

Original Article

PREVALENCE OF GINGIVAL RECESSION IN CLASS I MALOCCLUSION PATIENTS TREATED WITH NON-EXTRACTION FIXED ORTHODONTIC THERAPY: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objectives: This research was performed to determine the prevalence of gingival recession in class I malocclusion patients treated with non-extraction fixed appliance therapy.

Materials and Methods: This study was conducted at the Department of Orthodontics, de'Montmorency College of Dentistry, Lahore from March 2022 to September 2022. Ninety patients were selected. After debonding, a WHO periodontal probe was used to measure gingival recession clinically on the mandibular incisors, maxillary premolars and molars. The chi-square test was applied, with a p value of ≤ 0.05 considered significant.

Results: Of the 90 subjects, 37 (41.11%) were male and 53 (58.89%) female. Gingival recession was present in 7 subjects (7.78%).

Conclusion: The prevalence of gingival recession following non-extraction fixed appliance treatment in class I subjects was low.

Key words: Gingival recession, Malocclusion, Non-extraction, Orthodontics, Prevalence, Tooth movement

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INTRODUCTION

The periodontium is a connective tissue comprising four components: alveolar bone, periodontal ligament (PDL), cementum and gingiva¹. Gingival tissues are vital in maintaining aesthetics while providing protection to the tooth surface. Gingival recession results when there is apical migration of tissues exposing the root surface². Distance between

cemento-enamel junction and margins of gingiva tells about the recession level. It can be localized or generalized and it may result in predisposition to root caries, hypersensitivity, non- carious cervical lesions, poor aesthetics, black triangles and difficulty in maintaining oral hygiene^{3,4}.

Gingival recession occurs more commonly in older individuals than younger ones. It is more prevalent on facial rather than lingual tooth surface⁵. It is caused by various factors involving aggressive brushing, improper flossing, nail-biting, periodontal or mechanical trauma. and improper orthodontic movement of teeth⁴. Poorly designed partial dentures or high frenal attachments may also lead to recession of gums^{6,7}. Although orthodontic tooth movement

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is not the primary cause but it may result in gum recession if it occurs in presence of periodontal inflammation. During Orthodontic treatment, presence of wires and brackets in the mouth makes it difficult for the patients to maintain their oral hygiene. Poor oral hygiene is also one of the factors leading to gingival recession⁸.

During orthodontic tooth movement, palatal root torque moves the root into alveolar bone improving recession. However, proclining the lower incisors orthodontically by more than 10° results in lingual gingival recession⁵. Expansion using expanders like Hyrax may lead to periodontal defects like loss of alveolar bone buccally that may result in gingival recession⁴. According to a recent literature review, gingival recession was found in 5.8% of teeth at end of orthodontic treatment⁴. Mostly studies are conducted only on anterior teeth particularly mandibular incisors. Since eating habits and practices for maintaining oral hygiene vary from population to population so this study was conducted on a Pakistani population. Since eating habits, oral hygiene practices, and periodontal biotypes vary between populations, findings from Western studies may not be directly applicable to South Asian patients. Dietary habits such as betel nut and pan chewing, along with differing oral hygiene awareness, may influence periodontal health in the Pakistani population. Local data on gingival recession following non-extraction orthodontic treatment are scarce, and this study was therefore conducted to address that gap.

This study focused not only on the mandibular incisors but maxillary posterior teeth of patients having class I malocclusion who had undergone non extraction fixed appliance orthodontic treatment like expansion of upper and lower dental arches.

This will also help us to determine and improve the limit of expansion and proclination to avoid any periodontal defects like gingival recession, dehiscence and fenestrations in Pakistani population.

The objective of this study was to determine the prevalence of gingival recession in class I malocclusion patients treated with non-extraction fixed appliance therapy, and to assess its association with gender.

It was hypothesized that the prevalence of gingival recession following non-extraction fixed

appliance therapy in class I malocclusion patients would be low, with no significant association between gingival recession and gender.

MATERIALS AND METHODS

After the study protocol was approved by the Ethical Review Board of de'Montmorency College of Dentistry, Lahore 90 patients were selected once they gave informed consent for this study. Gingival recession was measured at end of orthodontic treatment. Recession occurs when gingival margins move apically and away from cement-enamel junction on the mid facial surface. After debonding (T2), periodontal WHO probe was used to measure gingival recession clinically on mandibular incisors, maxillary premolars and molars. All measurements were performed by a single trained examiner using a standardized technique to ensure consistency and eliminate inter-examiner variability.

