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Molar Incisor Hypomineralisation an Overview of the Literature

Aaran Patel and David Gillam*

*Institute of Dentistry, Barts and the London School of Medicine and Dentistry, Queen Mary University, London, UK.

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***Corresponding Author:** Dr. David G Gillam, Barts and The London School of Medicine & Dentistry QMUL, Institute of Dentistry, Turner Street, Whitechapel, London E1 2AD, UK.

Abstract

Molar Incisor Hypomineralisation (MIH), is a highly prevalent globally recognised developmental condition in young children which affects the enamel of both first permanent molars and permanent incisors and may also present in the deciduous dentition. Numerous diagnostic criteria for MIH have been employed together with various management and treatment strategies These strategies involve a combination of preventive, desensitising, restorative, and behavioural approaches depending on the severity of the condition which can pose clinical challenges for the clinician as well as prolonged periods of treatment for children with MIH.

Introduction

Altercations during the growth and development phase of the child's life may present as permanent surface enamel defects. For example, Molar Incisor Hypomineralisation (MIH), is a highly prevalent globally recognised developmental condition with an unknown aetiology, affecting the enamel of first permanent molars, permanent incisors and may also present in deciduous dentition (see Weerheijm 2003, Weerheijm et al 2003). Characterised by qualitative defects in the enamel, MIH leads to discolouration, increased porosity, and often significant dental anxiety and persistent discomfort. This can pose a challenge for both affected children and clinicians. This overview examines the published literature on MIH's prevalence, risk factors, clinical manifestations, and treatment options.

Specifically, it attempts to answer the question: "What is the current understanding of MIH in terms of its distribution, underlying causes, and optimal management practices with a main focus on, its classification, how to differentiate it from other similar enamel defects, and its associated treatment options?"

Word-wide Prevalence and Complications

According to Allam et al (2017) there is wide disparity in the reported prevalence figures of MIH affecting children worldwide, with prevalence rates varying greatly across the regions. For example, Pentapati et al. (2017) previously reported on a global pooled prevalence of 11.24% and highlighted marked variations between the different geographic regions. This study draws attention to significantly higher prevalence rates in certain areas, such as Northern Europe and South America, which may be linked to environmental and genetic influences, as well as differences in healthcare systems and public awareness. A more recent systematic review and meta-analysis by Lopes et al. (2021), however indicated that the global pooled prevalence of MIH was 13.5% clearly highlighting the widespread nature of this condition. This study also highlighted regional differences by continent, recording a higher prevalence than reported in Europe (14.4%), Africa (14.5%), America (15.3%) compared to Asia (10.7%). Furthermore, the study notes a slight but significant rise in prevalence over time, which could be linked to increased awareness and improved diagnostic accuracy. (Table 1)

Lopes et al. (2021) expanded on these findings by analysing the temporal trends and suggested that increasing prevalence figures over recent decades could be partly due to heightened recognition of MIH by clinicians as well as improved diagnostic tools. The meta-analysis also indicated a variability in the prevalence data based on age groups, with younger children often displaying higher rates, potentially due to early-stage enamel development being more vulnerable to disruptions. Together, these studies highlight the complexity of MIH prevalence data, revealing how both intrinsic and extrinsic factors, including inconsistencies in research methodologies, can influence reported rates.

Continent	N	Estimate	95% CI	p-value (%)
Africa	5	14.5	7.7-25.6	<0.001 (98.1)
Asia	29	10.7	8.5-13.5	<0.001 (98.7)
America	30	15.3	12.8-18.3	<0.001 (96.3)
Europe	34	14.4	12.1-17.1	<0.001 (97.8)
Oceania	1	14.7	11.2-18.9	n/a

Test for subgroup differences (random effects model) p-value = 0.1643

MIH Molar-Incisor Hypomineralization, HSPM Hypomineralization of the Second Primary Molars, 95%CI 95% Confidence Interval, FMR female/male ratio.

