ISSN Print: 2394-7489
ISSN Online: 2394-7497
Impact Factor (RJIF): 7.85
IJADS 2025; 11(4): 531-533

www.oraljournal.com
Received: 11-08-2025
Accepted: 13-09-2025

Alejandra Chávez García
Prosthodontics Department, Universidad Autónoma de Nuevo León, Monterrey, Mexico

Patricia García Palencia
Prosthodontics Department, Universidad Autónoma de Nuevo León, Monterrey, Mexico

Corresponding Author:
Alejandra Chávez García
Prosthodontics Department, Universidad Autónoma de Nuevo León, Monterrey, Mexico

Treatment approaches for molar-incisor hypomineralization

Alejandra Chávez García and Patricia García Palencia

DOI: https://www.doi.org/10.22271/oral.2025.v11.i4e.2293

Abstract
Introduction: Molar-incisor hypomineralization (MIH) is an enamel disorder that affects a significant number of children and represents a clinical challenge due to its variability in severity, functional implications, esthetic compromise, and the need for specialized treatments.
Objective: To analyze the multifactorial etiology of MIH, its clinical manifestations and differential diagnosis, as well as current therapeutic approaches for anterior and posterior teeth, with the aim of promoting timely identification and adequate clinical management. Methodology: A literature search was conducted in PubMed, SCOPUS, and Google Scholar using keywords such as "molar incisor hypomineralization," "enamel hypomineralization," "treatment," "pediatric dentistry," and "fluoride therapy," prioritizing articles published between 2022 and 2024.
Results: Evidence indicates that MIH has a multifactorial origin involving genetic, environmental, and systemic factors that disrupt enamel maturation. Clinically, well-defined opacities, porosity, and post-eruptive breakdown are observed, increasing susceptibility to caries and complicating the differential diagnosis. For anterior teeth, minimally invasive techniques such as resin infiltration, microabrasion, and esthetic restorations have shown favorable outcomes. For molars, treatment depends on severity and includes composite resin, glass ionomers, prefabricated metal crowns, and, in severe cases, planned extractions. Digital technologies provide more precise restorative alternatives.
Discussion: The wide clinical variability of MIH and the absence of uniform diagnostic criteria hinder the development of standardized therapeutic protocols, and current evidence on long-term treatment durability remains limited.
Conclusion: Management of MIH must be individualized, considering the degree of structural involvement and the patient's esthetic and functional needs. Diagnostic standardization and longitudinal studies are essential to optimize clinical decision-making.

Keywords: Molar-incisor hypomineralization, dental enamel, pediatric dentistry, differential diagnosis, minimally invasive treatments, dental restoration

1. Introduction

Molar-incisor hypomineralization (MIH) is a developmental enamel defect affecting a substantial percentage of the pediatric population, posing a significant challenge in pediatric dentistry. Its impact is not only clinical but also economic, given the specialized care required to improve patients' quality of life (Inchingolo *et al*., 2023) [9].

General background

MIH manifests as enamel defects in permanent first molars and, in some cases, incisors. Environmental, genetic, and systemic factors have been identified as possible contributors, although its exact etiology remains unclear (Richards A., *et al*., 1986).

Specific background

Recent studies report prevalence rates ranging from 2.4% to 40%, depending on geographic region and diagnostic criteria (Inchingolo *et al*., 2020). This variability complicates the implementation of universal prevention and treatment strategies.

Particular background

Treatment of MIH has evolved over time, from fluoride varnishes to resin restorations and

low-level laser therapy to reduce dental hypersensitivity (Jiménez ADP *et al*., 2023).

Justification

Addressing MIH is essential due to its high prevalence and its impact on oral health and quality of life. Reviewing the literature allows identification of the most effective strategies for diagnosis and treatment, supporting informed clinical decisions.

Objective

To analyze the multifactorial etiology of MIH, its clinical manifestations and differential diagnosis, as well as current treatment approaches for affected anterior and posterior teeth, to establish a comprehensive understanding that contributes to improved clinical identification and management.

2. Methodology

A literature search was conducted in databases such as PubMed, SCOPUS, and Google Scholar using English keywords including "molar incisor hypomineralization," "enamel hypomineralization," "treatment," "pediatric dentistry," and "fluoride therapy." Articles published between 2022 and 2024 were selected, prioritizing systematic reviews and controlled clinical studies.

