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Frequency of Gingival Recession in Correlation With Gingival Phenotype: A Cross-Sectional Study

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Author`s Contribution

[1,3]Conception, synthesis, planning of research, and writing of the manuscript/Data Collection, Final Approval of the study to be published, [2,5]Active participation in methodology, interpretation, and discussion, review of the manuscript,[4,6]data entries, and statistical data analysis, Literature Review

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ABSTRACT

Objective: To determine the frequency of gingival recession in relation to gingival phenotype of healthy patients.

Methodology: A total of 216 healthy patients, consisting of 95 males and 121 females across various age groups from 13 to 70 years old, were examined in this study. Gingival phenotype was determined by four examiners using dental probe transparency, chosen for its non-invasive nature and high reproducibility. Gingival contour and shape were evaluated defining thin gingiva as transparent and thick as non-transparent. After observing 216 patients (108 thick, 108 thin), frequency analysis was conducted to ascertain which phenotype correlated more closely with gingival recession.

Results: Analysis of the relationship between gingival recession and phenotype revealed a stronger correlation in patients with a thin phenotype. On the upper incisors, 53% of patients had gingival recession, while 46% exhibited a thin phenotype. The lower incisors showed even higher rates of recession, with 83% of patients affected, of which 68% had a thin phenotype. Chi-square test results confirmed the significant association between gingival phenotype and recession.

Conclusion: Our study suggests that individuals with a thin gingival phenotype have a higher prevalence of gingival recession, especially in the lower teeth.

Keywords: Gingival recession, Gingival biotype, gingival Phenootype, periodontitis, Dentine hypersensitivity

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Introduction

Gingival recession is apical migration of the marginal gingiva from its original position beyond the cementoenamel junction (CEJ). Root exposure, dentine hypersensitivity and increase in root caries are just few phenomena caused by gingival recession (GR).[1] While gingival recession doesn't lead to increased tooth loss, it's frequently viewed as a cosmetic concern by many patients and is commonly linked to the development of dentin hypersensitivity and carious/non-carious cervical lesions on the exposed root surface.[2]

Numerous factors contribute to the occurrence of gingival recession, including thin biotype, insufficient attached gingiva, bone deficiencies, tooth misalignment, and high frenum or muscle attachment. Additionally, iatrogenic factors like faulty restorative cervical margins and prior orthodontic treatment are suggested as probable predisposing factors of gingival recession, yet, the primary etiological factors linked to gingival recession are inflammatory periodontal conditions and mechanical trauma.[3] After extensive research spanning several decades on gingival morphology, scientists have categorized gingiva according to gingival thickness (GT) and the width of keratinized tissue in the faciopalatal dimension, commonly known as gingival biotype.[4]

The unique periodontal characteristics, encompassing the shape, texture, and positioning of both the gingiva and the alveolar process, delineate an individual's specific 'periodontal biotype'. These attributes significantly

influence how the periodontium responds to inflammation and subsequent treatment. In the 2017 Classification of Periodontal Diseases and Conditions by the World Workshop of Periodontology, the term 'biotype' has been updated to 'phenotype.' Thus, in this review, we adopt the term 'periodontal phenotype.' However, identifying the periodontal phenotype proves challenging, as the typical variations in biotypes are observed in only a minority of individuals, with the majority exhibiting an intermediate clinical presentation.[5]

Different gingival phenotypes exhibit varied responses to inflammation, restorative procedures, trauma, and Para functional habits. Previously, Ochsenbien and Miller highlighted the significance of considering 'thick versus thin' gingiva in treatment planning for restorative procedures.[6] Gingival thickness of >2mm is defined as thick and that of <1.5mm as thin phenotype. Thick phenotype is more resilient, has sufficient zone of keratinized tissue, thick underlying bony architecture and is associated with tapered crown form whereas thin phenotype is delicate, translucent with minimum zone of attachment, thin bone labially over the roots which exhibits more pathological and osseous defects like GR, fenestrations and dehiscence.[7]

Thick gingival tissue exhibits greater resistance to inflammation and trauma. On the other hand, thin gingival tissue is more susceptible to inflammation and trauma. Inflammation of the periodontium leads to increased pocket formation and gingival recession in thick and thin tissues, respectively.[8]

An adequate width of keratinized gingiva is critically important in preventing gingival recession. According to Weisgold, individuals with thin scalloped gingiva had greater prevalence of GR.[9]

The data collected from this study will identify whether gingival phenotype influences gingival recession, when primary contributing factors are largely absent. To achieve this, two groups comprising equal number of participants with thick and thin phenotypes were examined. This would help us to evaluate the relation of gingival phenotype and recession in its true entity. The finding of the study will guide us in adopting long-term strategies to prevent gingival recession.

The rationale of our study was to investigate the frequency of gingival recession and its relation with the phenotype of the gingiva in anterior teeth.

