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Prevalence of Non-Carious Cervical Teeth Loss in a Sample of Erbil Population

Kani Mahmood Adhem* Raid Fahim Salman**

Abstract

Background and objective: Special emphasis is placed on the elevated occurrence of cervical non-carious tooth lesions across different age groups. The primary objective of this study is to assess the prevalence of non-carious tooth lesions in a sample of Erbil population.

Methods: The study was done retrospectively from September 2022 to February 2023 at the Khanzad Teaching Center, Erbil, Iraq. Total of 270 patients who sought dental treatment rather than non-carious lesions and / or attended for routine checkup and then were selected randomly and categorized into five distinct age groups which start from 18 to over 58 years, Clinical examinations which consist of full mouth examination of the teeth by visual and Tactile to determine the presence of non-carious tooth.

Result: The overall prevalence of non-carious tooth lesions was 34.2%, and this prevalence tended to rise with age, it has a significant role in developing tooth loss. Attrition shows a significant association with age ($p<0.01$), with a higher prevalence observed in older age groups. Attrition was observed in higher percentage than other defects (16.3%). the data reveals a higher prevalence of abrasion among males compared to females (6.00% vs. 2.80%, respectively). and females exhibit a slightly higher prevalence of abfraction compared to males (2.40% vs. 1.20%, respectively).

Conclusion: The prevalence of non-carious cervical lesions exhibits a positive correlation with age, with a notable predilection for the vestibular tooth surfaces. Among these lesions, attrition emerges as the most observed non-carious tooth lesion.

Keywords: Abfraction, Abrasion, Dental, Erosion, Prevalence of non-caries tooth lesion

*BDS. (TIU), KHCMS Trainee. Email: kani.mahmuud@gmail.com (corresponding author)
**BDS, M.Sc., Ph.D. Conservative Dentistry, Professor, Hawler Medical University
College of Dentistry, Email: raid.fahim@hmu.edu.krd

Introduction

A condition where there's a loss of tooth structure at the junction between the enamel and cementum, but it is not caused by bacteria it is called a non-carious tooth lesion (NCL).[1] Hypersensitivity, plaque buildup, pulpal engagement, root fractures, and aesthetic concerns may arise as consequences of non-carious cervical lesions (NCCL). [2] These lesions can be categorized based on their causes into erosion, abrasion, abfraction, and attrition. However, it is important to note that in many instances, the origins of these lesions are complex and involve interconnected factors in their development and advancement.[3] Dental erosion refers to the gradual, chronic, and typically painless loss of hard tooth tissues due to chemical exposure to acids, without bacterial involvement.[4] These acids, which can originate from external sources such as diet or internal factors like reflux, target both enamel and eventually dentin non-carious lesions are frequently termed "erosion lesions "or "cervical wear". [5,6,7] The term "abfraction" originates from the Latin word "frangere," meaning "to break." It is employed to describe wedge-shaped defects in the cervical region, which arise from occlusal forces exerted on the tooth, causing it to flex "Cervical abrasions" or "non-carious cervical tooth surface loss".[8,9] can occur due to mechanical forces, such as aggressive tooth brushing, improper use of dental floss, and abrasive ingredients in toothpaste. These actions lead to lesions resembling abfractions in the cervical area".[8] whereas abrasions often affect multiple adjacent teeth. Abfractions may occur in a single tooth, whereas abrasions are not always associated with occlusal interference. As abrasion progresses, there is a gradual loss of tooth structure under abrasive conditions.[10] Abrasion refers to the physical wearing down of teeth. The development of NCCLs is considered multifactorial, involving a combination of factors such as friction (attrition and abrasion), occlusal stress, and biocorrosion. Additionally, the term "erosion" is used to describe the impact of acids on tooth wear.[11-13] Attrition is characterized by the wearing down of teeth through direct contact with other teeth, without the involvement of any external substance. This can occur due to either physiological or pathological factors. Physiological wear is a gradual degradation of dental shape.[14] Bruxism is a primary cause of excessive attrition and can lead to the development of facets on opposing teeth. There continues to be ongoing debate regarding the dominance of various etiological factors in this process Tooth substrate deprivation resulting from attrition, abrasion, and erosion is not limited solely to the cervical region. [7,15,16] This complicates the diagnosis of NCCLs. In 1984, Lee and Eakle, began discussing and categorizing various etiological factors contributing to non-carious loss of tooth structure to establish a clearer definition. [17] In 1992; the term "non carious cervical lesion" was being utilized. [18] Some studies define any loss of tissue at the cementoenamel junction (CEJ) as an NCCL.[19,20] While others focus solely on wedge-shaped lesions or lesions with a depth of 1mm to be NCCLs.[1,21,22,23]. There is a significant disparity in the reported prevalence rates of NCCLs in epidemiological studies, ranging widely from 5% to 85%. This variation could stem from several factors, including the use of different terminology to describe the same condition, diversity in the methods used for diagnosis, definition, and assessment, as well as differences in geographical location, time, and the demographics of the populations studied.[1,12, 15,21,24,25] This study aims to systematically estimate the prevalence of NCCLs in a sample the Erbil population, to examine the higher incidence of (erosion, abrasion, attrition, abfraction) and to correlate the incidence with different factors and specific teeth.

