Original Article

Prevalence of Carious and Non-Carious Cervical Lesions in Teeth with Gingival Recession

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Abstract

Objective: The essential objective of this research was to explore the association between gingival recession (GR) and both carious (CCL) and non-carious cervical lesions (NCCLs), encompassing abrasion, erosion, and abfraction, and to evaluate their association with selected mechanical and demographic factors.

Methods: A total of 69 males and females between the ages of 18 and 80 participated in this cross-sectional observational study. From October 2023 to March 2024, these individuals were enrolled in the University of Sulaimani's College of Dentistry. They frequently visited the periodontics department to receive periodontal treatments. The presence of CCLs and NCCLs was clinically assessed in 410 teeth with GR. Negative binomial regression, Spearman's correlation, and non-parametric tests were used to analyze the data.

Results: Of the 69 patients with gingival recession (GR), 81.2% were aged 30–60 years, with a median of 4 affected teeth per patient. Incorrect brushing was reported by 94.2%. GR severity was not significantly associated with age, gender, brush stiffness, or brushing method. GR was significantly associated with non-carious lesions ($p = 0.022$) and abrasion ($p = 0.001$), but not erosion ($p = 0.063$). Hard toothbrush use showed a non-significant increase in GR count (IRR = 1.30, $p = 0.489$).

Conclusions: In this study the gingival recession was commonly associated with cervical lesions. Age and gender were not significantly related to GR, while hard toothbrush users were expected to have a 30% higher GR count, though not significant. GR was significantly linked to non-carious lesions, particularly abrasion.

Keywords: *Gingival recession, Carious cervical lesions, Non-carious cervical lesions, Prevalence, Cross-sectional study.*

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Introduction

Gingival recession (GR) has been defined by the apical displacement of the marginal gingiva in relation to the cementoenamel junction (CEJ), which results in root surface exposure and a loss of the periodontal attachment apparatus[1]. GR is associated with clinical attachment loss and may present as either localized or generalized. Its development and progression are influenced by a wide range of factors that can be broadly categorized into anatomical, physiological, and pathological groups[2,3].

Anatomical factors include alveolar bone dehiscence and abnormal tooth positioning. Physiological contributors include orthodontic treatment, the use of partial dentures, abrasive or traumatic toothbrushing, intra- or perioral piercings, and sub-gingivally placed dental restorations. Pathological factors include tooth mobility, plaque and calculus accumulation, periodontal disease, pathogenic damage, tobacco use, particularly smoking, and occlusal trauma. Socio-demographic factors, gingival phenotype, and mechanical trauma are also significant risk factors for GR[4-9]. The prevalence, severity, and extent of GR can vary significantly among individuals and populations[10].

Noncarious cervical lesions (NCCLs), characterized by loss of tooth structure at the CEJ, often on the buccal surfaces, are commonly associated with GR[11]. The exact etiology of NCCLs has not been precisely defined; however, there is broad agreement among researchers that the cause of this kind of defect may be multifactorial and thus difficult to identify[12].

Senna et al.[13] reported a prevalence of NCCLs ranging from 0.8% to 85.7%, with the mandibular first premolars appearing to be the most highly impacted teeth[14]. Risk factors associated with NCCLs included thin gingival phenotype, inadequate keratinized tissue width, poor oral hygiene (as reflected by higher Plaque Index and Gingival Index scores), and increased occlusal wear[15-18]. Other risk factors, such as age, gender, gastric reflux, soft drinks, alcohol consumption, and citrus fruits, were also observed in different studies to be correlated with NCCLs[19-22].

Cervical carious lesions (CCLs) present similarly but are primarily of infectious origin, typically affecting dentin below the CEJ and diagnosed through visual and tactile examination[23-25].

Although GR, NCCLs, and CCLs have been extensively studied, most research has examined these conditions in isolation, and there is limited information on their co-occurrence and associated risk factors in specific populations. Furthermore, prevalence and lesion patterns may vary with socio-demographic characteristics, oral hygiene practices, dietary habits, and access to dental care.

To date, no cross-sectional epidemiological studies have investigated the prevalence of CCLs and NCCLs in patients with GR among the Kurdish population attending the College of Dentistry. This knowledge gap limits clinicians' ability to develop targeted preventive and management strategies for this group.

