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Knowledge and Attitudes of Dental Professionals in the Evaluation of Molar Incisor Hypomineralisation (MIH). Awareness, Diagnosis and Treatment Approaches: An Overview

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Abstract

Molar-incisor hypomineralisation (MIH) is a developmental enamel defect of systemic origin that presents diagnostic and therapeutic challenges in dentistry. Despite its increasing prevalence, several studies indicate variability in clinicians' knowledge, confidence and attitudes towards MIH management. While awareness of the condition is relatively high, differentiating MIH from other enamel defects remains a common difficulty. Treatment approaches range from fluoride-based therapies and composite restorations to preformed metal crowns (PMCs), with inconsistencies in clinical decision making. This review explores the current understanding of MIH treatment approaches among dental students and practitioners, alongside perceived barriers to effective treatment. Additionally, it highlights gaps in education, resources and clinical training that contribute to variations in management. By analysing existing literature, this paper underscores the need to enhance professional competency to optimise MIH treatment and improve patient outcomes.

Introduction

Developmental enamel defects in children represent a significant challenge in paediatric dentistry, with molar-incisor hypomineralisation (MIH) emerging as a condition of growing importance (Rodd et al., 2021). Defined as the hypomineralisation of one or more of the first permanent molars and permanent incisors, MIH is characterised by discoloured, soft enamel that is prone to post-eruptive breakdown, hypersensitivity and an increased risk of carious lesions (Weerheijm, 2004). As a result of its high prevalence and significant impact on paediatric dentistry, MIH has become an increasingly recognised global concern. Prevalence rates are estimated to range from 2.8% to 40.2% with considerable variation attributed to differences in geographical location, population demographics, and a lack of standardised diagnostic criteria (Almuallem & Busuttil-Naudi, 2018).

Misdiagnosis and uncertainty among clinicians in identifying MIH may further contribute to the underestimation of its true prevalence. To address these variables in MIH prevalence studies, the European Academy of Paediatric Dentistry (EAPD) diagnostics and epidemiological criteria are used (Lygidakis et al., 2010, 2021, see also Jianu et al 2022).

Recent studies suggest that approximately 1 in 7 children worldwide are affected by the condition, with children from lower socioeconomic backgrounds having higher rates of MIH, likely due to limited healthcare access and socioeconomic challenges (Rodd et al., 2021). The management of MIH requires a multifaceted approach tailored to the severity of the condition, age and cooperation of the patient and the long-term prognosis of the affected teeth. Treatment modalities are extensive from prevention, stabilisation to extractions and behaviour management strategies and may be categorised based on both the severity and dental developmental age.

It is important to note that some of these treatments require specialist care in paediatric dentistry. However, updated or modified guidelines used in research may not filter down to practitioners at this stage, potentially leading to inconsistencies in care. This review attempts to provide a comprehensive overview of current knowledge and attitudes towards the treatment of MIH, using data from published questionnaire-based studies. It focuses on the challenges faced in diagnosis and management, as well as identifying critical knowledge gaps and examines the diverse perceptions of treatment strategies.

Aim

The aim of this review is to evaluate the awareness of MIH and the approaches to its clinical management, several questionnaire-based studies have been conducted across various countries. These studies have explored the knowledge, attitudes and perceptions of dental professionals regarding MIH, highlighting uncertainty around treatment options and standardisation. Guidelines, including the EAPD diagnostic criteria, are available however clinical approaches often vary, potentially influenced by cultural and regional differences.

Search Strategy

A systematic approach was conducted to identify, evaluate and combine relevant studies. To evaluate the knowledge and attitude of dental professionals when diagnosing the awareness of MIH and the approaches to its clinical management. Several questionnaire-based studies have been conducted across various countries and these studies have explored the knowledge, attitudes and perceptions of dental professionals regarding MIH, highlighting uncertainty around treatment options and standardisation. Guidelines, including the EAPD diagnostic criteria, are available however clinical approaches often vary, potentially influenced by cultural and regional differences.

