LITERATURE REVIEW

NON-CARIOUS DENTAL LESIONS: A NARRATIVE LITERATURE REVIEW

LESÕES DENTÁRIAS NÃO CARIOSAS: UMA REVISÃO NARRATIVA DA LITERATURA

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ABSTRACT

Non-carious dental lesions (NCDLs) correspond to a group of structural alterations characterized by the gradual and irreversible loss of hard dental tissue not associated with caries, resulting from mechanical and chemical processes. This wear is classified into four categories according to its etiopathogenesis: attrition, abrasion, abfraction, and biocorrosion. The aim of this study was to review the literature on the prevalence, etiopathogenesis, differential diagnosis, prevention, and treatment of NCDLs. An advanced search was conducted in the PubMed, BVS, and CAPES Journal Portal databases using DeCS and MeSH descriptors. Articles published in scientific journals in English and Portuguese and available in full text were included. Duplicate studies or those not related to the topic were excluded. After screening titles and abstracts, 44 articles were selected for full-text reading. Tooth wear is highly prevalent across all age groups; approximately 51% of young adults present four or more teeth with wear, while 31% of children exhibit at least one worn tooth. NCDLs present a multifactorial etiology and wide clinical variability. Preventive strategies integrated with etiopathogenesis and long-term monitoring are essential in the clinical management of NCDLs. Dentists must be familiar with the clinical characteristics of each type of lesion and identify the etiological factors involved in their onset and progression to ensure proper prevention, early diagnosis, and appropriate treatment.

Keywords: Tooth wear; Dental abrasion; Dental erosion; Differential diagnosis.

RESUMO

As lesões dentárias não cariosas (LDNC) correspondem a um conjunto de alterações estruturais caracterizadas pela perda gradual e irreversível de tecido dentário duro não relacionada à cárie, causada por processos mecânicos e/ou químicos. Esse desgaste é dividido em quatro tipos, de acordo com a etiopatogenia: atrição, abrasão, abfração e erosão. O objetivo deste estudo foi revisar a literatura sobre a prevalência, etiopatogenia, diagnóstico diferencial, prevenção e tratamento das LDNC. Uma busca avançada foi realizada nas bases de dados PubMed/MEDLINE, BVS e Portal de periódicos CAPES utilizando os descritores DeCS e MeSH. Artigos publicados em revistas científicas em inglês e em português, disponíveis na íntegra, foram incluídos. Estudos duplicados ou não relacionados ao tema foram excluídos. Após a triagem dos títulos e resumos, 44 artigos foram selecionados para leitura completa. O desgaste dentário é altamente prevalente na população; aproximadamente 51% dos jovens adultos apresentam quatro ou mais dentes com desgaste; em crianças, 31% apresentam pelo menos um dente desgastado. As LDNC apresentam etiologia multifatorial e ampla variabilidade clínica. Estratégias preventivas com abordagem integrada à etiopatogenia e ao monitoramento a longo prazo são fundamentais para o manejo clínico das LDNC. O cirurgião-dentista deve conhecer as características clínicas de cada tipo de lesão e identificar os fatores etiológicos envolvidos na sua instalação e progressão, para que a prevenção, o diagnóstico precoce e o tratamento adequado sejam realizados.

Palavras-chave: Desgaste dentário; Abrasão dentária; Erosão dentária; Diagnóstico diferencial.

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INTRODUCTION

Non-carious dental lesions (NCDLs) refer to structural alterations characterized by progressive and irreversible loss of hard dental tissue not associated with bacterial action (1-3). These alterations are included in the scope of tooth wear and result from interaction between mechanical and chemical processes that promote pathological removal of enamel and dentin (3,4). Their etiopathogenesis is multifactorial, involving occlusal forces, recurrent acid challenges, and individual factors that influence structural susceptibility (4-6).

Tooth wear is considered highly prevalent in different populations, with functional, aesthetic, and sensory impacts, especially when associated with dentin hypersensitivity and advanced structural loss (7-9). Behavioral and systemic factors, such as bruxism and frequent acid exposure, play a relevant role in the progression of these lesions (5,10,11). Although international guidelines have contributed toward standardizing diagnostic criteria and guiding clinical management (4,12), there are still gaps in the integration between etiopathogenesis, differential diagnosis, and definition of preventive and therapeutic strategies based on individual risk.

Considering the above, the present study aims to review the current scientific literature on the prevalence, etiopathogenesis, differential diagnosis, prevention, and treatment of NCDLs.

