

Periodontal status of Pakistani orthodontic patients

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Abstract: The objective of this study was to evaluate and compare the periodontal status of orthodontic patients and non-orthodontic patients, aged 15–28 years, of both genders. The cross-sectional study included 100 orthodontic and 100 non-orthodontic patients evaluated using a Community Periodontal Index for Treatment Need (CPITN) probe on the index teeth. A questionnaire was distributed to the participants to assess and evaluate the use of oral hygiene aids. The data were analyzed using SPSS version 17, and various comparisons were performed using the chi-square test. The study revealed that there was a statistically significant association in CPITN scores between the orthodontic and non-orthodontic patients ($p < 0.01$). The study showed that patients undergoing orthodontic treatment have increased plaque accumulation and probing depth resulting in periodontal tissue destruction. Proper oral hygiene practices and interdental aids should be employed to control plaque.

Keywords: Periodontics; Periodontal Index; Periodontal Pocket; Orthodontics.

Introduction

Gingival inflammation encircling the teeth is known as gingivitis, a form of periodontal disease.¹ Fixed orthodontic appliances frequently encroach upon the gingival sulcus, causing difficulty in plaque removal, inhibiting effective oral hygiene and affecting gingival health.² Gingivitis can become extensive within 21 days, developing in patients who fail to maintain proper oral hygiene.³

Patients undergoing orthodontic treatment often complain of gingival hypertrophy, gingival bleeding, increased plaque accumulation and calculus formation as bands, brackets, ligature wires and elastics promote the accumulation of microbial flora and food debris.^{4,5,6} Hence, appropriate oral hygiene measures should be undertaken to avoid periodontal disease and caries due to accumulation of plaque around the orthodontic appliances.⁷ The goal of this study was to evaluate and compare the periodontal status of orthodontic patients versus that of non-orthodontic patients.

Methodology

This study was reviewed and approved by the Research and Ethical Committee of the dental section of Sir Syed College of Medical Sciences (SSCMS), Karachi, Pakistan.

This was a cross-sectional study conducted among patients reporting to the orthodontic and periodontic departments at the dental hospital of SSCMS from October 2013 to November 2014. There were 200 patients (53 males and 147 females), out of which 100 were orthodontic patients (test group) and 100 were non-orthodontic patients (control group), aged from 15 to 28 years. Detail of gender distribution is given in Figure 1. The former are referred to as the ortho group and the latter as the non-ortho group. A clinical examination of all patients was performed by a single examiner from the periodontic department who was sent to the orthodontic department for data collection. To establish intra-examiner reliability, ten patients were examined on two occasions at a 1-week interval using the Community Periodontal Index and analyzed using the kappa test.

Inclusion criteria included patients aged 15–28 years of both genders under treatment for at least 3 months. Exclusion criteria included patients having at least one of the following conditions: any systemic disease, generalized periodontal problems or disease, cyst, cleft or congenital malformations and patients undergoing removable appliance treatment.

All patients in both groups were evaluated using the Community Periodontal Index for Treatment Need (CPITN) on the index teeth (11, 16, 17, 26, 27, 31, 36, 37, 46 and 47). To assess and evaluate the use of oral hygiene aids, a questionnaire was distributed among all the patients containing questions regarding (1) use of toothbrush and frequency, (2) use of interdental cleaners such

as dental floss and interdental brush, (3) use of mouthwash, (4) use of tongue cleaners and (5) dental visits.

Examination Procedure

The index teeth of each patient in both groups were examined according to World Health Organization guidelines using a sterilized CPITN probe and mouth mirror under a good light source. Each tooth sulcus was probed to determine pocket depth, detect calculus and ascertain bleeding response. The sites selected for probing were the distal, midline and mesial of both facial and lingual/palatal surfaces. The full depth of the gingival sulcus or pocket was gently probed with the probe tip. The probing depth was read by inserting the probe parallel to the long axis of the tooth, between tooth and gingiva, starting at the distobuccal surface, and the position of the black band was observed on the probe. The dentition was divided into six sextants. The appropriate highest score for each sextant was determined and recorded in the appropriate box. Scoring was done on all index teeth as follows: code 0, healthy; 1, bleeding on probing; 2, supra- or subgingival calculus; 3, shallow pocket of 4–6 mm; 4, deep pocket of 6 mm or more; and X, a sextant with less than two teeth (excluded sextant).