Therefore, this study aims to determine the relationship between gingival recession, CCLs, and NCCLs (including abrasion, erosion, and abfraction), and to identify associated risk factors and lesion distribution patterns. Findings from this study are expected to inform early diagnosis, prevention, and clinical management of cervical lesions in patients with GR.

Patients and Methods

Sample description

This study included a sample of 69 participants (both males and females) aged 18- 80 years. They were attending the College of Dentistry from October 2023 to March 2024. The volunteers were usually regular attendees visiting the periodontics department for periodontal treatments. Ethical approval No. 55 for the study was granted by the relevant institutional committee, and informed consent was obtained from each participant before data collection began.

For the purposes of analysis, the subjects were categorized into three groups based on the presence and type of cervical lesions in teeth with GR: Group 1 (GR only): Participants with GR without any cervical or root surface lesions. Group 2 (GR with NCCLs): Participants with GR in teeth exhibiting non-carious cervical lesions (NCCLs), such as abrasion, abfraction, and erosion. Group 3 (GR with CCLs): Participants with GR in teeth showing carious cervical lesions (CCLs) affecting the cervical or root surfaces.

Participants presenting with both NCCLs and CCLs in teeth with GR were classified in Group 3, due to the greater clinical significance of carious lesions. The severity of gingival recession in each tooth was measured in millimeters from the cementoenamel junction to the free gingival margin using a periodontal probe and recorded for all affected teeth. This allowed for quantitative assessment of the depth of recession across the dentition.

The frequency of GR in specific teeth was also recorded to identify which teeth were most affected, enabling analysis of tooth-specific patterns and lesion distribution.

The limited recruitment period and strict eligibility criteria resulted in a relatively small sample size, which may affect the generalizability of the findings. Future multicenter studies with longer recruitment periods and larger samples are recommended.

Clinical parameters

CCL and NCCLs/root lesions were identified through clinical examination under adequate lighting. CCLs were diagnosed based on: The presence of softened dentin or enamel at the cervical or root surface; discoloration (brown or black), often with cavitation; a tactile stick with a sharp probe indicating demineralization or loss of structure[26]; lesions consistent with bacterial decay, confirmed by probing and visual assessment.

NCCLs were diagnosed based on hard tissue loss at the cervical region not associated with caries, smooth hard surfaces with no softness or stickiness, V-shaped notches (abrasion/abfraction), shallow concavities (erosion), and absence of discoloration or carious softness. Correlation with brushing habits, occlusal stress, or dietary acids as per patient history[27-29].

Photographic documentation was not included in the study protocol. Therefore, lesion identification and classification were based exclusively on standardized visual and tactile clinical criteria performed by trained examiners to ensure diagnostic consistency and reliability.

The inclusion criteria focused on patients with GR, while the exclusion criteria included: third molar teeth, periodontal health status, History of orthodontic treatment, Systemic diseases, Medications affecting the Gingiva, and Smoking. The materials used were a dental mirror, a dental explorer, and a questionnaire form.

Examiner Calibration

To guarantee uniformity and standardization in clinical evaluation and data recording, the study supervisor led a calibration training session for all examiners prior to the start of the study. Reviewing the diagnostic standards for GR, CCLs, and NCCLs was part of the calibration procedure. Standardized training on the evaluation and scoring of the gingival index (Mühllemann & Son, 1971) and plaque index (Silness and Löe, 1964) was conducted. To align clinical scoring and interpretation, volunteer patients participated in practice sessions[42,43].

During the calibration phase, a subset of 10 patients was evaluated independently by each examiner to assess inter-examiner reliability. Two statistical techniques were used to determine examiner agreement: the intraclass correlation coefficient (ICC) for continuous outcome scores and Cohen's kappa statistics for categorical data. Before data collection began, all examiners met or exceeded the acceptable reliability thresholds, with kappa>0.80 and ICC >0.85.

Statistical Analysis

To ensure confidentiality, each participant's case sheet was given an identity number for statistical analysis. All variables were properly coded prior to data entry. For analysis, the data were first entered into IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). The Chi-square test and the Negative Binomial Regression were employed. When the p-value was less than 0.05, the results were deemed statistically significant.

