ORIGINAL ARTICLE

TOOTH WEAR CORRELATIONS WITH NUTRITION AND LIFESTYLE

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Abstract: *Background*: In recent years, the subject of tooth wear has been extensively studied in literature, due to its increased incidence and risk of affecting patients' oral health and quality of life. The aim of the study was to determine the relationship between dental wear, nutrition and lifestyle, as well as to determine treatment possibilities. *Methods*: The study was conducted on a group of 50 patients who presented to the dental clinic for the rehabilitation of dental lesions. Following the anamnesis and clinical examination, the origin of the lesions and the diagnosis were established, and an individualized treatment plan was drawn up. *Results*: The tooth wear indices in all cases presented higher values in the study group than the values obtained in the control group. There is a correlation between non-cariogenic dental lesions number and mechanical and chemical factors, such as aggressive brushing and consumption of acidic foods. *Conclusions*: Nutrition and lifestyle influence oral health and tooth wear. Dentists have an important role in patients' education for oral health, nutrition and lifestyle.

Keywords: dental wear, abrasion, abfraction, BEWE

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1. Introduction

In recent decades, the topic of tooth wear has been increasingly researched in the literature. The term “tooth wear” was described in 2019 by the International Association for Cariology for Dental Research (IADR) and the European Organization for Caries Research (ORCA) as the cumulative loss of mineralized tooth surface substance caused by physical or physicochemical processes [1]. Tooth wear is the gradual loss of dental hard tissues and can be the result of three main mechanisms, namely dental abrasion, dental attrition and dental erosion. To these three mechanisms is added a fourth mechanism, dental abfraction, which potentiates the evolution of tooth wear in cervical area [2,3]. These mechanisms can be determined by exposure to various factors such as: acids, physiological and non-physiological mechanical forces, or low salivary flow and buffer capacity [2]. Clinical and experimental observations in the literature have shown that the individual mechanisms of tooth wear acts rather together and rarely individually [4]. In most cases it is difficult to determine the major cause of tooth wear or how the different wear mechanisms interact. It is well known that the interactions between mechanical and erosive wear are the most important, and these have been the subject of a large number of in vivo investigations [4].

Bruxism is defined as "a repetitive masticatory muscular activity characterized by clenching or grinding of the teeth and/or by stiffening or thrusting of the mandible and specified as either sleep bruxism or waking bruxism, depending on its circadian phenotype" [5]. Tooth wear and bruxism are considered to be associated conditions [6,7], but diagnosing tooth wear is difficult due to its multifactorial etiology and diverse modes of presentation and progression [5]. Currently, there are a multitude of assessment systems, such as the Tooth Wear Evaluation System (TWES) and the Basic Erosive Wear Examination (BEWE) [8-10]. Ideally, an index should have a basic structure that should allow more elaborate categories to be developed for precise scientific purposes, which could then be brought to the simplified version for clinical needs or for screening procedures [10,11].

Tooth wear is an irreversible phenomenon that results in aesthetic and functional disorders. A general trend of increasing tooth wear with age has been established [12]. The prevalence of tooth wear is 3% in people aged 20 and increases to 17% in people aged 70. Although the progression of tooth wear is usually slow, it can eventually lead to pain, functional problems, or impaired facial aesthetics [5]. Successful management depends on an accurate diagnosis and understanding of the etiological factors. Through etiological factors, two categories of factors are considered: chemical factors and mechanical factors. Chemical factors involved in tooth wear could be exogenous like acidic foods and drinks, acidic medicines, acidic mouthwashes, acidic artificial saliva, or endogenous as gastric acid in gastro-esophageal reflux disease. Mechanical factors involved could be exogenous like incorrect toothbrushing, diverse parafunctions, or endogenous like bruxism. The progression of tooth wear can be controlled or prevented if the etiology is known. The first step in successful treatment is early identification of

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the problem. This can be achieved through a complete history taking accompanied by a thorough clinical examination [8,13-15]. It is important to diagnose the process of tooth wear in children and adults as early as possible.