An electronic literature search was conducted using the online databases, PubMed, Cochrane and Embase, to identify relevant questionnaire-based studies. Studies were included if they focused on MIH, its knowledge and

attitudes and utilised a questionnaire-based methodology. Keywords used in the search included "Molar-incisor-hypomineralisation or MIH", "Knowledge or Awareness", "Attitude or Perception", "Questionnaires or Surveys". MeSH terms included: "Molar Incisor Hypomineralisation", "Dental Enamel Hypoplasia", "Surveys and Questionnaires" and "Health Knowledge, Attitudes, Practice". Boolean operators (AND, OR) were used to refine the search strategy and filters were applied to include studies published in English. An exclusion criterion was applied to ensure relevance and eliminate studies that did not align with the objectives of this review.

Studies were included if they:

1. Used a questionnaire-based study design.

2. Included keywords related to MIH.

3. Focused on MIH knowledge and attitudes.

4. Included dental students or dental practitioners as participants.

5. Were published in English within the last 20 years.

An exclusion criterion was applied to ensure relevance and eliminate studies that did not align with the objectives of this review. For example:

1. Studies that were not questionnaire-based were excluded to maintain consistency.

2. Studies that did not focus on dental students or dental practitioners were excluded.

3. Studies with a response rate below 50% were excluded due to concerns with response bias and reliability.

4. Studies with a small sample size of as they may not provide reliable results.

5. Studies that did not report how their questionnaire was developed or validated were excluded.

6. Studies not published in English were excluded.

7. Studies published over 20 years ago were excluded if they did not reflect current understanding and treatment approaches for MIH.

Studies on Knowledge and Attitudes of MIH Treatment

A total of 17 studies published between 2008 and 2024 were selected and reviewed, examining knowledge and attitudes towards MIH treatment approaches. These studies have been categorised into two groups: seven studies focus on dental students (Table 1) and ten studies assess dental practitioners including general dental practitioners (GDPs), private dentists and paediatric dentists (Table 2).

The findings highlight variations in knowledge, clinical decision-making and perceived challenges in managing MIH. Across the studies, a general trend was seen regarding varying levels of knowledge and confidence in MIH management, with dental students generally feeling less confident compared to experienced practitioners. Although awareness of MIH was high, many respondents reported challenges in differentiating it from other enamel defects. Treatment approaches also varied with fluoride-based therapies, composite restoration and preformed metal crowns (PMCs) being the most frequently mentioned options. A consistent finding was the demand for additional training, particularly in clinical diagnosis and treatment planning. These trends are further explored in the discussion.

Study	Population	Sample Size and Methodology	Knowledge findings	Attitudes findings
Silva et al. (2016)	Dental students King Saud University, Riyadh	Online questionnaire	64% of dental students have not heard of MIH.	Confidence in diagnosis correlated with training and years of experience.
		4th year students 5th year students (149/222 responded – 67.1%)	70% lacked knowledge of its clinical characteristics. 67% of students were not confident in diagnosing MIH.	37% of dentists with <5 years' experience reported as lacking confidence in their clinical ability to diagnose MIH. Significantly, a greater proportion of GDPs (90.5%) than specialists (72.1%) expressed the need for further training in MIH.
			<u>Treatment:</u> Only 26 students had experience of MIH clinically and used composite resin (11.4%), GIC (11.4%) and PMCs (3%)	Across all groups, treatment was the most requested aspect for additional training (91.3% for GDPs). Orthodontists primarily sought further education on the aetiology of MIH (100%).
	General and specialist dentists from Saudi Dental Association	230/407 dental practitioners responded (56.5%)	Majority of GDPs (76.9%) and specialists (86.3%) were familiar with MIH in their practice. Aetiology: both students and dentists stated that genetics were more likely attributed to MIH <u>Treatment:</u> Most frequently used materials were resin composite, PMCs.	Contrastingly, 79.2% of dental students would more likely want training in diagnosis than dentists.
Elhennawy et al. (2020)	Dental students in Germany	Total of 877 students participated from 22/31 dental schools (71%) Questionnaire via post	97% of students reported being familiar with MIH 88% were aware of the diagnostic criteria but only 42% were able to translate this knowledge in practice. 33% of students felt confident in their ability to clinically identify MIH.	98% expressed interest in receiving additional training, including theoretical and clinical practice on diagnosis (92%), treatment (91%) and aetiology (60%). 92% of students would like to investigate the prevalence of MIH in greater detail.