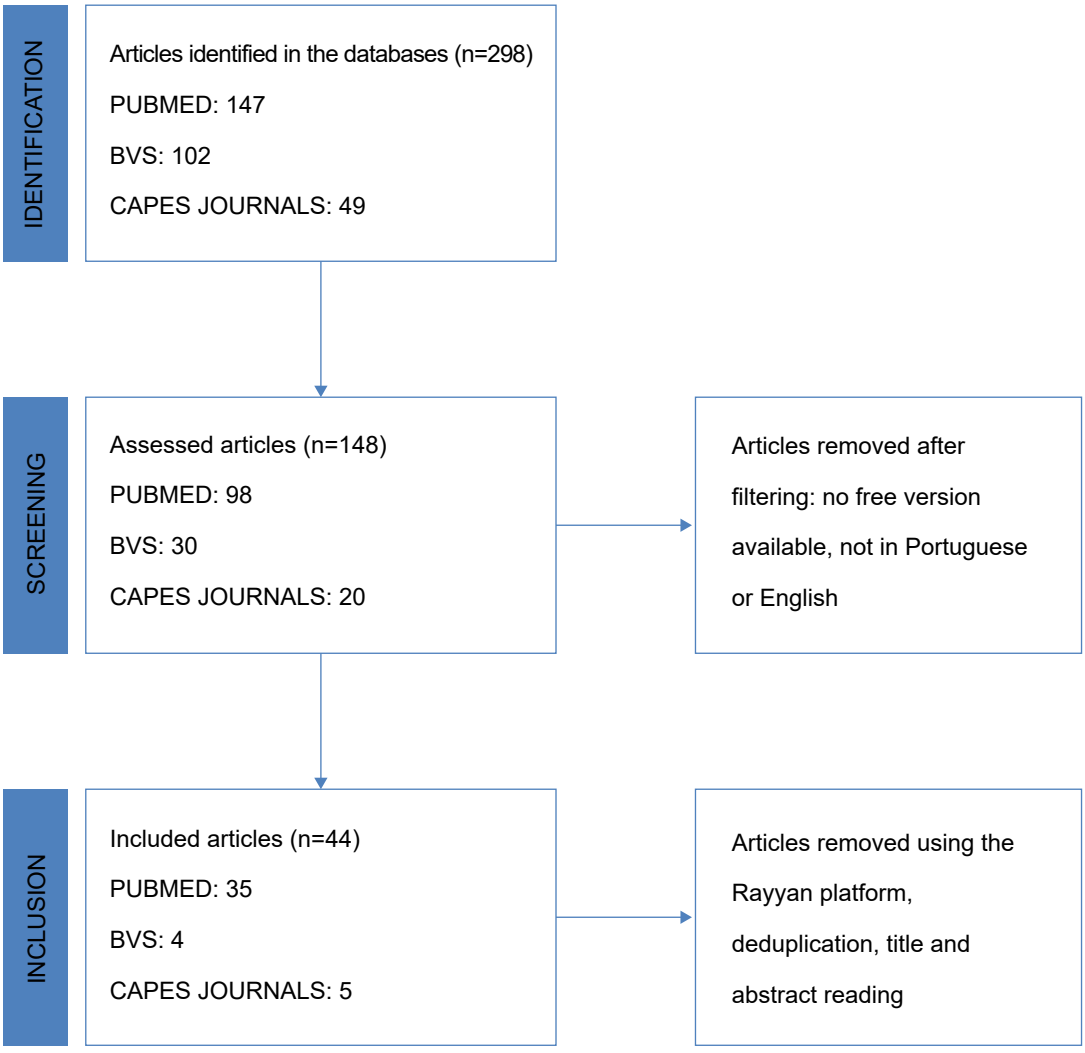

Figure 1 - Flow diagram

METHODOLOGY

A narrative literature review was conducted through an advanced search in the PubMed/MEDLINE, Virtual Health Library (BVS), and CAPES Journal Portal databases with the health descriptors (DeCS) and Medical Subject Headings (MeSH): “Tooth Wear,” “Tooth Erosion,” “Non-carious Cervical Lesions,” “Dental Attrition,” “Dental Abrasion,” “Non-

Carious Tooth Lesions," and "Differential Diagnosis" combined using the Boolean operators AND and OR, and without restriction as to year of publication of the studies. The database searches resulted in the identification of 298 articles published between 1985 and 2026, allowing the inclusion of classic and contemporary evidence. After screening by applying filters for the inclusion of Portuguese and English languages, and free full-text availability, 148 articles were found. Use of the artificial intelligence platform Rayyan enabled article deduplication, reading of titles and abstracts, and application of inclusion and exclusion criteria. Thus, we included studies with different methodological designs, comprising scoping reviews, narrative reviews, observational studies (cross-sectional, case-control, cohort, and longitudinal), laboratory studies, qualitative studies, anatomical and morphological studies, methodological studies focused on the development of classification systems and indices, in addition to consensus documents, clinical guidelines, and conceptual or update articles on tooth wear and NCDLs. Thus, 44 articles were selected to compose the present narrative literature review, as presented in the flow diagram (Figure 1).

