

Knowledge, Attitude and Practice Regarding Molar Incisor Hypomineralization and Its Management Among Pediatric Dentist

¹Dr Vivek Dhruv Kumar, Professor, Department of Pediatric and Preventive Dentistry, V S Dental College, Bengaluru, Karnataka

²Dr Syeda Husna Noorein, Post Graduate Resident Department of Pediatric and Preventive Dentistry, V S Dental College, Bengaluru, Karnataka

³Dr Suma G, Professor, Department of Pediatric and Preventive Dentistry, V S Dental College, Bengaluru, Karnataka

⁴Dr Zuha Naseem, Post Graduate Resident, Department of Pediatric and Preventive Dentistry, V S Dental College, Bengaluru, Karnataka

Corresponding Author: Dr Syeda Husna Noorein, Post Graduate Resident Department of Pediatric and Preventive Dentistry, V S Dental College, Bengaluru, Karnataka

Citation of this Article: Dr Vivek Dhruv Kumar, Dr Syeda Husna Noorein, Dr Suma G, Dr Zuha Naseem, “Knowledge, Attitude and Practice Regarding Molar Incisor Hypomineralization and Its Management Among Pediatric Dentist”, IJDSIR- July – 2025, Volume – 8, Issue – 4, P. No. 140 – 149.

Copyright: © 2025, Dr Syeda Husna Noorein, et al. This is an open access journal and article distributed under the terms of the creative common’s attribution non-commercial License. Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given, and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Molar Incisor Hypomineralization (MIH) poses a considerable challenge in pediatric dentistry, as it involves developmental enamel defects affecting the first permanent molars and incisors. These defects lead to discoloration, structural weaknesses, and heightened susceptibility to caries, sensitivity, and wear.

The compromised enamel often lacks the typical strength and resistance to acids, making affected teeth more prone to demineralization and decay. Additionally, MIH can cause functional and aesthetic concerns for children, potentially impacting their self-esteem and oral health-related quality of life. This study aims to evaluate

the knowledge and practices of pediatric dentists regarding the management of initial carious lesion in children with Molar Incisor Hypomineralization (MIH).

Materials and Methodology: An online questionnaire survey was performed among a minimum of 100 pediatric dentists. Using google form, Responses were recorded was statistically analyzed.

Results and Conclusion: The average knowledge on MIH was considered better among pediatric dentists when compared with the post graduates and least amongst the general dentists.

These results may serve future programs to increase knowledge, perceptions and clinical experiences towards MIH.

Keywords: Molar Incisor Hypomineralization (MIH), management, RMGIC, survey

Introduction

Molar incisor hypomineralization (MIH) was first described by Weerheijm et al ¹ in 2001 and refers to qualitative developmental enamel defects, which affect one or more first permanent molars and, less frequently, the upper permanent incisors. It clinically presents as white-creamy or yellow-brown demarcated opacities, and it is combined with structural loss, resulting in post-eruptive enamel breakdown (PEB) in severely affected enamel.

It poses a considerable challenge in pediatric dentistry, as it involves developmental enamel defects affecting the first permanent molars and incisors. These defects lead to discoloration, structural weaknesses, and heightened susceptibility to caries, sensitivity, and wear.

The compromised enamel often lacks the typical strength and resistance to acids, making affected teeth more prone to demineralization and decay. Additionally, MIH can cause functional and aesthetic concerns for children, potentially impacting their self-esteem and oral health-related quality of life.

However, the management approach can vary among pediatric dentists, with some favouring more conservative treatments, such as fluoride therapies, while others may prefer more invasive methods like restorations or sealants, especially in cases with deeper lesions. This disparity in the approach to treating initial carious lesions in MIH stems from the variety of treatment options available, as well as differing clinical experiences and guidelines among practitioners.

This study aims to evaluate the knowledge and practice of pediatric dentists regarding the management of initial carious lesion in children with Molar Incisor Hypomineralization (MIH).

Material and Methods

The study was performed among 100 pediatric dentist including pediatric post graduate students. Google forms software survey was used to create an online English questionnaire. A questionnaire was designed based on the existing validated questionnaire ²⁻⁴. The questionnaire was first piloted by a group of postgraduate students to ensure that the questions were easy to understand and took no longer than 5 min to complete. The respondents could reply anonymously via a google form questionnaire link. The google form link was sent using WhatsApp, personal email and was put up on pediatric forum of various social platforms like Facebook, twitter and Instagram. The email declared by the participants was optional.

