

Original Article

Effect of Periodontal Scaling in Patients Undergoing Orthodontic Treatment on General Oral and Periodontal Health

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ABSTRACT

Background: Orthodontic treatments, while improving dental alignment and facial aesthetics, significantly complicate oral hygiene management due to the fixed nature of orthodontic appliances. This study investigates the potential benefits of periodontal scaling in mitigating the adverse effects on oral and periodontal health among orthodontic patients.

Objective: To evaluate the impact of periodontal scaling on the general oral and periodontal health of patients undergoing orthodontic treatment.

Methods: This descriptive cross-sectional study included 50 patients from the College of Dentistry, Sharif Medical and Dental College, Lahore. Conducted from April 2023 to April 2024, the study utilized a questionnaire to collect demographic data and information about the patients' last dental scaling. The Community Periodontal Index for Treatment Needs (CPITN) and the Decayed, Missing, Filled Teeth Index (DMFT) assessed the periodontal and general oral health.

Results: The correlations between the time since the last scaling and general oral health (DMFT score: $p=0.950$) and periodontal health (CPITN: $p=0.635$) were not statistically significant. Higher DMFT scores were noted in patients who last had scaling over a year ago (30%), followed by those never scaled (26%). Pocket depths of 6mm were solely observed in unscaled patients.

Conclusion: The incidence of decayed, missing, and filled teeth, as well as deeper pocket depths, were notably higher in orthodontic patients who had not received scaling in over a year or never at all, emphasizing the necessity of regular periodontal care.

Keywords: Decayed, Missing, Filled Teeth Index; Orthodontic Treatment; Oral Health; Periodontal Health; Scaling; Community Periodontal Index for Treatment Needs.

INTRODUCTION

Orthodontic treatment, designed to correct skeletal and dental malocclusions and to enhance mastication and facial aesthetics, frequently complicates the maintenance of optimal oral hygiene (1). The inclusion of fixed orthodontic appliances, such as brackets and wires, often leads to food entrapment. While regular brushing and flossing are vital, they may not sufficiently remove all plaque and calculus buildup (1).

Dental plaque is clinically described as a structured, resilient, yellowish-greyish substance that tenaciously adheres to the intraoral hard surfaces, including both removable and fixed restorations (2, 3). This plaque undergoes mineralization to form calculus. The formation of dental plaque is a staged process that begins with the formation of a pellicle on the tooth surface, followed by the initial attachment of bacteria, and culminates in the maturation of the biofilm (2). The biofilm predominantly harbors gram-positive rods and cocci, which are majorly found on the tooth surfaces (2). Caufield and Gibbons highlighted that the majority of *Streptococcus mutans* in saliva or on the tongue originates from biofilms on the teeth (4).

Inadequate oral hygiene allows bacteria to remain on these surfaces for extended periods, thereby increasing their proliferation (5). The presence of fixed brackets exacerbates gingival inflammation due to altered subgingival microbial compositions, leading to changes in oral microbiology (6). Additionally, alterations in the pH of saliva can increase the prevalence of cariogenic bacteria in accumulated plaque, which then contributes to the breakdown of tooth structure and results in dental caries (7).

To counter these challenges, ultrasonic scalers are employed to remove both subgingival and supragingival deposits from teeth, which prevents plaque accumulation and discourages calculus formation (8). Such periodontal scaling, whether manually with curettes or mechanically with ultrasonic devices, has been shown to be an effective preventive measure against enamel demineralization in patients undergoing orthodontic treatment (9). Several studies have confirmed the positive impact of maintaining oral hygiene on reducing the incidence of dental caries and periodontal issues in this population, thus underscoring its necessity as a critical component of preventive care (10).

The objective of the present research is to investigate the effect of periodontal scaling on general oral and periodontal health in patients undergoing orthodontic treatment. This study aims to provide empirical evidence on the efficacy of proactive oral hygiene measures in preventing dental and periodontal complications among orthodontic patients.

MATERIAL AND METHODS

A descriptive cross-sectional study was conducted to assess the impact of periodontal scaling on oral health among orthodontic patients. This study included 50 children aged 12 to 17 years, undergoing orthodontic treatment at the College of Dentistry, Sharif Medical and Dental College, Lahore, from April 2023 to April 2024. Prior to the commencement of data collection, ethical approval was secured from the Ethical Committee of Sharif Medical Research Centre (SMRC) under the approval number SMDC/SMRC/195-21, dated June 8, 2021. Informed consent was obtained from all participants.