The incidence of tooth wear is increasing, being influenced by dietary habits and functional and parafunctional factors, which can compromise the structural integrity of the tooth, and ultimately affect the oral health and quality of life of patients. Thus, the aim of the present study was to determine the relationship between tooth wear, nutrition and lifestyle, as well as to determine treatment options.

2. Materials and method

Study design

The retrospective cross-sectional study included a group of 50 patients, aged between 18 and 56 years, who presented for dental diagnosis and treatment in the Oral Rehabilitation Clinic of the Faculty of Dentistry of the University of Medicine and Pharmacy of Craiova, between January 2015 and June 2015. The data collected for the study were extracted from the dental charts that included the results of the clinical, endooral and exooral examination and from the questionnaire about eating habits, diet, lifestyle, and parafunctions, highlighting the factors involved in the etiology of non-carious dental lesions. All patients included in the study gave informed consent for all medical procedures performed. All participants signed the agreement for the management of personal data (GDPR) and completed the standard form for inclusion in the medical research study according to law no. 46/2003. The study was approved by the Ethics Committee of the University of Medicine and Pharmacy of Craiova, with no 63/29.01.2024.

Study groups

Inclusion criteria included dentate patients, patients with reduced partial edentulism, or patients with small-extension prosthetic restorations (maximum 3 teeth).

Exclusion criteria included completely edentulous patients, patients with extensive partial edentulism, patients with extensive dental prosthetic or implant-prosthetic restorations.

Patients were divided into two groups, the control group consisting of patients who did not present tooth wear lesions (n=19) and the study group consisting of patients who presented tooth wear lesions (n=31).

Data were interpreted and processed using Microsoft Excel programs.

3. Results

In the present study, a total of 50 patients who met the inclusion criteria were analyzed and were randomly divided into two groups, namely the control group and the study group. The patients were aged between 18 and 56 years (mean: 34.94± 10.37) and came from both urban and rural areas. Of these, 34 patients were females and 16 patients were males (Table 1).

Non-cariogenic dental lesions were studied according to diet, comparing the proportion of these lesions in patients consuming sweets, acidic fruits, acidic foods, carbonated drinks, and alcohol.

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Table 1. Demographic data.

Parameter	Category	Study Group (n / %)	Control Group (n / %)	Total (n / %)
		31 (62%)	**19 (38%)**	**50 (100%)**
Gender	F	18 (36%)	14 (28%)	32 (64%)
	M	13 (26%)	5 (10%)	18 (36%)
Residence	Urban	23 (46%)	17 (34%)	40 (80%)
	Rural	8 (16%)	2 (4%)	10 (20%)
Age group	18-30 years	13 (26%)	7 (14%)	20 (40%)
	31-56 years	18 (36%)	12 (24%)	30 (60%)

The following data were obtained: 45% of sweets consumers showed abrasion, 30% showed attrition, 9% showed abfraction. 30% of carbonated drink consumers had abrasion, 60% of soda drink consumers had attrition, while 4% had abfraction, and 70% of soda drink consumers had erosion. In the study group, among fruit consumers, 4% have abrasion. 25% of fruit consumers have abfraction, 35% have attrition, 25% have dental erosion. Acidic foods and drinks in the study group was higher compared with the control group: 32.26% from the study group consumed acidic foods and drinks 1 time per day compared with 16.13% in the control group, and 32.26% from the study group consumed acidic foods and drinks 2-3 times per day compared with 25.8% in the control group (Figure 1).

