ORIGINAL RESEARCH

Effect of fixed orthodontics treatment on gingival health

Dr. Sumit S Shetgar[1], Dr. Vikramaditya Todkar[2], Dr. Rutuja Kempwade Todkar[3]

[1]Lecturer, Department of Periodontology, Tatyasaheb Kore Dental College and Research Center, India
[2]Lecturer, Department of Orthodontics and Dentofacial Orthopaedic, Tatyasaheb Kore Dental College and Research Center, India
[3]Lecturer, Department of Oral Pathology and Microbiology, Tatyasaheb Kore Dental College and Research Center, India

Corresponding Author
Dr. Sumit S Shetgar
Lecturer, Department of Periodontology, Tatyasaheb Kore Dental College and Research Center, India
Email: sum2141@gmail.com

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ABSTRACT

Aim- To assess the relationship between orthodontic treatment and gingival health. **Materials and methods-** This study aimed to evaluate the effects of fixed orthodontic treatment on gingival health. A total of 50 patients scheduled for orthodontic treatment were recruited for the research. An exhaustive intraoral examination was performed to assess visible plaque, any clinically apparent inflammation, and instances of gingival recession. The classification of gingival recession, when observed, adhered to the criteria established by Miller. Additionally, gingival biotype analysis was conducted based on assessments of gingival texture and capillary transparency. Follow-up records were also analyzed. Data analysis was done using SSPS software. **Results-** The visible plaque value increased from 4.2 before treatment to 5.7 after treatment, with a statistically significant P value of 0.002. Visible inflammation also showed a significant increase, rising from 3.12 before treatment to 14.01 after treatment, with a P value of 0.015. Similarly, the gingival recession score increased from 0.12 prior to treatment to 0.43 post-treatment, with a P value of 0.002, indicating a notable difference after orthodontic intervention. **Conclusion-** Following fixed orthodontic treatment, there is a notable rise in plaque accumulation, inflammation, and gingival recession. Therefore, it is essential to perform regular oral prophylaxis throughout the course of orthodontic care.

Keywords- hygiene, malocclusion, gingiva

INTRODUCTION

The interrelationship between periodontics and orthodontics has been extensively studied, yet it remains a controversial topic. Research has shown that malocclusion can negatively impact periodontal health, and one of the key goals of orthodontic treatment is to enhance dental health and extend the lifespan of teeth. By correcting dental irregularities, orthodontic treatment not only improves alignment but also contributes to better oral hygiene and reduces or eliminates occlusal trauma. For these reasons, it is often suggested that orthodontic treatment can lead to improved periodontal health. Straighter teeth are generally easier to clean, and aligning the teeth properly within the alveolar bone may promote a healthier periodontium.[1,2]

However, despite the benefits of correcting dental and skeletal issues, the placement of orthodontic appliances can alter oral hygiene habits and negatively affect periodontal health. The close proximity of the appliances to the gingival sulcus, along with plaque accumulation and the challenges posed to maintaining proper oral hygiene, complicates the effectiveness of orthodontic care. Orthodontic appliances and the associated mechanical interventions can provoke local soft tissue responses, particularly in the gingiva.[3,4]

Clinically, the insertion of orthodontic appliances can lead to chronic infections, inflammatory hyperplasia, irreversible attachment loss (including permanent bone loss), and gingival recession. Additionally, pre-existing mucogingival conditions may worsen with the application of orthodontic forces.[5,6] This retrospective study aims to assess the relationship between orthodontic treatment and gingival health.

MATERIALS AND METHODS

This study aimed to evaluate the effects of fixed orthodontic treatment on gingival health. A total of 50 patients scheduled for orthodontic treatment were recruited for the research. Comprehensive data collection was conducted for all participants, including intraoral and extra-oral radiographs,

alongside photographic documentation recorded on separate forms. An exhaustive intraoral examination was performed to assess visible plaque, any clinically apparent inflammation, and instances of gingival recession. The classification of gingival recession, when observed, adhered to the criteria established by Miller. Additionally, gingival biotype analysis was conducted based on assessments of gingival texture and capillary transparency. Follow-up records were also analyzed. Data analysis was done using SSPS software.

RESULTS

Table 1: Demographic data

Parameter	Fixed Orthodontic Treatment (n = 50)	
	With Dental Extraction (n = 22)	Without Dental Extraction (n = 28)
Mean age (years)	16.6	17.3
Gender		
Male	14	16
Female	8	12
Mean treatment time(months)	30.2	28.9

Among the 22 patients who underwent dental extraction, the mean age was 16.6 years, while for the 28 patients who did not have dental extraction, the mean age was 17.3 years. Regarding gender distribution, the group with dental extraction consisted of 14 males and 8 females, whereas the non-extraction group had 16 males and 12 females. The mean treatment time for patients with dental extraction was 30.2 months, slightly longer than the 28.9 months observed in those without dental extraction.