Table 1: Meta-analysis on the prevalence of MIH per continent. Acknowledgement Lopes et al (2021)

Predisposing Factors and Aetiology of MIH

Molar Incisor Hypomineralisation (MIH) is influenced by several factors at various stages of development, which can broadly be classified into prenatal, perinatal, postnatal, genetic, or environmental. Each of these stages represents a window of vulnerability during amelogenesis – the process of enamel formation – where disturbances may lead to qualitative defects in the enamel. Ameloblasts, the cells responsible for enamel production, are highly sensitive to systemic stress, infections, and environmental toxins. Disruptions during any stage of enamel formation can result in hypomineralisation, causing weakened, porous, and discoloured enamel that is prone to breakdown (Silva et al., 2016; Garot et al., 2022, see also Goel et al 2021). (Table 2)

Environmental Factors	Genetical factors	Medical Factors	Systemic Factors
Antibiotics (e.g., Amoxicillin)	Matrix Metallopeptidase (MMP-20 Enamelysin protein)	Chicken pox	Severe malnutrition
Vaccines	Kallikrein (KlK4)	Infectious diseases	Bilirubinemia
Dioxins in milk	Domain Containing 1 (Dix Genes)	Respiratory diseases	Chronic diseases
Social-economic factors	RUNX2 gene	Febrile illness	Thyroid and parathyroid disturbances
Nutrition		Premature birth	Maternal diabetes
		Prolonged delivery	
		Cyanosis	
		Neonatal hypocalcaemia	
		Vitamin D deficiency	

Table 2: Acknowledgement: Adapted from Multifactorial aetiology of MIH – dos Santos & Maia (2012). Molar Incisor Hypomineralisation: Morphological, Aetiological, Epidemiological and Clinical Considerations. 10.5772/37372.

Prenatal Factors

Prenatal factors play a significant role in the aetiology of MIH, as foetal enamel development begins in utero. Maternal health conditions, including systemic infections, diabetes, and respiratory illnesses during pregnancy, can negatively influence the enamel-forming process. For example, maternal fever has been associated with increased oxidative stress and inflammatory responses, which may impair ameloblast function leading to enamel hypomineralisation in the developing foetus (Silva et al., 2016). Additionally, the prolonged use of antibiotics, analgesics, or antiepileptic drugs during pregnancy has been associated with developmental enamel defects, as these medications can cross the placental barrier and interfere with normal amelogenesis (Lopes et al., 2021). Adequate intake of calcium, vitamin D, and proteins during this period, are essential for normal mineralisation of the foetal tissues, including dental enamel, and deficiencies may disrupt normal enamel maturation (Garot et al., 2022).

Perinatal Factors

Perinatal factors, which occur at the time of birth, are equally critical in influencing the development of MIH. Preterm birth and low birth weight are strongly associated with a higher risk of enamel defects, as teeth are in the process of mineralisation during this stage. Premature infants often experience incomplete enamel maturation, leaving their developing teeth more susceptible to hypomineralisation (Silva et al., 2016). Birth complications, such as hypoxia (oxygen deprivation), may also increase this risk, by impairing the function of ameloblasts, which rely on stable oxygen levels for optimal enamel formation (Garot et al., 2022). Neonatal intensive care interventions, such as prolonged intubation, corticosteroid therapy, and medication use, have also been identified as contributing factors. The physiological stress and medical treatments required for preterm infants can disrupt normal developmental processes, leading to long-term dental consequences (Lygidakis et al., 2022).

Postnatal Factors

Postnatal factors are the influences that occur during the period of vulnerability after birth, as enamel continues to develop, to early childhood. Frequent childhood illnesses, such as respiratory infections, high fevers, and otitis media, have been closely linked to MIH. These conditions trigger systemic inflammation and fever-induced stress, which can impair ameloblast activity and disrupt enamel mineralisation (Lopes et al., 2021). The use of Antibiotics, particularly amoxicillin, is another key postnatal factor associated with MIH. Research has shown that prolonged or repeated courses of antibiotics during the first three years of life may interfere with amelogenesis, potentially increasing the risk of hypomineralisation (Garot et al., 2022).