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Patients and method

The study design was considered as cross-sectional observational epidemiological study type and the statistical methods used were descriptive statistics by frequency percentages with inferential statistics using Fisher Exact Test. This retrospective study was conducted in August 2022, lasted approximately one year at the diagnostic department of Khanzhad Teaching Centre, intraoral examination was done for 270 patients, the research approved by Kurdistan Higher Council of Medical Specialties, and the patients were informed of the purpose of the study and the details of the examination procedures. In the study subjects we examined 7,560 teeth of permanent dentition which include (central, lateral, canine, premolars, and first and second molar). The criteria for participation in our study included not currently undergoing orthodontic treatment or using prostheses, having all-natural teeth in both dental arches (excluding third molars), and not experiencing tooth mobility. The assessment involved a questionnaire which consisted of taking the patients' personal data (first name, gender, date of birth, address, telephone number and education level). The patients were divided into five age groups. The first age group consisted of patients aged between 10-25 years, the second 26– 35 years, the third 36–45 years, the fourth 46–55 years, and 56 over. Clinical examinations were visual and tactile, the instrument used for examination including dental chair, mirror, probe, good source of light and the patient positioned upright in dental chair. during our examination, the buccal, lingual, and palatal aspects of all teeth assessed. The tip of periodontal probe placed perpendicular to the tooth surface and inserted it into the bottom of the gingival sulcus, crossing the cementoenamel junction (CEJ). to approximately one-half the height of the corresponding cusp tip. If the probe was retained by some irregularity, we considered the irregularity to be a non-carious cervical lesion even if it was located at the CEJ, since clinically detectable irregularities in this area may cause flexure of the tooth.[26] All the patients answered a questionnaire referring to factors of brushing, bruxism, preferred chewing side, consumption of extrinsic acids and presence of intrinsic acids.

Results

A total of 252 adults were initially recruited for the study, but 28 individuals were excluded based on predefined criteria, resulting in a final sample size of 252 patients. Their ages ranged from 18 to over 59 years. Upon clinical examination, 86 out of the 252 patients were diagnosed with NCCLs, yielding an overall prevalence rate of 34.2% as shown in figure (1).

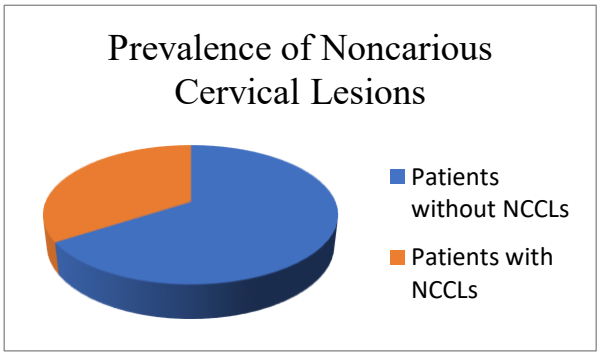

Figure (1): The bar illustrates the prevalence of Non-carious Cervical Lesions (NCCLs)

With increasing age, the prevalence of NCCLs also increased as higher incidence occurred in over 58 age groups while people of younger age are less commonly affected as shown in Table (1). Table (2) and figure (2) illustrate the frequency of type tooth loss (attrition, erosion, abrasion, abfraction) with Age groups, Attrition shows a significant association with age ($p<0.01$), with a higher prevalence observed in older age groups, reaching 36% in the +58-age group. Abrasion also exhibits a significant relationship with age ($p<0.01$), with the highest prevalence in the 38-47 age group at 20%.