The inclusion criteria for this questionnaire study was practising pediatric dentists and pediatric post graduate students. The exclusion criteria included interns, general dental practitioners and specialists other and pediatric dentist.

Questionnaire Instruments

The Questionnaire consisted of three parameters to assess the knowledge, attitude and practise. In knowledge the possible etiologic factors related to MIH was considered as it is considered to be multifactorial in nature, in attitude section pediatric dentists were asked if they felt confident in identifying MIH, their challenges encountered. And in practise individual questions on different aspects of procedure like favourable material of choice for restoration, when is the need for preventive treatment, what kind of remineralizing paste and what

instruction is usually advised, how frequent is the recall visit.

The following 19 questions were evaluated by a group of 3 experienced pediatric dentists to assess the various treatment option being used.

Analysis

Data were entered into an excel spreadsheet by google forms. Statistical analysis was performed using IBM SPSS software. Descriptive analysis (simple frequency distribution and percentage) was determined significant difference between the 2 study groups (pediatric dentists and postgraduates) was checked using Pearson's chi-square test.

Knowledge

Have u come across cases of MIH in your practise?

- a) Yes
- b) No
- c) Not sure

What do u think the Etiology of MIH could be:

- a) Acute medical conditions that affects the mother or child during pregnancy
- b) Believed to be related to systemic disturbances during tooth development
- c) Exclusively caused by genetic factors

Attitude

Are u Confident in Managing MIH:

- a) Highly confident in all aspects of MIH management
- b) Confident in diagnosis, but less confident in treatment planning and communication
- c) Not confident in any aspect of MIH management

What do u think are the main Challenges in Managing MIH:

- a) Primarily patient non-compliance
- b) Managing patient behavior, achieving adequate anesthesia, and obtaining good isolation
- c) Lack of diagnostic tools and difficulty in diagnosis.

Practice

Factors Considered in Treatment Planning: (x)

- a) Only the severity of the defect is considered
- b) The severity of the defect, the child's age, the presence of symptoms, and the child's caries risk are considered
- c) Treatment plans are standardized for all cases

Preventive Measures Recommended:

- a) No specific preventive measures are recommended
- b) Good oral hygiene practices, fluoride treatments, and dental sealants are recommended
- c) Preventive measures are not effective for MIH

Restorative Options Commonly Used:

- a) Primarily fillings made of composite
- b) Resin infiltration, glass ionomer cement
- c) use of crowns and veneers

Non-restorative Options Considered:

- a) Non-restorative options are rarely considered
- b) Fluoride varnish, sealants, and sometimes bleaching are considered
- c) Only fluoride varnish with remineralizing agents

Follow-up Appointment Frequency:

- a) No regular follow-up appointments are scheduled
- b) Follow-up appointments are typically scheduled every 6 months
- c) Follow-up appointments are only scheduled for complex cases

Barriers to Effective MIH Management:

- a) No significant barriers exist
- b) Patient behavior, financial constraints, and limited access to specialized equipment or materials can be barriers
- c) The primary barrier is the lack of awareness among dentists

Which of the following treatments can be used to arrest caries progression in early stages of MIH-affected teeth?

- a) Only traditional restorative fillings
- b) Silver Diamine Fluoride (SDF) application
- c) Immediate extraction of the affected tooth

What is the role of resin infiltration in managing initial carious lesions in MIH?

- a) It is not effective in MIH-affected teeth
- b) It can be a minimally invasive option to strengthen and seal the affected enamel
- c) It is contraindicated in MIH due to the weakened enamel structure

How does the management of initial carious lesions in MIH differ from those in non-MIH teeth?

- a) There are no significant differences in management
- b) MIH-affected teeth require more aggressive treatment
- c) MIH-affected teeth often require more conservative and minimally invasive approaches

Which of the following is crucial for long-term success in managing initial carious lesions in MIH?

- a) Relying solely on restorative treatments
- b) Regular dental check-ups and good oral hygiene practices at home
- c) Avoiding all sugary foods and drinks

ACP and CCP Paste Application in MIH Management

What is the primary role of Casein Phosphopeptide-Amorphous Calcium Phosphate (CPP-ACP) pastes (like MI Paste) in MIH management?

- a) To remove the affected enamel
- b) To provide immediate pain relief
- c) To promote remineralization of weakened enamel

How do CPP-ACP pastes work to remineralize enamel?

