



Influence of Different Orthodontic Bracket System on Periodontal Status among Smoking and Non-Smoking Patients - A Cross Sectional Study

Sheethalan M S R,

Post Graduate,

Department Of Periodontics, Saveetha Dental College

Prasad Ravichandran,

Post Graduate,

Department Of Orthodontics, Saveetha Dental College

Sankari M,

Professor,

Department Of Periodontics, Saveetha Dental College

Saravana Dinesh,

Reader,

Department Of Orthodontics, Saveetha Dental College

Abstract –

Objective - To determine effect of different bracket design on periodontal clinical parameters among smokers and non-smokers.

Materials and methods –

The study included total of 24 patients (12 conventional and 12 self-ligating). Among the conventional group 6 smokers and 6 non-smokers were present, whereas 5 smokers and 7 non-smokers were present in self-ligating group. Clinical parameters of probing pocket depth, gingival index and plaque index were taken into consideration.

Results –

No significant difference present between smokers and non-smokers among patients wearing self-ligating and conventional brackets in terms of clinical parameters.

Conclusion –

Bracket design does not have any influence on periodontal clinical parameters among smokers and non-smokers.

Keywords – orthodontic appliances, self-ligating brackets, periodontal indices, periodontium

INTRODUCTION-

Orthodontic brackets often causes hindrance in oral hygiene due to its design which favours accumulation of plaque. Orthodontic appliances also contributes to gingival, periodontal and cariogenic alterations because it modifies the oral microbiota. [1,2] Different bracket systems are used for the orthodontic treatment which serves as an ideal niche for the normal microbiota which may become established and act as an opportunist, inducing imbalance and subsequent disease.

Among the various bracket systems self-ligating brackets was proposed to be more effective in maintaining the oral hygiene over conventional brackets due to reduced complexity of the bracket design and also elimination of the ligatures causes less plaque accumulation. [2]

Smoking is a well-known risk factor for periodontal diseases. [3] Studies have shown that smokers have higher plaque accumulation, more pathogenic flora and less response to the periodontal therapy. [4]

Many studies were present comparing the clinical and microbial parameters between conventional and self-ligating bracket system. Although smoking has a deleterious effect to the periodontal status, to our knowledge no

literature evidence suggest whether the different bracket system have any additive effects to the smoking habit in progression of the periodontal disease. Therefore this study compares periodontal status among smokers and non-smokers in patients wearing self-ligating and conventional bracket system.

MATERIALS AND METHODS-

The study included 24 patients of both sexes, aged 16 to 30 years, with cast discrepancy less than 7mm and with comparable relative crowding. Among the 24 patients, 12 patients were wearing conventional brackets (6 smokers and 6 non-smokers) and 12 patients were wearing self-ligating brackets (5 smokers and 7 non-smokers).

Inclusion Criteria-

Patient aged 16 to 30 years, of either sex, with permanent dentition. Only current smokers and patient who have completed minimum of 3 months of orthodontic treatment were included in the study.

Clinical Parameters-

Clinical parameters of Silness and Loe plaque index, Loe and Silness gingival index [5] and probing pocket depth

were taken into consideration. They were evaluated as follows:

Clinical indicators were evaluated as follows

Plaque index (PI):

0. No plaque

1. Plaque when the probe is passed along the gingival margin

2. Visible plaque

3. Abundance of plaque

Gingival index (GI):

0. Complete absence of visual signs of inflammation

1. Slight change in colour and texture

2. Visible inflammation and tendency to bleeding when the probe is passed lightly along the gingival margin

3. Clear inflammation with tendency to spontaneous bleeding

Probing Depth (PD):

Measured in millimetres with a periodontal probe (NC 15; Hu-Friedy, Chicago, IL, USA), was recorded as the distance from the gingival margin to the most apical part of the sulcus. Three readings were carried out per tooth (mesiobuccal, buccal, distobuccal).

The results of the pocket depth, gingival index and plaque index were averaged for all the teeth and a mean value for each subject was calculated.

Statistical Analysis-

Data were analysed using SPSS 16.0 version for windows.

All parameters were found to be parametric hence were

presented as mean \pm Standard deviation (Mean \pm SD). Comparison of mean pocket depth, gingival index and plaque index among smokers and non-smokers were done by independent sample T-test.

RESULTS-

A total of 24 patients between the age groups of 16 to 30 were included in our study. Out of those, 12 patients had conventional brackets and the remaining 12 had self-ligating brackets. The general demographics of patients selected were summarized in table 1. The mean age of patients wearing conventional brackets was 20 ± 5 years and that of self-ligating was 19 ± 3 years. Among patients wearing conventional brackets, 42% were males as against 50% among patients with self-ligating brackets. 50% of conventional bracket wearers were smokers whereas in self-ligating group it was 42%.

Table 2 shows the comparison of mean pocket depth, plaque index and gingival index between smoking and non-smoking patients having conventional brackets. Mean of all the three indices were found to be slightly higher among smokers compared to non-smokers. However, the difference was not significant at 5% level.

Table 3 shows the same comparison of indices among patients wearing self-ligating brackets. Here also, the mean pocket depth, plaque index and gingival index were higher among smokers although it is not significant statistically at 5% level.