Inclusion criteria involved:

- 1- Patients with class I malocclusion that requires non- extraction fixed appliance orthodontic treatment.
- 2- Age 12-20 years.
- 3- Complete permanent dentition except 8s.
- 4- No prior orthodontic treatment.
- 5- Absence of any gingival or periodontal disease.

Exclusion Criteria involved:

- 1- Patients having poor oral hygiene.
- 2- Patients having extensive restorations.
- 3- Patients using betel nuts or any form of tobacco.
- 4- Patients taking any medication.

Size of sample includes 90 patients which was determined using non-probability, consecutive sampling technique and using confidence level of 95% with 5% margin of error and taking expected percentage of gingival recession to be 5.8%.

Data were analysed using SPSS version 20.0. Gender and gingival recession were expressed as frequencies and percentages, and mean $\pm$ SD was calculated. The chi-square test was used for stratified analysis, with significance set at $p \leq 0.05$

RESULT

Ninety cases meeting the selection criteria were included.

The age of participants ranged from 12 to 20 years, with a mean age of 16.58 ± 1.95 years.

Gender distribution shows that 41.11 % (n=37) were male whereas 58.89 % (n=53) were females. (Table No. 1)

Gingival recession was recorded in 7.78% (n = 7) of subjects (95% CI: 3.2%–15.4%). (Table No. 2)

The data was stratified for gender and Chi square test was applied, post stratification with p value <0.05 considered as significant. (Table No. 3)

DISCUSSION

Appropriate stimulation by occlusion can affect the periodontal tissue structure, promoting preservation and remodeling, which plays an important role in the regulation of teeth and periodontal firmness. If there is an absence of pertinent occlusal force acting as a trigger on the periodontium, there are multiple changes such as root resorption and periodontal ligament weakness leading to disparity in masticatory system⁹. Excessive occlusal forces more than the capacity of periodontium causes injury to attachment apparatus. This is called secondary occlusal trauma. Secondary occlusal trauma can lead to widening of periodontal ligament, loss of bone and tooth mobility.

Table 1: Gender Distribution

Gender	No. of subjects	Percentage
Male	37	41.11%
Female	53	58.89%
Total	90	100%

Table 2: Gender Distribution

Gingival recession	No. of subjects	Percentage
Yes	7	7.78%
No	83	92.22%
Total	90	100%

Table 3: Gender stratification frequency for gingival recession

Gender	Gingival Recession		P value
	Yes	No	
Male	1 (2.70%)	36 (97.30%)	0.14
Female	6 (11.32%)	47 (88.68%)	

Weak periodontium is also caused by plaque-induced inflammation. If excessive force is produced on such periodontium, it leads to more clinical attachment loss and more tooth mobility¹⁰.

One part of the periodontium is gingiva, it has a vital role in enhancing the esthetics of teeth as well as safeguarding the root portion of the tooth surface. Gingival shrinkage leads to tooth sensitivity, increase in triangular spaces in between adjacent teeth, increase chances of root caries and many other harmful outcomes¹¹. As per the research, when comparing patients with normal occlusal function and low occlusal activity, the frequency of gingival recession is higher in lower occlusal activity patients⁹.

Thin gingival phenotype is considered to be more prone to gingival recession when compared with thick phenotype. Gingival phenotype is formed by keratinized tissue and gingival thickness on top of alveolar bone. Thin gingiva is considered when the gingival thickness ranges from 0.63-1.24mm. Dental plaque accumulation is widely recognized as the primary cause of gingival recession. The second most frequent cause is aggressive tooth brushing, followed by dental malocclusion, prior dental trauma, high frenal attachment, and smoking. A lack of or minimal keratinized gingival tissue is also considered a contributing factor¹¹. Gingival recession most commonly affected the maxilla (60%) on the buccal surfaces of maxillary molars and premolars followed by mandible (40%)¹².

The relationship between gingival recession and orthodontic treatment is still controversial. Some previous researches have claimed a significant relationship between the treatment and recession, especially when moved out of alveolar housing. Orthodontic treatment also makes brushing difficult, leading to food impaction and gingival recession. This causes gum recession. According to Gebistorf et al., 85% of patients had at least 1 gum recession after orthodontic treatment in long term¹³.

There are different methods to assess gingival biotypes and recession. Most commonly used methods are direct measurements, probe transparency, visual method and ultrasonic devices. The direct measurements by visual assessment is very basic and does not require any special equipment and is non-invasive. It is also very cheap and convenient¹⁴.

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According to a systematic review by Stodle IH, manual probes used for direct assessment has the same accuracy as electronic probes. Hence manual probes remain to be clinical standard for diagnosis and monitoring of patients¹⁵⁻¹⁷.