- a) By directly filling in the defects in the enamel
- b) By delivering calcium and phosphate ions to the tooth surface, facilitating remineralization
- c) By strengthening the underlying dentin

When is the most effective time to apply CPP-ACP pastes?

- a) Immediately after brushing and flossing
- b) Before brushing in the morning
- c) At bedtime, allowing for prolonged contact with the teeth

How do you instruct patients to use CPP-ACP pastes?

- a) Apply a thin layer to the affected teeth and rinse thoroughly
- b) Apply a thin layer to the affected teeth and avoid rinsing for at least 30 minutes
- c) Apply a thick layer to the affected teeth and rinse immediately

Which treatment would you prefer for a semi-erupted permanent molar with moderate MIH, post-eruptive fracture and sensitivity in the tooth in a seven-year-old patient?

- Fluoride varnish
- Glass ionomer cement
- Composite
- Extraction
- Not sure

Results and Discussion

From 100 samples 6 general dentists with 43 pediatric dentist and 51 postgraduates had participated in the survey.

Knowledge:

Q1.	May be		No		Yes		χ^2	P-Value
	n	%	n	%	n	%		
Other	0	0%	11	25%	2	4%	16.258	0.003*
Pediatric Dentist	0	0%	11	25%	23	46%		
Postgraduate Student	6	100%	22	50%	26	50%		
Total	6	100%	43	100%	51	100%		

Statistically significant association was observed between knowledge and experience of MIH (P<0.01).

Q2	Other		Pediatric Dentist		Post Graduate Student	
	n	%	n	%	n	%
Acute medical conditions that affects the mother or child during pregnancy	1	10%	4	10%	5	10%
Acute medical conditions that affects the mother or child during pregnancy; Believed to be related to systemic disturbances during tooth development	1	20%	9	20%	10	20%
Acute medical conditions that affects the mother or child during pregnancy; Believed to be related to systemic disturbances during tooth development; Exclusively caused by genetic factors	1	14%	6	14%	7	14%
Believed to be related to systemic disturbances during tooth development	3	48%	21	48%	24	48%
Exclusively caused by genetic factors	0	8%	3	8%	4	8%
Total	6	100%	43	100%	51	100%

Q4	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Confident in diagnosis, but less confident in treatment planning and communication	6	100%	22	50%	39	77%	29.180	<0.001*
Highly confident in all aspects of MIH management	0	0%	22	50%	4	8%		
Not confident in any aspect of MIH management	0	0%	0	0%	8	15%		
Total	6	100%	43	100%	51	100%		

*denotes significant association

Q5	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Lack of diagnostic tools and difficulty in diagnosis	2	33%	10	23%	24	46%	7.553	0.109
Managing patient behavior, achieving adequate anesthesia, and obtaining good isolation	2	33%	25	59%	18	35%		
Primarily patient non-compliance	2	33%	8	18%	10	19%		
Total	6	100%	43	100%	51	100%		

Q6	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Only the severity of the defect is considered	0	0%	0	0%	4	8%	6.408	0.171
The severity of the defect, the child's age, the presence of symptoms, and the child's caries risk are considered	6	100%	41	95%	47	92%		
Treatment plans are standardized for all cases	0	0%	2	5%	0	0%		
Total	6	100%	43	100%	51	100%		

Q7	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Good oral hygiene practices, fluoride treatments, and dental sealants are recommended	4	67%	31	73%	43	85%	3.920	0.417
No specific preventive measures are recommended	0	0%	4	9%	2	4%		
Preventive measures are not effective for MIH	2	33%	8	18%	6	12%		
Total	6	100%	43	100%	51	100%		

Q8	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Primarily fillings made of composite	0	0%	6	14%	6	12%	5.615	0.230
Resin infiltration, glass ionomer cement	2	33%	23	55%	33	65%		
Use of crowns and veneers	4	67%	14	32%	12	23%		
Total	6	100%	43	100%	51	100%		

Q9	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Fluoride varnish, sealants, and sometimes bleaching are considered	0	0%	25	59%	20	38%	11.715	0.020*
Non-restorative options are rarely considered	2	33%	2	5%	10	19%		
Only fluoride varnish with re-mineralizing agents	4	67%	16	36%	22	42%		
Total	6	100%	43	100%	51	100%		

Q10	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Follow-up appointments are only scheduled for complex cases	0	0%	2	5%	4	8%	2.819	0.589
Follow-up appointments are typically scheduled every 6 months	6	100%	41	95%	45	88%		
No regular follow-up appointments are scheduled	0	0%	0	0%	2	4%		
Total	6	100%	43	100%	51	100%		