The data were analyzed using the Statistical Package for Social Sciences, version 17 (SPSS, Inc., Chicago, IL, USA), and various comparisons were performed using the chi-square test.

Results

Out of 200 patients examined, 53 were male and 147 were female, with an age range from 15 to 28 years. Mean duration of orthodontic treatment was 8 months. Table 1 shows the distribution of CPITN scores between the orthodontic and non-orthodontic patients. When comparing CPITN scores between groups, we found that in the ortho group, 58% had periodontal pockets (CPITN scores 3 and 4), whereas only 16% in the non-ortho group had pockets (CPITN scores 3 and 4). There was a statistically significant association between the ortho and non-ortho groups in the advancement of periodontal disease ($p < 0.01$) (Table 2). Among the orthodontic patients, only 6 (6%) using the interdental brush had periodontal pockets

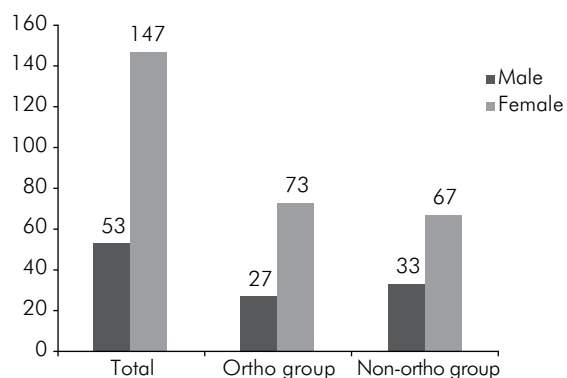


Figure 1. Ortho and non-ortho patients' gender distribution.

(CPITN scores 3 and 4), whereas 52 (52%) patients who were not using it had periodontal pockets (CPITN scores 3 and 4) (Figure 2). The study revealed that, among all 200 patients, only 7 of the 64 using interdental aids (10%) had periodontal pockets (CPITN scores 3 and 4), whereas of the 136 non-interdental aid users, 67 (49%) had periodontal pockets (CPITN scores 3 and 4) (Figure 3). There was a significant association between interdental aids users and non-users among all patients in the advancement of periodontal disease ($p < 0.01$) (Table 3).

Table 1. Distribution of CPITN scores among ortho and non-ortho groups.

CPITN Score	Ortho Group N = 100	Non-Ortho Group N = 100
0	3	21
1	30	48
2	9	15
3	57	16
4	1	0

Table 2. Comparison of CPITN scores between ortho and non-ortho groups.

CPITN	Scores 0, 1, 2	Scores 3, 4	p-value
Ortho group	42 (42%)	58 (58%)	0.000*
Non-ortho group	84 (84%)	16 (16%)	

*Statistically significant.

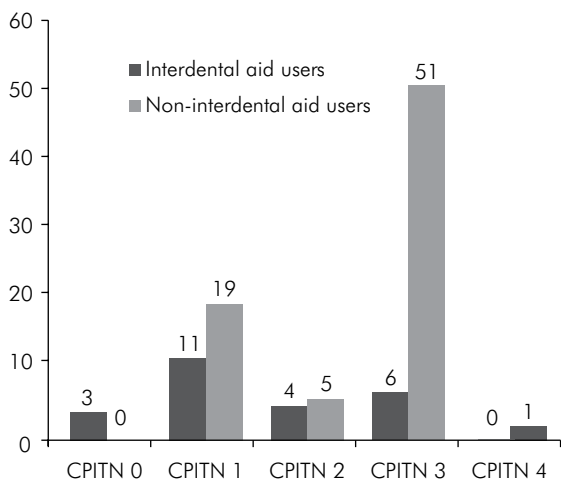


Figure 2. CPITN scores between interdentals and non-interdentals aid users among orthodontic patients.

Regarding answers to the questionnaire, all patients in both ortho and non-ortho groups reported using a toothbrush to clean their teeth with a frequency of once daily (67%), twice daily (31%) and thrice daily (2%). Regarding the use of interdental cleaners, 48 (48%) of patients in the ortho group claimed use of the interdental brush, while in the non-ortho group, only 16 (16%) patients reported the use of dental floss. Thirteen (13%) orthodontic patients and six (6%) non-orthodontic patients claimed the use of tongue cleaners. Of the 200 patients in the study, a total of 11 (11%) in the ortho group and 39 (39%) in the non-ortho group reported the use of mouthwash. Only 19 (19%) of the ortho patients and 11 (11%) of the non-ortho patients reported visiting the dentist for a checkup.