			Aetiology: Two-third of the students chose genetic components as the main cause of MIH. 79% found it difficult to differentiate MIH from other developmental defects, particularly amelogenesis imperfecta and enamel hypoplasia. <u>Treatment:</u> most preferred option was direct resin composite, as chosen by 60% of respondents, followed by preformed metal crowns (46%) with adhesion and durability being the most relevant factors.	
Bekes et al. (2021)	Dental students in Vienna, Austria	100 final year students with a high response rate of 94% 94 paper-based MCQ questionnaires	High awareness of MIH among students (98%) with 86% understanding its clinical features. Aetiology – 69% identified genetic factors as the main cause. Only 13% reported clinical ability to identify MIH, with 5% feeling confident and 86% being slightly confident. 77% found it challenging to differentiate MIH from other developmental defects, particularly, enamel hypoplasia and amelogenesis imperfecta. <u>Treatment:</u> Composite resin was the preferred material for treatment with 64% choosing 'durability' as the key	94% believed it would be valuable to explore the prevalence of MIH in Austria. 96% suggested to including clinical training regarding diagnosis in their course.

			influential factor for their choice.	
Hamza et al. (2021)	Final year dental students in all Swiss Dental Schools	113/133 (response rate = 85%) Survey (previously used in English and German)	99% were familiar with MIH. Only 12% felt confident in diagnosis although 98% knew about the clinical features. 72% found it challenging differentiating MIH from amelogenesis imperfecta and enamel hypoplasia. Aetiology: majority (82%) chose genetic as the aetiological factor of MIH. <u>Treatment</u>: Direct composite fillings – 66% Indirect restorations – 28% SSC – 26% Main influential factors: adhesion (80%), durability (62%) and aesthetics (50%).	Low confidence in clinical practice Challenges in long-term restoration success (61%) and diagnosis (58%). 89% suggested more clinical training in the curriculum, with particular focus on treatment (87%), diagnosis (80%) and aetiology (41%).
Liu & He (2022)	Undergraduate and Postgraduate students at Wuhan University.	368/540 student questionnaires were collected, of which 328 were eligible for analysis (68% response rate). Online questionnaire. A presurvey was conducted to ensure questions were understood.	80% of students had heard of MIH. Few students knew about aetiological factors, diagnostic principles and treatment options. 40% had observed MIH clinically and of these, 63% were confident in distinguishing MIH from other developmental dental conditions. <u>Treatment:</u> Only 3% had performed treatment for MIH and most of these students	Only 25% of students felt confident in identifying MIH Most respondents were highly motivated with 90% expressing strong expectations for changes to systematic teaching on MIH, particularly in areas of clinical manifestations, diagnosis and treatment.

			reported using pit and fissure sealants for mild cases. No treatment was favoured for other cases.	
Gunay. (2023)	Dental students in Turkey	4th year students (111) - 51% 5th year students (107) - 49% Online questionnaire with 23 questions	Awareness among 5th year students (98.1%) were better compared to 4th year students (68.5%) 55.9% of 4th year students and 89.7% of 5th year students were aware of the clinical features. Aetiology – Most students chose genetic factors as the main cause. Only 26.1% felt confident in diagnosing MIH. <u>Treatment:</u> Students in both years reported using composite resin material, mainly influenced by aesthetic considerations.	Most students felt that investigating the prevalence of MIH in Turkey would be worthwhile. Students reported difficulties in differentiating MIH from other dental conditions.
Tarazona-Valero et al. (2024)	Dental students and dental hygienist students in Spain	290/448 students 4th and 5th year dental students. 2nd year oral hygiene students – from different universities. Response rate was 70.5%. Effectiveness rate was 91.8%. Digital questionnaire of	75.2% students had heard of MIH with dental students having greater level of knowledge. Aetiology – most students identified genetic factors as the primary cause. Recognised that maternal health during pregnancy could be an influential factor. 58.3% of students found it difficult to differentiate MIH from other conditions.	83.8% expressed a desire to additional training and educational sessions, particularly emphasising on enhancing skills in diagnosis and treatment.