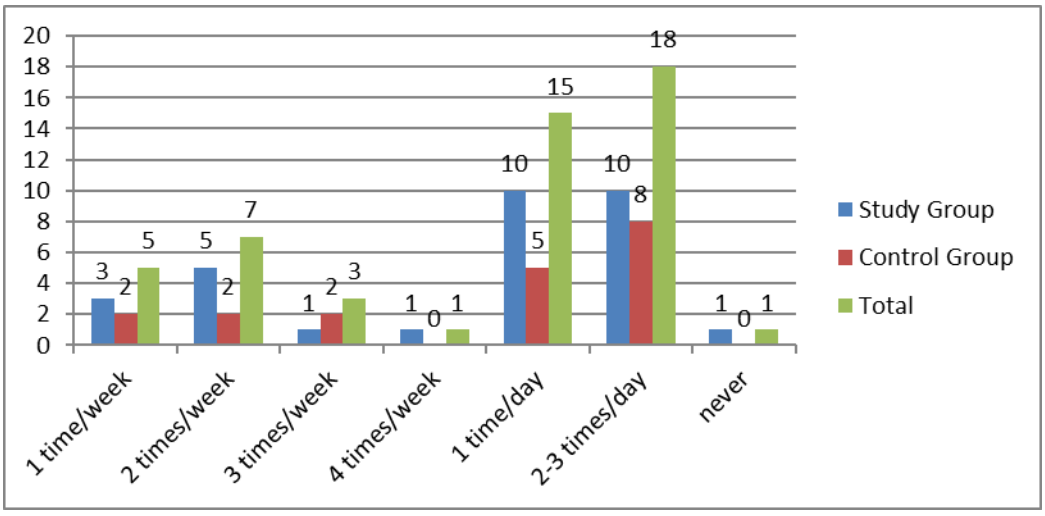

Figure 1. Frequency of consumption of sweets and carbonated drinks.

Regarding the type of brushing applied, 97.77% of the study group participants use toothbrushes with medium-hard bristles for brushing their teeth, while 63.16% of the control group use toothbrushes with hard bristles (Figure 2).

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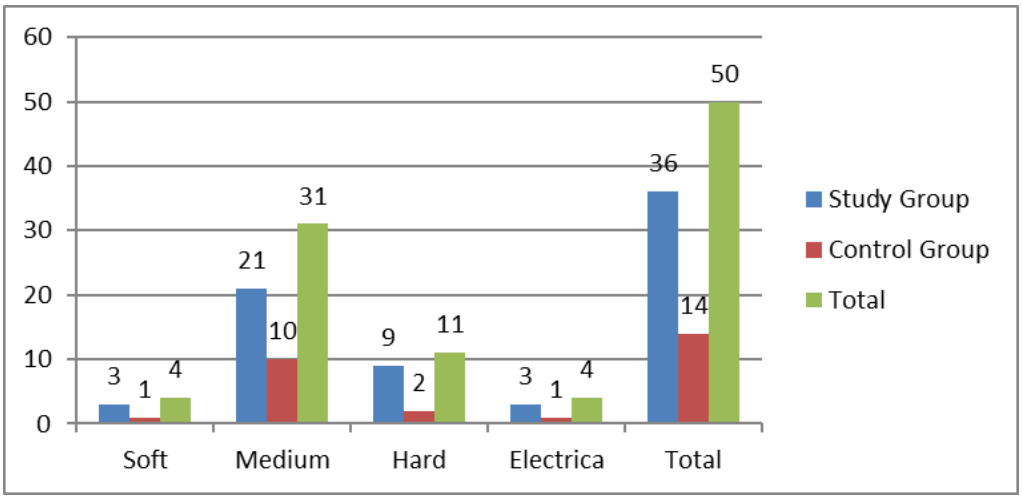

Figure 2. Distribution of patients according to the type of brushing used.

41.9% of the study group patients use the vertical brushing technique, compared to 21.05% patients in the control group. 52% of all patients use the circular brushing technique, 48.38% in the study group and 57.89% in the control group. Only 14% of patients from the study use horizontal technique of toothbrushing (Figure 3).