Results

Demographic Characteristics

A total of 69 patients were included in this analysis. The study population was nearly evenly distributed between genders, with 34 females (49.3%) and 35 males (50.7%). Most participants (n = 56, 81.2%) were in the 30–60-year age group. Regarding oral hygiene habits, 94.2% (n = 65) reported using an incorrect brushing method (Table 1). The overall median number of teeth with GR per patient was 4.0 (IQR: 2.0–7.0).

Association Between GR Severity and Risk Factors

There was no significant association between gender and GR severity ($\chi^2 = 12.795$, $p = 0.618$), although males showed a slightly higher median GR count (Median = 5.0) compared to females (Median = 4.0).

Similarly, while the >60 years group demonstrated a higher median GR count (Median = 6.0) than the younger age groups (Median = 4.0), the difference across age categories was not statistically significant ($\chi^2 = 25.729$, $p = 0.689$).

Brush stiffness was not significantly associated with GR severity ($\chi^2 = 29.527$, $p = 0.964$), despite a higher median among hard brush users (Median = 5.5). Likewise, brushing method showed no significant association with GR severity ($\chi^2 = 12.016$, $p = 0.999$) (Table 2).

Association Between GR and Other Dental Lesions

Chi-square analysis demonstrated a significant association between GR and non-carious lesions (χ^2 =

7.604, df = 2, p = 0.022; Cramer's V = 0.330), indicating a moderate association. A stronger significant association was observed between GR and abrasion (χ^2 = 13.113, df = 2, p = 0.001; Cramer's V = 0.433).

However, the association between GR and erosion was not statistically significant (χ^2 = 5.537, df = 2, p = 0.063) (Table 3).

Regression Analysis of Risk Factors

A Negative Binomial regression model was constructed to assess predictors of GR count.

Using the 30–60 years age group, female gender, soft brush stiffness, and correct brushing method as reference categories, none of the predictors showed a statistically significant association with GR count. Hard toothbrush use was associated with an IRR of 1.30 (95% CI: 0.62–2.74, p = 0.489), indicating a 30% higher expected GR count compared with soft-brush users; however, this was not statistically significant. Similarly, age group, gender, and brushing method were not significant predictors in the adjusted model (Table 4).

Table 1: Demographic distribution of the sample.

Variable	Category	Frequency (n)	Percentage (%)
Total Sample		69	100.00%
Gender	Female	34	49.30%
	Male	35	50.70%
Age Group	< 30 years	6	8.70%
	30–60 years	56	81.20%
	> 60 years	7	10.10%
Brush Stiffness	Soft	29	42.00%
	Medium	28	40.60%
	Hard	12	17.40%
Brushing technique	Wrong	65	94.20%
	Correct	4	5.80%
Main Habit	Bruxism	29	42.00%
	Mouth breathing	15	21.70%
	Smoking	8	11.60%
	Trauma	5	7.20%
	Other*	12	17.40%

*Lip piercing, Pencil biting, Biting.

Table 2: Assessment of GR severity according to risk factors.

Variable	Category	N	Median Number of Teeth with GR	Interquartile Range (25th–75th)	Chi-Square test	P-value
Gender	Female	34	4	2.0 – 6.0	12.795	0.618
	Male	35	5	3.0 – 9.0		
Age Group	< 30 years	6	4	1.8 – 4.0	25.729	0.689
	30–60 years	56	4	2.0 – 8.3		
	> 60 years	7	6	4.5 – 9.5		
Brush Stiffness	Soft	29	4	2.0 – 7.0	29.527	0.964
	Medium	28	4	2.8 – 6.0		
	Hard	12	5.5	2.8 – 10.0		
Brushing Method	Correct	4	4	3.3 – 6.0	12.016	0.999
	Wrong	65	4	2.0 – 7.0		

Table 3: Chi-square test showing the relationship between GR and Other Dental Lesions.

Outcome Variable	Chi-Square Value	df	p-value	Cramer's V	Interpretation
Non-caries Lesion Positive	7.604	2	**.022**	.330	**Significant** (Moderate association)
Abrasion Positive	13.113	2	**.001**	.433	**Significant** (Moderate-strong association)
Erosion Positive	5.537	2	.063	.281	Not Significant

* Correlation is significant at the 0.05 level.