Malnutrition, particularly deficiencies in calcium, vitamin D, phosphorus, and protein, disrupts amelogenesis, leading to porous and weakened enamel. Nutritional deficiencies also make children more susceptible to systemic illnesses, compounding the risk of enamel defects (Silva et al., 2016). Recurrent high fevers, often resulting from respiratory or systemic infections, can induce oxidative stress and inflammation, which can disrupt ameloblast activity during critical developmental stages, impairing enamel formation (Garot et al., 2022). Additionally, hospitalisation—especially involving prolonged medical interventions or intensive care—exposes children to systemic stress, medications, and hypoxia, further compromising ameloblast function and elevating the risk of MIH (Lopes et al., 2021).

Breastfeeding plays a protective role in early enamel development by providing essential nutrients and immune support. However, prolonged breastfeeding beyond two

years without introducing nutrient-dense solid foods may result in dietary imbalances that negatively affect enamel quality (Garot et al., 2022). Conversely, early weaning or exclusive formula feeding can lead to deficiencies in critical minerals required for proper enamel mineralisation (Silva et al., 2016). Addressing these postnatal factors, such as ensuring balanced nutrition, preventing infections, and adopting appropriate breastfeeding practices, can help mitigate the risk of MIH and support long-term dental health.

Genetic and Environmental Influences

Genetic predisposition may also play a role in MIH, with evidence suggesting familial clustering of the condition in some cases. Silva et al. (2016) proposed that while genetic factors are likely to influence individual susceptibility, environmental factors such as exposure to pollutants, toxins, or certain medications are critical in triggering enamel defects.

Environmental factors, including exposure to pollutants, dioxins, and endocrine-disrupting chemicals, also play a significant role in postnatal enamel defects. Children living in areas with high levels of industrial pollution are more likely to develop MIH, as these environmental toxins can accumulate in the body and affect developing tissues, including teeth (Silva et al., 2016). Addressing these postnatal risk factors through improved paediatric healthcare, pollution control, and judicious use of antibiotics can help mitigate the incidence of MIH.

Contradictions and Debates

Despite significant research, the aetiology of MIH remains a subject of debate due to conflicting findings. For example, some studies emphasise the role of early-life illnesses and antibiotic use, whereas other studies report no consistent associations, such discrepancies may be due to differences in study design or diagnostic criteria. Garot et al. (2022) also the noted discrepancies in environmental risk factors, such as pollution and socioeconomic status, and attributed these to geographic variations and methodological inconsistencies. Silva et al. (2016) further emphasised that the timing and severity of risk exposures may vary significantly, complicating causal inferences. This ongoing debate underscores the need for longitudinal studies with standardised protocols to reconcile these inconsistencies. Moreover, the unknown aetiology and interplay of various risk factors complicate efforts to predict MIH prevalence, tying its origins closely to its diverse clinical manifestations and reinforcing its status as a complex condition.

