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OBLITERATING-ACTION TOOTHPASTES IN THE TREATMENT OF PATIENTS WITH DENTIN HYPERSENSITIVITY FOLLOWING PERIODONTAL TREATMENT

CREMES DENTAIS DE AÇÃO OBLITERADORA NO TRATAMENTO DE PACIENTES COM HIPERSENSIBILIDADE DENTINÁRIA APÓS TRATAMENTO PERIODONTAL

CREMAS DENTALES CON ACCIÓN OBLITERADORA EN EL TRATAMIENTO DE PACIENTES CON HIPERSENSIBILIDAD DENTINARIA POSTERIOR AL TRATAMIENTO PERIODONTAL

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ABSTRACT

Dentin hypersensitivity is a common clinical condition characterized by acute, transient pain resulting from exposed dentin in response to thermal, tactile, evaporative, osmotic, or chemical stimuli, negatively affecting patients' quality of life. Given the wide availability of desensitizing toothpastes, it is essential to evaluate the scientific evidence regarding their effectiveness. The aim of this study was to analyze, through a literature review, the scientific evidence on occluding toothpastes for the treatment of dentin hypersensitivity. Scientific articles published in indexed databases were selected, focusing on the main mechanisms of action and the clinical efficacy of different desensitizing agents. The studies demonstrated that active ingredients such as fluorides, arginine, nano-hydroxyapatite, casein phosphopeptide-amorphous calcium phosphate (CPP-ACP), and bioactive glasses significantly reduce dentin hypersensitivity, primarily through dentinal tubule occlusion and, in some technologies, by inducing biomineralization processes. However, methodological heterogeneity among the studies limits direct comparisons and prevents the identification of a universally superior agent. It can be concluded that the currently available scientific evidence supports the use of occluding toothpastes as a conservative, effective, and clinically relevant therapeutic strategy for the management of dentin hypersensitivity, highlighting the importance of individualized treatment selection and evidence-based decision-making.

KEYWORDS: Dentin hypersensitivity. Dentifrices. Dentin Desensitizing Agents.

RESUMO

A hipersensibilidade dentinária é uma condição clínica frequente, caracterizada por dor aguda e transitória decorrente da exposição da dentina frente a estímulos térmicos, táteis, evaporativos, osmóticos ou químicos, impactando a qualidade de vida dos pacientes. Diante da ampla disponibilidade de dentifrícios dessensibilizantes, torna-se necessária a análise das evidências científicas relacionadas à sua efetividade. O objetivo deste estudo foi analisar, por meio de revisão da literatura, as evidências científicas sobre os cremes dentais de ação obliteradora no tratamento da hipersensibilidade dentinária. Foram selecionados artigos científicos publicados em bases de dados indexadas, abordando os principais mecanismos de ação e a eficácia clínica dos diferentes agentes dessensibilizantes. Os estudos demonstraram que princípios ativos como fluoretos, arginina, nano-hidroxiapatita, fosfopeptídeo de caseína-fosfato de cálcio amorfo (CPP-ACP) e biovidros bioativos promovem redução significativa da hipersensibilidade dentinária, principalmente por meio da oclusão dos túbulos dentinários e, em algumas tecnologias, pela indução de processos de biomineralização. Entretanto, a heterogeneidade metodológica entre os estudos limita comparações diretas e impede a identificação de um agente universalmente superior. Conclui-se que as evidências científicas atualmente disponíveis

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sustentam a utilização dos cremes dentais de ação obliteradora como uma estratégia terapêutica conservadora, eficaz e clinicamente relevante para o manejo da hipersensibilidade dentinária, ressaltando a importância da seleção individualizada do tratamento e da tomada de decisão baseada em evidências.
***PALAVRAS-CHAVE**: Sensibilidade da dentina. Dentifrícios. Dessensibilizantes Dentinários.*

RESUMEN
La hipersensibilidad dentinaria es una afección clínica frecuente caracterizada por dolor agudo y transitorio resultante de la exposición de la dentina a estímulos térmicos, táctiles, evaporativos, osmóticos químicos, lo que afecta la calidad de vida de los pacientes. Dada la amplia disponibilidad de pastas dentales desensibilizantes, es necesario un análisis de la evidencia científica relacionada con su eficacia. El objetivo de este estudio fue analizar, mediante una revisión bibliográfica, la evidencia científica sobre las pastas dentales obliterantes en el tratamiento de la hipersensibilidad dentinaria. Se seleccionaron artículos científicos publicados en bases de datos indexadas, que abordaban los principales mecanismos de acción y la eficacia clínica de diferentes agentes desensibilizantes. Los estudios han demostrado que ingredientes activos como fluoruros, arginina, nanohidroxiapatita, fosfopéptido de caseína-fosfato de calcio amorfo (CPP-ACP) y biovidrios bioactivos reducen significativamente la hipersensibilidad dentinaria, principalmente a través de la oclusión de los túbulos dentinarios y, en algunas tecnologías, mediante la inducción de procesos de biomineralización. Sin embargo, la heterogeneidad metodológica entre los estudios limitan las comparaciones directas e impide la identificación de un agente universalmente superior. Se concluye que la evidencia científica disponible actualmente respalda el uso de pastas dentales obliterantes como una estrategia terapéutica conservadora, eficaz y clínicamente relevante para el tratamiento de la hipersensibilidad dentinaria, destacando la importancia de la selección de un tratamiento individualizado y la toma de decisiones basada en la evidencia.
***PALABRAS-CLAVE**: Sensibilidad de la Dentina. Dentífricos. Desensibilizantes Dentinarios.*

1- INTRODUCTION

Dentin hypersensitivity (DH) is a common clinical condition with considerable relevance, particularly among patients who have undergone periodontal treatment. Scaling and root planning (SRP) are considered the gold standard for the treatment of periodontal diseases. However, despite satisfactory clinical outcomes, dentin hypersensitivity may develop as a post-treatment complication (DE OLIVEIRA et al., 2020). According to the literature, the prevalence of this condition varies in population but tends to increase significantly following nonsurgical periodontal therapy, particularly after scaling and root planning. This increase is associated with the greater dentin exposure resulting from the loss of protective gingival tissue, pre-existing gingival recession, and the removal of mineralized biofilm that frequently covers root surfaces (DE OLIVEIRA et al., 2020). Such conditions may affect not only patients' oral health but also their dental esthetics and self-esteem, as they may occur in both anterior and posterior regions.

According to the 2018 Classification of Periodontal and Peri-Implant Diseases and Conditions, periodontal health can be achieved in patients with a history of periodontal disease, whether on an intact or a reduced periodontium. Nevertheless, dentin hypersensitivity may persist as a sequela of the disease itself or of the treatment performed (DE OLIVEIRA et al., 2020). These patients should be assessed individually, and several therapeutic approaches can provide satisfactory outcomes.