Table 4: Negative Binomial Regression Model for Predictors of Gingival Recession.

Predictor	Category	Incidence Rate Ratio (IRR)	95% Confidence Interval	P-value
Age Group	30–60 Years	Reference*	—	—
	< 30 Years	0.56	0.20 – 1.57	0.27
	> 60 Years	1.4	0.60 – 3.25	0.436
Gender	Female	Reference	—	—
	Male	1.28	0.76 – 2.16	0.35
Brush Stiffness	Soft	Reference	—	—
	Medium	1.03	0.58 – 1.84	0.915
	Hard	1.3	0.62 – 2.74	0.489
Brushing Method	Correct	Reference	—	—
	Wrong	0.86	0.25 – 2.89	0.803

*Used as a reference for prediction.

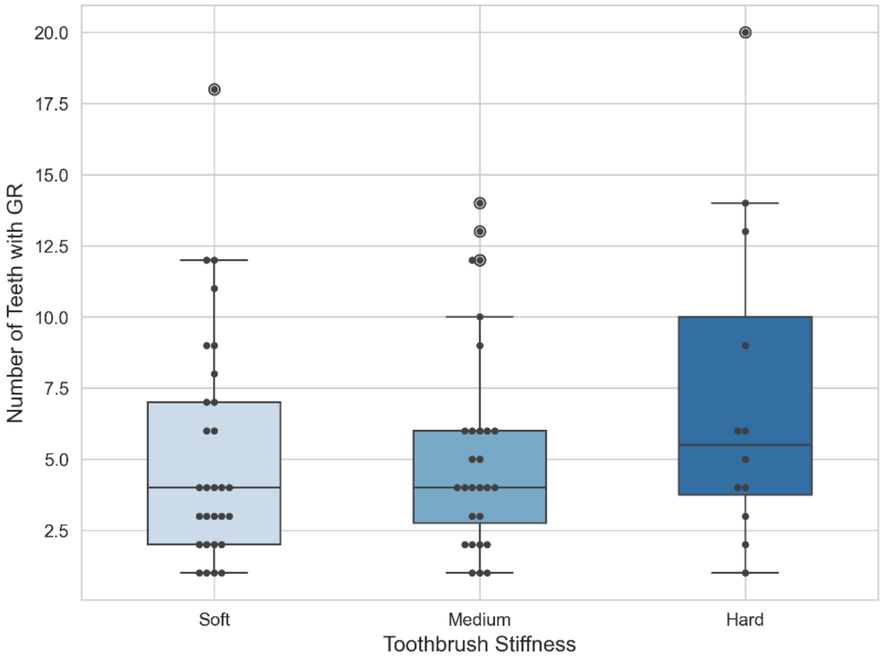

Figure 1: Distribution of GR by Toothbrush type.

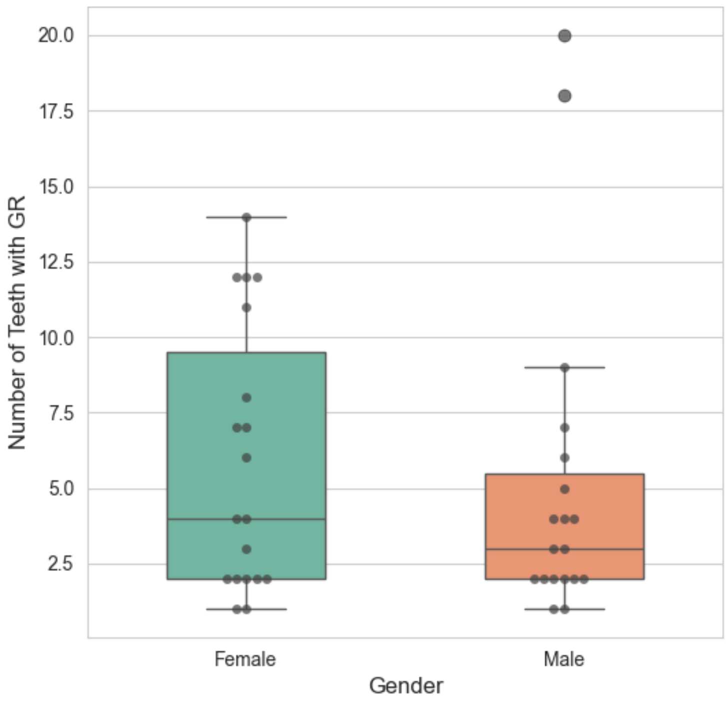

Figure 2: Severity of GR by gender.