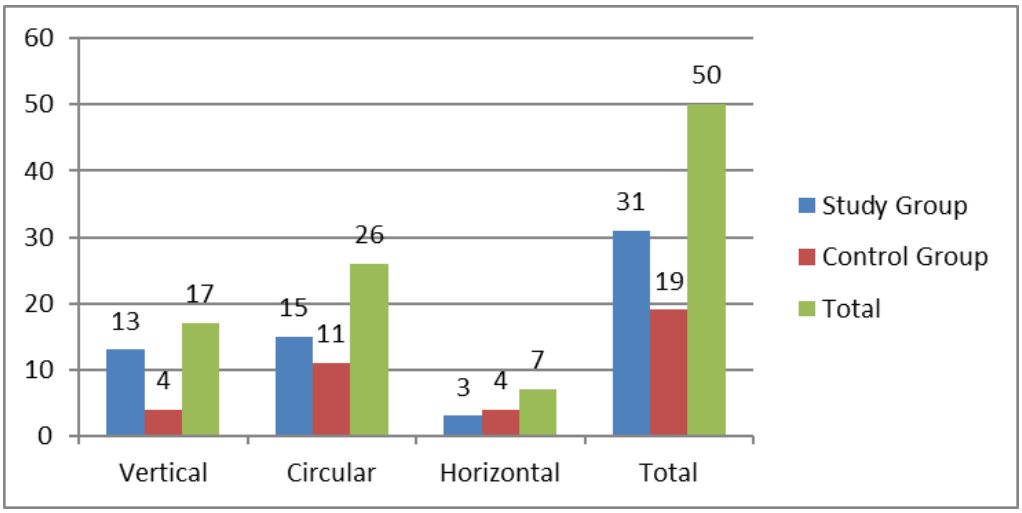

Figure 3. Distribution of patients according to the type of brushing used.

The abrasion lesions caused by brushing were found on the buccal surfaces, at the neck, both at the level of the maxillary and mandibular front teeth [Figure 4a, Figure 4b], as well as at the level of the lateral teeth. These had the appearance of open lesions with large extension, flattened and of reduced depth. Their restoration was performed with flowable composite materials [Figure 4c, Figure 4d]. The analysis according to the BEWE wear index showed the following results: the BEWE tooth wear index in the study group was 7.6 and 5.2 for the control group. The BEWE index for women with non-

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cariogenic lesions is 3.2, as opposed to 2.9 in the control group, and for men in the group with tooth wear it has a value of 4.4 and a value of 2.3 for those in the control group.

Figure 4. Abrasion lesions of maxillary front teeth b. Abrasion lesions of mandibular front teeth c. Restorations of maxillary front teeth d. Restorations of mandibular front teeth.

4. Discussion

Following the history taking, endooral and exooral examination and the application of the questionnaire, on the group represented by the 50 patients, aged between 18 and 56 years, divided into two groups: a study group consisting of patients with non-carious cervical lesions and a control group consisting of patients who do not present non-carious cervical lesions, several data and values were extracted. Thus, it was found that non-carious cervical lesions are present in a higher percentage in women, compared to the percentage of men. Regarding gender, there is no consensus in the literature regarding the association with the presence of tooth wear in a certain gender. Although it is assumed that in the case of the male gender a higher occlusal pressure is exerted due to the greater masticatory force [16], in the study carried out by Grippo et al. it was demonstrated that there is no correlation between these two parameters [17].

In the study conducted by Fontelle et al., the correlation between the presence of non-carious lesions, bruxism, gender, diet, sensitivity and the presence of dental wear was analyzed. Their results showed that over half of the examined individuals presented dental lesions of non-carious origin, the majority being over 30 years of age [18]. The study conducted by Teixeira et al. also showed a higher prevalence of lesions of non-carious origin in patients over 30 years of age, the

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motivation being the longer period in which the teeth are exposed to etiological factors [19].

Depending on the background of the study participants, it is noted that a higher percentage of non-carious dental lesions was observed in patients who came from urban areas. It is worth noting that the study was conducted on a group consisting of a higher proportion of patients from urban areas than from rural areas. In other studies, a correlation between social status and educational level has been reported, with the presence of lesions of non-carious origin.In urban areas, exposure to dietary etiological factors (acidic drinks, citrus fruits), as well as the frequency of tooth brushing are higher. Many non-carious cervical lesions were of the abrasion type produced by improper tooth brushing, with vertical movements, performed shortly after exposure to acidic foods [20,21]. It has been recognized in the literature that diet is directly responsible for inducing the appearance of tooth wear by eroding the enamel surface [22,23].