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Table (1): Association between type of tooth loss with age groups

		Age group												p*
		18-27		28-37		38-47		48-57		+58		Total		
		N	%	N	%	N	%	N	%	n	%	N	%	
Attrition	Yes	1	0.4%	6	2.4 %	5	2.0%	11	4.4 %	18	7.1 %	41	16.3%	p<0.01
	No	50	19.8%	47	18.7 %	43	17.1%	38	15.1 %	33	13.1 %	211	83.7%	
Abrasion	Yes	0	0.0%	1	0.4 %	10	4.0%	6	2.4 %	5	2.0 %	22	8.7%	p<0.01
	No	51	20.2%	52	20.6 %	38	15.1%	43	17.1 %	46	18.3 %	230	91.3%	
Erosion	Yes	0	0.0%	3	1.2 %	2	0.8%	1	0.4 %	8	3.2 %	14	5.6%	p<0.01
	No	51	20.2%	50	19.8 %	46	18.3%	48	19.0 %	43	17.1 %	238	94.4%	
Abfraction	Yes	0	0.0%	0	0.0 %	2	0.8%	3	1.2 %	4	1.6 %	9	3.6%	p>0.05
	No	51	20.2%	53	21.0 %	46	18.3%	46	18.3 %	47	18.7 %	243	96.4%	

*Fisher Exact Test, **Significant at level (0p<0.05)

Table (2): Frequency table of type tooth loss with Age Group

	18-27		28-37		38-47		48-57		+58	
Attrition	1	2%	6	12%	5	10%	11	22%	18	36%
Abrasion	0	0%	1	2%	10	20%	6	12%	5	10%
Erosion	0	0%	3	6%	2	4%	1	2%	8	16%
Abfraction	0	0%	0	0%	2	4%	3	6%	4	8%
Total	1	2%	10	20%	19	38%	21	42%	35	70%

