Periodontal Assessment among Orthodontic Patients attending a Teaching Dental Hospital of Kathmandu, Nepal

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ABSTRACT

Gingivitis is a common periodontal disease that affects the health of the periodontium. Periodontal diseases are caused mainly due to accumulation of plaque. Orthodontic treatment involves use of many appliances which favor plaque retention, thus affecting the periodontium. Maintenance of proper oral hygiene is essential to maintain healthy periodontium during and after the fixed orthodontic treatment. This was a prospective study consisting of 110 respondents undergoing fixed orthodontic treatment within the range of 15-25 years visiting the Department of Orthodontics at Nepal Medical College. Community Periodontal Index for treatment needs (CPITN) was used to assess their periodontal status at 6, 12 and 18 months intervals. Maxillary left first molars showed highest CPITN score followed by maxillary right molar and mandibular first molars. Repeated measures (Analysis of Variance) ANNOVA showed highest CPITN scores among respondents who were undergoing treatment for 18 months compared to scores of 6 and 12 months, significantly.

This study was done to assess and compare the periodontal status of the patients before and during different intervals (6-12-18 months) of the fixed orthodontic treatment using CPITN index. Use of appropriate oral hygiene practices and interdental aids is recommended to control plaque causing gingivitis and periodontal problems during the treatment. Proper band placement and removal of overhanging materials are essential to minimize the periodontal destruction in molars.

Keywords: CPITN index, gingivitis, orthodontics, WHO probe

INTRODUCTION

Gingivitis is a condition in which there is inflammation of the gingiva surrounding the teeth. Gingivitis is a common periodontal disease that affects the health of the periodontium. Periodontal diseases are caused mainly due to accumulation of plaque.[1] Orthodontic treatment involves use of many appliances which favor plaque retention, thus affecting the periodontium.[2-4] Orthodontic appliances not only tend to retain bacterial plaque and food debris, leading to gingivitis, but also are capable of modifying the gingival ecosystem.[5]

The demand of orthodontic treatment is increasing day by day as patients are being more concerned about their estheticsthan function.[6,7] As orthodontic appliances cause plaque retention, proper oral hygiene maintenance becomes difficult in orthodontic patients.[2] So it is essential to educate the orthodontic patient to maintain proper oral hygiene during the course of treatment. Maintenance of proper oral hygiene is essential to maintain healthy periodontium during and after the fixed orthodontic treatment.[8] Poor oral hygiene maintenance among the orthodontic patients could be due to lack of education or due to negligence by the patient themselves.[9]

Therefore, it is essential to provide proper oral hygiene instructions to the orthodontic patients and educate them about the effects of poor oral hygiene on the teeth and periodontium by motivating them to use proper brushing techniques and interdental aids (interproximal brushes, dental floss).[5,8,10]

The aim of the present study is to evaluate the periodontal status of the patients undergoing fixedorthodontic treatment using Community Periodontal Index of Treatment Needs (CPITN) at theDepartment of Orthodontics in NMC from Jan 2015-2017, at various intervals (0-6-12-18months) during the course of the treatment.

MATERIALS AND METHODS

This is a prospective study conducted from January 2013 to January 2015. The patients were examined before starting orthodontic treatment, after 6 months, 12 months and 18 months of treatment and the periodontal health was assessed by using CPITN (community periodontal index) around the index teeth using mouth mirror and WHO CPITN probe.[2,5,8,10] All the patients underwent oral prophylaxis and were given oral hygiene instructions at the start of orthodontic treatment,prior to assessment of the periodontal status.

CPITN INDEX

The following CPITN coding system was used to record periodontal status[21]:

0, healthy periodontium

1 bleeding observed after probing

2 calculus detected during probing, but the black band on the probe was visible

3 pocket 4–5mm (the black band on the probe is within the gingival margin)

4 pocket ≥6mm (blackband on the probe not visible).

TN 0 corresponded to healthy periodontium with no treatment needs.

Patients with gingival bleeding need oral hygiene instruction : (TN 1)

code 2 and 3 need also scaling (TN 2)

If there is at least one sextant with CPITN 4, the person needs complex periodontal treatment like surgical intervention and/or deep scaling and root planing.

