since severe gingivitis [1, 4–6] until chronic periodontitis [7, 8] with periodontal pocket, clinical attachment loss [9–11], and alveolar bone loss [12–15].

Some studies also showed that periodontal attachment loss and alveolar bone loss are uncommon in children, but its prevalence increases in 12- to 17-year-old adolescents when compared with children from 5 to 11 years [13, 16–20].

A multinational study in 8,730 subjects from 15 to 17 years old was accomplished by Hansen et al. [19], which represented a global sample (18 centers of 16 countries), and the authors stated that the early periodontal destruction in 15-year-old young people seems to be a common phenomenon in the whole world. Although these studies have found that the alveolar bone loss was a common finding in adolescents, the diagnosis of bone loss in pediatric patients has been neglected [15]. Sjödin et al. [21] demonstrated that 40% of patients diagnosed in adulthood with periodontitis had already presented alveolar bone loss in deciduous dentition.

Several studies showed the prevalence of periodontal disease in young and adolescent patients using X-rays as a method of diagnosis [17, 18, 22–27]. Although there are limitations in the X-ray conventional technique [28], it represents an available and acceptable method when the technical standardization can be obtained because it is very useful [29]. The studies that use X-rays to check the alveolar bone loss aim to obtain information about periodontal disease to diagnose if the images indicate a disease condition or
a normalcy variation. In this way, some studies reported various findings considering the subjectivity of the parameters and analyses, focusing on some of the problems about this methodology [13]. However, the X-rays have shown a strong correlation between the clinical and radiographic findings [30] and a good correlation with the clinical attachment loss [31], especially using the interproximal (bitewing) X-rays, which have shown to be a valuable method for the detection of incipient bone loss [18]. Thus, the interproximal (bitewing) radiography has been the most used method to check bone loss in young people [17–19, 22, 25, 32].

The radiographic examination can be a useful method for the determination of the early reabsorption of alveolar bone crest, considering the extent of the gingival problem in children and young people. The aim of this study was to verify the prevalence of alveolar bone loss in adolescents by means of the interproximal X-rays.

2. Materials and Methods

2.1. Sample Selection. This research was approved by the Research Ethics Committee of University Center of Educational Foundation of Barretos—UNIFEB. A survey was carried out at Elementary Public Schools in Barretos city (São Paulo, Brazil) to check the availability of 15-year-old students for voluntary participation in the research. Some schools were randomly chosen according to their location through the method of stratified sampling to obtain a representative sample of the city. The adolescents were taken to the dental clinics of the University Center of the Educational Foundation of Barretos (UNIFEB) by bus, kindly loaned by the Road Company Rio Grande (Barretos, São Paulo, Brazil) for safety transportation and without any cost for the students and institution (UNIFEB). Parents or guardians should sign a written consent form for authorization of the adolescents for the participation in the study. Thus, initially 380 patients from the 400 obtained were examined. The criterion for exclusion of the subject in the sample was based on the absence of at least one proximal surface of a first upper molar and a first lower molar for the readings [32].

2.2. Radiographic Examination. The radiographic examination was obtained through two X-rays shots per patient (one on each side), using the interproximal technique in the region of premolars and molars [16, 19, 25]. An X-ray machine was used at 70 KV 8 mA (Dabi Atlante, Ribeirão Preto, SP, Brazil), and the X-ray shots were standardized by the use of positioners to the interproximal technique (bitewings, Indusbello, Londrina, Brazil). The shots were carried out within all the standards of biosecurity, using lead apron and rapid exposure Ektaspeed films (Kodak, São Paulo, Brazil), packed in PVC plastic film. The films were evaluated by an investigator (EMB) that evaluated the radiographs in an appropriate negatoscope in a dark room, with the screen covered by paper and dark suitable window for accommodation of the film for the examinations.

The measurements were carried out by a single examiner (EMB) on different days with two days apart, evaluating a maximum of 40 X-rays per day. The measurements were made from the distance from the cementoenamel junction until the alveolar bone crest, with the support of a magnifying glass and precision caliper (Mitutoyo, Tokyo, Japan). A distance greater than 2 mm between the cementoenamel junction and the alveolar bone crest was considered as bone loss [17–19, 25]. The bone crest was defined as the most coronal level in which the periodontal membrane retains its normal thickness [5]. Subsamples of three radiographs were read again, with one-week interval for the proof and determination of reproducibility and reliability of the data. The intraexaminer diagnostic confidence was evaluated by Kappa statistics [33], reaching a concordance level of 88%.

The measurements were performed from the distal surface of the canine teeth up to the mesial surface of the second molars fully erupted. Surfaces with superposition of dental elements, presence of dental braces or cases with no possibility of determining the cementoenamel junction were excluded, as well as teeth in eruption process, and films with processing problems or that presented errors in the X-rays shot. Then, 54 patients were excluded from the 380 patients initially examined, and the study was followed with 326 subjects.

2.3. Statistical Analysis. The statistical analysis was performed in some data by the binomial test for proportions. The Cochran test (Q) was used for comparison between the numbers of lesions. P < 0.05 was considered as statistically significant difference. The program used was BioEstat 5.0 (Belém, PA, Brazil).

### Table 1: Distribution of the subjects in the study.

| Gender  | Examined N (%) | Excluded N (%) | Included N (%) |
|---------|----------------|---------------|---------------|
| Man     | 129 (33.95)    | 22 (5.8)      | 107 (28.2)    |
| Woman   | 251 (60.05)    | 32 (8.4)      | 219 (57.6)*   |
| Total   | 380 (100)      | 54 (14.2)     | 326 (85.8)    |

*P < 0.0001 (binomial test for comparison of proportions; P < 0.05 indicates statistically significant difference).

3. Results

Table 1 shows the distribution of young people radiographed in relation to gender. The results showed that the proportion of women was higher than men in the sample (P < 0.0001). Table 2 shows the distribution of types of alveolar bone loss (horizontal and vertical) according to the gender. The data showed higher proportion of bone loss in men than in women (P = 0.03). There was greater predominance of horizontal bone loss than vertical lesions (P < 0.0001). The distribution of the number of horizontal and vertical lesions (1, 2 or 3) can be verified in Table 3. It is verified that men showed higher proportion in the total number of lesions than women (P = 0.03), and that the majority showed one or two lesions.
It can be concluded that the interproximal radiography was an efficient method for the detection of alveolar bone loss, revealing low prevalence in adolescents and predominance of horizontal bone defects.

**Conflict of Interests**

The authors declare that they have no conflict of interests.
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