3. Results

3.1 Multifactorial Etiology of MIH

MIH is an enamel defect resulting from a combination of genetic, epigenetic, and environmental influences. It occurs during enamel formation—particularly the maturation stage—when ameloblasts may fail to function properly. Genes such as ENAM and AMELX have been implicated, while childhood illnesses, birth complications, and toxin exposure may also contribute. The prolonged process of enamel formation makes it vulnerable to disturbances over many years (Butera A., *et al*., 2022) [2].

3.2 Clinical Manifestations and Differential Diagnosis

Clinically, MIH is observed as altered translucency of the enamel, with or without discoloration, ranging from yellow to dark brown, often with well-defined borders. Surface porosity increases susceptibility to fractures, leading to "post-eruptive enamel breakdown," potentially exposing dentin and greatly increasing caries risk. In incisors, MIH frequently affects the incisal third, producing significant esthetic concerns (Wall A., *et al*., 2020) [15].

Differential diagnosis is essential, as MIH resembles other enamel defects. Amelogenesis imperfecta affects the entire dentition and is genetic in origin, whereas MIH is localized. Enamel hypoplasia presents more regular borders and reduced enamel quantity. White-spot carious lesions appear in plaque-retentive areas, where MIH rarely develops. Dental fluorosis results from excess fluoride exposure and exhibits poorly defined lesions, unlike the sharply demarcated borders characteristic of MIH. Clinical examination and thorough patient history are essential (Goel N., *et al*., 2021) [6].

3.3 Treatment Approaches for Anterior Teeth

Management of anterior teeth affected by MIH is important not only clinically but also psychologically, as esthetic defects can significantly impact children. Given the delicacy of developing tooth structures, minimally invasive strategies are preferred. These include microabrasion (effective for superficial white opacities), resin infiltration (improves esthetics for a range of opacity severities), and etch-bleach-seal procedures (for yellow or brown lesions). Other options include external bleaching, composite restorations, composite veneers, and porcelain veneers for patients over 18 years. No single protocol applies universally due to clinical variability, often requiring personalized combination therapies (Butera A., *et al*., 2022) [2].

3.4 Treatment Approaches for Posterior Teeth

Treatment of MIH-affected molars depends on severity. In mild cases, prevention is prioritized; in moderate or severe cases, atraumatic restorative techniques, composite resin, indirect restorations, or preformed metal crowns may be required. Treatment selection must consider patient cooperation and enamel characteristics. In severe cases, planned extractions may be indicated. Digital restorative technologies such as CAD/CAM offer precise and minimally invasive solutions (Aboumusallam H.S., *et al*., 2023).

4. Discussion

Findings from this review indicate that MIH is a complex condition with a multifactorial origin that continues to obscure the identification of a single etiologic mechanism. The interplay of genetic, epigenetic, environmental, and systemic factors suggests that ameloblast dysfunction during enamel maturation likely results from multiple simultaneous events. This complexity corresponds with the wide clinical variability reported in the literature and reinforces the need for more uniform and sensitive diagnostic criteria.

Clinical manifestations described in the literature highlight significant structural compromise, including opacities, porosity, and post-eruptive enamel breakdown, all of which increase caries susceptibility and hinder adhesion of restorative materials. These alterations not only affect masticatory function but also have psychological consequences, especially when anterior esthetics are involved. Precise and early diagnosis is therefore essential both for differentiation from other enamel defects and for guiding therapeutic decision-making.

Treatment approaches are varied, reflecting the absence of standardized protocols and the need for individualized care. Minimally invasive techniques for anterior teeth have shown promising esthetic and patient-acceptance outcomes; however, long-term evidence remains limited. Severely affected molars are prone to restoration failure due to compromised enamel structure, making prefabricated metal crowns and indirect restorations effective alternatives. Integration of digital workflows such as CAD/CAM enhances precision and durability, though their use in pediatric dentistry still requires standardization.

Pain and hypersensitivity management emerges as a critical factor, influencing both patient cooperation and treatment success. MIH should therefore be considered not only a structural condition but also one affecting the child's emotional experience. Parent education, prevention, and early intervention are essential components of comprehensive management.

Despite advances, large variations in methodologies, severity criteria, and sample selection limit comparability across studies, underscoring the need for well-designed longitudinal research to evaluate treatment efficacy, disease progression, and associated risk factors. Evidence-based clinical guidelines would support decision-making and facilitate standardized care across different dental settings.

Overall, MIH remains a significant challenge in pediatric

dentistry. A multidisciplinary, preventive, and patient-centered approach is essential to improve prognosis, function, and quality of life for affected children.