Discussion

The research aimed to investigate the prevalence of CCL and NCCLs and their correlation with GR in patients visiting the College of Dentistry. The study examined this specific group of people to determine how GR and related cervical lesions were affecting them in their area.

The results showed that GR was very common, consistent with findings from other studies: isolated recession is more common than CCLs or NCCLs[30].

Our results showed that teeth with gingival recession were most often associated with CCLs, followed by NCCLs such as abrasion, erosion, and other stress-related cervical defects (previously referred to as abfraction). The observed correlations among caries and abrasion suggest that these lesions frequently coexist with gingival recession, whereas erosion demonstrated a weaker association. These patterns may indicate the cumulative effect of physical and biological factors on the cervical tooth surfaces in individuals with GR.

The study identified that aggressive and frequent toothbrushing, particularly employing a horizontal scrub technique, constitutes the primary etiological factor in gingival recession (GR). Such brushing habits were associated with 93.8% of documented recession cases. This statistically significant correlation underscores the critical importance of individualized oral hygiene guidance provided by dental professionals. It highlights that neither toothbrush design nor brushing method is universally superior; rather, selection should be tailored to each patient's specific needs and based on evidence-based professional recommendations.[31,32]. The lack of a statistically significant association between brushing technique and gingival recession may be partly explained by the small number of participants using the correct brushing technique (n = 4), which may have limited the statistical power to detect a significant difference.

The chi-square test showed a strong association between GR and the three defined clinical categories: recession without other conditions, recession with CCLs, and recession with NCCLs. The substantial standardized residuals in the recession-only group, relative to the expected frequencies, indicate that factors such as brushing habits, occlusal stress, inflammation, or anatomical variations are influencing the distribution beyond chance alone. This underscores the necessity for a multifactorial strategy in both prevention and treatment[34,35].

In this study, abrasions were the most common type of NCCL, followed by erosions. This pattern was consistent with earlier findings that identified mechanical factors, such as harsh brushing techniques, as significant causes of abrasion development[35].

On the other hand, erosion was less common, suggesting that chemical factors such as dietary acids do not play a major role in this group. These results endorse the formulation of targeted preventive strategies. Teaching people to brush their teeth gently, such as avoiding horizontal strokes and using toothbrushes with medium bristles, could reduce the number of mechanical lesions[36].

These results show how important it is to use preventive methods that address physical factors contributing to non-carious cervical lesions and gingival recession. One example is an educational program that teaches people how to clean their teeth gently and use the right dental tools. Oral hygiene aids may help reduce the frequency of abrasion-induced mechanical lesions. There is still no clear answer on how toothbrush design and bristle hardness affect plaque control and hard-tissue damage, and no single toothbrush has been found to be the best for everyone[37].

Even though erosion didn't seem to have a big effect on gingival recession in this study, other studies have shown that counseling people on their diets to limit acidic foods and drinks may lower the risk of dental erosion[38-41]. Moreover, age, gender, and a history of scaling and polishing did not exhibit a significant correlation with gingival recession in this study.

This study has several limitations. First, it was cross-sectional, making it hard to draw cause-and-effect conclusions. Second, the brushing method was reported by the participants themselves, which could introduce recall bias. Third, the sample was confined to a single dental institution and may not represent wider population trends. Future longitudinal studies involving heterogeneous populations are essential to validate these findings and investigate causal relationships.

Conclusion

This study highlights the prevalence of gingival recession (GR) and its association with cervical lesions. gingival recession was commonly associated with cervical lesions. Age and gender were not significantly related to GR or cervical lesions. Hard toothbrush users were expected to have a 30% higher GR count than soft brush users, though this was not statistically significant. GR was significantly linked to non-carious lesions, particularly abrasion. Findings reflect associations, not causation.

Declarations

Ethics Approval and Informed Consent (Institutional Review Board) Statement: This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Ethics Committee of the College of Dentistry, University of Sulaimani, with approval number [210\23] dated [05\11\2023]. Written informed consent was obtained from all participants prior to inclusion in the study.