Table 2: Comparison of Oral Health Parameters

Variable	Fixed Orthodontic Treatment	P value
Visible Plaque Value		
Before Treatment	4.2	0.002*
After Treatment	5.7	
Visible Inflammation Value		
Before Treatment	3.12	0.015*
After Treatment	14.01	
Gingival Recession Score		
Before Treatment	0.12	0.002*
After Treatment	0.43	

Table 2 presents a comparison of oral health parameters before and after fixed orthodontic treatment. The visible plaque value increased from 4.2 before treatment to 5.7 after treatment, with a statistically significant P value of 0.002. Visible inflammation also showed a significant increase, rising from 3.12 before treatment to 14.01 after treatment, with a P value of 0.015. Similarly, the gingival recession score increased from 0.12 prior to treatment to 0.43 post-treatment, with a P value of 0.002, indicating a notable difference after orthodontic intervention.

Table 3-Comparison of gingival biotype

Gingival Biotype Score	Percentage of affected patients Before treatment	Percentage of affected patients After treatment
Maxilla		
Thin	58%	50%
Thick	76%	82%
Mandible		
Thin	32%	36%
Thick	48%	56%

The gingival biotype of patients was assessed before and after orthodontic treatment. In the maxilla, 58% of patients were classified as having a thin gingival biotype before treatment, which decreased to 50% after treatment. Conversely, the percentage of patients with a thick gingival biotype in the maxilla increased from 76% to 82% post-treatment. In the mandible, 32% of patients had a thin gingival biotype prior to treatment, rising to 36% after treatment. Meanwhile, the proportion of patients with a thick biotype in the mandible increased from 48% to 56% following treatment.

DISCUSSION

Patients undergoing orthodontic treatment with fixed appliances are at risk for developing gingival inflammation because of the increased challenge to oral hygiene. Dental plaque is a primary etiologic factor in gingivitis[7]. The patient's inability to clean his or her teeth adequately around fixed orthodontic devices promotes plaque accumulation that can then

lead to gingival inflammation. An overall increase in salivary bacterial counts, especially Lactobacillus, has been shown after orthodontic appliance placement.[8]

A study done by Boke et al. (2014)[9] to assess the relationship between orthodontic treatment and gingival health showed no statistically significant differences in patients treated with functional appliances before and after treatment. However, in patients treated with fixed orthodontic appliances, there were significant increases in visible plaque, visible inflammation, and gingival recession post-treatment, while the gingival biotype remained unchanged. A positive correlation was identified between the position of the lower incisors and gingival recession in patients who underwent fixed appliance treatment and tooth extraction. Additionally, the study found that cuspids had the highest prevalence of gingival recession.

The findings of our study align with those of Boke et al. (2014), which also observed significant changes in oral health parameters following orthodontic treatment. In our study, visible plaque increased from 4.2 before treatment to 5.7 after treatment, with a statistically significant P value of 0.002. Visible inflammation similarly rose from 3.12 to 14.01, with a P value of 0.015. Gingival recession scores increased from 0.12 to 0.43, also showing a statistically significant difference with a P value of 0.002. These results mirror Boke et al.'s findings, which reported significant increases in visible plaque, visible inflammation, and gingival recession among patients treated with fixed orthodontic appliances, further emphasizing the impact of orthodontic treatment on gingival health.

Another study conducted by Mahindra et al. (2017)[10] to evaluate the effects of fixed orthodontic treatment on gingival health found that, based on clinical examinations of their patients' oral health status, the mean value of the plaque index (PI) was 65.24 (SD 16.43), the gingival bleeding index (GBI) was 19.14 (SD 7.95), and the ortho-plaque index (OPI) was 53.56 (SD 8.74) concluding that patients wearing orthodontic appliances were having high plaque index, gingival bleeding index and ortho plaque index scores therefore, educating and motivating these patients remains the cornerstone for achieving optimal oral hygiene results.

Therefore fixed orthodontic treatment has been shown to significantly affect gingival health, often leading to increased plaque accumulation, gingival inflammation, and recession. The studies reviewed indicate that patients undergoing orthodontic treatment typically experience higher indices for plaque and gingival bleeding, underscoring the importance of diligent oral hygiene practices.[11] This highlights the necessity for orthodontic practitioners to implement robust educational and motivational strategies to encourage patients to maintain optimal oral hygiene throughout their treatment.[12] By prioritizing these efforts, the adverse effects on gingival health can be mitigated, ultimately promoting better oral outcomes and enhancing the overall effectiveness of orthodontic interventions. Continuous monitoring and support are essential to foster better dental health during and after orthodontic care.

CONCLUSION

Following fixed orthodontic treatment, there is a notable rise in plaque accumulation, inflammation, and gingival recession. Therefore, it is essential to perform regular oral prophylaxis throughout the course of orthodontic care.

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