		18 questions	Preferred non-surgical treatment: Fluoride varnish application and fissure sealants. Preferred surgical intervention: RMGIC and composite fillings.	

Table 1: Key findings in knowledge and attitudes of MIH treatment approaches among dental students in selected studies.

Study	Population	Sample Size and Methodology	Knowledge findings	Attitudes findings
Crombie et al. (2008)	Members of the Australian and New Zealand Society of Paediatric Dentistry	130 useable questionnaires were returned (58.8%) Questionnaires via mail.	98.5% of respondents were familiar with MIH and encountered it in practice. Aetiology: contrasting views with uncertainty in their answers. The majority thought there is genetic influence or medications involved. <u>Treatment:</u> PMC reported most common option for severe MIH amongst PDs. GIC used widely as was composite resin. Influenced by adhesion and durability and personal experience.	96.9% agreed on the importance of investigating MIH prevalence. Clinical challenges – 96.9% reported aesthetics and long-term success restorations.
Hussein et al. (2014)	GDPs and dental nurses in Malaysia	131/225 responded (response rate 58.2%) Questionnaire	82.5% GDPs and 82.4% dental nurses were informed about MIH. Aetiology: there was a lack of consensus regarding the contributing factors. GDPs indicated that fluoride ingestion and medications taken during pregnancy as potential causative factors. Dental nurses suggested	Most common barrier for GDPs were child's behaviour (95.9%), insufficient training (70.1%) followed by difficulty in LA (60.8%). 93% GDPs and 76.5% dental nurses stated that they had not received adequate information about

			that genetic components and medications taken during pregnancy or early childhood were the main cause. Treatment: More than half said that they used fluoride varnish for initial management. No significant differences regarding the type of materials used but composite resin and GIC were most popular.	MIH and were open to receiving clinical training on its diagnosis and treatment options. Additional training in diagnosis was requested even though they expressed a high level of confidence.
Kalkani et al. (2016)	Dentists in the UK undergoing specialist training in paediatrics and GDPs.	37/52 speciality trainees (71% response rate) and 31 GDPs Online questionnaire sent via email.	Both groups showed difficulty in distinguishing MIH from other dental conditions. 13/37 trainees felt confident and 17/37 felt very confident in diagnostic ability. Half the GDPs reported that they were only slightly confident in diagnosis.	Minimal evidence of either group using a specific index for diagnosis and none of the practitioners indicated that they routinely use an index. Further research is needed to understand If this is due to lack of awareness or conscious decision.
Kopperud et al. (2016)	Norwegian dentists	(n = 1061).61.5% responded Electronic pre-coded questionnaire with three patient cases sent to all dentists employed by the Public Dental Service (PDS) in Norway .	Case 1 - Newly erupted first permanent molar with moderate hypomineralisation and no disintegration: Majority chose fluoride varnish (53.5%) Case 2 - Newly erupted first permanent molar with severe damage and post-eruptive breakdown: Majority chose GIC restoration (57.5%) Over 6 months, the average number of SSCs placed was 1.7 (range 0-8).	Many dentists perceived MIH-affected children as more anxious (48.2%) influencing their treatment options. More than 50% found it difficult to anaesthetise MIH molars but only 12.5% tried administering pain killing medications before treatment. 59.6% would have liked to refer MIH cases but lacked access.
Alanzi et al. (2018)	Dentists in Kuwait	221/310 dentists (response rate of 71.3%) -115 GDPs -106 dental specialists	72% of GDPs were not confident in diagnosing MIH – majority practices <5 years. Treatment: extraction was the	Main barrier to treatment for GDPs were the child's behaviour, long treatment times and insufficient training.