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In selected cases, periodontal plastic and esthetic surgery represents a viable treatment option. These procedures aim to provide greater comfort and protection to exposed dental structures while improving patients' self-esteem and restoring smile harmony. However, even after successful surgery, some patients may experience residual dentin hypersensitivity. Furthermore, these surgical procedures may be contraindicated because not all patients present suitable clinical conditions for their performance. Due these clinical scenarios, increasing attention has been directed toward the development of effective protocols for controlling dentin hypersensitivity. Among the available approaches, desensitizing agents are well-established therapeutic options, with clinical evidence supporting their effectiveness in relieving pain associated with this condition. Products and technologies with dentinal tubule-occluding properties have recently gained prominence, particularly because of their ability to occlude exposed dentinal tubules, a mechanism directly related to Brännström's hydrodynamic theory. According to Brännström's theory, dentin hypersensitivity results from fluid movement within the dentinal tubules, which transmits stimuli to the dental pulp and elicits a painful response. This mechanism occurs when dentin becomes exposed and its tubules remain patent (BRÄNNSTRÖM; ASTRÖM, 1972; LIU et al., 2020). Desensitizing agents incorporated into gels and toothpastes have demonstrated favorable clinical outcomes, reinforcing their role as relevant therapeutic alternatives for managing dentin hypersensitivity, particularly in periodontally treated patients, who are at greater risk of developing this complication.

Therefore, this literature review aims to evaluate, based on the available scientific evidence, the effectiveness of dentifrices with dentinal tubule-occluding properties in the treatment of dentin hypersensitivity in patients who have undergone surgical or nonsurgical periodontal therapy. This review analyzes recent studies investigating the gels and dentifrices most commonly used in the current management of dentin hypersensitivity through dentinal tubule occlusion, with particular emphasis on technologies supported by robust scientific evidence.

2- METODOLOGY

This study was conducted as a narrative review of the literature. The literature search was performed in the PubMed database using the search terms "toothpaste" AND "dentin hypersensitivity." Articles published between 2021 and 2026 were considered, including clinical trials, randomized controlled clinical trials, meta-analyses, narrative reviews, and systematic reviews, according to their relevance to the research topic. The search strategy identified 37 articles, of which 18 were selected for inclusion in this review following title and abstract screening.

3- LITERATURE REVIEW

DH is characterized by brief, sharp, and well-localized pain arising from exposed dentin in response to tactile, thermal, chemical, osmotic, or evaporative stimuli. It is considered a multifactorial condition and cannot be attributed to any other dental disease or defect, such as dental caries, pulpal inflammation, or tooth fractures (BAHŞI et al., 2012). SRP is considered the gold standard for

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nonsurgical periodontal treatment. The American Dental Association (ADA) recommends SRP as the first-line therapy for patients with periodontitis because of its moderate clinical benefit and favorable safety profile regarding adverse effects (SMILEY et al., 2015; CATON et al., 2018). Nevertheless, DH is one of the most frequently reported adverse effects of this treatment. The primary objective of SRP is the mechanical removal of supra- and subgingival biofilm and calculus adhering to root surfaces. The removal of these deposits may result in dentin exposure due to the loss of protective gingival tissue, pre-existing gingival recession, and the removal of mineralized biofilm (DRAENERT et al., 2013; SPLIETH; TACHOU, 2013). DH develops when dentin, typically in the cervical region, and the dentinal tubules become exposed, a condition commonly associated with gingival recession and loss of dental enamel (DEMIRCI et al., 2022). According to the 2018 Classification of Periodontal and Peri-Implant Diseases and Conditions, periodontal health may be achieved in patients with a history of periodontal disease, either on an intact or a reduced periodontium. However, DH may persist as a sequela of the periodontal disease itself or of the treatment performed (CATON et al., 2018).

Currently, the most widely accepted theory explaining this phenomenon is Brännström's hydrodynamic theory (BRÄNNSTRÖM, 1963), which proposes that pain results from fluid movement within exposed dentinal tubules and may be triggered by thermal, tactile, osmotic, or evaporative stimuli (ASKAR et al., 2019). The mechanical displacement of this fluid activates nerve endings located at both the dentin–pulp interface and within the dental pulp, eliciting acute and reversible pain. Factors such as noncarious cervical lesions, including abrasion and erosion, loss of dental enamel, and gingival recession may contribute to dentinal tubule exposure (AMINOSHARIAE; KULILD, 2021). According to the 2018 Classification of Periodontal and Peri-Implant Diseases and Conditions, periodontal health can be achieved in individuals with a history of periodontitis, both in cases involving an intact periodontium and in those involving a reduced periodontium (CATON et al., 2018). Clinical periodontal health on an intact periodontium is characterized by the absence of attachment loss, probing depths of up to 3 mm, bleeding on probing at fewer than 10% of sites, and no radiographic evidence of bone loss.

Clinical gingival health on a reduced periodontium encompasses two situations. The first involves a patient with successfully treated and stable periodontitis, characterized by attachment loss, probing depths of up to 4 mm, no sites with probing depths of 4 mm or greater presenting bleeding on probing, bleeding on probing at fewer than 10% of sites, and radiographic bone loss. The second involves a patient without periodontitis, characterized by attachment loss, probing depths of up to 3 mm, bleeding on probing at fewer than 10% of sites, and possible radiographic bone loss—for example, in cases of gingival recession or clinical crown lengthening (STEFFENS; MARCANTONIO, 2018). Although the progression of gingival recession does not appear to compromise tooth survival, it may, over the long term, be associated with esthetic concerns, DH, and other dental conditions of concern to both patients and clinicians (BERGLUNDH; GIANNOBILE; LANG, 2022). Several other conditions may cause symptoms resembling dentin-related pain. Therefore, patients must be carefully evaluated to exclude other potential sources of pain before an appropriate treatment strategy for DH is established. The characteristically brief and sharp pain may also be associated with carious lesions, chipped teeth, fractured restorations, marginal leakage, certain restorative materials, cracked tooth syndrome, and

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palatogingival grooves. These conditions require specific therapeutic approaches that generally differ substantially from those used to manage DH (DEMIRCI et al., 2022).