LITERATURE REVIEW

Types

NCDLs are classified into four types, according to their etiopathogenesis and clinical characteristics: attrition, abrasion, and abfraction, predominantly associated with mechanical processes; and erosion, related to the chemical process of corrosion (1-3,13-16). This classification is widely used to guide diagnostic and therapeutic reasoning (4,12,13). However, this classification is essentially didactic and, in most cases, does not reflect isolated mechanisms (3,6).

Attrition is described as tooth wear associated with direct occlusal contact between opposing teeth, without an external agent. It can be physiological or caused by parafunctional habits (2,10).

Abrasion is characterized by the loss of tooth structure associated with external mechanical action, such as toothbrush bristles, pins, hair clips, fingernails, toothpicks, interdental devices, and musical instruments, with the characteristics of the lesion being directly influenced by the external agent (13,14).

Abfraction is the loss of tooth structure in the cervical region of the tooth associated with the concentration of stresses resulting from non-axial occlusal forces (5,17-21). Currently, the term non-carious cervical lesion (NCCL) is preferred to the term abfraction, as these lesions are recognized to have a multifactorial etiology involving the interaction of mechanical, chemical, and biological factors, rather than being attributed exclusively to mechanical stress in the cervical region of the tooth.

Erosion is characterized by the progressive loss of dental microanatomy due to the action of non-bacterial acids (1,3).

In general, the integration of morphology, localization, distribution pattern, and functional history of the patient is necessary for proper diagnosis and therapeutic planning in NCDLs (4,12,19,22).

Prevalence

Tooth wear has a high prevalence in different age groups and population contexts. A 2010 study in the United States found that 51% of adults presented four or more teeth with moderate to severe wear, while 31% of the evaluated children already presented at least one worn tooth, showing early onset and cumulative behavior of the condition (23).

Similarly, a study with Brazilian young adults in 2022 found a prevalence of 61.6% for tooth wear involving dentin, indicating structural compromise beyond the enamel in a significant portion of the population due to frequent consumption of acidic beverages and the presence of parafunctional habits (7). Another national study, in 2020, found that 100% of the evaluated individuals presented at least one dental surface with some degree of wear, with 21.6% already showing dentin involvement, demonstrating the high prevalence of initial alterations and the existence of cases in more advanced stages (24).

A 42.3% prevalence was reported for erosion in Polish young adults in 2017. The data showed a predominance of lesions classified as initial loss of enamel surface texture—without significant structural compromise (28.9%), followed by evident loss of hard dental tissue—involving less than 50% of the surface (12%) and, finally, severe loss of hard dental tissue—involving 50% or more of the surface (1.4%), demonstrating a higher concentration of erosion in the initial stages (8). Similarly, a 31.7% prevalence of erosion was observed in Mexican adolescents in 2016. In this population, 10.8% already had dentin exposure, indicating structural progression beyond enamel still at an early age (9).

A statistically significant association was observed between NCCL and bruxism, and between traumatic brushing technique and frequent intake of acidic beverages, in 2019 (20). Additionally, a case-control study observed a significant increase in the risk of NCCL in individuals with occlusal overload and parafunctional habits, in 2023 (21). In clinical studies in 2017, 2019, and 2025, NCCLs were significantly associated with facial dentin exposure, gingival recession, and hypersensitivity (19,25,26).

Thus, NCDLs have a high population prevalence, early onset, and progressive potential, with significant repercussions already in young adults (1,3).

Etiopathogenesis

The etiopathogenesis of attrition is based on repetitive friction between occlusal or incisal surfaces over time, promoting gradual removal of enamel and, at more advanced stages, of the underlying dentin (2,27). During physiological masticatory function, interocclusal contacts occur in a manner compatible with the adaptive capacity of the stomatognathic system (28). However, when there is increased intensity, frequency, or duration of these contacts, as in cases of parafunctional habits, functional overload can accelerate tooth wear (10). The progression relates to the magnitude of the applied force, the occlusal pattern, and the presence of interferences that increase the time or area of interocclusal contact (4,12). Reduced surface microhardness after acidic challenges increases susceptibility to subsequent mechanical friction wear (16,18).

Frequent contact of the dental surface with exogenous mechanical agents, in turn, produces wear classified as dental abrasion, with inadequate tooth brushing being the main etiological factor (13,22). In this context, excessive application of force combined with the use of abrasive toothpastes favors gradual wear, especially in the facial cervical region (20). Progression is directly related to brushing frequency, technique, and time of exposure to the causal factor (13). In addition, habits such as traumatic use of toothpicks and interdental devices can contribute to abrasive wear (22). Abrasion frequently occurs synergistically with erosion, as acid exposure reduces the surface resistance of enamel, making it more vulnerable to subsequent mechanical action (3,16).