Table 1: General demographics of selected patients

	Conventional brackets(n = 12)	Self-ligating brackets(n = 12)
Mean age (SD) years	20 (5)	19 (3)
Males (%)	5 (42%)	6 (50%)
Females (%)	7 (58%)	6 (50%)
Smokers (%)	6 (50%)	5 (42%)

Table 2: Comparing mean pocket depth, plaque index and gingival index between smokers and non- smokers wearing conventional brackets

Variables	Conventional Brackets			
	Smokers(n = 6)	Non-smokers (n =6)	t value	p value
Mean Pocket depth	2.26	2.35	-1.02	0.333
Mean Plaque index	1.12	1.02	1.20	0.260
Mean Gingival index	1.12	1.02	1.08	0.307

Table 3: Comparing mean pocket depth, plaque index and gingival index between smokers and non- smokers wearing self-ligating brackets

Variables	Self-ligating Brackets			
	Smokers (n = 5)	Non-smokers (n = 7)	t value*	p value**
Mean Pocket depth	2.46	2.38	1.01	0.335
Mean Plaque index	1.23	1.12	1.78	0.106
Mean Gingival index	1.11	1.07	0.57	0.580

*independent sample t-test

** $p < 0.05$ considered statistically significant

DISCUSSION-

Due to difficulty in maintaining the oral hygiene while wearing fixed orthodontic appliances it results in increased formation of biofilm and initiate inflammatory periodontal disease. [6] Also smoking which is a well-known risk factor for the periodontal disease which can aggravate the destruction and severity of the periodontal disease progression in patients wearing orthodontic brackets. Marketing materials advertise SLBs as brackets with better bacterial accumulation because of the elimination of elastomeric and stainless steel ligatures.

Literature suggest that there is no significant difference between the patients wearing SLBs and conventional brackets in terms of clinical parameters among non-smoking patients. [2] However study by Lee et al reported significant differences in the prevalence of putative periodontal pathogens in subgingival plaque in patients with conventional brackets. [7] Higher prevalence of AA in the subgingival plaque of patients with conventional brackets can be attributed to several factors: patient innate flora, inadequate oral hygiene, subgingival placement of orthodontic bands, or surface roughness of stainless steel ligature. [9] Different studies shows contradictory results while comparing periodontal status among self-ligating and conventional brackets which can be attributed to differences in study design, material and methods, studied microbes and statistical analysis.

Smoking and its clinical manifestation on periodontium is evident, but smokers show a reduced clinical signs of inflammation than non-smokers due to alterations in the size of blood vessels perfusing the gingival tissues thus reducing the clinical signs of bleeding, oedema, redness. [9, 10] Also smoking causes alterations in the periodontal microflora and less favourable response to periodontal treatment. [4]

Also studies shows that the smokers were 2.3 times more likely to harbour periodontal pathogen than former smokers or non-smokers. [11] Studies by Haffajee and Socransky concluded that periodontal pathogen colonized a larger proportion of sites, rather than counts or proportions among smoker than non-smokers. [12]

The results of the study shows that the delirious effect of smoking towards gingival tissue will be same irrespective of the type of bracket. Since the results are obtained in a cross sectional manner, further controlled studies with larger sample size is required to substantiate the results obtained.

BIBLIOGRAPHY -

1. Naranjo AA, Trivino ML, Jaramillo A, Betancourth M, Botero JE. Changes in the subgingival microbiota and periodontal parameters before and 3 months after bracket placement. *Am J Orthod Dentofacial Orthoped.* 2006;130:275, e17–e22.
2. Pandis N, Papaioannou W, Kontou E, Nakou M, Makou M, Eliades T. Salivary Streptococcus mutans levels in patients with conventional and self-ligating brackets. *Eur J Orthod.* 2010;32:94–99.
3. A. Guntsch, M. Erler, P.M. Preshaw, B.W. Sigusch, G. Klinger, E. Glockmann, Effect of smoking on crevicular polymorphonuclear neutrophil function in periodontally healthy subjects. *J. Periodontol. Res.* 41 (2006) 184–188.
4. J. Bergstrom, Tobacco smoking and chronic destructive periodontal disease. *Odontology* 92 (2004) 1–8.
5. Loe H. The gingival index, plaque index and the retention index system. *J periodontol* 1967;38(Suppl): 610–16.
6. Turkkahraman H, Sayin MO, Bozkurt FY, Yetkin Z, Kaya S, Onal S. Archwire ligation techniques, microbial colonization, and periodontal status in orthodontically treated patients. *Angle Orthod.* 2005;75:231–236.
7. Lee SM, Yoo SY, Kim HS, Kim KW, Yoon YJ, Lim SH, Shin HY, Kook JK. Prevalence of putative periodontopathogens in subgingival dental plaques from gingivitis lesions in Korean orthodontic patients. *J Microbiol.* 2005;43:260–265.
8. Paolantonio M, Festa F, di Placido G, D'Attilio M, Catamo G, Piccolomini R. Site-specific subgingival colonization by *Actinobacillus actinomycetemcomitans* in orthodontic patients. *Am J Orthod Dentofacial Orthoped.* 1999;115:423–428.
9. Bagaitkar J, Demuth DR, Daep CA, Renaud DE, Deanne L, Pierce DL. Tobacco Upregulates P. gingivalis Fimbrial Proteins Which Induce TLR2 Hyposensitivity. *PLoS One.* 2010 May;5(5):e9323.
10. Lima FR, Cesar-Neto JB, Lima DR, Kerbauy WD, Nogueira-Filho GR. Smoking enhances bone loss in anterior teeth in a Brazilian population: A retrospective cross-sectional study. *Braz Oral Res.* 2008 Oct-Dec;22(4):328–33.
11. Zambon JJ, Grossi SG, Machtei EE, Ho AW, Dunford R, Genco RJ: Cigarette smoking increases the risk for subgingival infection with periodontal pathogens. *J Periodontol.* 1996. 67 (10 Suppl): 1050-1054.
12. Haffajee AD, Socransky SS. Relationship of cigarette smoking to the subgingival microbiota. *Journal of Clinical Periodontology.* 2001;28:377–388.