Depending on the brushing method used, it was noted that most patients use a circular brushing method, followed by those who use a vertical brushing method, and the fewest patients use a horizontal brushing method. Following the questioning regarding the type of toothbrush used by the participants, most use toothbrushes with medium hardness bristles for brushing teeth, followed by those who use toothbrushes with hard bristles and finally those who use toothbrushes with soft bristles, in an equal percentage to those who use an electric toothbrush. In the study conducted by Pugh B.R. et al it was demonstrated that different brushing techniques and forces applied during brushing lead to considerable variations in the degree of tooth wear that occurs [24].Also, in other studies, a higher prevalence of cervical lesions of non-carious origin has been reported in patients with habits such as excessive brushing or incorrect brushing technique associated with an acidic diet [25,26]. Wiegand et al. considered that the timing of brushing after an erosive attack, the frequency of brushing per day, and the force applied in the type of brushing are important in maintaining the integrity of the teeth hard tissues. It is interesting to note that demineralized enamel surface layer is removed faster than eroded dentine by an intensive toothbrushing. The force of toothbrushing and the abrasivity of the toothpaste are cofactors in the etiology of non-carious cervical lesions [27].

A review and meta-analysis on in vitro studies on human teeth concluded that delayed tooth brushing after an erosive attack was not as effective in reducing damage to human enamel compared to immediate brushing. The use of fluoridated toothpaste had a significant role in this effect [28].

Regarding restorative material options, for non-carious cervical dental lesions, glass ionomer cement, resin-modified glass ionomer cement, base liners with a combination of composite resin or giomers, and composite resins in association with dentin adhesive agents can be used [29-31]. In the literature, it has been found that resin-modified glass ionomer cement is the preferred variety for this type of dental lesions [32,33].

It has several characteristics that make it a good choice, namely biocompatibility,

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adhesion to calcified substrates, and a coefficient of elasticity similar to dentin. In addition to its advantages, it also has certain disadvantages, like the technical difficulties related to the sticky nature of the material, the unaesthetic appearance, and solubility in the acidic oral environment [34]. Other authors recommend that non-carious cervical lesions suspected to be caused primarily by abfraction should be restored with a micro hybrid composite or a flowable composite resin, which has low elasticity, that will bond to the tooth and will not compromise retention [35].

5. Conclusions

Non-carious cervical dental lesions, such as erosion or abrasion, are strongly associated with the consumption of acidic foods and drinks, as well as with the type of toothbrushing. Restoration of these lesions can be easily achieved with the help of flowable composite materials, ionomer cements or resin-modified ionomer cements. The dentist has a very important role both in preventing this type of non-carious lesions by educating patients on brushing techniques, but also on eating habits and lifestyle, as well as in their restoration.