Abfraction is associated with the accumulation of stress in the cervical region of the tooth, resulting from non-axial occlusal forces (5,17). The area near the cementoenamel junction (CEJ) exhibits structural characteristics that favor the concentration of mechanical stress when subjected to repetitive eccentric loads (14). In the presence of excursive movements, premature contacts, occlusal interferences, and parafunctions, such as centric and eccentric bruxism, repetitive dental flexion occurs, with the generation of traction and compression stress in the facial cervical region (5,10,20,21). This cyclic stress promotes the formation of microcracks in the cervical enamel and subsequent propagation to the underlying dentin, culminating in localized loss of structure and generating a well-demarcated wedge-shaped lesion (15,16). As cervical dentin exposure occurs, there is an increase in tubular permeability, favoring the development of dentin hypersensitivity (19,25). Root exposure increases the area susceptible to thermal and osmotic stimuli, intensifying the painful response characteristic of dentin hypersensitivity (22,25,26). The interaction between biomechanical overload and erosion can intensify lesion progression, as previous acidic challenges facilitate the propagation of microcracks and the increase in dentin exposure (3,19,21,29). Thus, abfraction should be understood within a multifactorial etiopathogenic model, in which the concentration of occlusal stress acts as a triggering or modulating factor, but its progression depends on the interaction with chemical and mechanical factors , such as erosion and abrasion. (5,19,21).

The progressive demineralization of enamel and dentin resulting from repeated exposure to extrinsic or intrinsic acids characterizes erosion (1,3). Extrinsic acids are mainly associated with frequent consumption of carbonated beverages and acidic foods (3,30), while intrinsic acids originate from the stomach and are related to gastroesophageal reflux and recurrent episodes of vomiting (11,16). In erosion, acid exposure promotes superficial mineral dissolution and the formation of a softened layer susceptible to subsequent mechanical removal (18). Progression depends on the frequency and duration of acid exposure, salivary composition, and individual buffering capacity (6,28). Cervical structural loss due to demineralization can predispose to the development of dentin hypersensitivity and favor the action of associated mechanical mechanisms, such as abrasion and abfraction (19,25).

Thus, the etiopathogenesis of NCDLs must be understood within a multifactorial and dynamic model, in which mechanical, chemical, and behavioral factors act interdependently in the onset and progression of tooth wear (4,13).

DIAGNOSIS

Indices and methods for diagnosis

Indices and systems for assessment have been proposed with the aim of standardizing diagnosis and enabling longitudinal monitoring of tooth wear (12,31,32). The Tooth Wear Index (TWI) remains the initial benchmark in standardizing the global clinical assessment of tooth wear, providing the classification of severity on different surfaces (33), and is currently used mainly as a benchmark in comparative and epidemiological studies (32).

The Basic Erosive Wear Examination (BEWE) was later proposed as a simplified system, being widely used in clinical practice and population studies due to its applicability in screening and monitoring of erosive wear (34,30). The Tooth Wear Evaluation System (TWES) expanded the diagnostic proposal by integrating the extent, severity, and distribution of wear on all tooth surfaces (12), making it more suitable for detailed evaluation and clinical planning. Its updated version, TWES 2.0, refined the criteria for structured registration and longitudinal monitoring of wear, being preferably used in clinical research and in contexts that require greater diagnostic accuracy (31,32).

In occlusal assessment, the Johansson Index contributed toward standardizing the measurement of occlusal wear and its distribution across dental surfaces (28), while, in NCCLs, the cervical location code was proposed as a complementary tool for standardizing the anatomical location of cervical lesions, with both being used in clinical practice and scientific research (35).

In addition to conventional clinical indices, more recent studies have incorporated digital technologies, such as intraoral scanning and three-dimensional comparison of digital models, providing objective and reproducible measurement of structural loss over time (36,26). These methods show higher sensitivity in detecting early alterations (36); however, they still have limited application in clinical practice due to limitations related to cost and technological availability (32).

The diagnosis of tooth wear remains essentially clinical, requiring correlation between lesion morphology, anatomical location, distribution pattern, and etiological factors identified in the anamnesis (4,13,29), with different indices being used complementarily according to the clinical or research context (12,31).

Differential diagnosis

The differential diagnosis of NCDLs should be based on the integrated analysis of lesion morphology, anatomical location, wear pattern, clinical progression, and associated factors, as the mechanisms of attrition, abrasion, abfraction, and erosion frequently coexist in the same individual (1,2,5,13). The literature notes that isolated evaluation of the visual aspect can lead to diagnostic errors, requiring a correlation with a detailed anamnesis and careful clinical examination (12,14,19).