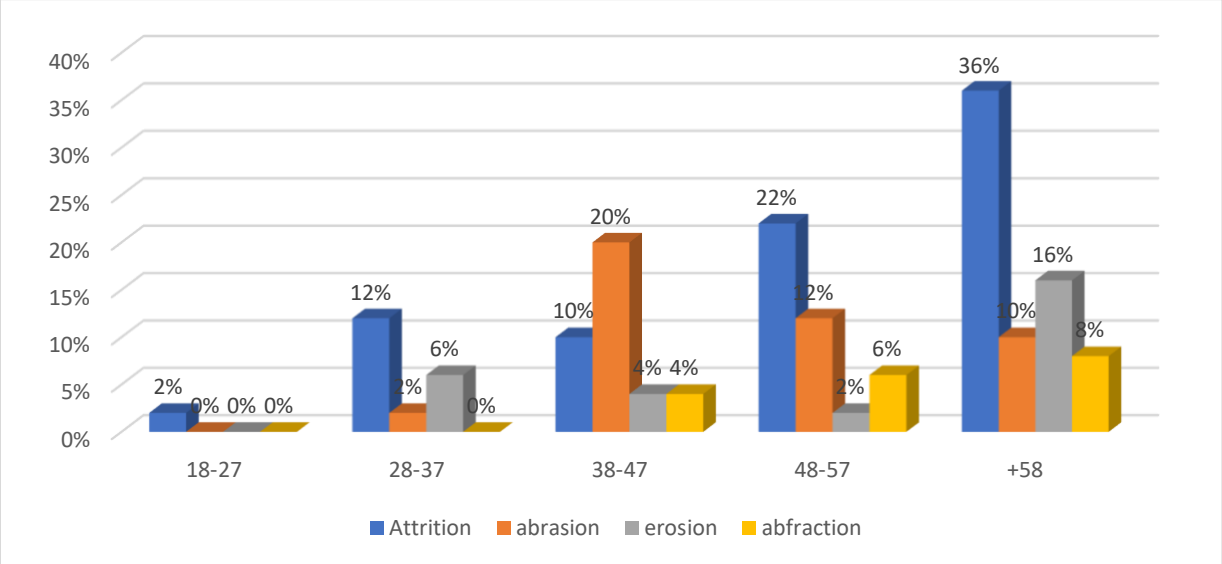

Figure (2): Frequency table of type tooth loss with Age Group

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The data in Table (3) provides a breakdown of tooth loss occurrences categorized by four types: attrition, abrasion, erosion, and abfraction, stratified by gender (male and female). There is no significant difference between gender and erosion and attrition both genders will be equally affected. Interestingly, the data reveals a higher prevalence of abrasion among males compared to females (6.00% vs. 2.80%, respectively). and females exhibit a slightly higher prevalence of abfraction compared to males (2.40% vs. 1.20%, respectively). as illustrated in Table (3).

Table (3): Frequency type of tooth loss with Gender

	Male		Female		Total	
	Count	%	Count	%	Count	%
Attrition	21	8.40%	20	8.00%	41	47.7%
Abrasion	15	6.00%	7	2.80%	22	25.6%
Erosion	7	2.80%	7	2.80%	14	16.3%
Abfraction	3	1.20%	6	2.40%	9	10.5%
Total	46	18.40%	40	16.00%	86	100.00%

Table (4) shows the distribution type of tooth loss (attrition, abrasion, erosion, and abfraction) across various tooth types. Notably, attrition is most prevalent in the Upper and Lower anterior, with 25 cases (9.9%) each, while abrasion predominantly affects the Lower premolars, particularly the First & Second premolars on both sides, with 9 cases (3.6%) and 8 cases (3.2%) respectively. Erosion cases are primarily observed in the Upper and Lower anterior, with 12 cases (4.8%) and 8 cases (3.2%) respectively.

Table (4): Frequency table of type tooth loss with tooth types

		Attrition		abrasion		Erosion		Abfraction	
		Count	%	Count	%	Count	%	Count	%
Upper anterior	Yes	25	9.9%	0	0.0%	12	4.8%	0	0.0%
Upper right premolars	Yes	0	0.0%	4	1.6%	0	0.0%	0	0.0%
	First & second	6	2.4%	3	1.2%	3	1.2%	3	1.2%
Upper left premolars	Yes	0	0.0%	2	0.8%	0	0.0%	1	0.4%
	First & second	6	2.4%	4	1.6%	3	1.2%	2	0.8%
Upper right molars	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	First & second	0	0.0%	0	0.0%	1	0.4%	0	0.0%
Upper left molars	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	First & second	0	0.0%	0	0.0%	1	0.4%	0	0.0%
Lower anterior	Yes	25	9.9%	0	0.0%	8	3.2%	1	0.4%
Lower right premolars	Yes	2	0.8%	8	3.2%	0	0.0%	1	0.4%
	First & second	6	2.4%	9	3.6%	3	1.2%	7	2.8%
Lower left premolars	Yes	0	0.0%	9	3.6%	0	0.0%	0	0.0%
	First & second	6	2.4%	7	2.8%	3	1.2%	6	2.4%
Lower right molars	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	First & second	0	0.0%	0	0.0%	1	0.4%	0	0.0%
Lower left molars	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	First & second	0	0.0%	0	0.0%	1	0.4%	0	0.0%
All	Yes	10	4.0%	0	0.0%	0	0.0%	0	0.0%
	First & second	0	0.0%	0	0.0%	0	0.0%	0	0.0%

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Figure (2) illustrate the cause of NCTL, most of the cases were due to malocclusion because of edge-to-edge contact, emerges as the most prevalent cause of tooth loss, accounting for 31.3% of cases. followed by lower case aggressive brushing which is counted as second most common causative factor for NCTL as shown in Figure (3). Acidic drinks, such as sodas and citrus juices, contribute significantly to tooth loss, representing 16.9% of cases.