References

1. Inchingolo F, Dipalma G, Azzollini D, Trilli I, Carpentiere V, Hazballa D, Bordea IR, Palermo A, Inchingolo AD, Inchingolo AM. Advances in Preventive and Therapeutic Approaches for Dental Erosion: A Systematic Review. Dent J (Basel). 2023 Nov 29;11(12):274.
2. FDI World Dental Federation. Tooth Wear. Int Dent J. 2024 Feb;74(1):163-164. doi: 10.1016/j.identj.2023.10.007.
3. Schlueter N, Amaechi BT, Bartlett D, Buzalaf MAR, Carvalho TS, Ganss C, Hara AT, Huysmans MDNJM, Lussi A, Moazzez R, Vieira AR, West NX, Wiegand A, Young A, Lippert F. Terminology of Erosive Tooth Wear: Consensus Report of a Workshop Organized by the ORCA and the Cariology Research Group of the IADR. Caries Res. 2020;54(1):2-6.
4. Lussi, A., Hellwig, E., Zero, D., & Jaeggi, T. (2006). Erosive tooth wear: diagnosis, risk factors and prevention. American journal of dentistry, 19(6), 319.
5. Bronkhorst H, Kalaykova S, Huysmans MC, Loomans B, Pereira-Cenci T. Tooth wear and bruxism: A scoping review. J Dent. 2024 Jun;145:104983.
6. Shellis RP, Addy M. The interactions between attrition, abrasion and erosion in tooth wear. Monogr Oral Sci. 2014;25:32-45.
7. Yap AU, Chua AP. Sleep bruxism: Current knowledge and contemporary management. J Conserv Dent. 2016 Sep-Oct;19(5):383-9.
8. Bartlett D, Dattani S, Mills I, Pitts N, Rattan R, Rochford D, Wilson NHF, Mehta S, O'Toole S. Monitoring erosive toothwear: BEWE, a simple tool to protect patients and the profession. Br Dent J. 2019 Jun;226(12):930-932.
9. Wetselaar P, Lobbezoo F. The tooth wear evaluation system: a modular clinical guideline for the diagnosis and management planning of worn dentitions. J Oral Rehabil. 2016 Jan;43(1):69-80.
10. Ramesh N, O'Toole S, Bernabé E. Agreement between two common tooth wear indices: Guidance on indications for use. J Dent. 2022 Jul;122:104126.
11. Roehl JC, Katzer L, Jakstat HA, Wetselaar P, Ahlers MO. Reliability of the Assessment of Tooth Wear Severity on Dental Hard Tissues and Dental Restorations, Using the TWES 2.0, by Nonexperts. J Oral Rehabil. 2025 Feb;52(2):125-136.

12. Kaklamanos EG, Menexes G, Makrygiannakis MA, Topitsoglou V, Kalfas S. Tooth Wear in a Sample of Community-Dwelling Elderly Greeks. Oral Health Prev Dent. 2020 Apr 3;18(2):133-138.
13. Nobre M, Almeida L, Magalhães M, Carvalho R, Rua J, Proença L, Vieira AM. Tooth Wear and Salivary Factors: Insights from a Cohort of Dental Students. J Clin Med. 2025 Mar 13;14(6):1936.
14. Lyttle, H. A., Sidhu, N., & Smyth, B. (1998). A study of the classification and treatment of noncarious cervical lesions by general practitioners. The Journal of prosthetic dentistry, 79(3), 342-346.
15. Bader, J. D., Levitch, L. C., Shugars, D. A., Heymann, H. O., & McClure, F. (1993). How dentists classified and treated non-carious cervical lesions. Journal of the American Dental Association (1939), 124(5), 46-54
16. Stănuși, A., Ionescu, M., Cerbulescu, C., Popescu, S. M., Osiac, E., Mercuț, R., Scrieciu, M., Pascu, R. M., Stănuși, A. Ș., & Mercuț, V. (2022). Modifications of the Dental Hard Tissues in the Cervical Area of Occlusally Overloaded Teeth Identified Using Optical Coherence Tomography. Medicina, 58(6), 702.
17. 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 Feb;24(1):10-23
18. Fontelle GA, do Nascimento FY, Silva PB, Rolim JP. Risk Factors associated with noncarious cervical lesions. J Clin Exp Dent. 2024 Jul 1;16(7):e873-e878.
19. Teixeira DNR, Thomas RZ, Soares PV, Cune MS, Gresnigt MMM, Slot DE. Prevalence of noncarious cervical lesions among adults: A systematic review. J Dent. 2020 Apr;95:103285.
20. Liu JW, Shi XY, Li JX, Li X. The Prevalence of Erosive Tooth Wear and Related Risk Factors in 6- to 12-Year-Old Students. Oral Health Prev Dent. 2021 Dec 8;19:635-646.
21. Kalsi H, Khan A, Bomfim D, Tsakos G, McDonald AV, Rodriguez JM. Quality of life and other psychological factors in patients with tooth wear. Br Dent J. 2021 Jul 8.
22. Katirci G, Celik EU. The prevalence and predictive factors of dentine hypersensitivity among adults in Turkey. BMC Oral Health. 2023 Jul 11;23(1):474.
23. Colak H, Aylikci BU, Hamidi MM, Uzgur R. Prevalence of dentine hypersensitivity among university students in Turkey. Niger J Clin Pract. 2012 Oct-Dec;15(4):415-9.
24. Pugh BR. Toothbrush wear, brushing forces and cleaning performance. J Soc Cosmet Chem. 1978;29:423–31.
25. Goodacre CJ, Eugene Roberts W, Munoz CA. Noncarious cervical lesions: Morphology and progression, prevalence, etiology, pathophysiology, and clinical guidelines for restoration. J Prosthodont. 2023 Feb;32(2):e1-e18.
26. Chiriac, A.M., Mercut, V., Popescu, S.M., Alexandru, D., Mercut, R., Popescu, F. D. (2019). Applications of Factorial Analysis in the Study of Risk Factors and their Chemical Influence for Erosive Dental Wear. Revista de Chimie, 70(2), 693-699
27. Wiegand A, Schlueter N. The Role of Oral Hygiene: Does Toothbrushing Cause Harm? Monogr Oral Sci. 2025;33:32-37.
28. Hong DW, Lin XJ, Wiegand A, Yu H. Does delayed toothbrushing after the consumption of erosive foodstuffs or beverages decrease erosive tooth wear? A systematic review and meta-analysis. Clin Oral Investig. 2020 Dec;24(12):4169-4183.
29. Teixeira DNR, Zeola LF, Machado AC, Gomes RR, Souza PG, Mendes DC, Soares PV. Relationship between noncarious cervical lesions, cervical dentin hypersensitivity, gingival recession, and