The clinical examination was performed in a systemic manner starting from maxillary right sextant. The tip of the probe was inserted gently putting the probe parallel to the long axis of the tooth, between the tooth and gingiva. Examination was started at the distobuccal surface of index tooth, to the full depth of the sulcus or pocket and the probing depth was read by observing the black band. The sites examined on the tooth were distal, midline and mesial on both facial and lingual/palatal surfaces. The highest score for each sextant was determined and recorded in the appropriate box.

Prevalence of periodontal disease among orthodontic patients was taken from a study conducted in Kathmandu; Nepal.[1]Sample size of 110 was taken for the study.Patients within 15 -25years were included in the study. Written and informed consent were taken from the patients prior to the examination. Non-probability sampling wasdone. All patients visiting the orthodontic department in NMC from Jan 2013 to 2015, between 15-25 years were target population. Out of the total patients visiting the hospital, the first 110 patients who fulfilled the inclusion criteria irrespective of gender were selected in this study.

All patients having a full complement of permanent dentition including first and second molars, undergoing fixed orthodontic treatment at the dental department in Nepal medical College will be included. The patients with missing tooth/teeth, undertaking medications, having systemic problems, having defect in hard and soft tissue morphology, para-functional habits, wearing removable orthodontic appliancesand those unwilling to participate will be excluded. Patients who refuse to participate in any part of the study will be discontinued from the study. All recorded data was entered and statistically analyzed using SPSS version 17data analyzer and various comparisons were performed by chi square test.

Ethical clearance was obtained from the Ethical Committee of Nepal Medical College Teaching Hospital. Informed written consent was obtained from the patients 18 yearsand above before performing the study. Parental consent was obtained from the patients below 18 years of age.

RESULTS

In this study, age range of the patient was 15-25 years. Out of total population 57.3% belonged to age group 15-19 years and 42.7% belonged to 20-25years, 31.8% were male and 68.2% were female (Table 1). Mean CPI score of all indexed teeth before starting fixed orthodontic treatment was found to be 0. The mean CPI score of 16 during six months of treatment was found to be 0.75 (0.70), twelve months of treatment was found to be 1.45 (0.86) and eighteen months of treatment was found to be 2.00 (1.07) as shown in Table 2. The mean score of 11 during six months of treatment was 0.40 (0.65), twelve months of treatment was 0.96 (0.81) and eighteen months of treatment was 1.2 (0.99). The mean score of 26 during six months of treatment was 0.80 (0.78), twelve months of treatment was 1.6 (1.2) and eighteen months of treatment was 2.1 (1.00). The mean score of 36 during six months of treatment was 0.72 (0.76), twelve months of treatment was 1.5 (2.15) and eighteen months of treatment was 1.8 (1.06). The mean score of 31 during six months of treatment was 0.59 (0.74), twelve months of treatment was 1.1 (0.89) and eighteen months of treatment was 1.72 (1.09). The mean score of 46 during six months of treatment was 0.65 (0.72), twelve months of treatment was 1.2 (0.85) and eighteen months of treatment was 1.72 (1.09) (Table 2). From the above results, the highest CPI score was seen in 26 followed by 16, 36, 46, 31 and 11 during eighteen months of treatment. This showed that periodontal health of molars were affected more than incisors during fixed orthodontic treatment and more CPI score of indexed teeth were seen during eighteen months of treatment than six months and twelve months.

Table 1: Distribution of respondents

		Frequency	Percent
Age group	15-19 yrs	63	57.27273
	20-25 yrs	47	42.72727
Gender	Male	35	31.81818
	Female	75	68.18182
	Total	110	100

Table 2: Mean CPI Scores at Various intervals

Time	Mean	Sd
6 MONTHS	0.67	0.60
12 MONTHS	1.28	0.63
18 MONTHS	1.73	0.80

Treatment need according to CPITN score during eighteen months of fixed orthodontic treatment in 16 showed that professional cleaning of teeth was required and oral hygiene instructions were required during fixed orthodontic treatment. Treatment need according to CPITN score during eighteen months of fixed orthodontic treatment in 11 showed that patient need to improve the personal oral hygiene during treatment. Treatment need according to CPITN score during eighteen months of fixed orthodontic treatment in 26 showed that professional cleaning of teeth was required and oral hygiene instructions were required during the treatment. Treatment need according to CPITN score during eighteen months of fixed orthodontic treatment in 36, 31 and 46 showed that patient need to improve the personal oral hygiene during treatment.