Q11	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Patient behavior, financial constraints, and limited access to specialized equipment or materials can be barriers	4	67%	27	64%	31	62%	0.086	0.958
The primary barrier is the lack of awareness among dentists	2	33%	16	36%	20	38%		
Total	6	100%	43	100%	51	100%		

Q12	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Immediate extraction of the affected	0	0%	0	0%	1	3%	4.545	0.337

tooth								
Only traditional restorative fillings	2	33%	10	23%	20	39%		
Silver Diamine Fluoride (SDF) application	4	67%	33	77%	30	58%		
Total	6	100%	43	100%	51	100%		

Q13	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
It can be a minimally invasive option to strengthen and seal the affected enamel	2	33%	37	86%	45	88%	32.908	<0.001*
It is contraindicated in MIH due to the weakened enamel structure	4	67%	6	14%	0	0%		
It is not effective in MIH-affected teeth	0	0%	0	0%	6	12%		
Total	6	100%	43	100%	51	100%		

Q14	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
MIH-affected teeth often require more conservative and minimally invasive approaches	6	100%	29	68%	41	81%	6.115	0.191
MIH-affected teeth require more aggressive treatment	0	0%	12	27%	6	12%		
There are no significant differences in management	0	0%	2	5%	4	8%		
Total	6	100%	43	100%	51	100%		

Q15	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Avoiding all sugary foods and drinks	0	0%	0	0%	6	12%	16.276	0.003*
Regular dental check-ups and good oral hygiene practices at home	6	100%	35	82%	45	88%		
Relying solely on restorative treatments	0	0%	8	18%	0	0%		
Total	6	100%	43	100%	51	100%		

*denotes significant association

Q16	Other		Pediatric Dentist		Post Graduate Student	
	n	%	n	%	n	%
To promote remineralization of weakened enamel	6	100%	11	26%	51	100%
Total	6	100%	11	26%	51	100%

Q17	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
By delivering calcium and phosphate ions to the tooth surface, facilitating remineralization	6	100%	39	91%	51	100%	5.393	0.249
By directly filling in the defects in the enamel	0	0%	2	5%	0	0%		
By strengthening the underlying dentin	0	0%	2	5%	0	0%		
Total	6	100%	43	100%	51	100%		

Q18	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
At bedtime, allowing for prolonged contact with the teeth	2	33%	37	86%	41	81%	44.791	<0.001*
Before brushing in the morning	4	67%	2	5%	0	0%		
Immediately after brushing and flossing	0	0%	4	9%	10	19%		
Total	6	100%	43	100%	51	100%		

*denotes significant association

Q19	Other		Pediatric Dentist		Post Graduate Student		χ^2	P-Value
	n	%	n	%	n	%		
Apply a thin layer to the affected teeth and avoid rinsing for at least 30 minutes	4	67%	39	91%	43	85%	2.841	0.242
Apply a thin layer to the affected teeth and rinse thoroughly	2	33%	4	9%	8	15%		
Total	6	100%	43	100%	51	100%		

Q20	Other		Pediatric Dentist		Post Graduate Student	
	n	%	n	%	n	%
Composite	1	10%	4	10%	5	10%
Extraction	1	20%	9	20%	10	20%
Fluoride varnish	1	14%	6	14%	7	14%
Glass ionomer cement	3	48%	21	48%	24	48%
Not sure	0	8%	3	8%	4	8%
Total	6	100%	43	100%	51	100%

With MIH being a globally alarming problem and developing countries need to deal with the majority of MIH burden ⁵, there is a great need to address any knowledge gaps in such countries. To the best of the authors' knowledge, this is the first questionnaire to investigate the knowledge, perceptions, attitudes, and clinical experiences on MIH among pediatric dentists and postgraduates. We used an online questionnaire because it is more accurate, easier to use by participants, and increases the obtained response rate.