Gingival recessions resulting from the progression of periodontal disease or occurring as a consequence of scaling and root planning should be managed using different approaches according to their clinical indications. In selected cases, periodontal plastic and esthetic surgery represents a viable treatment option. These procedures aim to provide greater comfort and protection to exposed dental structures while restoring patients' self-esteem and smile harmony. Periodontal plastic surgery is defined as a group of surgical procedures performed to correct or eliminate anatomical, developmental, or traumatic deformities of the gingiva or alveolar mucosa (STEFFENS; MARCANTONIO, 2018). This concept initially included only surgical procedures within the scope of mucogingival therapy. For this reason, the 1996 World Workshop in Clinical Periodontics replaced the term "mucogingival surgery" with "periodontal plastic surgery," a term originally introduced by Miller in 1993. Its scope was expanded to include periodontal–prosthetic corrections, clinical crown lengthening, ridge augmentation, esthetic surgical corrections, root coverage procedures, papillary reconstruction, peri-implant soft tissue corrections, and surgical exposure of unerupted teeth for orthodontic treatment (ADDY, 2002).

The 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions adopted a classification system for gingival recessions (JEPSEN et al., 2018) based on the extent of buccal or lingual gingival recession relative to interproximal clinical attachment loss (CAIRO et al., 2011): Recession Type 1 (RT1): gingival recession without interproximal attachment loss. The interproximal cementoenamel junction (CEJ) is not clinically detectable on either the mesial or distal surface of the tooth; Recession Type 2 (RT2): gingival recession associated with interproximal attachment loss. The amount of interproximal attachment loss, measured from the interproximal CEJ to the apical extent of the interproximal sulcus or pocket, is less than or equal to the buccal attachment loss, measured from the buccal CEJ to the apical extent of the buccal sulcus or pocket; Recession Type 3 (RT3): gingival recession associated with interproximal attachment loss. The amount of interproximal attachment loss, measured from the interproximal CEJ to the apical extent of the sulcus or pocket, is greater than the buccal attachment loss, measured from the buccal CEJ to the apical extent of the buccal sulcus or pocket (STEFFENS; MARCANTONIO, 2018).

Another factor to consider is whether the recession is accompanied by a cervical step, as this determines whether restorative treatment is required before the surgical procedure. The root condition should also be assessed, including the presence or absence of concavities on the root surface. According to this classification, Class + indicates the presence of a cervical step greater than 0.5 mm, whereas Class − indicates the absence of a cervical step greater than 0.5 mm. Therefore, every recession type - RT1, RT2, or RT3 - should be followed by the corresponding cervical-step designation (+ or −) (SPLIETH; TACHOU, 2013). Although most patients experience a significant reduction in dentin hypersensitivity following root coverage, this outcome is not achieved in every case. Systematic reviews and meta-analyses have shown that root coverage surgery reduces the frequency and intensity of DH in approximately 67% of cases, with relative risks of 0.33 for unstimulated hypersensitivity and 0.47 for stimulated hypersensitivity. Nevertheless, the procedure does not completely eliminate symptoms in all

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patients (BERGLUNDH; GIANNOBILE; LANG, 2022). The literature also indicates that the reduction in DH is associated with the extent of root coverage achieved. However, even after complete root coverage, some patients report residual hypersensitivity, which may be associated with individual factors, anatomical variations, or the patient's biological response (BERGLUNDH et al., 2022; ANTEZACK et al., 2022). Another relevant consideration is that DH is a relatively common postoperative complication of periodontal surgery. It has been reported in up to 5.7% of cases in large retrospective series, although most cases are mild and do not interfere with the surgical outcome (DOUGLAS DE OLIVEIRA et al., 2013). Therefore, although periodontal root coverage surgery provides favorable results in reducing DH, residual and persistent cases have been reported and should be considered when treatment is planned and patients are selected and counseled for the procedure (ANTEZACK et al., 2022; DOUGLAS DE OLIVEIRA et al., 2013).

Accordingly, patients who undergo surgical procedures and continue to experience some degree of residual or persistent hypersensitivity should receive individualized treatment. Therapeutic options described in the literature include restorative materials, laser therapy, topical desensitizing agents, and, in selected cases, surgical reassessment. Restorative materials such as composite resins and glass-ionomer cements are clinically indicated because of their biocompatibility and ability to occlude exposed dentinal tubules. Recent studies have also demonstrated considerable effectiveness for laser therapy. However, no standardized treatment protocol has yet been established for either low-power lasers (LPLs) or high-power lasers (HPLs). Both modalities appear capable of providing significant improvements in DH under most of the proposed protocols. Nevertheless, because of the number and heterogeneity of the available LPL and HPL protocols, it is not currently possible to determine the most effective long-term treatment strategy (MENDES et al., 2021; CHEN et al., 2025).

Topical desensitizing agents with neural and dentinal tubule-occluding mechanisms of action have also demonstrated effectiveness, although a wide variety of products is commercially available. These agents act through different mechanisms and have varying clinical indications. Neural-acting agents reduce the sensitivity of nerve endings within the dentinal tubules by preventing nerve depolarization. Most products with a neural mechanism of action contain 5% potassium nitrate. However, their effects develop gradually, requiring continued use for several days or even weeks before the expected clinical outcome is achieved.

Tubule-occluding agents act by sealing open dentinal tubules, thereby reducing or preventing intratubular fluid movement (BRÄNNSTRÖM, 1963) and consequently alleviating DH. Numerous commercially available products contain active ingredients such as sodium fluoride, stannous fluoride, arginine, hydroxyapatite, casein phosphopeptide-amorphous calcium phosphate (CPP-ACP), bioactive glasses, phosphosilicates, oxalates, and nanoparticles. These agents promote the formation of crystals or mineral precipitates on the dentin surface and within the dentinal tubules. By limiting intratubular fluid movement, they consequently inhibit the transmission of painful stimuli to the dental pulp. These active ingredients are incorporated into both at-home products, particularly desensitizing toothpastes, and professionally applied products, including fluoride varnishes, dentin sealants, and bioactive materials developed to promote dentinal tubule occlusion (LIU et al., 2020).

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Dentinal Tubule-Occluding Desensitizing Agents

The clinical management of dentin hypersensitivity (DH) has become increasingly challenging because it depends on the accurate identification and control of etiological factors, as well as the effective management of painful symptoms. DH remains a common condition in clinical practice. In addition to the factors traditionally associated with dentin exposure, it has been linked to emerging factors such as erosive dietary habits, lifestyle, the excessive use of highly abrasive dentifrices, bruxism, and mental health and sleep disorders (SCARAMUCCI et al., 2014). In this context, desensitizing agents with either neural or dentinal tubule-occluding mechanisms of action have been widely used as therapeutic strategies to control pain and improve patients' quality of life.