associated risk factors: A cross-sectional study. J Dent. 2018 Sep;76:93-97.
30. Alcântara PM, Barroso NFF, Botelho AM, Douglas-de-Oliveira DW, Gonçalves PF, Flecha OD. Associated factors to cervical dentin hypersensitivity in adults: a transversal study. BMC Oral Health. 2018 Sep 3;18(1):155.
31. Park SM, Rhee WR, Park KM, Kim YJ, Ahn J, Knowles JC, Kim J, Shin J, Jang TS, Jun SK, Lee HH, Lee JH. Calcium Silicate-Based Biocompatible Light-Curable Dental Material for Dental Pulpal Complex. Nanomaterials (Basel). 2021, 27;11(3):596.
32. Koc Vural U, Meral E, Ergin E, Gürgan S. Twenty-four-month clinical performance of a glass hybrid restorative in non-carious cervical lesions of patients with bruxism: a split-mouth, randomized clinical trial. Clin Oral Investig. 2020 Mar;24(3):1229-1238.
33. Fernandes JB, Contreras SM, da Silva Spinola M, Batista GR, Bresciani E, Caneppele TMF. Do bioactive materials show greater retention rates in restoring permanent teeth than non-bioactive materials? A systematic review and network meta-analysis of randomized controlled trials. Clin Oral Investig. 2023 Dec 28;28(1):44.
34. Jakupović S, Šehić A, Julardžija F, Gavranović-Glamoč A, Sofić A, Bajsman A, Kazazić L. The Influence of Different Occlusal Loading on Six Restorative Materials for Restoration of Abfraction Lesions-Finite Element Analysis. Eur J Dent. 2022 Oct;16(4):886-894.
35. Worthington HV, Khangura S, Seal K, Mierzwinski-Urban M, Veitz-Keenan A, Sahrmann P, Schmidlin PR, Davis D, Iheozor-Ejiofor Z, Rasines Alcaraz MG. Direct composite resin fillings versus amalgam fillings for permanent posterior teeth. Cochrane Database Syst Rev. 2021 Aug 13;8(8):CD005620.

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Will be provided on request.

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