Clinically, attrition is characterized by wear resulting from tooth-to-tooth contact, generally in incisal and occlusal areas, presenting wear surfaces, with a symmetrical pattern between opposing teeth (2,5,10,27). The incisal edges of the anterior teeth show flat, smooth, and polished surfaces, which are typical characteristics of wear by attrition. Notably, there is reduced cusp relief, progressive coronal shortening, and the presence of antagonistic wear facets that correspond and come into contact during excursive mandibular movements. The gradual loss of occlusal anatomy gives teeth a discoid morphology, characterized by rounded contours and disc-shaped surfaces, showing the mechanical action resulting from tooth-to-tooth contact over time (2,10,27). This configuration is compatible with chronic attrition, especially when associated with functional overload and parafunctions, such as bruxism (10). Attrition follows the occlusal plane and demonstrates a wear pattern compatible with mandibular kinematics, that is, there is parallelism between the antagonist wear facets (12,28) (Figure 2).

Abrasion results from repetitive external mechanical action, commonly related to traumatic brushing and the use of toothpastes with higher abrasive potential (13,20,22). In this case, it presents clinically as a shallow or moderate cervical depression, with a smooth surface and rounded borders, predominantly on the facial surface. The depth tends to be limited, and progression is associated with the patient-reported oral hygiene pattern and the frequency of exposure to the mechanical stimuli (18,19,21) (Figure 3).

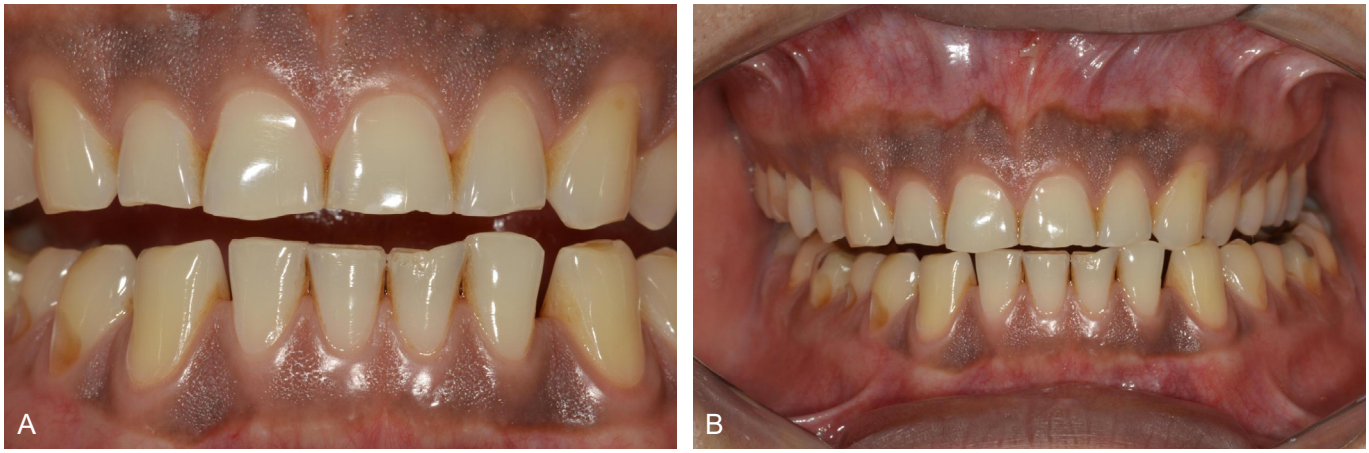

Figure 2 - Tooth wear caused by attrition. A) The incisal edges show flat, smooth, and polished wear surfaces, on the anterior teeth. B) In excursive movements, the antagonistic wear facets come into contact. The buccal surfaces of the lower posterior teeth (quadrant 4) show erosion (saucer-shaped), demonstrating that the various phenomena related to tooth wear often occur simultaneously in non-carious dental lesions.

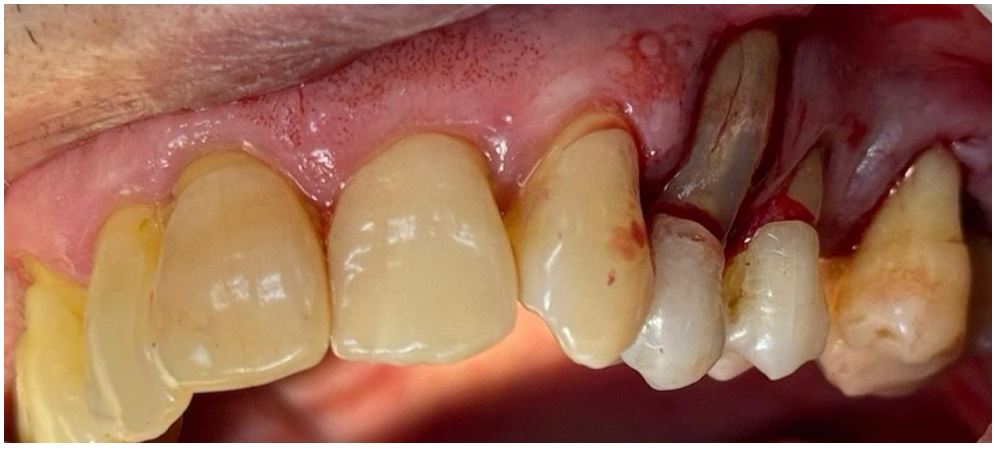

Figure 3 - Wear of tooth cementum in upper premolars with gingival recession. The buccal view shows tooth wear caused by abrasion associated with traumatic brushing and highly abrasive toothpaste.