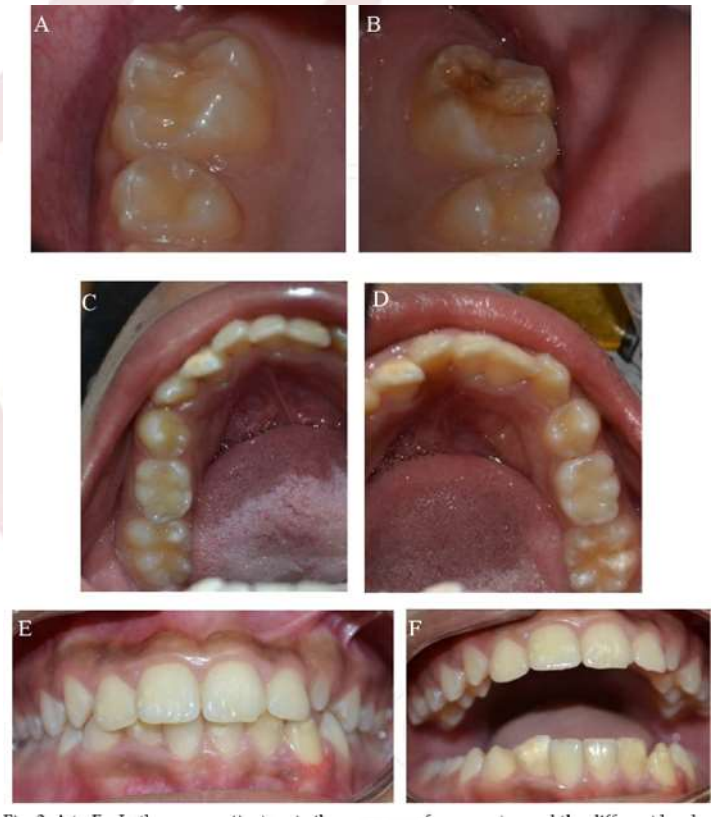
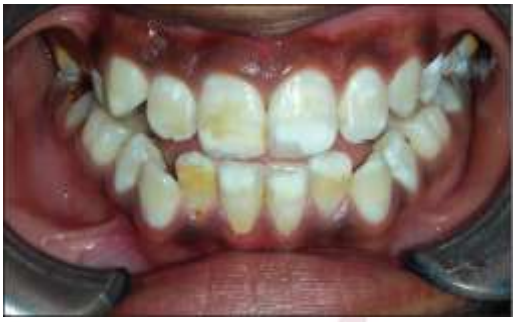
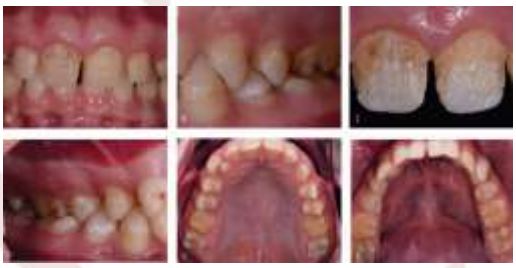


Figure 1: Appearance of MIH-affected teeth (Acknowledgement Weerheijm et al., 2003; Jälevik & Klingberg, 2002).

Teeth affected by MIH exhibit distinct clinical characteristics resulting from both enamel hypomineralisation and structural weaknesses. The enamel appearance is a hallmark of MIH, with demarcated opacities >1 mm in diameter, ranging in colour from white or creamy to yellow or brown. Darker shades indicate more severe hypomineralisation. The appearance of the enamel is soft and porous, making it highly prone to post-eruptive breakdown (PEB) where a sharp demarcation between affected and sound enamel can be observed, emphasising its localised nature, which distinguishes it from any systemic enamel defects such as fluorosis. MIH typically affects the first permanent molars and, to a lesser extent, the incisors. It is often asymmetric, with one molar severely affected while the contralateral molar may remain unaffected or mildly compromised (Weerheijm et al., 2003; Jälevik & Klingberg, 2002)

Post-eruptive breakdown (PEB) is frequently observed in molars due to occlusal loading, leaving the dentine exposed and vulnerable to rapid caries progression. The porous and weak enamel structure shifts the balance toward demineralisation, exacerbating caries susceptibility (Jälevik, 2010). Sensory changes are another significant feature in this process, with increased tooth sensitivity resulting from the porous enamel structure allowing external stimuli to reach the pulp. This hypersensitivity, coupled with chronic pulp inflammation, often deters adequate oral hygiene practices (Fagrell et al., 2013). Restorative needs in MIH-affected teeth are complicated due to poor adhesion of restorative materials to the hypomineralised enamel, leading to higher failure rates for restorations. In severe cases, the extensive damage may require extractions or atypical restorations such as stainless-steel crowns (Lygidakis et al., 2010; Crombie et al., 2014).

Figure 2: Acknowledgement Appearance of MIH-affected teeth post-treatment - Schönewolf et al. 2022. Artificial intelligence-based diagnostics of molar-incisor-hypomineralisation (MIH) on intraoral photographs. Acknowledgement Clin Oral Invest 26, 5923–5930 (2022). https://doi.org/10.1007/s00784-022-04552-4