Age: As gingival recession is reported to increase with age, the relatively young age of this orthodontic sample may partly explain the low overall prevalence observed. The small number of recession cases did not permit meaningful comparison across age subgroups.

Gender: Recession was recorded in 1 of 37 males (2.70%) and 6 of 53 females (11.32%). Although recession appeared more frequently among females, this difference was not statistically significant ($p = 0.14$), indicating no significant association between gender and gingival recession in this sample. This is consistent with the view that gingival recession following orthodontic treatment is more closely related to tooth position and oral hygiene than to gender.

The higher number of recession cases among females, although not statistically significant, may be explained by their thinner gingival biotype and generally greater attention to tooth brushing, as more frequent and forceful brushing has been associated with gingival recession. Hormonal influences on the periodontium during adolescence may also contribute. However, given the small number of affected cases, this apparent gender difference should be interpreted with caution.

Tooth type: Measurements in this study were taken on the mandibular incisors and the maxillary premolars and molars, as these are the teeth most affected during non-extraction treatment involving arch expansion and incisor proclination. Gingival recession has been reported to affect the buccal surfaces of maxillary molars and premolars most commonly, followed by the mandibular region. The overall low prevalence in this sample suggests that teeth were largely moved within the alveolar envelope. A tooth-level breakdown of recession was not analysed and is acknowledged as a limitation of this study.

This study's results will help orthodontist to determine the gingival status of maxillary premolars and molars and mandibular incisors in fixed comprehensive non-extraction orthodontic plan. This can

aid in better control of maxillary molar expansion, potentially preventing bone dehiscence in patients.

In this study, the observed prevalence of gingival recession of 7.78% is comparable to the 5.8% reported by Morris et al. at the end of orthodontic treatment, supporting the view that non-extraction fixed appliance therapy carries a relatively low risk of gingival recession in class I subjects⁴.

However, in their research, it was established that orthodontic treatment is not a primary cause of gingival recession. While increased maxillary expansion during treatment may slightly increase the risk of post-treatment gingival recession, the effects are generally minimal⁴.

Laursen et al. showed that moving roots toward the centre of the alveolar bone with a segmented appliance consistently reduced gingival recession in patients whose roots initially lay outside the alveolar housing, with all cases improving in Miller's classification. This reinforces that recession is closely tied to the root's position relative to the alveolar bone rather than to orthodontic movement itself, supporting the low recession prevalence observed in our non-extraction sample, where teeth were moved within the alveolar envelope¹⁸.

Study by Bin Bahar et al. showed that gingival recession is similar in patients undergoing orthodontics especially in anterior teeth when compared with patients without treatment¹⁹. Whereas study by Ashfaq M revealed gingival recession in about 40% cases in one or more teeth during orthodontic treatment²⁰. Another study by Antanavičienė G revealed similar results²¹.

Very few studies were conducted on class I malocclusion in which gingival recession was recorded, however, this study provides valuable insights into gingival status of maxillary premolars and molars and mandibular incisors in non-extraction treated cases. It is helpful in determining and improving the limit of maxillary premolar and molars expansion along with mandibular incisor proclination to avoid dehiscence.

This study has certain limitations. It was conducted at a single centre using a non-probability consecutive sampling technique, which may limit the generalizability of the findings to the wider population. The cross-sectional design assessed gingival

recession only at the end of treatment, without a pre-treatment baseline for direct comparison. In addition, only seven cases of gingival recession were observed; this limited number of events precluded multivariable regression and confounder analysis, and a tooth-level breakdown of recession was not performed. Future longitudinal studies with larger samples and probability-based sampling are recommended to confirm these findings and to evaluate potential risk factors in greater detail.

CONCLUSION

This study found a low prevalence of gingival recession in class I malocclusion patients treated with non-extraction fixed appliance therapy.