Abfraction is described as a wedge-shaped or V-shaped lesion, located in the cervical region, with well-defined margins, acute internal angles, generally located in the facial cervical region (5,15-17) (Figure 4). It can occur in isolation or associated with abrasion and erosion, configuring a multifactorial pattern of cervical wear (4,13,22). The presence of occlusal interferences, functional overload, and bruxism reinforces the diagnostic hypothesis of abfraction associated with mechanical stress (10,19,21).

The clinical aspect of erosion is characterized by the presence of smooth enamel, loss of surface shine, rounded edges, and, at more advanced stages, dentin exposure with wide concavities (3,18,37) (Figure 5). Palatal lesions on upper teeth suggest an intrinsic origin, often associated with gastroesophageal reflux (1,3,11), while localized wear on facial surfaces may indicate frequent consumption of acidic beverages (3,37,38). Erosion often acts as a potentiating factor for other wear mechanisms, reducing the surface resistance of enamel and dentin (3,16,18).

Correct differential diagnosis guides therapeutic management and avoids unnecessary or ineffective restorative interventions (10,26,39). The main clinical characteristics used in differential diagnosis are summarized in Chart 1.

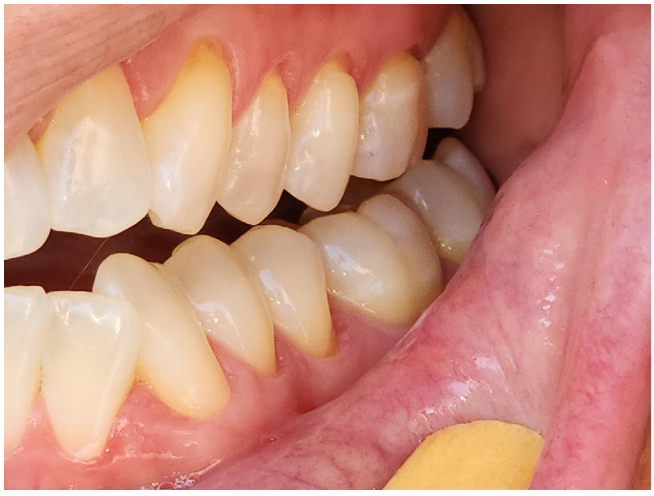

Figure 4 - Non-carious cervical lesions in upper canine, premolars, and first molar. Facial view showing wedge-shaped lesions with sharp margins and marked depth.

Figure 5 - Tooth wear caused by erosion. The occlusal surface shows dentin exposure and saucer-shaped lesions (characterized by smooth, shallow concavities with rounded edges in enamel or dentin) on the lower premolars and molars.

Chart 1 - Differential diagnosis of non-carious dental lesions

Clinical criteria	Attrition	Abrasion	Abfraction	Erosion
Location	Posterior: occlusal Anterior: incisal	Varies according to the external agent	Cervical area of the buccal surface of premolars and canines and, to a lesser extent, of the upper incisors	Palatal surface of upper incisors; Facial/Occlusal
Morphology	Flat and polished surfaces; reduced cusps; when there is dentin exposure, there is a yellowish or brownish appearance	Shallow cervical depression, smooth contours; Form compatible with the external object	Wedge-shaped and V-shaped, deep with well-defined margins	Rounded concavities; loss of enamel luster
Associated factors	Functional overload	Vigorous horizontal brushing and use of highly abrasive toothpastes Friction of objects	Occlusal interferences Occlusal overload Association with other NCDLs	Intrinsic origin: Gastroesophageal reflux, recurrent vomiting, and eating disorders Extrinsic origin: Frequent consumption of acidic beverages or foods.

Prevention

Repetitive friction between dental surfaces associated with high mechanical stress is the determining factor in attrition, mainly in patients with bruxism or daytime clenching. In this context, early diagnosis of attrition requires the recognition of signs of functional overload, such as occlusal polishing and/or muscular symptoms (2,10). The prevention of attrition, in turn, requires patient awareness of unconsciously performed daytime clenching, encouragement of mandibular relaxation at rest, and stress control, as stress acts as a modulator of muscle activity (10). The treatment involves the use of a stabilizing occlusal splint, indicated as a biomechanical preventive measure for interocclusal protection, force redistribution, and reduction of direct tooth contact during parafunctional activity, limiting the progression of wear (12,28). Finally, periodic patient monitoring enables the detection of increased contact areas and the progression of wear before there is significant dentin exposure (31,36).