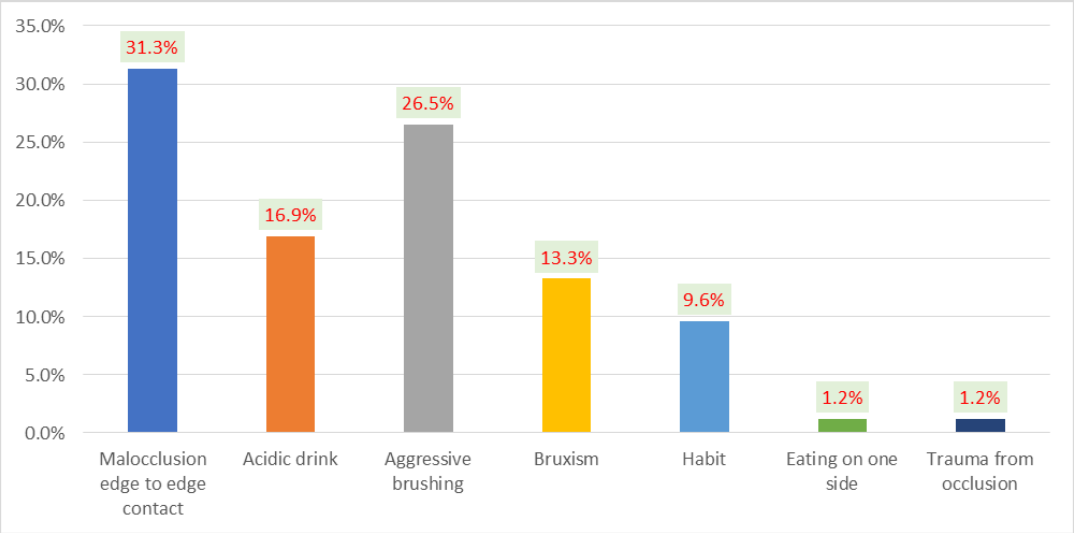

Figure (3): The cause of tooth loss

Discussion

This research aims to analyze the occurrence of NCCLs in a sample Erbil population, exploring characteristics including age, gender, and tooth type in relation to several forms of tooth loss (attrition, abrasion, erosion, and abfraction). The results reveal important patterns and connections within the studied population. Based on the findings of this clinical study, the total prevalence of NCCLs in the general population of Erbil was 34.2% was in the range of other cross-sectional studies across wide age-range Asian populations.[27] As age increased, the occurrence of NCCLs also notably increased, with the greatest rate seen in those aged 58 and above. The rise in NCCL prevalence with age corresponds to earlier studies emphasizing the combined impact of several non-carious causes with time, resulting in tooth loss and structural deterioration. Several studies have stated the prevalence of cervical wear lesions with age.[28] Examining several categories of tooth loss revealed unique trends and connections. Tooth wear caused by tooth-to-tooth contact, known as attrition, was significantly associated with age [14], with older age groups showing a greater incidence. This discovery highlights how attrition worsens with age-related changes in teeth and bite dynamics. The outcomes of this cross-sectional study support that the incidence of NCCLs is a multiple-variable phenomenon. The combination of several factors seems necessary to explain NCCL development and progression. As most common cause of NCTL is Malocclusion due to edge-to-edge contact which leads to attrition. Abrasion related to toothbrushes brush reported to be the second important risk factor for the occurrence of NCCLs. Abrasion caused by mechanical friction from external sources showed a significant correlation with a, brushing technique with the greatest occurrence in the 38-47 age