Methodology

This cross-sectional study was conducted in Periodontology department of Islamabad Medical and Dental College-dental section in the duration of 6 months. A total of 216 patients in an anticipated population portion P1=0.01409 and P2 =0.1965 was determined. These patients were divided into 2 groups according to their gingival phenotype (108 thick, 108 thin). The age range of minimum 13 years to maximum 70 years (31±10) was selected on the basis of inclusion and exclusion criteria.

The reason of selection over the age of 12 years was because of the fact that maxillary anterior teeth usually erupts by the age of 12 to 13 years and mixed dentition is usually finished by this time which was our exclusion criteria. After the approval from Institutional Review Board, data was collected in clinical departments by the trained researchers after taking the written consent from the patient (in accordance with 1964 Declaration of Helsinki). Presence and absence of gingival recession was recorded also the phenotype was observed. Our study included maxillary and mandibular teeth of systemically healthy, non-smoking patients having gingivitis and gingival recession. We excluded the patients with periodontitis, past orthodontic or periodontal treatment, presence of any fixed/removable prosthesis, subjects with crowding, subjects having drug history for past six months, smokers, carious lesions class (V), high frenal attachment and those with faulty brushing habits. Gingival phenotype for each of the subject was determined by four examiners of different clinical departments. There are different methods to determine phenotype. The gingival phenotype (GT portion) has been previously measured via different techniques, such as by direct visual inspection, dental probe transparency, trans gingival probing, ultrasonic transducer, parallel profile periapical radiography and CBCT.[10] Among these various techniques, dental probe transparency is a non-invasive way of measuring gingival phenotype and is highly reproducible so this method was selected in our study to evaluate the phenotype and its correlation with the recession.[11] After taking history, clinical examination of the patients in proper light and under illumination was done by mouth mirror and UNC 15 probe. Presence and absence of gingival recession was recorded in the Performa. For this study, gingival index was not used. Gingival contour and shape was used to assess the phenotype. Trans-gingival method was used to measure the phenotype. The UNC 15 probe was placed in the buccal sulcus of the patients who have gingivitis and recession. The probe transparency was seen as an impression of the metal probe outside the gingiva while

the probe was still there in the sulcus and was used to record phenotype as thin and absence of transparency across the buccal gingiva was considered as thick gingiva. After a sample of 216 patients (108 thick, 108 thin) were observed, frequency was found out to see whether or not which phenotype is more closely associated to GR.

Data collected was encoded, entered and analyzed by using SPSS version 23.0. Frequencies in the form of tables, percentages and bar charts were recorded. Cross-tabulation was used to determine the relation between gingival phenotype and gingival recession. Frequencies were also recorded to evaluate recession in canines and incisors. Chi-square test of independence was applied between phenotype vs. recession in lower incisors and canines.

Results

In this study total of 216 healthy patients (95 males and 121 females) of different age groups ranging from minimum 13 to maximum 70 years were included. Increased tendency of recession was observed with increasing the age of patients as shown in figure 1.

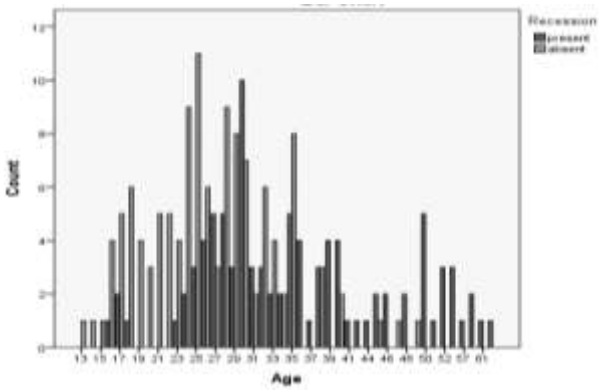

Figure 1. Illustration of relationship between gingival recession and age of patients.

Out of 216 patients 94 showed recession in which 61 were females and 33 were male patients. Gingival phenotype was recorded in 216 patients and was divided into groups of thick and thin phenotype with 108 patients in each group. The relation between the gingival recession and phenotype was analyzed (Table I) showing increased tendency of gingival recession in patient with thin gingival phenotype and vice versa.

In upper incisors 53% of patients showed gingival recession and 46% had thin phenotype. In upper canines 46% of patients had gingival recession and 44% patients exhibited thin phenotype.

On contrary to upper teeth, 83% of patients showed gingival recession in lower incisors and 68% had thin phenotype in this area. Similar results were seen in lower canines where 79% of patients had gingival recession in lower canines and 67% had thin phenotype. The value of chi-square test of independence was applied on gingival phenotype vs. gingival recession showing significant result (0.00).