Enamel Defect	How to Spot	How It Differs from MIH	Appearance
Molar-Incisor Hypomineralisation (MIH)	- Localised opaque white, yellow, or brown demarcated opacities on molars and incisors. - Post-eruptive enamel breakdown (PEB) is common. - Teeth are often sensitive to stimuli (cold, mechanical).	- Specific to first permanent molars and incisors. - Enamel is hypomineralised (soft and porous), leading to increased caries risk.	
Fluorosis	- Symmetrical, diffuse, white mottling across many teeth. - Severe cases: pitting and brown stains.	- Affects all teeth exposed during development (not localised to molars/incisors). - Caused by high fluoride intake.	
Amelogenesis Imperfecta (AI)	- Generalised enamel abnormalities across all teeth: thin, pitted, or rough enamel. - Discoloured enamel (yellow/brown) with no clear demarcation.	- Genetic origin affecting all teeth. - Enamel thickness is reduced, unlike MIH, which primarily involves qualitative defects.	

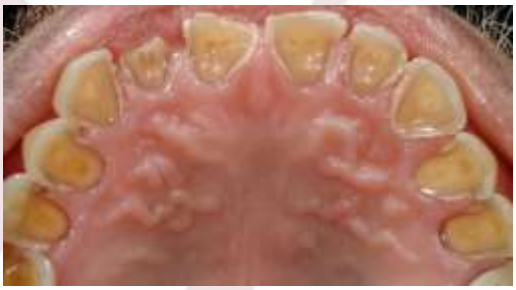
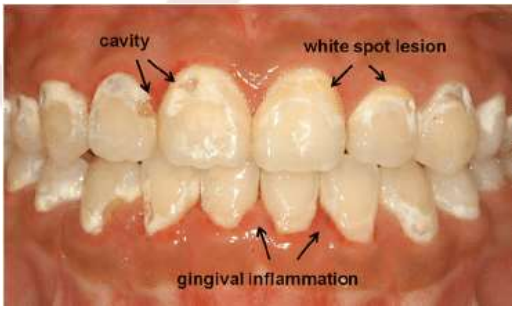
Hypoplasia	- Defects in enamel thickness (e.g., grooves, pits, or missing enamel). - Defects are symmetrical and localised to specific regions of the tooth.	- Affects enamel quantity (hypoplasia) rather than quality (hypomineralisation). - Caused by trauma or systemic disturbances.	
Erosion	- Loss of enamel surface (smooth, shiny appearance). - Often affects incisal or occlusal surfaces.	- Caused by chemical wear (e.g., acidic diet, GERD). - No post-eruptive breakdown or hypomineralised enamel as in MIH.	
White Spot Lesions (Caries)	- Localised, chalky white spots, often near the gumline. - Progression to cavitation in later stages.	- Result of demineralisation due to plaque build-up. - Lack of a clear demarcation seen in MIH lesions.	

Table 3: Acknowledgement How to identify and differentiate between enamel defects Ghanim et al. 2015.

Reasons why distinguishing between different enamel defects may be difficult.

Clinicians may find similar clinical features present in multiple types of enamel defects. These enamel defects shown in Table 2 can have enamel with similar opacities, discolouration, and structural weakness. In the latter stages of MIH, as shown in Fig 2, the enamel can sometimes become severely broken-down making diagnosis difficult. In addition to this, the unknown aetiology of certain defects, together with their multifactorial nature, which can arise at any point of the child's development, as well as the possibility of patients presenting with multiple defects, makes it more difficult to pinpoint an exact cause and consequently an accurate diagnosis. Another key challenge is the lack of standardised diagnostic criteria, which leads to variability in how conditions such as MIH are identified. Since diagnosis often relies

on both visual examination and clinical judgment, subjectivity can contribute to inconsistencies, making it clear why enamel defects can be difficult to distinguish.