REFERENCES

1. Torabi S, Soni A. Histology, Periodontium. BTI - Stat-Pearls.
2. Haider Zahid A, N., & Faiza Ijaz. LABIAL GINGIVAL RECESSIONS AND THE POST TREATMENT PROCLINATION OF MANDIBULAR INCISORS. *Journal of Ayub Medical College Abbottabad*. 2024;36(4): 788–92.
3. Ji JJ, Li XD, Fan Q, Liu XJ, Yao S, Zhou Z, et al. Prevalence of gingival recession after orthodontic treatment of infraversion and open bite. *J Orofac Orthop*. 2019;80(1):1–8.
4. Morris JW, Campbell PM, Tadlock LP, Boley J, Buschang PH. Prevalence of gingival recession after orthodontic tooth movements. *Am J Orthod Dentofacial Orthop*. 2017;151(5):851–859.
5. Antonarakis GS, Joss CU, Triaca A, Kuijpers-Jagtman AM, Kiliaridis S. Gingival recessions of lower incisors after proclination by orthodontics alone or in combination with anterior mandibular alveolar process distraction osteogenesis. *Clin Oral Investig*. 2017;21(8):2569–2579.
6. Serra-Pastor B, Bustamante-Hernández N, Fons-Font A, Solá-Ruiz MF, Revilla-León M, Agustín-Panadero R. Periodontal outcomes of anterior fixed partial dentures on teeth treated with the biologically oriented preparation technique: A 6-year prospective clinical trial. *J Prosthet Dent*. 2023;129(5):703–709.
7. Mary AF, Govindaraju L. High frenal attachment and its prevalence among children - A retrospective study. *J Adv Pharm Technol Res*. 2022;13(Suppl 2):S573–S577.
8. Crego-Ruiz M, Jorba-García A. Assessment of the periodontal health status and gingival recession during orthodontic treatment with clear aligners and fixed appliances: A systematic review and meta-analysis. *Med Oral Patol Oral Cir Bucal*. 2023;28(4):e330–e340.
9. Zhu R, Zhang Z, Lu B, Zhang P, Liu W, Liang X. Unloading of occlusal force aggravates alveolar bone loss in periodontitis. *J Periodontal Res*. 2022;57(5):1070–1082.
10. Pornprom APJ, Tohnak S, Piyapattamin T, Wirojchanasak S. Association of Bone Loss Severity with Signs of Occlusal Trauma in Teeth with Reduced Periodontium. *Journal of International Dental and Medical Research*. 2024;17(1):196-202.
11. Cadenas de Llano-Pérula M, Castro AB, Danneels M, Schelfhout A, Teughels W, Willems G. Risk factors for gingival recessions after orthodontic treatment: a systematic review. *European Journal of Orthodontics*. 2023;45(5):528-44.
12. Vignoletti F, Di Martino M, Clementini MA-O, Di Domenico GL, de Sanctis M. Prevalence and risk indicators of gingival recessions in an Italian school of dentistry and dental hygiene: a cross-sectional study. *Clin Oral Investig*. 2020;24(2):991–1000.
13. Gebistorf M, Mijuskovic M, Pandis N, Fudalej PS, Katsaros C. Gingival recession in orthodontic patients 10 to 15 years posttreatment: A retrospective cohort study. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2018;153(5):645-55.
14. Koppolu P, Al Arabi AA, Al Khayri MJ, Alfaraj FA, Alsafwani WM, Alhozaimi SF, et al. Correlation between Gingival Thickness and Occurrence of Gingival Recession. *Journal of Pharmacy and Bioallied Sciences*. 2023;15(Suppl 1).
15. Stodle IH, Imber JC, Shanbhag SV, Salvi GE, Verket A, Stähli A. Methods for Clinical Assessment in Periodontal Diagnostics: A Systematic Review. *Journal of Clinical Periodontology*. 2025;n/a(n/a).
16. Sutor S, Graetz C, Geiken A, Straßburger M, Löwe C, Holtmann B, et al. Effect of a powered and a manual toothbrush in subjects susceptible to gingival recession: A 36-month randomized controlled clinical study. *International Journal of Dental Hygiene*. 2025;23(1):26-36.
17. Fernandes GVO, & Muller, R. Back to the Basics: Mastering Probing Techniques for Comprehensive Periodontal Assessment. *The Journal of Basic and Clinical Dentistry*. 2024;1(1):1-8.
18. Laursen MG, Rylev M, Melsen B. The role of orthodontics in the repair of gingival recessions. *American Journal of Orthodontics and Dentofacial Orthopedics*.

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2020;157(1):29-34.

19. Bin Bahar BSK, Alkhalidy SR, Kaklamanos EG, Athanasiou AE. Do orthodontic patients develop more gingival recession in anterior teeth compared to untreated individuals? A systematic review of controlled studies. *International Orthodontics*. 2020;18(1):1-9.

20. Ashfaq M, Sadiq A, Sukhia RH, Fida M. Association of

hard and soft tissue factors with gingival recession in orthodontically treated patients: A retrospective study. *International Orthodontics*. 2021;19(1):60-6.

21. Antanavičienė G, Zasčiurinskienė E, Smailienė D, Basevičienė N. The Impact of Orthodontic Treatment on Pre-Existing Gingival Recessions: A Retrospective Study. *Applied Sciences* [Internet]. 2021; 11(19).

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: FY, AS, EM AR, NE

Acquisition, Analysis or Interpretation of Data: FY, AS, EM AR, NE

Manuscript Writing & Approval: FY, AS, EM AR, NE

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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