Table I: Contingency table between gingival recession and phenotype

			Phenotype		
			thin	**thick**	Total
Recession	**present**	Count	76	18	94
		% within Recession	80.9%	19.1%	100.0%
		% within Phenotype	70.4%	16.7%	43.5%
	absent	Count	32	90	122
		% within Recession	26.2%	73.8%	100.0%
		% within Phenotype	29.6%	83.3%	56.5%
Total		Count	108	108	216
		% within Recession	50.0%	50.0%	100.0%
		% within Phenotype	100.0%	100.0%	100.0%

Discussion

Gingival recession is one of the most prevalent dental problems. According to the systematic review and meta-analysis by Amber JC et al in 2020, gingival recession is observed in more than 2/3rd of the world population.[12] High prevalence of gingival recession has been reported in Japanese and Indian population.[13,14] Gingival recession is also a prevalent condition in Pakistani population. Recent research done in Peshawar reported more than 50 percent of the study population exhibited gingival recession.[15]

Our study meticulously distributed an equal number of patients into thin and thick phenotype groups, adhering to stringent exclusion criteria, thereby enhancing the reliability and credibility of our findings. Overall frequency of gingival recession of 43.51 % was observed, indicating a notably high occurrence, particularly among females who showed a strong predilection towards it (fig 2). Among participants with gingival recession prevalence of females was 64.89% when compared with males. Similar results were reported by Susan et al in 2014 in Brazilian population where the prevalence of gingival recession was significantly high in female patients.[16] On contrary Bashir et al. reported a greater trend of gingival recession in male patients as compared to females.[17] The reason they reported was poor oral hygiene practice and

higher smoking rates in male patients. As these factors are controlled in our research, this might be the reason of disagreement in our results.

According to literature gingival recession has a very strong connection with the phenotype of the gingiva. The gingiva is the thinnest in lower anterior teeth and canine area.[18] An inclination in our population with thin gingival phenotype towards increased gingival recession was evident which was mostly encountered in lower incisors and canines. This inclination was consistent even after adjusting for other risk factors of recession in thin phenotype. These results are in accordance with the extensive literature search done by Cortenelli and Bissada in 2018.[2] Chrysanthakopoulos et al., in 2013 also reported the increased prevalence of gingival recession in lower incisors as compared to rest of the dentition with prevalence rate of 50.1%.[19] On contrary research done by Bouchard et al. in 2001 reported the prevalence of gingival recession to be greater in upper canine and premolars as compared to the rest of the dentition.[20] The explanation behind this conflict was the study population of their research, as they included the patients with faulty tooth brushing and presented it to be the main reason of gingival recession. In our study population the faulty tooth brushing was excluded leading which might be the reason of this disagreement.

Almost 100% of patients with age 50 and above showed gingival recession. These results are in accordance with the survey done in 2020 by Kalina et al.[21] According to Needleman et al (2018) the prevalence of gingival recession was strongly associated with increase in the age i.e. 70% of the patients who were 70 and above were suffering from gingival recession.[22] Bouchard et al, reported a decreased trend of gingival recession with increase in age only if proper oral hygiene or surgical interventions were done to decrease or stabilize the recession.[20]

Strictly controlled co-factors and equal number of patients in both phenotype groups are the major strength of this research. However, we also recommend onset of greater scale cross-sectional studies with greater sample size to reveal better understandings of the correlation existing between the gingival phenotypes and recession based upon gender, ages and lifestyle.

Conclusion

Our study concludes that gingival recession exists predominantly in people having thin gingival phenotype. Also, a more pronounced trend of gingival recession was observed in lower teeth and female predilection are the factors pointing towards the thin phenotype being the major culprit of gingival recession with rest of the factors controlled. On the basis of these results we recommend a close observation of patients having thin gingival phenotype with increased number of recall visits especially in female and elderly patients so that gingival recession can be prevented before its occurrence. Also addressing the awareness of gingival recession and its causes through educational programs and public health initiatives can provide a great insight to patients regarding the occurrence and prevalence of gingival recession.