5. Conclusion

Molar-incisor hypomineralization represents a clinical challenge due to its multifactorial origin and wide range of manifestations. Accurate diagnosis is essential to distinguish it from other enamel defects and to establish an appropriate treatment plan. Therapeutic approaches must be individualized according to severity and patient-specific needs. Minimally invasive techniques are favored for anterior teeth, while molars may require indirect restorations or crowns. In severe cases, planned extractions are a valid option. Despite the availability of multiple techniques, further research is needed to standardize protocols and improve long-term outcomes.

References

1. Almuallem Z, Busuttil-Naudi A. Molar incisor hypomineralisation (MIH)—An overview. Br Dent J. 2020;225(7):601-609.
2. Butera A, Pascadopoli M, Pellegrini M, Trapani B, Gallo S, Radu M, *et al*. Biomimetic hydroxyapatite paste for molar-incisor hypomineralization: A randomized clinical trial. Oral Dis. 2022. DOI:10.1111/odi.14124.
3. Dipalma G, Inchingolo AD, Inchingolo F, Charitos IA, Di Cosola M, Cazzolla AP. Focus on the cariogenic process: microbial and biochemical interactions with teeth and oral environment. J Biol Regul Homeost Agents. 2021;35(6 Suppl 1):55-60.
4. Durmus B, Sezer B, Tugcu N, Caliskan C, Bekiroglu N, Kargul B. Two-year survival of high-viscosity glass ionomer in children with molar incisor hypomineralization. Med Princ Pract. 2021;29:501-507.
5. Enax J, Amaechi BT, Farah R, Liu JA, Schulze zur Wiesche E, Meyer F. Remineralization strategies for teeth with molar incisor hypomineralization (MIH): A literature review. Dent J (Basel). 2023;11(3):80.
6. Goel N, Jha S, Bhol S, Dash BP, Sarangal H, Namdev R. Molar incisor hypomineralization: Clinical characteristics with special emphasis on etiological criteria. J Pharm Bioallied Sci. 2021;13(Suppl 2):S651.
7. Ilczuk-Rypuła D, Zalewska M, Pietraszewska D, Dybek A, Nitecka-Buchta A, Postek-Stefańska L. Prevalence and possible etiological factors of molar-incisor hypomineralization (MIH) in a population of Silesian children in Poland: A pilot retrospective cohort study. Int J Environ Res Public Health. 2022;19(14):8697.
8. Kaminski VdL, Michita RT, Ellwanger JH, Veit TD, Schuch JB, dos Riesgo RS, *et al*. Exploring potential impacts of pregnancy-related maternal immune activation and extracellular vesicles on immune alterations observed in autism spectrum disorder. Heliyon. 2023;9(8):e15593.
9. Inchingolo AM, Malcangi G, Ferrante L, Del Vecchio G, Viapiano F, Mancini A, *et al*. Damage from carbonated soft drinks on enamel: A systematic review. Nutrients. 2023;15(1):174.
10. Lagarde M, Vennat E, Attal JP, Dursun E. Strategies to optimize bonding of adhesive materials to molar-incisor hypomineralization-affected enamel: A systematic review. Int J Paediatr Dent. 2020;30:405-420.
11. Lygidakis N, Garot E, Somani C, Taylor G, Rouas P, Wong F. Best clinical practice guidance for clinicians dealing with children presenting with molar-incisor-hypomineralisation (MIH): An updated European Academy of Paediatric Dentistry policy document. Eur Arch Paediatr Dent. 2021;23:3-21.
12. Minetti E, Palermo A, Inchingolo AD, Patano A, Viapiano F, Ciocia AM, *et al*. Autologous tooth for bone regeneration: Dimensional examination of Tooth Transformer® granules. Eur Rev Med Pharmacol Sci. 2023;27(15):5421-5430.
13. Oh N, Nam S, Lee J, Kim H. Retrospective study on the survival rate of preformed metal crowns in permanent first molars. J Korean Acad Pediatr Dent. 2020;47:140-147.
14. Singh SK, Goyal A, Gauba K, Bhandari S, Kaur S. Full coverage crowns for rehabilitation of MIH affected molars: 24-month randomized clinical trial. Eur Arch Paediatr Dent. 2022;23(3):389-397.
15. Wall A, Leith R. Contemporary management options for molar incisor hypomineralisation. J Ir Dent Assoc. 2020;66:36-43.

How to Cite This Article
García AC, Palencia PG. Treatment approaches for molar-incisor hypomineralization. International Journal of Applied Dental Sciences. 2025;11(4):531-533.