Discussion

The periodontal status of orthodontic and non-orthodontic patients was examined in this study. CPITN scores showed an increase in the data

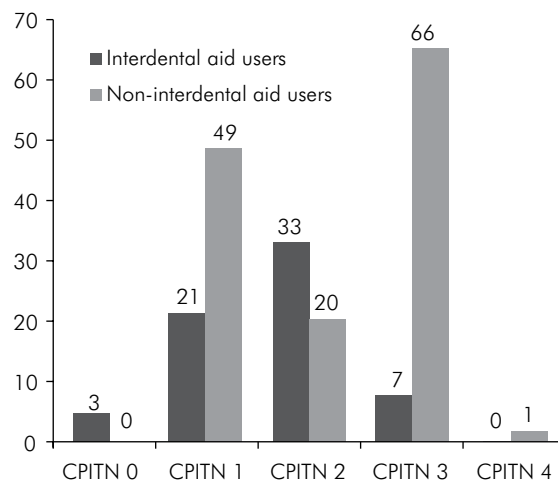


Figure 3. Relationship of CPITN Scores between interdentals and non-interdentals aid users among all patients.

Table 3. Comparison of CPITN scores between interdentals and non-interdentals aid users among all patients.

CPITN	Scores 0, 1, 2	Scores 3, 4	p-value
Interdental aid users (N = 64)	57 (89%)	7 (10%)	0.000*
Non-interdentals aid users (N = 136)	69 (50%)	67 (49%)	

*Statistically significant.

recorded of patients receiving fixed orthodontic treatment. Naranjo *et al.*⁸ reported that the placement of brackets influenced the ecological environment of retentive sites by the accumulation of biofilm, and the CPITN scores agree with those results. A marked increase was seen in the Plaque and Gingival Index of the experimental group because the increased bleeding and inflammation deteriorated the periodontal condition. Since there was a significant increase in both clinical and microbiological parameters 3 months after the fixed appliances were placed, these results were similar to those observed by Ristic *et al.*⁹

The CPITN scores of the ortho and non-ortho groups were significantly different, although the scores of patients using interdental aids were significantly lower than those not using the aids. It is a difficult for patients wearing orthodontic appliances to maintain proper oral hygiene because of the accumulation of dental plaque. Thus, it is believed that the accumulation of plaque and increased pocket depth are the results of fixed orthodontic appliance placement leading to an increase in CPITN scores.

Baer *et al.*¹⁰ suggested that interdental areas are notably more affected periodontally in orthodontic patients. This statement confirms that fixed orthodontic appliances have the property of accumulating dental plaque, which itself is an initiating factor for all periodontal diseases. These results agree with the results from other studies.¹¹ A normal sulcus has some depth in a clinically healthy gingiva. The depth of a periodontal sulcus is determined differently; some studies have reported a depth of 1.5 mm and others reported 1.8 mm.¹²

Areas of bone loss where pockets are suspected are indicated in radiographs.¹³ An increase in probing depth and a slight loss of attachment around the teeth was reported by Zachrisson and Zachrisson¹⁴ in patients undergoing orthodontic treatment with fixed orthodontic appliances.

Plaque is the primary etiological agent and initiating factor in almost all periodontal and gingival conditions, but the proper removal of plaque from the teeth and gingival surfaces is a challenge in the presence of fixed orthodontic appliances. Gram positive rods and cocci are the main organisms commonly present in early plaque. Later on, they are replaced by gram negative and anaerobic organisms, which may initiate a periodontal reaction.¹⁵ During orthodontic treatment, adequate oral hygiene measures are more difficult to achieve. In such conditions, orthodontic appliances act as mechanical plaque traps, wherein plaque can eventually evolve into a pathological state. Thus, the most important factor involved in preserving the periodontal health of patients undergoing orthodontic therapy is plaque control.

Motivating young age groups and getting them to practice good oral hygiene will certainly enhance levels of dental care.^{16,17} Special types of floss and powered and interdental toothbrushes have been shown to improve plaque control in orthodontic patients.¹⁸

Within the limitations of this study, we found that during the orthodontic treatment, periodontal health status is affected; however, further studies are needed to reveal the periodontal health status after appliance removal.

Conclusion

The present study results showed significant deterioration in periodontal status during the course of orthodontic treatment; fortunately, there was no severe bone loss leading to tooth mobility or loss. Thus, in order to maintain good periodontal health, proper oral hygiene practices and interdental aids should be employed.

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