The development of new desensitizing toothpaste formulations has enabled the incorporation of different active ingredients with distinct mechanisms of action and specific therapeutic purposes (MARTINS et al., 2022). These products may be incorporated into both professional and at-home treatment protocols. Toothpastes are particularly advantageous because of their accessibility, relatively low cost, conservative nature, and ease of use. Moreover, they do not require a prescription or direct clinical intervention, making them one of the first-line approaches for the treatment of DH (MARTO et al., 2019). In this context, advances in desensitizing toothpaste formulations reflect the pursuit not only of faster and longer-lasting relief from DH but also of technologies capable of producing more stable dentinal tubule occlusion that is resistant to the chemical and mechanical challenges of the oral environment (MARTINS et al., 2022; POLLARD et al., 2023). Furthermore, more recent formulations have incorporated bioactive and biomimetic technologies designed not only to occlude dentinal tubules but also to promote dentin remineralization and biomineralization, thereby enhancing the durability of the desensitizing effect (FREITAS et al., 2021; MARTINS et al., 2022).

Although they share the same therapeutic objective of reducing dentin permeability through dentinal tubule occlusion, tubule-occluding desensitizing agents differ in terms of their active ingredients, the mechanisms involved in mineral barrier formation, and the level of scientific evidence supporting their clinical efficacy (FREITAS et al., 2021; POLLARD et al., 2023). The principal agents incorporated into desensitizing toothpastes include fluorides, arginine, casein phosphopeptide–amorphous calcium phosphate (CPP-ACP), bioactive calcium sodium phosphosilicate (NovaMin®), hydroxyapatite, and nano-hydroxyapatite. In addition to differences in their mechanisms of action, these agents vary in the onset of clinical response, stability of dentinal tubule occlusion, remineralization potential, and robustness of the available evidence. These factors should be considered when selecting the most appropriate therapy for each patient and will be discussed in the following sections (FREITAS et al., 2021; MARTINS et al., 2022; POLLARD et al., 2023).

Fluorides

Fluorides represent one of the most traditional and widely used strategies for the treatment of dentin hypersensitivity and are incorporated into various desensitizing toothpaste formulations. In addition to their well-established role in preventing dental caries, these compounds can reduce dentin

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permeability by promoting the formation of mineral precipitates on the exposed dentin surface and within the dentinal tubules. This process occludes the tubules and reduces intratubular fluid movement, consistent with Brännström's hydrodynamic theory (MARTINS et al., 2022; FREITAS et al., 2021). The most commonly used compounds include sodium fluoride (NaF) and stannous fluoride (SnF_2). Their mechanisms of action differ in terms of the composition and properties of the precipitates formed, their resistance to erosive and abrasive challenges, and, consequently, the durability of their desensitizing effects (MARTINS et al., 2022; LIU et al., 2024; POLLARD et al., 2023).

Sodium fluoride was one of the first agents incorporated into desensitizing toothpastes because of its ability to promote the precipitation of calcium- and fluoride-rich compounds on the dentin surface, thereby reducing dentinal tubule permeability. However, evidence indicates that this precipitated layer has limited stability when exposed to the chemical and mechanical challenges of the oral environment, making continuous product use necessary to maintain its clinical effect (MARTINS et al., 2022; FREITAS et al., 2021). Conversely, formulations containing stabilized stannous fluoride have demonstrated a greater ability to form more resistant mineral deposits, promoting longer-lasting dentinal tubule occlusion and a significant reduction in dentin hypersensitivity across different clinical protocols (LIU et al., 2024; MOSQUIM et al., 2025; QIU et al., 2026).

Recent clinical trials further support the effectiveness of stannous fluoride-based toothpastes, according to both patient-reported outcomes and examiner-based clinical assessments. Liu et al. (2024) observed a significant reduction in hypersensitivity following the use of stabilized stannous fluoride formulations, whereas Qiu et al. (2026) demonstrated consistent improvements in both clinical outcomes and patient-reported symptoms. However, recent systematic reviews have emphasized that the clinical performance of fluorides may vary according to product formulation, active ingredient concentration, and study design. Therefore, no consensus has been reached regarding the superiority of these agents across all clinical situations (POLLARD et al., 2023). Furthermore, Martins et al. (2022) highlighted that advances in desensitizing toothpastes have increasingly focused on the development of bioactive technologies that combine dentinal tubule occlusion with remineralization processes, seeking to improve the stability and durability of the desensitizing effect.

Although fluorides remain among the most extensively studied and widely used agents for managing dentin hypersensitivity, their limitations—particularly those concerning the stability of dentinal tubule occlusion—have encouraged the development of bioactive biomaterials with remineralizing potential and greater resistance to the chemical and mechanical challenges of the oral environment. These materials will be discussed in the following sections (MARTINS et al., 2022; FREITAS et al., 2021; POLLARD et al., 2023).

Hydroxyapatite and Nano-Hydroxyapatite

Hydroxyapatite and nano-hydroxyapatite represent some of the most promising bioactive approaches for the treatment of dentin hypersensitivity because their chemical composition resembles that of the principal mineral component of dental tissues. This biomimetic characteristic facilitates the interaction between the material and the exposed dentin surface, promoting the deposition of crystals

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capable of reducing dentin permeability through dentinal tubule occlusion. Compared with conventional hydroxyapatite, nano-hydroxyapatite consists of smaller particles, providing a larger contact area with the tooth surface and facilitating penetration into the dentinal tubules, which may enhance its desensitizing and remineralizing effects (FREITAS et al., 2021; CHEN et al., 2026).

Recent clinical studies have demonstrated that toothpastes containing nano-hydroxyapatite significantly reduce dentin hypersensitivity, with symptom improvement observed within the first weeks of use and sustained effects throughout clinical follow-up. These findings have been attributed to the ability of nano-hydroxyapatite to form a mineral layer on the dentin surface and promote dentinal tubule occlusion, thereby reducing intratubular fluid movement and, consequently, the transmission of painful stimuli. Furthermore, because its composition resembles that of dental mineral, this biomaterial combines a desensitizing effect with remineralizing potential. This feature distinguishes it from technologies whose mechanisms are limited to the formation of superficial precipitates (CHEN et al., 2026; JOSIC et al., 2024).

Despite these promising findings, literature reviews have highlighted considerable heterogeneity among commercial formulations, particle sizes, concentrations, and clinical protocols. These factors hinder direct comparisons among studies and make it difficult to establish the superiority of this technology over other desensitizing agents. Nevertheless, comparative analyses suggest that nano-hydroxyapatite may provide outcomes comparable or superior to those of traditionally used technologies, reinforcing its potential as an alternative for the treatment of dentin hypersensitivity (POLLARD et al., 2023; FREITAS et al., 2021).

Within the periodontal context, nano-hydroxyapatite may be particularly beneficial for patients with exposed root surfaces following nonsurgical periodontal therapy or resulting from gingival recession because its mechanism of action combines dentinal tubule occlusion with remineralizing potential. Although the available clinical findings are favorable, longitudinal studies conducted specifically in periodontal patients are still required to establish evidence-based clinical protocols and confirm the long-term effectiveness of the observed outcomes.