Diagnostic Criteria for Molar Incisor Hypomineralisation (MIH)

Diagnostic System	Key Features	Source
European Academy of Paediatric Dentistry (EAPD)	- Demarcated opacities >1 mm, ranging from white/cream to yellow/brown. - Post-eruptive enamel breakdown (PEB). - Hypersensitivity to thermal or mechanical stimuli. - Excludes fluorosis and amelogenesis imperfecta.	Lygidakis et al., 2010; updated 2022
Modified EAPD Severity Index	- **Mild MIH**: Opacities without PEB or severe sensitivity. - **Moderate MIH**: Opacities with limited PEB, minor aesthetic issues. - **Severe MIH**: Extensive PEB, severe sensitivity, caries risk.	Taylor, et al., 2016
Würzburg MIH Treatment Need Index (MIH TNI)	- Incorporates visual assessment of defects (opacities, PEB). - Categorises treatment needs: preventive care, restorative treatment, or extractions. - Includes patient-reported symptoms like sensitivity and pain.	Steffen et al., 2017 Updated Bekes et al 2023
Molar Hypomineralisation Severity Index (MHSI).	First permanent molars (FPMs) and permanent incisors (PIs) in 283 affected children were examined for hypomineralisation characteristics [defect colour, location, post-eruptive breakdown (PEB); restorations placed/replaced/atypical; sensitivity].	Oliver et al 2014
Molar Hypomineralisation Severity Index (MHSI)	- **Mild**: Small, localised opacities. - **Moderate**: Larger opacities with minor PEB. -**Severe**: Extensive PEB, hypersensitivity, and high caries risk.	Jälevik,& Klingberg, 2002
Developmental defects of enamel index (DDE Index)	Demarcated, qualitative defects of enamel of systemic origin, affecting one or more permanent molars [usually FPMs] with or without involvement of the incisor teeth	Crombie et al. 2009 (Review) Melbourne

Modified DDE Index for use in epidemiological studies of enamel defects	The DDE Index was modified following an earlier study to allow for the measurement of demarcated, diffuse, and hypo-plastic defects and their severity.	Clarkson & O'Mullane (1989)
The 10-point scoring system based on the EAPD criteria (Ghanim et al. 2011)	Morphological enamel defects involving the occlusal and/or incisal third of one or more permanent molars or incisors as result of hypomineralization of systemic origin	dos Santos and Maia 2012
Ghanim et al. 2015 (Review)	A detailed diagnostic chart was proposed combining both clinical presentation of the enamel lesion and the size of the surface area affected: 0: no visible enamel defect; 1: enamel defect, non-MIH, 2: White creamy demarcated, yellow or brown demarcated opacities; 3: PEB; 4: Atypical restoration; 5: Atypical caries; 6: Missing because of MIH; 7: Cannot be scored. Lesion extension criteria (after diagnosing i.e. scores 2 to 6): I: less than one third of the tooth affected; II: at least one third but less than two thirds of the tooth affected; III: at least two thirds of the tooth affected	Ghanim et al. 2015
To describe a new molar-incisor hypomineralization (MIH) severity scoring system (MIH-SSS) that focuses on the defects' severity and to assess the system's validity and reliability over 3 years.	Briefly, the MIH severity scoring system (MIH-SSS) is based on ten codes: code 0, no enamel opacity. code 1, the presence of white/creamy enamel opacity without post-eruptive breakdown (PEB). code 2, the presence of yellow/brown opacity without PEB. code 3, PEB restricted to the enamel with white/creamy opacity. code 4, PEB restricted to the enamel with yellow/brown opacity, code 5, PEB exposing dentin (hard when probed). code 6, PEB exposing dentin (soft when probed). code 7, atypical restoration without marginal defect. code 8, atypical restoration with marginal defect. code 9, tooth extracted due to MIH. Code 9 (extraction of first permanent molar due to MIH) is recorded if the condition is diagnosed in another first permanent molar (white or yellow opacities, PEB, or atypical restorations). If no other first permanent molar is affected, code 9 should be recorded only in cases where incisors are affected	Cabral et al 2020

Hypomineralised Second Primary Molars (HSPM)	- Considers enamel hypomineralisation in second primary molars (HSPM) as a predictive marker for MIH. - Defects often asymmetrical, potentially indicating MIH risk in permanent dentition.	Garot, et al., 2022
Clinical Observations	- Visual identification of demarcated opacities and PEB. - Typically localised to occlusal and buccal surfaces of first molars and incisors. - Differentiates MIH from fluorosis and trauma.	Schwendicke et al., 2021

Table 3: Different Diagnostic Criteria for MIH (Allam et al 2017) modified

Treatment and Management Strategies for MIH

Table 4 summarises different approaches used for treating MIH and managing the condition:

Treatment Approach	Key Features	Severity	Outcome	Source
Preventive Measures				
Fluoride Varnishes	- Reduces sensitivity and protects against caries. - Regular application for mild to moderate cases.	Mild, Moderate	- Temporary relief from sensitivity. - Reduces enamel breakdown risk.	Lygidakis et al., 2010; Somani et al., 2021
Remineralising agents e.g., silver diamine fluoride (SDF) and CPP-ACP (MI Paste™)	- Promotes remineralisation. - Reduces hypersensitivity and breakdown. - Applied topically.	Mild, Moderate	-Improved enamel remineralisation. - Reduces further breakdown.	Inchingolo et al., 2023, AAPD 2024

Sealants	-Protects occlusal surfaces from caries. - May fail in severe cases due to poor bonding.	Mild, Moderate	- Effective in well-bonded cases. - Higher failure rate in severe MIH.	Somani et al., 2021
Desensitising Agents				
Fluoride Gels, Pastes & Varnishes	- Blocks the dentinal tubules to reduce hypersensitivity. - Used as part of routine oral hygiene.	Mild, Moderate	- Immediate but temporary sensitivity relief. - Requires ongoing use.	Taylor et al., 2016, Ghanim et al 2017
Desensitising toothpastes and gels	- Reduces sensitivity by incorporating it into dentinal tubules. - Present in toothpaste and gels.	Mild, Moderate	- Long-term sensitivity reduction with continuous use.	Inchingolo et al., 2023
Remineralising agents e.g., silver diamine fluoride (SDF)	Promotes remineralisation. -Reduces hypersensitivity by tubular occlusion and breakdown. - Applied topically.	Mild, Moderate	SDF can be used as a safe and effective tooth desensitizer in adults, with good results, as was achieved in a short-term follow-up. However, more studies with longer evaluation periods are required.	Piovesan et al. 2023 AAPD 2024
Sugar-free chewing gum	May help mineralise, desensitise and act as a source of bio-available calcium and phosphate for the MIH erupting teeth.	Mild, Moderate?	Limited Data	Ghanim et al. 2017
Restorative Treatment				
Glass Ionomer Cement (GIC)	- Suitable for mild cases. - Releases fluoride but has weaker mechanical properties.	Mild, Moderate	- Short-term solution. - Prone to wear and failure.	Inchingolo et al., 2023; Lygidakis et al., 2010

Composite Restorations	-Aesthetic and durable but challenging adhesion to MIH enamel. -Etch-and-rinse systems improve bonding.	Moderate, Severe	- Aesthetic improvement. - Higher risk of bond failure compared to normal enamel.	Lagarde et al., 2020; Somani et al., 2021
Stainless Steel Crowns (SSCs)	- Long-term durability for severe MIH cases. - Preferred for paediatric patients with extensive breakdown.	Severe	- Excellent durability. - Prevents further breakdown.	Lygidakis et al., 2010
Ceramic Crowns	- Aesthetic permanent restoration requiring significant tooth prep.	Severe	- Long-term aesthetic and functional restoration.	Inchingolo et al., 2023
Resin Infiltration (ICON)	- Minimally invasive. - Improves aesthetics and prevents progression.	Mild, Moderate	- Aesthetic improvement. - Slows down progression of opacities.	Crombie et al., 2014
Micro-abrasion with 18% hydrochloric or 37.5% phosphoric acid and pumice	For creamy-whitish defects.	More profound enamel defects might be dealt with by combining micro-abrasion and bleaching (e.g., 10% carbamide per oxide, for brownish-yellow defects may be considered but only in adolescents to avoid side-effects such as sensitivity.	May produce reasonable results	Ghanim et al. 2017