		Questionnaire	least preferable option. Composite resin was the most favoured treatment (~65%), followed by GIC (35.7%).	87% of respondents strongly agreed on the necessity of clinical training for managing tooth hypomineralisation.
Wall &, Leith (2020)	Irish Dentists – only GDPs	204/230 respondents used for analysis. Questionnaire distributed within an e-newsletter and the same three patient cases (Clinical scenarios with three cavity designs) from Kopperud et al. (2016) were used. Case 1: Which treatment would you provide for this newly erupted first permanent molar with moderate hypomineralisation and no disintegration of the surface enamel? The patient is six years old, has good oral hygiene, normal occlusion and is cooperative. Case 2: Which treatment would you provide for this newly erupted, severely damaged first permanent molar with post-eruptive breakdown? The tooth is sensitive to air. The patient is six years old, has good oral hygiene, normal occlusion and is cooperative. Image and question. Case 3: Where would you place the preparation margin if	98% observed that the pattern of enamel breakdown in MIH differs what is typically seen in dental caries. 91% felt confident or very confident in diagnosing MIH. <u>Treatment:</u> 84% selected composite resin to restore MIH affected teeth, followed by GIC (58%). PMC and amalgam were less commonly selected. Case 1 - Newly erupted first permanent molar with moderate hypomineralisation and no disintegration: 43% chose a resin fissure sealant and 40% would choose a GIC fissure sealant. Case 2 - Newly erupted first permanent molar with severe damage and post-eruptive breakdown: The two most popular choices were GIC (31%), followed by composite resin (29%)	71% felt comfortable managing MIH. Statistical analysis found that dentists aged ≥36 were less likely to feel comfortable managing MIH. Most cited barrier to care was the child's behaviour (81%), followed by difficulty in LA (53%). Insufficient training was also a challenge (27%).

		restoring this MIH affected first permanent molar, and which restorative material would you use? The patient is nine years old, has good oral hygiene, normal occlusion and is cooperative. Image and question.	Case 3 - Remove all MIH-affected enamel and leave the preparation border in healthy tooth substance (cavity design and choice of restorative material) For all three designs chosen, composite resin was the most popular material choice (64%, 66% and 38%, respectively)	
Skaare et al. (2021)	Dentists and dental hygienists (DHs) in Oslo, Norway	100 respondents Response rate = 74.1% Electronic questionnaire	100% of respondents were familiar with MIH. 86% felt confident diagnosing MIH, with practitioners who qualified within the last 10 years feeling much more confident. Aetiology: The majority chose genetic factors and medication use during childhood. Treatment: Composite resin (77.8%) and GIC were most used materials. One fourth of the practitioners would use SSCs.	Treatment barriers: child's behaviour (84.1%), difficulty in LA (71.4%). 69% would like to have further training with particular focus on treatment (77%), aetiology (70%), diagnosis (57%).
Seremidi et al. (2022)	Dentists in Greece	360 participants with a response rate of 94%. - 185 GDPs -175 dental specialists Cross-sectional study-based questionnaire with 37 MCQs	92% of respondents indicated that they are familiar with MIH, with 78% citing their undergraduate studies as their primary source of knowledge. Aetiology: Genetics (80%) was reported as the cause by GDPs. Treatment: clinical examination, severity of lesion and caries risk are taken into consideration before choosing the best option. For anterior lesions, 34% opted for micro-abrasion while 37%	70% mentioned difficulty with adhesion as the main problem. 65% of respondents stated that improvement in their knowledge regarding MIH treatments was needed through seminars and hands-on courses.