Bioactive Glasses

The development of bioactive glasses represented an important therapeutic advancement in the treatment of dentin hypersensitivity because these materials combine dentinal tubule occlusion with remineralizing potential. Unlike conventional desensitizing agents, bioactive glasses promote the controlled release of calcium, sodium, phosphate, and, in some formulations, fluoride ions, facilitating the formation of a hydroxyapatite-like mineral layer on the exposed dentin surface. This process reduces dentin permeability and contributes to the formation of a more stable mineralized layer that is biologically integrated with the dental structure. This characteristic has attracted increasing interest because of its potential to provide greater resistance to the chemical and mechanical challenges of the oral environment (FREITAS et al., 2021; SANTOS et al., 2025).

Among the most extensively studied bioactive materials is calcium sodium phosphosilicate (NovaMin®), whose efficacy has been widely investigated in laboratory studies, systematic reviews, and

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clinical trials. Its mechanism of action is based on ion exchange between the bioactive glass particles and the oral environment. This interaction promotes the release of calcium and phosphate ions, increases the local pH, and leads to the formation of a calcium phosphate-rich layer that subsequently develops into a hydroxyapatite-like structure, thereby promoting dentinal tubule occlusion and reducing painful symptoms (FREITAS et al., 2021; SANTOS et al., 2025).

Clinical studies published in recent years have reported promising findings for this technology. Compared with conventional fluoride-containing toothpastes, formulations containing bioactive calcium sodium phosphosilicate have produced significant reductions in DH in both immediate assessments and during clinical follow-up. In addition to symptom improvement, some studies have observed a rapid onset of action and maintenance of the desensitizing effect over time, suggesting that the mineral deposition promoted by bioactive glasses may provide more stable dentinal tubule occlusion than certain conventional fluoride-based formulations (BHOWMIK et al., 2021; HASTURK et al., 2026; CREETH et al., 2026).

Nevertheless, these findings should be interpreted with caution. Systematic reviews have highlighted considerable heterogeneity among the available commercial formulations, active ingredient concentrations, application protocols, and methods used to assess dentin hypersensitivity. These factors hinder direct comparisons among studies and preclude consistent conclusions regarding the clinical superiority of different desensitizing agents (POLLARD et al., 2023; FREITAS et al., 2021). Thus, although the overall body of evidence indicates that bioactive glasses represent a promising alternative for the treatment of dentin hypersensitivity, their clinical use should be considered in light of the characteristics of each formulation and the methodological quality of the available evidence.

Within the periodontal context, this technology is particularly relevant for patients with root exposure resulting from gingival recession or nonsurgical periodontal therapy. By simultaneously promoting dentinal tubule occlusion and the formation of stable mineral deposits, these materials may provide a conservative approach to pain control, improving patient comfort and contributing to greater adherence to periodontal treatment (FREITAS et al., 2021; HASTURK et al., 2026). However, despite the promising findings currently available, randomized clinical trials with long-term follow-up—particularly those involving periodontal populations—are still needed to confirm the clinical effectiveness of these biomaterials and establish evidence-based therapeutic protocols.

Casein Phosphopeptide–Amorphous Calcium Phosphate (CPP-ACP)

CPP-ACP represents an important bioactive strategy for the treatment of dentin hypersensitivity. Its mechanism of action is based on the ability of casein phosphopeptides to stabilize calcium and phosphate ions in an amorphous form, maintaining their bioavailability on the tooth surface and increasing the local concentration of these minerals. This process stimulates apatite precipitation on exposed dentin, promotes dentinal tubule occlusion, reduces dentin permeability, and simultaneously contributes to the remineralization of dental tissues. This characteristic distinguishes CPP-ACP from desensitizing agents whose effects are predominantly limited to dentinal tubule occlusion (FREITAS et al., 2021; MARTINS et al., 2022).

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In addition to its biomineralizing mechanism, recent clinical evidence supports the effectiveness of CPP-ACP in controlling dentin hypersensitivity. In a randomized clinical trial involving 164 patients, Ayan et al. (2025) observed that all evaluated desensitizing agents significantly reduced hypersensitivity after eight weeks of follow-up. However, the CPP-ACP group demonstrated the greatest reduction in symptoms compared with the other experimental groups and achieved the most favorable outcomes according to the Dentine Hypersensitivity Experience Questionnaire-15 (DHEQ-15), Visual Analog Scale (VAS), and Schiff Sensitivity Scale (SSS).

These findings support the clinical potential of CPP-ACP as an at-home treatment option for dentin hypersensitivity, particularly because it combines desensitizing and remineralizing effects. The findings reported by Ayan et al. (2025) also corroborate those of previous clinical studies in which CPP-ACP-containing formulations outperformed potassium nitrate and propolis and, in certain assessments, NovaMin®. These results further support the consistency of the clinical benefits provided by this biomaterial across different treatment protocols.

Despite these promising findings, systematic reviews have highlighted heterogeneity among the available commercial formulations, active ingredient concentrations, application protocols, and methods used to assess dentin hypersensitivity. This heterogeneity makes direct comparisons among desensitizing agents difficult (POLLARD et al., 2023). In addition to these methodological limitations, CPP-ACP has an important clinical restriction. Because it is derived from casein, its use is not recommended in patients with an allergy to milk proteins. Importantly, this restriction applies exclusively to individuals with a milk protein allergy and does not constitute a contraindication for patients with lactose intolerance, as the latter results from lactase enzyme deficiency rather than an adverse response to milk proteins (CARR, 2024).

Martins et al. (2022) further emphasized that the remineralizing potential of CPP-ACP represents an important biological advantage. Nevertheless, the currently available evidence does not support its consistent clinical superiority over all other bioactive materials evaluated in the literature. Therefore, CPP-ACP represents a promising therapeutic option for managing dentin hypersensitivity because it combines dentinal tubule occlusion with enhanced remineralization. However, randomized clinical trials with longer follow-up periods and standardized methodologies are still required to establish its clinical effectiveness and enable more robust comparisons with other desensitizing technologies (FREITAS et al., 2021; MARTINS et al., 2022; POLLARD et al., 2023; AYAN et al., 2025).

Arginine

Arginine is one of the principal technologies incorporated into desensitizing toothpastes and is particularly notable for its mechanism of action based on the physical occlusion of dentinal tubules. Generally combined with calcium carbonate, this technology promotes the formation of a calcium- and arginine-rich complex that is deposited on the dentin surface and within exposed dentinal tubules. At physiological pH, arginine—a positively charged amino acid—has a high affinity for the dentin surface, promoting mineral adhesion and reducing dentin permeability through a mechanism consistent with Brännström's hydrodynamic theory (FREITAS et al., 2021; MARTINS et al., 2022).

