# Molar-incisor hypomineralization in pediatric dentistry: A literature review

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**ABSTRACT**
Hypomineralization is a failure in tooth enamel due to interference with the calcification process. One of the manifestations of this anomaly is Incisor Molar Hypomineralization (MIH), which mainly affects molars and, occasionally, permanent incisors. In this review of HMI in pediatric dentistry, we explore everything from diagnosis to treatment options. The etiology of HMI is idiopathic and multifactorial, often confused with other dental conditions due to similar clinical features. Difficulty in establishing an accurate diagnosis can hinder the treatment plan. Challenges such as hypersensitivity, fear and anxiety of the child, as well as adherence to restorative materials, are faced in the clinical practice of the dental surgeon. Difficulty brushing and the presence of pain in children with HMI negatively impact quality of life. Treatment is complex, adapted to the severity of the affected teeth, ranging from preventive measures to restorative procedures and extractions. The study of HMI is crucial for pediatric dentists, allowing for accurate diagnoses and appropriate treatments, contributing to improving the quality of life of affected patients.

**Keywords:** Pediatric dentistry, Hypomineralization, Molar, Incisor.

## 1 INTRODUCTION

Hypomineralization is a qualitative failure in tooth enamel resulting from interferences during the process of calcification or maturation of the tooth. Molar Incisor Hypomineralization (MIH) is an anomaly that mainly affects the first permanent molars, and can also affect the permanent incisors (FRASCINO *et al*., 2017; DHAREULA *et al*., 2018). Clinically, IMH presents with abnormal translucency and opacity in tooth enamel, and may exhibit superficial or deep cavities, vertical or horizontal grooves, and partial or total absence of tooth enamel (MANTON *et al*., 2020; SILVA-JUNIOR *et al*., 2016).

Hypomineralized enamel is susceptible to fractures soon after its eruption, especially under the influence of chewing force, leaving the dentin unprotected and making the tooth prone to the development of caries lesions. The affected tooth may be highly sensitive to temperature changes due to chronic pulp inflammation associated with greater innervation of the area, which hinders analgesia and, consequently, child management (FARAH *et al*., 2010; ELHENNAWY *et al*., 2017).

Recently, HMI has been recognized as a global oral health condition and has gained significant prominence in clinical practice. Its epidemiological profile serves as a reference for the definition of oral health promotion strategies. It is worth mentioning that, depending on its degree of incidence, HMI has a direct impact on children's overall health and quality of life (GHANIM *et al*., 2017). In addition, it presents several challenges for dentists, further highlighting the need for in-depth study (SANTOS-PINTO *et al*., 2020).

Thus, the purpose of this analysis is to review the literature related to HMI, in order to provide data to pediatric dentists, addressing aspects of the diagnosis, clinical characteristics and treatment options of this condition.

## 2 SUBJECTS AND METHODS

This study consists of a review of the literature, focusing on the clinical and therapeutic aspects of HMI. For data collection, a bibliographic search was carried out covering scientific articles in the LILACS, Pubmed and SCIELO (Scientific Electronic Library Online) databases. The keywords "Molar Incisor Hypomineralization" and "Pediatric Dentistry" were used.

## 3 LITERATURE REVIEW

HMI is a defect in the quality of tooth enamel that occurs during the maturation phase of the tooth. It has an idiopathic origin and can manifest in one or even four molars and permanent incisors. The etiology of IMH has not been conclusively determined, and may be related to antibiotic use, childhood ENT diseases, and dioxin exposure (WILLMOTT *et al.,* 2008; PADAVALA & SUKUMARAN, 2018).

In addition, it is relevant to note that HMI also has a genetic influence (PADAVALA & SUKUMARAN, 2018). Regarding clinical characteristics, this condition is revealed by chromatic or structural alterations, such as white, brown, cream or yellow coloration, abnormal translucency and porous aspect. These changes are associated with enamel loss and tooth thickness, making the molar more prone to fractures, which can cause pain and sensitivity (ALLAZZAM *et al*., 2014; BANDEIRA LOPES *et al*., 2021).

These characteristics have a significant impact on patients' quality of life, potentially generating low self-esteem, bullying episodes, as well as chewing and speech difficulties (DANTAS-NETA *et al*., 2016; GHANIM *et al*., 2017). The differential diagnosis of HMI encompasses conditions such as enamel hypoplasia, dental fluorosis, amelogenesis imperfecta, and dental caries. Due to their similarity to several of these conditions, early diagnosis and implementation of appropriate interventions can present challenges (WILLMOTT *et* al., 2008; ALZAHRANI *et al*., 2023).

The approach to HMI requires a personalized treatment, as there is no specific protocol established. Treatment options can follow different pathways, including prevention, rehabilitation, and, in some cases, tooth extraction (ELHENNAWY & SCHWENDICKE, 2016; SUNDFELD *et al*., 2020). To prevent caries and sensitivity, it is recommended to use toothpastes with a minimum concentration of 1000 ppm/F (BRÎNZĂ *et al*., 2020). In mild IMH lesions without caries, the use of resinous or ionomeric sealants may be considered. However, it is crucial to point out that hypomineralized teeth present adhesion challenges to sealants and restorations, due to chemical, physical, and morphological modifications that result in mineral loss (DHAREULA *et al*., 2018).

Tooth sensitivity is a common condition in individuals with HMI. To reduce this sensitivity, the literature suggests a variety of products, such as fluoride varnishes, PRG Barrier Coat®, arginine and calcium carbonate-based toothpastes, and CPP-ACP. In addition, the use of anti-inflammatory drugs has also been considered to reduce hypersensitivity and pain (TAILOR *et al*., 2017; AL-OTHAIBI *et al*., 2018).

The implementation of treatments for hypersensitivity is crucial, as it can affect the efficacy of anesthetic agents and patient compliance (DHAREULA *et al*., 2018). In addition to approaches to dealing with sensitivity, therapies using lasers and light-emitting diodes are also options. However, the results of these therapies are not yet conclusive (FRASCINO *et al*., 2017). Individuals with HMI often experience hypersensitivity to cold and heat, which can influence oral hygiene due to the pain generated, making them more susceptible to caries disease (Padavala & Sukumaran, 2018; Santos-Pinto *et al*., 2020).

As far as rehabilitation procedures are concerned, restorative treatment may involve the use of composite resin or CIV. Other options include microabrasion and teeth whitening for intact anterior teeth with aesthetic impairment (WILLMOTT *et al*., 2008; SUNDFELD *et* al., 2020). For molars with compromised cusps, inlay, onlay, or overlay may be indicated. Veneers on permanent incisors are alternatives that provide greater aesthetics (TAILOR *et* al., 2017). In cases of pulp involvement, endodontic treatment can be performed. However, if treatment is unsuccessful, tooth extraction followed by orthodontic rehabilitation may be considered (Willmott *et al*., 2008).

It is relevant to note that the anxiety and fear manifested by children with HMI can have a negative impact on treatment, resulting in behavioral aversions. Therefore, establishing a bond of trust between the professional and the patient, in addition to the application of behavioral management techniques, are essential for the success of the treatment (SANTOS-PINTO et al., 2020; MAFLA *et al*., 2023).

## 4 CONCLUSION

The analysis of HMI stands out as an element of significant relevance for pediatric dentists. Its clinical features, which share similarities with other anomalies, along with the variety of treatment options, can present diverse challenges. Therefore, by obtaining a more in-depth knowledge about this dental alteration, pediatric dentists have the ability to offer more effective care, contributing to the improvement of the quality of life of their patients.

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