The inclusion criteria were set to include children in the specified age range who were receiving orthodontic treatment, regardless of gender. Participants with mixed dentition were excluded from the study. Data collection was facilitated through a questionnaire, which gathered demographic information and details of the participants' most recent dental scaling visit. The oral health of the patients was evaluated using the Community Periodontal Index for Treatment Needs (CPITN) (11) and the Decayed, Missing, Filled Teeth Index (DMFT)(12). For the purposes of this study, the DMFT score was categorized into low and high levels: scores from 1 to 3 were considered low, while scores of 4 and above were categorized as high.

The sample size of 50 was determined using a non-convenience sampling technique, employing an online sample size calculator with a precision of 5%, a confidence level of 95%, and an assumed prevalence of periodontitis in orthodontic patients of 3%(13). Statistical analysis was conducted using SPSS version 23. The significance threshold was set at a P-value of 0.05 or less. The Kruskal-Wallis test was applied to detect differences in the CPITN and DMFT scores relative to the time elapsed since the last scaling. Additionally, the Fisher exact test was used to explore the association between periodontal health (as measured by the CPITN) and general oral health (as indicated by the DMFT scores) across different groups of orthodontic patients concerning the time since their last scaling.

RESULTS

A cross sectional study was done in patients undergoing orthodontic treatment with a mean age of 15.38 ± 1.839 years with 56% males and 44% females. Table 1 shows the distribution of orthodontic patients based on the time since their last scaling procedure.

Table 1: Time since last scaling in orthodontic patients

Patients undergone scaling	
Time since last scaling	n(%)
3 months	10 (10%)
6 months	22 (22%)
more than a year ago	36(36%)
never	32(32%)

Table 2 shows that there was no significant difference in the score of decayed ($p=0.515$), missing (0.779), filled ($p=0.839$) teeth among orthodontic patients with respect to the time since they last had their scaling done. A similar trend was seen with the CPITN score in these patients ($p=0.250$). It was seen that the scores orthodontic patients who had undergone scaling more than a year ago were higher than those who had undergone scaling procedures 3 month and 6 months ago depicting a worse general oral health with high tooth decay. The periodontal health of patients who had never had scaling done was worse than all other groups as shown in table 2.

Table 2: Difference in the scores of decayed, missing and filled teeth score and CPITN score across categories of orthodontic patients based on the time since their last scaling treatment

Parameters of oral health	Time since last scaling of orthodontic patients	N	Mean Rank	df	P value
	3 months	5	17.70	3	0.250

Community periodontal index for treatment needs score (CPITN score)	6 months	11	22.91	3	0.515
	more than a year ago	18	25.22		
	never	16	30.03		
	Total	50			
Decayed teeth score	3 months	5	17.00	3	0.515
	6 months	11	27.59		
	more than a year ago	18	27.03		
	never	16	25.00		
	Total	50			
Missing teeth score	3 months	5	22.50	3	0.779
	6 months	11	24.73		
	more than a year ago	18	26.58		
	never	16	25.75		
	Total	50			
Filled teeth score	3 months	5	30.40	3	0.839
	6 months	11	23.91		
	more than a year ago	18	25.83		
	never	16	24.69		
	Total	50			

Table 3 shows that as measured by DMFT index the highest DMFT score was seen in orthodontic patients who had their scaling done more than a year ago (30%) followed by those who never had their scaling done (26%) and then 6 months ago (20%) and but the association was non-significant (p=0.950).

Table 3: Association between general oral health in orthodontic patients with respect to time since last scaling

Time since last scaling of orthodontic patients	Decayed, missing, filled index (DMFT) Classification			P value
	Low score (dmft 1 to 3)	High score (dmft 4 and above)	Total	
3 months	1(2%)	4(8%)	5(10%)	0.950
6 months	1(2%)	10(20%)	11(22%)	
More than a year ago	3(6%)	15(30%)	18(36%)	
Never	3(6%)	13(26%)	16(32%)	

Table 4 shows that no significant association was seen between periodontal health and time since last scaling done in orthodontic patients (p=0.635). It was seen that pocket depth of 6mm or more were only found in patients who had never undergone scaling (4%). Pocket depths of 4-5mm were the highest in patients who had their scaling procedure done more than a year ago (16%), followed by 14% in those who never had it, 6 months ago (8%) and the least in those who had 3 months ago (2%). A similar trend was seen for calculus deposition i.e more than a year ago (18%), never (14%), 6 months ago (12%) and the least in 3 months ago as shown in table 4.