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In addition to its biological rationale, clinical studies have demonstrated that arginine-containing formulations can significantly reduce dentin hypersensitivity. In the randomized clinical trial conducted by Ayan et al. (2025), all evaluated desensitizing agents, including arginine-based toothpastes, produced significant improvements in sensitivity after eight weeks of use. The authors observed reductions in pain scores assessed using the Visual Analog Scale (VAS), Schiff Sensitivity Scale (SSS), and Dentine Hypersensitivity Experience Questionnaire-15 (DHEQ-15), demonstrating that arginine represents an effective at-home option for the clinical management of dentin hypersensitivity.

Nevertheless, although arginine has demonstrated consistent clinical efficacy, its performance should be assessed in comparison with other available technologies. In the study by Ayan et al. (2025), the CPP-ACP group exhibited a greater reduction in hypersensitivity at the end of the follow-up period. Thus, under the evaluated conditions, arginine provided a clinical benefit, although its effect was less pronounced than that observed with CPP-ACP. Similarly, the systematic review and network meta-analysis conducted by Pollard et al. (2023) demonstrated that different desensitizing agents provide clinical benefits. However, the authors emphasized that heterogeneity in product formulations, active ingredient concentrations, application protocols, and assessment methods prevents the establishment of a definitive hierarchy among the available technologies.

From a clinical perspective, arginine offers the advantage of rapidly forming mineral deposits capable of reducing dentin permeability and providing symptom relief with continued toothpaste use. However, as with other desensitizing agents that act predominantly through dentinal tubule occlusion, the stability of these deposits may be affected by the erosive and abrasive challenges of the oral environment. Continued treatment is therefore important for maintaining clinical outcomes (FREITAS et al., 2021; MARTINS et al., 2022).

Accordingly, arginine represents a well-established therapeutic option for controlling dentin hypersensitivity, particularly in formulations intended for daily use. Nevertheless, current evidence indicates that its clinical effectiveness should be interpreted according to the characteristics of each formulation and the patient's clinical profile. Its consistent superiority over other available bioactive technologies has not been established. Further clinical trials with longer follow-up periods and standardized methodologies may help define its relative position among the various desensitizing agents more precisely (POLLARD et al., 2023; AYAN et al., 2025).

4- DISCUSSION

Based on the evidence presented in this literature review, dentin hypersensitivity remains a common clinical challenge in dental practice, particularly among patients with root exposure resulting from gingival recession or nonsurgical periodontal therapy. In this context, desensitizing toothpastes represent a conservative, accessible, and widely used therapeutic approach whose efficacy is supported by different mechanisms of action and a growing body of clinical evidence. A comprehensive analysis of the literature demonstrates that, although several technologies effectively reduce pain, differences in

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their mechanisms of action, commercial formulations, and study designs hinder the establishment of a definitive hierarchy among the available technologies.

Overall, the evaluated agents can be classified into two main therapeutic strategies. The first comprises materials that act predominantly by occluding the dentinal tubules, such as fluorides and arginine combined with calcium carbonate, thereby reducing dentinal fluid movement in accordance with the hydrodynamic theory. The second includes bioactive materials, such as nano-hydroxyapatite, bioactive glasses, and casein phosphopeptide–amorphous calcium phosphate (CPP-ACP). In addition to promoting dentinal tubule occlusion, these biomaterials can stimulate biomineralization through the deposition of hydroxyapatite-like compounds, facilitating the formation of a mineral interface that may remain more stable over time (FREITAS et al., 2021; MARTINS et al., 2022).

The clinical studies included in this review demonstrated consistent findings regarding the ability of different agents to produce significant reductions in dentin hypersensitivity. In the randomized clinical trial conducted by Ayan et al. (2025), all evaluated technologies produced significant clinical improvements after eight weeks of follow-up, as demonstrated by reductions in VAS, Schiff, and DHEQ-15 scores. Although CPP-ACP achieved the most favorable outcomes in this study, the authors observed clinical benefits in all evaluated groups, indicating that different therapeutic strategies may be effective when appropriately used. However, it is important to emphasize that the superior performance of CPP-ACP was observed under the specific conditions of this clinical trial and should not, in isolation, be interpreted as definitive evidence of clinical superiority over other technologies. Similarly, studies investigating fluorides, bioactive glasses, and nano-hydroxyapatite have also reported favorable outcomes, further demonstrating that multiple technologies have potential for the clinical management of dentin hypersensitivity.

Despite these promising findings, direct comparisons among the different agents should be interpreted with caution. The systematic review and network meta-analysis conducted by Pollard et al. (2023) highlighted substantial heterogeneity among the available studies regarding active ingredient concentrations, commercial formulations, application protocols, methods used to elicit painful stimuli, scales used to measure sensitivity, and follow-up periods. This heterogeneity limits comparisons among studies, reduces the robustness of indirect comparisons among technologies, and hinders the identification of a universally superior agent. These findings indicate that the observed efficacy may be influenced by both formulation characteristics and the methodological design adopted.

From a clinical perspective, the findings of this review reinforce the need to individualize the selection of desensitizing toothpaste by considering not only its active ingredient but also the etiology of dentin hypersensitivity, the patient's clinical characteristics, and the quality of evidence available for each technology. The different agents analyzed demonstrated the potential to reduce dentin hypersensitivity and therefore represent viable therapeutic options for patients with exposed dentin, including cases associated with periodontal disease and nonsurgical periodontal therapy. Accordingly, individualized therapeutic decision-making remains one of the principal factors determining treatment success.

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Finally, although the available scientific literature demonstrates significant advances in the development of increasingly bioactive desensitizing agents, clinical studies with longer follow-up periods, standardized methodologies, and direct comparisons among different technologies are still required to strengthen the available evidence. Future investigations should clarify not only the immediate efficacy of these materials but also the durability of dentinal tubule occlusion, resistance to erosive and abrasive challenges in the oral environment, and clinical performance of these technologies in specific populations, including periodontal patients. Therefore, although different technologies demonstrate clinical efficacy in managing dentin hypersensitivity, a critical interpretation of the available evidence indicates that treatment selection should be based on the quality of the scientific evidence, the individual characteristics of the patient, and the clinical context in which treatment will be provided.

5- CONCLUSIONS

Based on the literature analyzed, dentinal tubule-occluding toothpastes represent an effective therapeutic option for managing dentin hypersensitivity. These products significantly reduce painful symptoms by occluding the dentinal tubules and, in the case of certain technologies, by additionally promoting biomineralization. The different active ingredients evaluated—including fluorides, nano-hydroxyapatite, bioactive glasses, casein phosphopeptide–amorphous calcium phosphate (CPP-ACP), and arginine—demonstrated favorable clinical outcomes, indicating that different therapeutic strategies can be successfully used to control dentin hypersensitivity. Although some agents have demonstrated superior performance in specific studies, the methodological heterogeneity among clinical trials and systematic reviews continues to limit direct comparisons among technologies and precludes the identification of a universally superior agent. Therefore, the selection of a desensitizing toothpaste should consider not only its active ingredient but also the etiology of dentin hypersensitivity, the patient's clinical characteristics, and the quality of the available scientific evidence.