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range.[8] This connection might be due to prolonged exposure to abrasive behaviors or environmental variables common among individuals in this age group. Also, acidic consumption.[3] even its intrinsic or extrinsic, constant utilization of carbonated soft drinks, citrus juice, and acidic fruits; acidic drinks were identified as risk factors in NCCLs for one of the common causes for developing NCL counts about 16.9%. However, trauma from occlusion in other studies counts as a common cause for developing NCL while in our study it doesn't play a significant role variation in dietary patterns and lifestyles across different populations may contribute to divergent outcomes in similar surveys. Numerous research studies have indicated that premolars exhibit the highest vulnerability to NCCLs.[27], as it was conducted with the result of our study, while other studies reported first molars were mostly affected by NCCLs .[29] which is not conducted with our study. according to our study, even anterior teeth commonly to be affected by attrition. According to another study, Men were more likely to present more NCCL than women.[30] However in our study Gender disparities in non-carious tooth loss were observed, with abrasion being more common in men and abfraction being twice as prevalent in females compared to males. Although erosion and attrition did not show notable gender discrepancies, the unique patterns identified highlight the complex nature of non-carious tooth loss, affected by behavioral, physiological, and environmental variables that may differ across gender and demographic groups. Attrition was particularly common in the upper and lower front teeth, emphasizing the impact of occlusal pressures and functional dynamics on wear in the front teeth.[8,17] Abrasion mainly impacted the lower premolars, especially the first and second premolars on both sides, indicating possible connections with abrasive behaviors or dietary habits unique to this area of the teeth.[9] As same with our results , these results highlight the need for thorough dental evaluations and educating patients on oral hygiene habits and occlusal management to reduce the chances of non-cavity-related tooth loss. Nevertheless, the current research has limitations. The cross-sectional design restricts the capacity to determine causation or longitudinal patterns in non-carious tooth loss. The sample size and demographic features may not accurately reflect the wider Erbil population; thus, care is needed when applying the results to a larger community. Overall, non-carious tooth loss, namely NCCLs, is a notable oral health issue in a sample of Erbil population. Age, gender, and tooth type are linked to various forms of tooth loss. Future longitudinal research with bigger and more varied groups is needed to better understand the complex causes and prevention methods for non-carious tooth loss in this population.

Conclusion

The prevalence of NCCL was 34.2% across different age groups, with a higher occurrence noted in older populations compared to younger ones. Among the types of tooth loss, attrition was found to be the most common, predominantly affecting anterior teeth. Additionally, gender was not found to have a significant influence on the development of NCCL.

Conflict of Interest

No conflict of interest.

References:

1. Aw TC, Lepe X, Johnson GH, Mancl L. Characteristics of non-carious cervical lesions: a clinical investigation. J Am Dent Assoc. 2002; 133:725-33.
2. Rees JS. The prevalence of tooth wear in a group of patients attending a university dental practice. Br Dent J. 2003;194(5):279–82. doi: 10.1038/sj.bdj.4809942.
3. Grippo JO, Simring M, Schreiner S. Attrition, abrasion, corrosion and abfraction