Dental abrasion, caused by the friction of external objects against the tooth, is facilitated by external mechanical trauma. To prevent the classic form of abrasion caused by “brushing with excessive force,” patients should be advised to adopt a light-pressure brushing technique, use soft-bristled brushes, and control frequency, avoiding excessively prolonged brushing (13,14). Furthermore, toothpaste

abrasiveness should also be considered, especially in patients with root exposure or previous wear (22,40). The prevention of abrasion is also associated with the habit of avoiding brushing immediately after ingesting acidic substances, as the temporary reduction in enamel microhardness caused by acid can increase susceptibility to subsequent mechanical wear (3,16). Regarding the prevention of other forms of tooth abrasion, the recommendation is not to use traumatic objects, such as toothpicks or interdental devices, as they can contribute to localized cervical wear (20,21).

The main factor associated with abfraction prevention is the reduction of stress concentration at the cementoenamel junction, as the structure of this region is vulnerable to microflexure (5,14). Thus, patients should be advised to avoid chronic unilateral chewing, habits of biting hard objects, or engaging in behaviors that produce repetitive eccentric loads (10,28). In addition, functional occlusal stabilization can also contribute to a more homogeneous redistribution of forces, reducing stress concentration in the cervical region and preventing the development of progressive microcracks (5,12). Cervical morphology should be evaluated periodically, as progression can occur insidiously, before clinical manifestations become evident (19,21). Given the interaction between biomechanical stress and structural weakening by chemical factors, abfraction prevention should be integrated into erosion and abrasion control strategies, in a multifactorial etiological model (4,13,22).

The modification of the acid exposure pattern is the primary factor in preventing erosion. The literature shows that progression does not depend solely on isolated pH, but mainly on the frequency and duration of acid contact with the dental surface (3,41,42). Thus, patient guidelines should include reducing the intake of carbonated drinks, energy drinks, isotonic drinks, and citrus juices throughout the day (37,38). In this context, saliva plays a protective role through its buffering capacity and supply of calcium and phosphate ions for surface remineralization (3,18). In cases of intrinsic etiology, such as gastroesophageal reflux, effective prevention depends on a medical approach to the systemic condition, as recurrent acid exposure compromises any isolated local measure (11,37). Advice to avoid immediate brushing after episodes of vomiting or acid ingestion is also fundamental to prevent erosion, in order to prevent interaction between temporarily softened enamel and subsequent mechanical abrasion (3,16). As an additional preventive measure, topical fluoride application can help increase tooth surface resistance to acid dissolution (18,38).

Treatment

Treatment of attrition is indicated when there is functional compromise, reduction of vertical dimension, extensive dentin exposure, or structural risk (10,28,31). The restorative approach should prioritize conservative and additive techniques, preserving the remaining tooth structure as much as possible, in accordance with contemporary principles of tooth wear management (13,41). In moderate cases, direct composite resin restorations can be used to re-establish occlusal anatomy and protect exposed dentin (37,40). Cases of severe wear may require a more comprehensive occlusal rehabilitation, involving indirect restorations, ceramic veneers, or crowns (37,39,42). For patients with associated bruxism, interocclusal protection with a stabilization splint is fundamental for preserving restorative longevity, reducing functional overload and the risk of fractures or secondary wear of restorations (10,12).

Elimination of mechanical trauma constitutes the first step in the treatment of cervical abrasion, including advice on changing the brushing technique, reduction of applied force, and control of toothpaste abrasiveness (13,22,28). If hypersensitivity persists after stabilization of the mechanical agent, topical desensitizing agents capable of promoting tubular obliteration or neural modulation are indicated (39). Potassium nitrate-based compounds predominantly act by modulating neural excitability, while agents that induce intratubular mineral precipitation, such as high-concentration fluoride agents and calcium-phosphate-containing systems, contribute to reducing dentin permeability (18,19,25,38). When there is significant cervical structural loss, food retention, or failure of desensitizing therapy, adhesive restoration is indicated for definitive sealing of exposed dentin (39,40).

Lesion sealing or restoration is related to abfraction treatment, with the control of non-axial occlusal overload being essential due to the participation of cervical stress concentration in the progression of these lesions (5,14,15). Repetitive cervical flexion resulting from bruxism or occlusal

interferences requires functional stabilization to increase restorative longevity (20,21,39). Associated hypersensitivity can initially be managed with tubular desensitizing agents (18,19,25); however, in lesions with structural progression or persistent symptoms, adhesive restoration constitutes a more predictable approach, acting as a physical barrier against external stimuli and contributing to the mechanical protection of the cervical region (15,39,40).