Table 4 : Association between periodontal health and time since last scaling in orthodontic patients

Time since last scaling of orthodontic patients	Community periodontal index for treatment needs (CPITN)				Total	P Value
	Bleeding	Calculus	Pocket 4-5mm	Pocket more than 6 mm		
3 months	1 (2%)	3 (6%)	1(2%)	0(0%)	5(10%)	0.635
6 months	1(2%)	6(12%)	4(8%)	0(0%)	11(22%)	
More than a year ago	1 (2%)	9(18%)	8(16%)	0(0%)	18(36%)	
Never	0 (0%)	7(14%)	7(14%)	2(4%)	16(32%)	

DISCUSSION

Orthodontic treatment, widely recognized as a significant risk factor for dental caries and periodontal issues, often complicates oral hygiene due to the entrapment of food by fixed appliances (14, 15). Our study examined the impact of periodontal scaling on oral health in patients undergoing orthodontic treatment and found no significant differences in the scores for decayed (p=0.515), missing (p=0.779), and filled (p=0.839) teeth based on the time elapsed since the last scaling. A high score on these indices typically indicates poorer oral health, yet our findings suggest that the timing of scaling may not directly influence these outcomes.

The DMFT index revealed that patients who had their scaling done over a year ago exhibited the highest scores, suggesting deterioration in oral health over time without regular professional cleaning (30%). This trend was followed by those who had never undergone scaling (26%), and then those who had scaling six months ago (20%). Despite these variations, the associations were not statistically significant ($p=0.950$). These findings align with previous research indicating that fixed orthodontic appliances can enhance plaque accumulation, thereby increasing the risk of dental caries if oral hygiene is not meticulously maintained (15, 18).

Regarding periodontal health, the Community Periodontal Index for Treatment Needs (CPITN) scores were higher in patients who had their last scaling more than a year ago compared to those who had more recent scaling, underscoring the importance of frequent periodontal care (19, 25). Despite this, no significant association was found between periodontal health and the timing of the last scaling ($p=0.635$). Interestingly, deeper pocket depths were predominantly observed in patients who had never undergone scaling, emphasizing the detrimental effects of neglecting professional dental care.

The study supports the necessity of regular dental visits and scaling to maintain oral hygiene during orthodontic treatment, as recommended by previous studies (20). Proper oral hygiene practices, including regular scaling, play a crucial role in mitigating the risks associated with orthodontic appliances (27, 28). Additionally, it is imperative that orthodontic treatment begins only after a thorough periodontal evaluation to ensure that the periodontal tissues are healthy and can support the treatment (29, 30).

However, the study is not without its limitations. The sample size, although adequate for initial explorations, may not fully capture the broader implications of scaling frequency on oral health outcomes across diverse populations. Moreover, the observational nature of the study limits the ability to establish causality between scaling frequency and specific oral health outcomes.

In conclusion, while our study adds to the existing literature by exploring the impact of scaling on oral health during orthodontic treatment, the findings highlight the complex interplay between orthodontic care, oral hygiene practices, and regular professional interventions. Future research with larger sample sizes and a longitudinal approach could provide deeper insights into optimizing oral health care protocols for orthodontic patients.

CONCLUSION

The study concluded that orthodontic patients who had not received scaling for over a year exhibited a higher prevalence of decayed, missing, and filled teeth, followed by those who never underwent scaling. Additionally, severe periodontal issues, indicated by pocket depths of 6mm or more, were exclusively found in patients who had never received scaling, with significant deterioration also noted in those who had their last scaling over a year ago. It is recommended that regular and periodic scaling be integrated into the oral healthcare regimen of orthodontic patients to mitigate the adverse effects of orthodontic appliances on oral health. Expanding the study to include a larger sample and multiple centers could provide a more comprehensive understanding of the impacts of scaling on oral health in this population.

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