Repeated measures annova was done to test the overall significant difference between the means at the different time points i.e. 6 months, 12 months and 18 months. It was seen that the mean scores for CPI Index were statistically significant ($F1.758, 191.638$) $= 109,941$, $p < 0.0005$). We can see that there was a significant difference in CPI scores between 6 months and 12 months times period ($p < 0.005$), between 12 months and 18 months ($p = 0.001$), and between 6 months and 18 months significantly ($p < 0.005$). From the Mean Difference column we can see that CPI scores was significantly increased from 12 months to 18 months time point (Table 3).

DISCUSSION

In the present study, the CPI score of patients receiving fixed orthodontic treatment was significantly more compared to pretreatment score. This result is similar to a study performed in Nepalese population in which the patients receiving fixed orthodontic treatment showed increased CPI score than non-orthodontic group of patients. This is because orthodontic appliances cause retention of plaque and adequate oral hygiene measures are more difficult to achieve during orthodontic treatment. This study agrees with the result of another study done by Naeem and Chatcha in Lahore to evaluate the oral hygiene status of patients receiving fixed orthodontic treatment; they found that periodontal status of patients receiving orthodontic treatment significantly worsened after the placement of fixed orthodontic appliances.[2] In a study done in Islamabad, it was seen that there was a strong relationship between progression of periodontal disease and duration of fixed orthodontic treatment. They also found that not only the brackets but the bands also influence the periodontal health.[8,12] Similarly in the present study, higher CPI scores was obtained in molars than other indexed tooth. Pocketdepth in this study was higher in banded molars which could be because of many factors like oral hygiene measures, bandposition impinging on gingiva (presence of subgingival band margins) and overhanging material and inaccessibility during the oral hygiene measures. The result of this study was similar to a study done in Karachi in which the pocket depth in first molars during twelve months interval of fixed orthodontic treatment was found to be more than the pocket depth in 6 months.[10] 80 % of the patients treated with the fixed orthodontic appliance and with clinical manifestations of plaque induced gingivitis showed periodontal pathogens in a quantity significant for the damage of periodontium.[11] This could be the reason for significant increase inpocket depth with the duration of treatment in the present study. Increased

Table 3: Pair wise comparison of Mean difference of CPI score at various time intervals

Time	time	Mean Difference		Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
6 months	2	-.616[*]	.060	.000	-.762	-.471
	3	-1.067[*]	.083	.000	-1.269	-.864
12 months	1	.616[*]	.060	.000	.471	.762
	3	-.450[*]	.072	.000	-.625	-.276
18 months	1	1.067[*]	.083	.000	.864	1.269
	2	.450[*]	.072	.000	.276	.625

a: Adjustment for multiple comparisons: Bonferroni
*: Mean difference is significant at the 0.05 level

periodontal problems with increased duration of treatment could be due to patients following oral hygiene instructions properly during initial period of fixed orthodontic treatment but with time due to negligence of patients in maintaining proper oral hygiene, periodontal problem has been found to worsen with increased duration of treatment.

Fixed orthodontic appliances like brackets, bands, modules etc.createfavorable environment for the accumulation of a microbiota and food residues, which, in time, may cause cariesand periodontal diseases.[17,18] Patient motivation and delivering proper instructions on gingival health maintenance to orthodontic patients are essential elements for successful orthodontic treatment. Therefore, appropriate oral hygiene practices and interdental aids should be used to control plaque during the treatment. Proper band placement (supra gingival band margins) and removal of overhanging materials are essential to minimize the periodontal destruction in molars. The study being of a descriptive study design cannot be used to draw causal relationships between the variables. An experimental study can be recommended for further results.

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