Author Contributions: MKF: Conceptualization, methodology, investigation, data curation, formal analysis, validation, visualization, writing—original draft preparation, writing—review and editing, project administration, manuscript submission, correspondence with the journal, response to editors' and reviewers' comments, and supervision. HJH: Writing—review and editing (contribution to the manuscript introduction). All authors have read and agreed to the published version of the manuscript.

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References

1. Wennström JL. Mucogingival therapy. Ann Periodontol. 1996;1(1):671-701.
2. Marschner F, Pfister W, Lechte C, Kanzow P, Hraský V. Systematic review and meta-analysis on prevalence and risk factors for gingival recession. J Clin Periodontol. 2021;48(9):1123-33.
3. Dias D, Flores PCS, Hilgenberg SP, Pinto EPS, Kozlowski Jr VA, et al. Risks and complications

in the use of oral piercing - clinical cases report. J Pathol Res Rev Rep. 2024;6(2):4-15.
4. Carranza F, Klokkevold P, Takei H, Newman M. Carranza's Clinical Periodontology. 13th ed. Philadelphia: Elsevier Saunders; 2019.
5. Fan J, Caton JG. Occlusal trauma and excessive occlusal forces: narrative review, case definitions, and diagnostic considerations. J Clin Periodontol. 2018;45(Suppl 20):S199-S206.
6. Steffens J, Marcantonio R. Classificação das doenças e condições periodontais e peri-implantares 2018: guia prático e pontos-chave. Rev Odontol UNESP. 2018;47(4):189-97.
7. Ustun K, Sari Z, Orucoglu H, Duran I, Hakki SS. Severe gingival recession caused by traumatic occlusion and mucogingival stress: a case report. Eur J Dent. 2008;2(2):127-33.
8. Merijohn GK. Management and prevention of gingival recession. Periodontol 2000. 2016;71(1):228-42.
9. Kundapur PP, Bhat KM, Bhat GS. Association of trauma from occlusion with localized gingival recession in mandibular anterior teeth. Dent Res J (Isfahan). 2009;6(2):71-4.
10. Hamed AM, Zardawi FM, Karim SA. Prevalence, extension, and severity of the gingival recession in an adult population sample of Sulaimani city–Iraq. Sulaimani Dent J. 2015;2(1):31-7.
11. Cortellini P, Bissada NF. Mucogingival conditions in the natural dentition: Narrative review, case definitions, and diagnostic considerations. J Periodontol. 2018;89(Suppl 1):S204-S213.
12. Nemcovsky CE, Artzi Z. Erosion-abrasion lesions revisited. Compend Contin Educ Dent. 1996;17(4),:416-20.
13. Senna P, Del Bel Cury A, Rösing C. Non-carious cervical lesions and occlusion: a systematic review of clinical studies. J Oral Rehabil. 2012;39(6):450-62.
14. Kolak V, Pešić D, Melih I, Lalović M, Nikitović A, Jakovljević A. Epidemiological investigation of non-carious cervical lesions and possible etiological factors. J Clin Exp Dent. 2018;10(7):e648-e656.
15. Bernhardt O, Gesch D, Schwahn C, Mack F, Meyer G, John U, et al. Epidemiological evaluation of the multifactorial aetiology of abfractions. J Oral Rehabil. 2006;33(1):17-25.
16. Bergström J, Eliasson S. Cervical abrasion in relation to toothbrushing and periodontal health. Scand J Dent Res. 1988;96(5):405-11.
17. West NX, Lussi A, Seong J, Hellwig E. Dentin hypersensitivity: pain mechanisms and aetiology of exposed cervical dentin. Clin Oral Investig. 2013;17(S1):9-19.
18. Kim DM, Neiva R. Periodontal Soft Tissue Non–Root Coverage Procedures: A Systematic review from the AAP regeneration workshop. J Periodontol. 2015;86(2-s):S56-72.
19. Smith WA, Marchan S, Rafeek RN. The prevalence and severity of non-carious cervical lesions in a group of patients attending a university hospital in Trinidad. J Oral Rehabil. 2008;35(2):128-34.
20. Teixeira DNR, Zeola LF, Machado AC, Gomes RR, Souza PG, Mendes DC, et al. Relationship between noncarious cervical lesions, cervical dentin hypersensitivity, gingival recession, and associated risk factors: A cross-sectional study. J Dent. 2018;76:93-7.
21. Larsen MJ, Nyvad B. Enamel erosion by some soft drinks and orange juices relative to their ph, buffering effect and contents of calcium phosphate. Caries Res. 1999;33(1):81-7.
22. Yoshizaki KT, Francisconi-Dos-Rios LF, Sobral MAP, Aranha ACC, Mendes FM, Scaramucci T. Clinical features and factors associated with noncarious cervical lesions and dentin hypersensitivity. J Oral Rehabil. 2017;44(2):112-8.
23. Ellefsen B, Holm-Pedersen P, Morse DE, et al. Assessing caries increments in elderly patients with and without dementia: a one-year follow-up study. J Am Dent Assoc. 2009;140(10):1233-40.
24. Powell LV, et al. Factors associated with caries incidence in an elderly population. Community Dent Oral Epidemiol. 1998;26(3):123-30.
25. Fure S. Ten-year cross-sectional and incidence study of coronal and root caries and some related factors in elderly Swedish individuals. Gerodontology. 2004;21(3):123-9.
26. Kidd EAM, Fejerskov O. Dental Caries: The Disease and Its Clinical Management. 3rd ed. Oxford: Wiley-Blackwell; 2015.
27. Grippo JO, Simring M, Coleman TA. Abfraction, abrasion, biocorrosion, and the enigma of noncarious cervical lesions: A 20-year perspective. J Esthet Restor Dent. 2012;24(1):10-23.
28. Bartlett DW, Shah P. A critical review of non-carious cervical (wear) lesions and the role of abfraction, erosion, and abrasion. J Dent Res. 2006;85(4):306-12.
29. Litonjua LA, Andreana S, Bush PJ, Cohen RE. Noncarious cervical lesions and abfractions: A re-evaluation. J Am Dent Assoc. 2003;134(7):845-50.
30. Susin C, Oppermann RV. Gingival recession: epidemiology and risk indicators in a representative urban Brazilian population. J Clin Periodontol. 2006;33(1):21-9.