			chose no treatment. 27% of PDs would use resin infiltration and 24% GDPs preferred composite resin. For moderate to severe posterior lesions, preformed metal crowns and composite resin were most favoured.	
da Costa Rosa et al. (2024)	Brazilian dental practitioners (private and public sector)	100/149 respondents - 67.1% response rate Online questionnaire with 27 questions	86% recognised MIH in their practice. Practitioners found it difficult to distinguish MIH from other developmental defects, particularly enamel hypoplasia (51%) and amelogenesis imperfecta (33%). <u>Treatment:</u> Uncertainty in conducting treatments were reported by 42% of practitioners in the private sector and 56% in the public sector. Mild MIH on permanent maxillary incisors – 43% would not propose any treatment. Mild MIH of first permanent molars – 51% would apply a fissure sealant. Severe MIH and moderate loss of structure with hypersensitivity – GIC (38%) followed by FV (22%). Severe MIH and extensive loss of structure with pulp involvement – Endo treatment and SSC (35%)	99% expressed the desire for further information about MIH. 71% were aware of the available diagnostic criteria and used this. Challenges in achieving long term restoration success (80%). Half of private dental practitioners were confident in treating MIH. More than half of the public sector practitioners felt a lack of confidence.

Tarhuni et al. (2024)	Libyan dentists in Benghazi	Response rate = 76% (389/511) Questionnaires	78.4% were familiar with MIH. Aetiology: 60.2% reported genetics as the cause, followed by environmental contamination (47.6%) and fluoride (42.9%) <u>Treatment:</u> GIC (43.2%) PMC (41.6%) Choice was influenced by adhesion (58.4%) and aesthetics (54%)	Dentists in public settings were less familiar with MIH. Challenges – aesthetics (59.4%) and diagnosis (44.2%).

Table 2: Key findings in knowledge and attitudes of MIH treatment approaches among dental practitioners in selected studies.

The reviewed studies a provide fundamental insight into the knowledge and attitudes of various dental practitioners and students regarding MIH and its treatment approaches. Awareness of MIH is relatively high among dental students across multiple studies; however significant gaps remain in practical knowledge and clinical confidence (Table 1). Elhennawy et al. (2020) stated that although 97% students were familiar with MIH, only 33% felt confident in their ability to clinically identify MIH.

Similar trends were observed in Austria, where only 13% of students reported clinical competency and in Turkey, where 26.1% felt confident in diagnosing MIH (Bekes et al., 2021; Gunay, 2023). In Swiss dental schools, final year students reported 99% familiarity with MIH, however only 12% felt confident in diagnosis (Hamza et al., 2021). These findings suggest that limited hands-on clinical exposure during undergraduate training may contribute to low diagnostic confidence.

In contrast, dental practitioners generally demonstrated greater familiarity with MIH than students, although confidence levels still varied. Experience in the clinical field may play an influential role in improving confidence levels. Dentists with fewer than 5 years of practice were less confident as shown by Alanzi et al. (2018) compared to those who practiced for more than 20 years who exhibited 91% confidence (Wall & Leith 2020) (Table 2). An exception was observed among Saudi Arabian and Kuwaiti practitioners where confidence in diagnosis was low even with clinical experience (Silva et al. 2016, Alanzi et al. 2018).

A common knowledge gap was the ability to differentiate MIH from other developmental defects such as amelogenesis imperfecta and enamel hypoplasia (Elhennawy et al., 2020; Bekes et al. 2021; Hamza et al., 2021; da Costa Rosa et al., 2024). This suggests that

theoretical understanding alone does not translate into clinical skill. Dental students predominantly attributed MIH to genetic factors (69% in Bekes et al., 2021 and 73.1% in Elhennawy et al., 2020) whereas GDPs demonstrated a broader understanding, considering maternal health and environmental factors (Hussein et al. 2014, Tarhuni et al. 2024).