Behavioural & Pain Management				
Local Anaesthesia & Sedation	- Used to manage pain and anxiety in hypersensitive patients.	Severe	- Ensures patient cooperation and comfort during procedures.	Somani et al., 2021
Cognitive Behavioural Techniques	- Helps address dental anxiety, especially in children.	Severe	- Reduces dental fear over time. - Improves treatment acceptance.	Garot et al., 2022
Dietary advice	May help reduce caries risk and sensitivity	Mild, Moderate?	Requires parent cooperation and compliance during the child's early childhood with a view of establishing a healthy lifestyle during adolescence and adulthood.	Ghanim et al. 2017
Extraction & Orthodontic Management				
Early Extraction	- Recommended for severe cases where restoration is unfeasible. - Should coordinate with orthodontics to prevent malocclusion.	Severe	- May improve long-term occlusion if planned correctly.	Cobourne et al., 2014
Space Maintenance	- Prevents shifting of adjacent teeth after extraction.	Severe	- Maintains proper alignment for future orthodontics.	Lygidakis et al., 2010

Table 4: Different treatment and management approaches for different severities of MIH – Acknowledgement: Inchingolo et al..2023 modified (see also AAPD 2024)

Discussion

It was evident from a review of the literature that numerous diagnostic criteria for MIH have been employed (see Table 3) as well various management and treatment have also been used (see Table 4). According to Inchingolo et al. (2023) numerous treatment approaches for managing Molar-Incisor Hypomineralisation (MIH) have been proposed involving a combination of preventive, desensitising, restorative, and behavioural strategies tailored to the severity of the condition. Preventive measures such as fluoride varnishes, CPP-ACP (MI Paste™), SDF and sealants aim to reduce MIH sensitivity/hypersensitivity, promoting enamel remineralisation, and protection against further enamel breakdown, particularly in mild to moderate cases (Inchingolo et al..2023, AAPD 2024). Desensitising agents, including fluoride gels and potassium nitrate, help manage MIH sensitivity, providing both temporary and long-term relief depending on their usage. Restorative treatments such as glass ionomer cements (GICs), composite restorations, and stainless steel or ceramic crowns address structural damage, with each option offering varying degrees of durability and aesthetic improvement, especially for moderate to severe cases. For managing pain and anxiety, local anaesthesia, sedation, and cognitive behavioural techniques are employed, particularly in severe cases, to ensure patient comfort. Additionally, in cases where restorative measures are not feasible, early extraction and space maintenance are considered to prevent malocclusion and preserve future orthodontic alignment (Inchingolo et al..2023, AAPD 2024). These approaches work together to manage MIH effectively, improving both functional and aesthetic outcomes. The question, however, is whether the various guidelines (as recommended by the EAPD or AAPD 2024) on the diagnosis and management of MIH have been understood and implemented in general practice. To address this issue a recent review by Kulendran & Gillam (2025) which highlighted several disparities in the knowledge, attitudes and treatment approaches related to MIH by clinicians. It was evident from this review that although clinicians recognised MIH both diagnostic confidence and treatment preferences varied due to several factors such as education, resource availability and clinical exposure. Furthermore, due to the apparent lack of global standardised guidelines leading to challenges in both diagnostic and prevalence reporting. According to Oliver et al (2014) current molar hypomineralisation (MH) indices do not guide clinicians in management of affected dentitions, and treatment is based on individual judgment The integration of both diagnostic and treatment frameworks using MIH-TNI (MIH Index and Würzburg TNI) may however allow for a more comprehensive diagnosis and management plan as well as the introduction of predictive tools such as the: HSPM and early-stage classifications to help with both the proactive monitoring and management of MIH. It is also evident that treatment needs should be based on the severity of the condition (Guerra et al. 2025)

Conclusion

Molar Incisor Hypomineralisation (MIH) is a complex condition with significant implications for both dental health and overall quality of life (QoL). Characterised by distinct enamel defects, post-eruptive breakdown, and hypersensitivity, MIH often results in psychosocial challenges for affected individuals, particularly children. Various diagnostic systems, such as the EAPD guidelines, MIH Index, and Würzburg TNI, aim to standardise the identification of MIH. However, differences in both the diagnostic criteria and the lack of global standardisation in variability in the prevalence reporting and complicated subsequent treatment planning. The incorporation of predictive tools such as Hypomineralised Second Primary Molars (HSPM) may therefore enhance both early detection and monitoring of the condition.

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