Clinical studies employing standardized methodologies, longer follow-up periods, and direct comparisons among different technologies are still needed to strengthen the available evidence and expand current knowledge regarding the effectiveness and durability of the various desensitizing agents. The development of bioactive materials and formulations capable of combining immediate pain control with long-lasting biomineralization represents a promising direction for advancing the treatment of dentin hypersensitivity. In conclusion, the currently available scientific evidence supports the use of dentinal tubule-occluding toothpastes as a conservative, effective, and clinically relevant therapeutic strategy for the treatment of dentin hypersensitivity. These findings reinforce the importance of evidence-based decision-making and individualized treatment planning, particularly for patients who have undergone scaling and root planning (SRP) or surgical periodontal therapy.

REFERENCES

ADDY, M. Dentine hypersensitivity: new perspectives on an old problem. International Dental Journal, v. 52, supl. 5, p. 367–375, 2002. doi: https://doi.org/10.1002/j.1875-595X.2002.tb00936.x

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AMINOSHARIAE, A.; KULILD, J. C. Current concepts of dentinal hypersensitivity. Journal of Endodontics, v. 47, n. 11, p. 1696–1702, 2021. doi: https://doi.org/10.1016/j.joen.2021.07.011

ANTEZACK, A.; OHANESSIAN, R.; SADOWSKI, C.; FAURE-BRAC, M.; BRINCAT, A.; ETCHECOPAR-ETCHART, D.; MONNET-CORTI, V. Effectiveness of surgical root coverage on dentin hypersensitivity: a systematic review and meta-analysis. Journal of Clinical Periodontology, v. 49, n. 8, p. 840–851, 2022. doi: https://doi.org/10.1111/jcpe.13664

ASKAR, H.; DI GIANFILIPPO, R.; RAVIDA, A.; TATTAN, M.; MAJZOUB, J.; WANG, H. L. Incidence and severity of postoperative complications following oral, periodontal, and implant surgeries: a retrospective study. Journal of Periodontology, v. 90, n. 11, p. 1270–1278, 2019. doi: https://doi.org/10.1002/jper.18-0658

AYAN, G.; MISILLI, T.; BULDUR, M. Home-use agents in the treatment of dentin hypersensitivity: clinical effectiveness evaluation with different measurement methods. Clinical Oral Investigations, v. 29, n. 1, p. 63, 2025. doi: https://doi.org/10.1007/s00784-025-06155-1

BAHŞI, E.; DALLI, M.; UZGUR, R.; TURKAL, M.; HAMIDI, M. M.; COLAK, H. An analysis of the aetiology, prevalence and clinical features of dentine hypersensitivity in a general dental population. European Review for Medical and Pharmacological Sciences, v. 16, n. 8, p. 1107–1116, 2012. http://www.europeanreview.org/wp/wp-content/uploads/1444.pdf

BERGLUNDH, T.; GIANNOBILE, W. V.; LANG, N. P. Capítulo 39. In: LINDHE, J.; BERGLUNDH, T.; GIANNOBILE, W. V.; LANG, N. P. (ed.). Tratado de periodontia clínica e implantologia oral. 6. ed. Rio de Janeiro: Elsevier, 2022. p. 967.

BHOWMIK, E.; PAWAR CHANDRASHEKHAR, D.; SHARMA HAREESHA, M. Comparative evaluation of fluorinol and calcium sodium phosphosilicate-containing toothpastes in the treatment of dentin hypersensitivity. International Journal of Dental Hygiene, v. 19, n. 4, p. 421–428, 2022. DOI: 10.1111/idh.12495. doi: https://doi.org/10.1111/idh.12495

BRÄNNSTRÖM, M. A hydrodynamic mechanism in the transmission of pain-producing stimuli through the dentine. In: ANDERSON, D. J. (ed.). Sensory Mechanisms in Dentine. Oxford: Pergamon Press, 1963. p. 73–79.

BRÄNNSTRÖM, M.; ASTRÖM, A. The hydrodynamics of the dentine; its possible relationship to dentinal pain. International Dental Journal, v. 22, n. 2, p. 219–227, 1972.

CAIRO, F.; NIERI, M.; CINCINELLI, S.; MERVELT, J.; PAGLIARO, U. The interproximal clinical attachment level to classify gingival recessions and predict root coverage outcomes: an explorative and reliability study. Journal of Clinical Periodontology, v. 38, n. 7, p. 661–666, 2011. doi: https://doi.org/10.1111/j.1600-051x.2011.01732.x

CARR, S. Milk products in dentifrices. British Dental Journal, Londres, v. 237, p. 584, 2024. doi: https://doi.org/10.1038/s41415-024-8019-y

CATON, J. G.; ARMITAGE, G.; BERGLUNDH, T.; et al. A new classification scheme for periodontal and peri-implant diseases and conditions – introduction and key changes from the 1999 classification. Journal of Periodontology, v. 89, supl. 1, p. S1–S8, 2018. doi: https://doi.org/10.1002/jper.18-0157

CHEN, J.; CUI, L.; YE, Z.; TANG, D.; BAO, X.; LI, Q. The comparison of lasers and topical desensitizing agents in the management of dentin hypersensitivity: a systematic review and meta-analysis. Clinical Oral Investigations, v. 29, n. 5, art. 264, 2025. doi: https://doi.org/10.1007/s00784-025-06329-x

CREETH, J.; GOYAL, C. R.; QIU, J.; LAMPTEY, M.; SANCHEZ, E.; QAQISH, J.; PEREIRA, P. G. Time-course of clinical efficacy of a 5% calcium-sodium phosphosilicate toothpaste on dentine hypersensitivity. Journal of Dentistry, v. 171, e106710, 2026. doi: https://doi.org/10.1016/j.jdent.2026.106710

DE OLIVEIRA R. P.; ALENCAR C. M.; SILVA F. A.; MAGNO M. B.; MAIA L. C.; SILVA C. M. Effect of desensitizing agents on dentin hypersensitivity after non-surgical periodontal therapy: A systematic review and meta-analysis. J Dent. 2020 Dec; 103:103498. doi: https://doi.org/10.1016/j.jdent.2020.103498

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DEMIRCI, M.; KARABAY, F.; BERKMAN, M.; ÖZCAN, İ.; TUNCER, S.; TEKÇE, N.; BAYDEMIR, C. The prevalence, clinical features, and related factors of dentin hypersensitivity in the Turkish population. Clinical Oral Investigations, v. 26, n. 3, p. 2719–2732, 2022. doi: https://doi.org/10.1007/s00784-021-04245-4

DOUGLAS DE OLIVEIRA, D. W.; MARQUES, D. P.; AGUIAR-CANTUÁRIA, I. C.; FLECHA, O. D.; GONÇALVES, P. F. Effect of surgical defect coverage on cervical dentin hypersensitivity and quality of life. Journal of Periodontology, v. 84, n. 6, p. 768–775, 2013. doi: https://doi.org/10.1902/jop.2012.120479

DRAENERT, M. E.; JAKOB, M.; KUNZELMANN, K. H.; HICKEL, R. The prevalence of tooth hypersensitivity following periodontal therapy with special reference to root scaling: a systematic review of the literature. American Journal of Dentistry, v. 26, n. 1, p. 21–27, 2013.