References

1. Mostafa D, Fatima N. Gingival recession and root coverage up to date, a literature review. Dentistry Review. 2022;2(1):100008. https://doi.org/10.1016/j.dentre.2021.100008
1. . Cortellini P, Bissada NF. Mucogingival conditions in the natural dentition: Narrative review, case definitions, and diagnostic considerations. J. Periodontol. 2018;89(1):204-213. https://doi.org/10.1002/JPER.16-0671
2. Fragkioudakis I, Tassou D, Sideri M, Vouros I. Prevalance and clinical characteristics of gingival recession in Greek young adults: A cross-sectional study. Clin. Exp. Dent. 2021;7(5):672-678. https://doi.org/10.1002/cre2.427
3. Koppolu P, Al Arabi AA, Al Khayri MJ, Alfaraj FA, Alsafwani WM et al. Correlation between gingival thickness and occurrence of gingival recession. J Pharm Bioallied Sci. 2023;15(1):495-501. https://doi.org/10.4103/jpbs.jpbs_585_22
4. Vlachodimou E, Fragkioudakis I, Vouros I. Is there an association between the gingival phenotype and the width of keratinized gingiva? A systematic review. Dent. J. 2021;9(3):34. https://doi.org/10.3390/dj9030034
5. Ochsenbein C, ROSS S. A reevaluation of osseous surgery. Dent. Clin. N. Am. 1969;13(1):87-102. https://doi.org/10.1016/S0011-8532(22)02947-0
6. Abraham S, Deepak KT, Ambili R, Preeja C, Archana V. Gingival biotype and its clinical significance-A review. Saudi J. Dent. Res. 2014;5(1):3-7. https://doi.org/10.1016/j.ksujds.2013.06.003
7. Singh M, Chaubey KK, Madan E, Thakur RK, Agarwal MC et al. Correlation between gingival biotype and occurrence of gingival recession. Saudi. J. Oral. Dent. Res. 2020;5(1):119-123
8. . Mallikarjuna DM, Shetty MS, Fernandes AK, et al. Gingival biotype and its importance in restorative dentistry: A pilot study. J. Interdiscip. Dent. 2016;6(3):116-120. https://doi.org/10.4103/2229-5194.201651
9. Wang J, Cha S, Zhao Q, Bai D. Methods to assess tooth gingival thickness and diagnose gingival phenotypes: A systematic review. J. Esthet. Restor Dent. 2022;34(4):620-

632. https://doi.org/10.1111/jerd.12900
10. Da Costa FA, Perussolo J, Dias DR, Araújo MG. Identification of thin and thick gingival phenotypes by two transparency methods: A diagnostic accuracy study. J. Periodontol. 2023;94(5):673-682. https://doi.org/10.1002/JPER.22-0488
11. Imber JC, Kasaj A. Treatment of gingival recession: when and how? Int. Dent. J. 2021;71(3):178-187. https://doi.org/10.1111/idj.12617
12. Suzuki S, Onose Y, Yoshino K, Takayanagi A, Kamijo H, Sugihara N. Factors associated with development of root caries in dentition without root caries experience in a 2-year cohort study in Japan. J. Dent. 2020;95:103304. https://doi.org/10.1016/j.jdent.2020.103304
13. Manchala SR, Vandana KL, Mandalapu NB, Mannem S, Dwarakanath CD. Epidemiology of gingival recession and risk indicators in dental hospital population of Bhimavaram. J. Int. Soc. Prev. Community Dent. 2012;2(2):69-74. https://doi.org/10.4103/2231-0762.109374
14. Danish ZF, Shah MN, Rehmat S, Hakam FA, Raza HA. Frequency of gingival recession and its severity: A Cross Sectional study among patients visiting periodontics department, Khyber college of dentistry, Peshawar. PODJ. 2019;39(1):60-64.
15. Susin C, Haas AN, Oppermann RV, Haugejorden O, Albandar JM. Gingival recession: epidemiology and risk indicators in a representative urban Brazilian population. J. Periodontol. 2004;75(10):1377-1386. https://doi.org/10.1902/jop.2004.75.10.1377
16. Bashir, N., Rashid, F., Bilal, A., Hassan, R. Gingivitis and Correlated Elements Amongst Patients Visiting Dental Care Facility in Rawalpindi: Gingivitis Amongst Patients Visiting Dental Care Facility in Rawalpindi. PJHS. 2022;3(06), 239-242. https://doi.org/10.54393/pjhs.v3i06.358
17. Lim HC, Lee J, Kang DY, Cho IW, Shin HS, Park JC. Digital assessment of gingival dimensions of healthy periodontium. J. Clin. Med. 2021;10(8):1550. https://doi.org/10.3390/jcm10081550
18. Chrysanthakopoulos NA. Prevalence and associated factors of gingival recession in G reek adults. J. Investive. Clin. Dent. 2013;4(3):178-185. https://doi.org/10.1111/jicd.12031
19. Bouchard, P., Malet, J., & Borghetti, A. (2001). Decision-making in aesthetics: root coverage revisited. Periodontol 2000. 2001;27(1), 97-120. https://doi.org/10.1034/j.1600-0757.2001.027001097.x
20. Kalina E, Górski B, Sobieska E, Zadurska M. Assessment of the effects of selected risk factors on the presence of gingival recession of incisors and canines in the mandible-a survey. Forum. Orthod. 2018;14(3):192-198. https://doi.org/10.5604/01.3001.0012.7220
21. Needleman I, Garcia R, Gkranias N, Kirkwood KL, Kocher T, Iorio AD, Moreno F, Petrie A. Mean annual attachment, bone level, and tooth loss: A systematic review. J Periodontol.2018;89(1):120-139. https://doi.org/10.1002/JPER.17-0062