31. Lee W, Kim SJ. The relationship between tooth brushing and gingival recession. J Periodontol. 2003;74(5):673-8.
32. Tenenbaum H. A clinical study comparing the effectiveness of plaque removal by brushing and flossing techniques. J Clin Periodontol. 1982;9(1):58-64.
33. Kassab MM, Cohen RE. The etiology and prevalence of gingival recession. J Am Dent Assoc. 2003;134(2):220-6.
34. Albandar JM, Kingman A. Gingival recession, gingival bleeding, and dental calculus in adults 30 years of age and older in the United States, 1988-1994. J Periodontol. 1999;70(1):30-43.
35. Rees JS. The biomechanics of abfraction. Proc Inst Mech Eng H. 2002;216(3):207-12.
36. Litonjua LA, Andreana S, Bush PJ. Noncarious cervical lesions and abfractions: a re-evaluation. J Am Dent Assoc. 2003;134(7):845-50.
37. Khursheed DA, Zardawi FM, Karim SA, Abdulrahman AA, Gul SS, Salih RO. Validity of CPITN Index Applied by Undergraduate Dental Students. Sulaimani Dent J. 2019;6(2):69-75.
38. Van der Weijden GA, Slot DE. Oral hygiene in the prevention of periodontal diseases: the evidence. Periodontol 2000. 2015;67(1):130-41.
39. Addy M, Hunter ML. Can tooth brushing damage your health? Effects on oral and dental tissues. Int Dent J. 2003;53(S3):177-86.
40. Eccles JD, Jenkins WG. Dental erosion and diet. J Dent. 1974;2(4):153-9.
41. West NX, Lussi A. Dental erosion: an increasing clinical problem? J Dent. 2013;41(11):889-904.
42. Silness J, Löe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condition. Acta Odontol Scand. 1964;22(1):121-35.
43. Mühlemann HR, Son S. Gingival sulcus bleeding: a leading symptom in initial gingivitis. Helv Odontol Acta. 1971;15(2):107-13.