FREITAS, S. A. A.; OLIVEIRA, N. M. A.; DE GEUS, J. L.; SOUZA, S. F. C.; PEREIRA, A. F. V.; BAUER, J. Bioactive toothpastes in dentin hypersensitivity treatment: a systematic review. Saudi Dental Journal, v. 33, n. 7, p. 395-403, 2021. doi: https://doi.org/10.1016/j.sdentj.2021.04.004

HASTURK, H.; BOYD, D.; MACDONALD-PARSONS, K.; TURNER-CAHILL, S.; SEONG, J.; WEST, N.; DOUCETTE, H. J. Comparative efficacy of novel bioactive glass versus sodium fluoride toothpaste for dentin hypersensitivity: a randomized clinical trial. Journal of Periodontology, v. 97, n. 5, p. 929–944, 2026. doi: https://doi.org/10.1002/jper.70024

JEPSEN, S.; CATON, J. G.; ALBANDAR, J. M.; et al. Periodontal manifestations of systemic diseases and developmental and acquired conditions: consensus report of Workgroup 3 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. Journal of Periodontology, v. 89, supl. 1, p. S237–S248, 2018. doi: https://doi.org/10.1002/jper.17-0733

JOSIC, U.; MARAVIC, T.; MAZZITELLI, C.; RINALDI, L.; D'ALESSANDRO, C.; D'URSO, D.; PELLEGRINO, G.; MAZZONI, A.; BRESCHI, L. The clinical and microbiological efficacy of a zinc-citrate/hydroxyapatite/potassium-citrate containing toothpaste: a double-blind randomized controlled clinical trial. Clinical Oral Investigations, v. 28, n. 12, p. 652, 2024. doi: https://doi.org/10.1007/s00784-024-06052-z

LIU X. X.; TENENBAUM H.C.; WILDER R. S.; QUOCK R.; HEWLETT E. R.; REN Y. F. Pathogenesis, diagnosis and management of dentin hypersensitivity: an evidence-based overview for dental practitioners. BMC Oral Health. 2020; 20:220. doi: https://doi.org/10.1186/s12903-020-01199-z

MARTINS, C. C.; RIVA, J. J.; FIRMINO, R. T.; SCHÜNEMANN, H. J. Formulations of desensitizing toothpastes for dentin hypersensitivity: a scoping review. Journal of Applied Oral Science, v. 30, e20210410, 2022. doi: https://doi.org/10.1590/1678-7757-2021-0410

MARTO, C. M.; BAPTISTA PAULA, A.; NUNES, T.; PIMENTA, M.; ABRANTES, A. M.; PIRES, A. S.; LARANJO, M.; COELHO, A.; DONATO, H.; BOTELHO, M. F.; MARQUES FERREIRA, M.; CARRILHO, E. Evaluation of the efficacy of dentin hypersensitivity treatments: a systematic review and follow-up analysis. Journal of Oral Rehabilitation, v. 46, n. 10, p. 952–990, 2019. doi: https://doi.org/10.1111/joor.12842

MENDES, S. T. C.; PEREIRA, C. S.; OLIVEIRA, J. L.; SANTOS, V. C.; GONÇALVES, B. B.; MENDES, D. C. Treatment of dentin hypersensitivity with laser: systematic review. Brazilian Journal of Pain, v. 4, n. 2, p. 152–160, 2021. doi: https://doi.org/10.5935/2595-0118.20210025

POLLARD, A. J.; KHAN, I.; DAVIES, M.; CLAYDON, N.; WEST, N. X. Comparative efficacy of self-administered dentifrices for the management of dentine hypersensitivity: a systematic review and network meta-analysis. Journal of Dentistry, v. 130, p. 104433, 2023. doi: https://doi.org/10.1016/j.jdent.2023.104433

SANTOS, J. V. do N.; MORAES, P. W. S. de; PEREIRA, M. N.; LEITE, J. V. C.; MAGALHÃES, G. A. P.; CAPEHART, K.; ANDRADE, A. K. M. de; LIMA, R. B. W. E. Bioactive glass products for the treatment of dentin hypersensitivity: a scoping review. Clinical Oral Investigations, v. 29, n. 10, p. 464, 2025. doi: https://doi.org/10.1007/s00784-025-06516-w

SCARAMUCCI, T.; ANFE, T. E. de A.; FERREIRA, S. da S.; FRIAS, A. C.; SOBRAL, M. A. Investigation of the prevalence, clinical features, and risk factors of dentin hypersensitivity in a selected Brazilian

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population. Clinical Oral Investigations, v. 18, n. 2, p. 651–657, 2014. doi: https://doi.org/10.1007/s00784-013-1008-1

SMILEY, C. J.; TRACY, S. L.; ABT, E.; MICHALOWICZ, B. S.; JOHN, M. T.; GUNSOLLEY, J.; COBB, C. M.; ROSSMANN, J.; HARREL, S. K.; FORREST, J. L.; HUJOEL, P. P.; NORAIAN, K. W.; GREENWELL, H.; FRANTSVE-HAWLEY, J.; ESTRICH, C.; HANSON, N. Evidence-based clinical practice guideline on the nonsurgical treatment of chronic periodontitis by means of scaling and root planing with or without adjuncts. Journal of the American Dental Association, v. 146, n. 7, p. 525–535, 2015. doi: https://doi.org/10.1016/j.adaj.2015.01.026

SPLIETH, C. H.; TACHOU, A. Epidemiology of dentin hypersensitivity. Clinical Oral Investigations, v. 17, Suppl. 1, p. S3–S8, 2013. doi: https://doi.org/10.1007/s00784-012-0889-8

STEFFENS, J. P.; MARCANTONIO, R. A. C. Classificação das Doenças e Condições Periodontais e

Peri-implantares 2018: guia Prático e Pontos-Chave. Revista de Odontologia da UNESP, v. 47, n. 4, p. 189–197, 2018. doi: https://doi.org/10.1590/1807-2577.04704

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