The treatment of erosion should prioritize the stabilization of acid challenge through dietary modification, control of the frequency of intake of acidic substances, and, when necessary, an interdisciplinary approach in cases of gastroesophageal reflux or eating disorders (3,11,13,29). Hypersensitivity resulting from superficial demineralization can be treated with professional application of fluoridated varnishes or remineralizing agents that promote mineral deposition and reduction of tubular permeability (18,37,38). Restorations should only be indicated after stabilization of the oral environment, especially in cases with significant morphological loss, as interventions under active acid challenge have shorter clinical longevity (1,4,37).

Thus, the treatment of NCDLs should integrate specific etiological control, management of dentin hypersensitivity, and, when indicated, conservative restorative intervention associated with functional protection (12,13,43,44).

DISCUSSION

NCDLs have a high prevalence and cumulative nature, with relevant clinical impact already in young individuals (7-9,23,24). The analyzed studies show a prevalence ranging from 31% to 62%, with significant dentin involvement in a substantial portion of cases, reinforcing that tooth wear should not be interpreted solely as a physiological phenomenon of aging, but as a pathological condition associated with continuous exposure to risk factors (3,29). However, the variation observed between studies may be attributed to the heterogeneity of diagnostic criteria and evaluation methods employed (12,31,32).

Regarding the etiopathogenesis, there is consensus on the multifactorial nature of NCDLs (3,4,13); however, there are still divergences on the predominant role of the factors involved. Grippo *et al.* (5) and Nascimento *et al.* (15) attributed a central role to cervical stresses resulting from non-axial occlusal forces, supporting the abfraction model as a relevant mechanism. In contrast, Lussi and Carvalho (3) and West and Joiner (18) noted erosion as the determining initial factor, by promoting enamel demineralization and increasing its susceptibility to subsequent mechanical action. In addition, studies with multifactorial analysis indicated that the progression of wear results from the dynamic interaction between chemical, mechanical, and behavioral factors (6,16), with no support for isolated etiological models. This divergence reinforces that the contemporary understanding of NCDLs should be based on an integrative model.

This inconsistency is also reflected in the classification of lesions. Although the classification into attrition, abrasion, abfraction, and erosion remains widely used due to its didactic value (1,2,13), recent studies have indicated that these mechanisms frequently overlap in clinical practice (3,6,16). Thus, the classification should be interpreted as an auxiliary tool, not representing independent etiological processes, making an integrated analysis essential.

Different diagnostic methods have been proposed for standardizing the assessment of tooth wear. The TWI represents one of the first structured models; however, it presents limitations as to sensitivity and reproducibility (33). The BEWE is widely used due to its simplicity and clinical applicability, especially in screenings (34). The TWES 2.0, in turn, presents a more comprehensive approach, providing a detailed assessment of the extent, severity, and progression of the lesions (12,31). Despite these advances, there is no consensus on the ideal system, as simplified methods may underestimate initial alterations, while more complex systems have lower clinical applicability. In this context, digital methods, such as intraoral scanning with three-dimensional analysis (36), have shown greater accuracy in detecting and monitoring wear, although they still have limitations regarding cost and availability.

Dentin hypersensitivity is one of the main clinical repercussions of NCDLs, being frequently associated with cervical dentin exposure and gingival recession (19,25,26). Studies have shown that its clinical prevalence may be higher than patient self-reports, suggesting underdiagnosis of this condition (25). These findings indicate that NCDLs should be understood not only as structural alterations, but as conditions with relevant functional impact.

Regarding clinical management, there is a consensus that controlling etiological factors is

determinant for therapeutic success in NCDLs (4,40,41). Restorative interventions without elimination or modification of causal agents present a higher risk of failure and recurrence of lesions, especially in cases associated with persistent occlusal overload (20,21). Although some studies suggest earlier restorative interventions in specific cases (37,39), the contemporary literature favors minimally invasive approaches, with an emphasis on prevention, habit modification, and longitudinal monitoring (38,41,43,44).

As a limitation, we note the heterogeneity of diagnostic criteria and evaluation methods used in the included studies, which hinders direct comparison between results (12,32). Furthermore, the scarcity of longitudinal studies limits the understanding of lesion progression over time (16,36), indicating the need for future research with more standardized designs. Therefore, the findings of this narrative literature review indicate that NCDLs should be understood as a multifactorial, dynamic, and cumulative condition. Clinical management should be based on individualized identification of risk factors, early diagnosis, and continuous monitoring, combined with integration of preventive and therapeutic strategies.

CONCLUSION

NCDLs refer to a cumulative process of structural loss of hard dental tissues with early onset and progressive evolution, when mechanical and/or chemical factors remain active. Dentists should prioritize early diagnosis, stabilization of the cause, and longitudinal monitoring, focusing on structural preservation, prevention of premature oral aging, and avoidance of more complex treatments.

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