Regarding treatment approaches, there were regional differences with some studies emphasising preventive strategies, whereas others favoured restorative interventions such as composite resin or PMCs. Non-surgical interventions including fluoride varnish application and fissure sealants were preferred for milder cases among students (Tarazona-Valero et al., 2024; Liu and He, 2022). The lack of detailed specification regarding MIH severity in the literature makes direct comparisons challenging. Nevertheless, composite resin consistently emerged as the most preferred material in several regions including Saudi Arabia (Silva et al., 2016), Germany (Elhennawy et al., 2020), Austria (Bekes et al., 2021), Kuwait (Alanzi et al., 2018) and Norway (Skaare et al., 2021). This choice was primarily influenced by durability and aesthetic properties. Conversely, glass ionomer cement (GIC) was the preferred option among practitioners in Australia and New Zealand (Crombie et al., 2008) and Libya (Tarhuni et al., 2024). PMCs were also widely chosen for severe MIH cases due to their longevity and durability factors (Crombie et al. 2008).

Notably, Kopperud et al., (2016) and Wall and Leith (2020) presented the same clinical cases yet reported differing treatment preferences (mild MIH). However, both studies agreed that GIC restorations were the most suitable option for severe MIH cases, reinforcing the notion that severity influences treatment choice. Additionally, it was reported that over six months, the average number of Stainless-Steel Crowns (SSCs) placed per practitioner was just 1.7 (range 0-8), suggesting low utilisation despite evidence supporting their longevity (Kopperud et al., 2016). Variation in individual preferences further highlights the subjectivity in MIH management. This may stem from differences in dental education, clinical training or availability of specific restorative materials. For example, limited access to SSCs in Brazil has influenced treatment choices despite their recognition as the most durable option (Farias et al., 2021). It also reflects the lack of consensus and evidence-based national guidelines on best practice leading to inconsistencies in decision-making.

The absence of a standardised diagnostic criterion further contributes to these discrepancies, as reported by Elhennawy et al. (2020), Alanzi et al. (2018), Kalkani et al. (2016) and da Costa Rosa et al. (2014). In response to limitations in earlier classifications, the Wurzburg Group in Germany developed the MIH Treatment Need Index (MIH-TNI) which scores each sextant based on extent of tooth structure loss and hypersensitivity (Steffen, Krämer and Bekes, 2017). The index was further refined with an updated version published in 2023 that incorporated non-invasive strategies and treatment approaches for incisors (Bekes et al., 2023). The lack of widespread validation and implementation of this index underscores the need for a universally accepted framework to guide MIH diagnosis and management.

The most common barriers to MIH treatment included challenges such as child behaviour, difficulty with local anaesthesia as well as insufficient training. A recurring theme across multiple studies was that most practitioners and students felt inadequately trained in MIH management. Across all reviewed studies, the majority expressed a desire for further education, particularly focusing on clinical diagnosis and treatment protocols. 93% of GDPs in Hussein et al. (2014) and 98% of dental students in Elhennawy et al. (2020) indicated a need for further clinical training and additional education, theoretically and practically. To address these knowledge and perception gaps, continuing professional development (CPD) programmes have been suggested, offering targeted training in MIH. These programmes could off hands-on training in diagnosing and treating MIH, helping bridge the gap between theoretical knowledge and practical clinical skills. There are

however limitations in the use of questionnaire-based studies including response bias where clinicians with greater interest in MIH may be more likely to respond or provide socially desirable answers leading to over- or underestimation of knowledge and confidence levels.

Variations in study design and sample sizes made direct comparisons difficult and the sample population may not be representative of the wider dental community, given the limited global representation of included studies. Despite these limitations, this review critically compares studies, ensuring a balanced interpretation of the available evidence. Future research using randomized sampling and longitudinal designs is recommended to strengthen understanding in this area.

Conclusion

This literature review highlights disparities in knowledge, attitudes and treatment approaches related to MIH. Although awareness of MIH is high, limited hands-on training affects diagnostic confidence and treatment preferences vary due to education, resource availability and clinical exposure. The absence of national, standardised guidelines further contributes to ongoing challenges in MIH management. Strengthening clinical training and integrating diagnostic and treatment frameworks such as MIH-TNI could enhance confidence and treatment outcomes.

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