https://doi.org/10.56056/amj.2025.385

revisited: a new perspective on tooth surface lesions. J Am Dent Assoc. 2004; 135:1109–1118.
4. Santhiya B, Puranik MP. Risk factors, assessment and management of dental erosion in dental setting-A literature review. Int J Appl Dent Sci. 2019; 5:28-36.
5. da Silva AM, Valencise ML, da Silva MA, de Sousa Neto MD. Are the bite force and electromyographic activity altered in muscle TMD patients with abfraction lesions Cranio - J Craniomandib Pract. 2017; 9634:1-7. doi:10.1080/08869634.2017.1407116/
6. Nascimento MM, Dilbone DA, Pereira PN, Duarte WR, Geraldeli S, Delgado AJ. Abfraction lesions: etiology, diagnosis, and treatment options. Clin Cosmet Investig Dent. 2016 May 3:79-87.
7. 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; 85:306-312. doi:10.1177/154405910608500405/
8. Rees JS, Hammadeh M, Jagger DC. Abfraction lesion formation in maxillary incisors, canines and premolars: a finite element study. Eur J Oral Sci. 2003 Apr;111(2):149-54.
9. Addy M, Shellis RP. Interaction between attrition, abrasion and erosion in tooth wear. Dent Eros. 2006; 20:17-31. doi:10.1159/000093348/
10. Torres CR. Modern Operative Dentistry, Principles for Clinical Practice, Non-carious Lesions. Nature Switzerland AG: Springer; 2021:11.
11. Bartlett D. Etiology and prevention of acid erosion. Compend Contin Educ Dent. 2009; 30:616-620.
12. Barron RP, Carmichael RP, Marcon MA, Sàndor GK. Dental erosion in gastroesophageal reflux disease. J Can Dent Assoc. 2003; 69:84-89.
13. Dawes C. What is the critical pH and why does a tooth dissolve in acid? J Can Dent Assoc. 2003; 69:722-724.
14. Torres CR, Barbe AG, Noack MJ, Wicht MJ. Diagnosis and Treatment Planning. Modern Operative Dentistry: Principles for Clinical Practice. 2020:1-42.
15. Goldstein RE, Curtis JW, Farley BA, Siranli S, Clark WA. Abfraction, abrasion, attrition, and erosion. Ronald E. Goldstein's Esthetics in Dentistry. 2nd ed.: Springer; 2018.
16. Willis JR, Gabris MA. Tooth wear: aetiology and presentation. Dent Update. 2009 Sep;36(9):539-548. doi:10.12968/denu.2009.36.9.539/
17. Sarode SC, Sarode GS, Kulkarni MA, Patil A. Non-carious cervical lesions: a review. J Oral Maxillofac Pathol. 2013;17(2):222-227. doi:10.4103/0973-029X.119759/
18. Rees JS. The effect of variation in occlusal loading on the development of abfraction lesions: a finite element study. J Oral Rehabil. 2002;29(2):188-193. doi:10.1046/j.1365-2842.2002. 00810.x/
19. Jiang H, Du MQ, Huang W, Peng B, Bian Z, Tai BJ. The prevalence of and risk factors for non-carious cervical lesions in adults in Hubei Province, Chi. Comm. Dent H. 211;28(1):22-28.
20. Brandini DA, de Sousa AL, Trevisan CI, Pinelli LA, do Couto Santos SC, Pedrini D, et al, non-carious cervical lesions and their association with toothbrushing practices: in vivo evaluation. Oper Dent. n.d.; 36:581-589. doi:10.2341/10-152-S/
21. Reyes E, Hildebolt C, Langenwalter E, Miley D. Abfractions and attachment loss in teeth with premature contacts in centric relation: clinical observations. J Periodontol. 2009;80(12):1955-1962. doi:10.1902/jop.2009.090149/
22. 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):17-26. doi:10.1111/j.1365-2842.2006.01532. x/

23. Takehara J, Takano T, Akhter R, Morita M. Correlations of non-carious cervical lesions and occlusal factors determined by using pressure-detecting sheet. J Dent. 2008;36(10):774-779. doi: 10.1016/j.jdent.2008.05.009/
24. Heymann HO, Sturdevant JR, Bayne S, Wilder AD, Sluder TB, Brunson WD. Examining tooth flexure effects on cervical restorations: a two-year clinical study. J Am Dent Assoc. 1991 May;122(5):41-7. doi: 10.1016/s0002-8177(91)25015-1/
25. Yoshizaki KT, Francisconi-dos-Rios LF, Sobral MA, Aranha AC, Mendes FM, Scaramucci T. Clinical features and factors associated with non-carious cervical lesions and dentin hypersensitivity. J Oral Rehabil. 2017;44(2):112-118. doi:10.1111/joor.12469/
26. Spranger H. Investigation into the genesis of angular lesions at the cervical region of the teeth. Quintessence Int. 1995;26(2):149-54.
27. Yang J, Cai D, Wang F, He D, Ma L, Jin Y, Que K. Non-carious cervical lesions (NCCLs) in a random sampling community population and association of NCCLs with occlusive wear. J Oral Rehabil. 2016;43(12):960-966.
28. Borcic J, Anic I, Urek MM, Ferreri S. The prevalence of non-carious cervical lesions in permanent dentition. J Oral Rehabil. 2004;31(2):117-123.
29. Telles D, Pegoraro LF, Pereira JC. Prevalence of non-carious cervical lesions and their relation to occlusal aspects: a clinical study. J Esthet Dent 2000;12(1):10-15.
30. 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 (07) e648-e656.

https://doi.org/10.56056/amj.2025.385