The prevalence of MIH in India was estimated to be 10.0% (95% CI: 0.07, 0.12) with significantly high heterogeneity.⁶ Although the etiology of MIH remains unclear to date, two theories have been suggested: environmental insults during the prenatal, perinatal, and postnatal periods or a genetic origin. with the results from this study the knowledge about the etiology seems to be multifactorial in nature. The present study reveals the barriers in management of MIH initial lesion is the limited access to the specialized material act as barrier. A B Skaare et al.2021, The clinician's treatment of MIH varied. Difficulties achieving adequate local anaesthetic (71.4%) and the child's behavioural problems (84.1%) were treatment barriers for the dentists. Schwen-dicke et al. 2018 ⁸ MIH-affected teeth, 27.4% (23.5–31.7%) did or will require the need for treatment due to pain, sensitivity, or post-eruptive breakdown .According to treatment for a semi-erupted permanent molar with moderate MIH, post-eruptive fracture and sensitivity in the tooth in a seven-year-old patient . The results showed the higher end to the use of GIC cement (37%) and Fluoride varnish (33.7%), with about 18% not sure about the treatment plan among pediatric dentist. Similar study shows that the use of composite restoration significant along with the GIC restoration sawia Karkoutly et.al.

In the present study, the most preferred dental material used by respondents was GIC restoration and resin infiltration. The findings were consistent with other studies but not in agreement with the results of Crombie et al and Lygidakis et al. reported a successful result of composite resin restoration after four years of placement on two or more surfaces of affected MIH molars. On the other hand, Mejare et al. and Kotsanos et al. found a considerable failure rate with composite resin and a need for additional retreatment.

A good response rate is a strength of this study. However, it has drawbacks. Firstly, in questionnaires, most participants would select answers that they deem correct, rather than those truly reflect their practices and beliefs. Secondly this study did not specify the demographic data as participants were from all over the globe. Thirdly, most participants were below the age of 30 and had fewer than 5 years of practice. Hence, the results of this questionnaire should be generalized with caution.

Conclusion

The findings from this survey provide valuable insights into the awareness of MIH. Where the average knowledge on MIH was considered better among pediatric dentists when compared with the post graduates and least amongst the general dentists. The Respondents did perceive an increased incidence of MIH, and lack in diagnosis, which could be corrected with the help of various programs and them being updated about the advanced restorative options available in market.

The recommended material of choice is RMGIC as the restoration with RMGIC have proved to be a good option, presenting greater longevity in a molar with minor structural defects and requiring repair or replacement in molars with larger structural defects. For

more severe destructive cases it is suggestive of endodontic procedure with crown placement preferably zirconia or stainless steel crown. And for minor initial preventive produre regular fluoride therapy with resin infiltration every 6 months.

These results may serve future programs to increase knowledge, perceptions and clinical experiences towards MIH.

References

1. Weerheijm KL, Duggal M, Mejàre I, Papagiannoulis L, Koch G, Martens LC, et al. Judgement criteria for molar incisor hypomineralisation (MIH) in epidemiologic studies: a summary of the European meeting on MIH held in Athens, 2003. *Eur J Paediatr Dent.* 2003;4:110–3.
2. Karkoutly, M., Hamza, B., Al Batal, S. et al. Knowledge, perceptions, attitudes, and clinical experiences on molar incisor hypomineralization among Syrian pediatric dentists and general dental practitioners: a cross-sectional study. *BMC Oral Health* **22**, 561 (2022). <https://doi.org/10.1186/s12903-022-02620-5>
3. Alshammari, Naji & Almugren, Amjad & Lopez, Jose & Almarshedy, Samaher. (2021). Knowledge, attitude, and practice regarding molar incisor hypomineralization among general dental practitioners in Saudi Arabia. *International Journal Of Community Medicine And Public Health.* 8. 4225. [10.18203/2394-6040.ijcmph20213523](https://doi.org/10.18203/2394-6040.ijcmph20213523).
4. Alanzi A, Faridoun A, Kavvadia K, Ghanim A. Dentists' perception, knowledge, and clinical management of molar-incisor-hypomineralisation in Kuwait: a cross-sectional study. *BMC Oral Health.* 2018 Mar 7;18(1):34. doi: 10.1186/s12903-018-0498-2. PMID: 29514684; PMCID: PMC5842522.
5. Schwendicke F, Elhennawy K, Reda S, Bekes K, Manton DJ, Krois J. Global burden of molar incisor hypomineralization. *J Dent.* 2018;68:10–8. <https://doi.org/10.1016/j.jdent.2017.12.002>.
6. Shetty AJ, Dixit UB, Kirubakaran R. Prevalence of molar incisor hypomineralization in India: A systematic review and meta-analysis. *J Indian Soc Pedod Prev Dent.* 2022 Oct-Dec;40(4):356-367. doi: 10.4103/jisppd.jisppd_462_22. PMID: 36861551
7. AB, Houlihan C, Nybø CJ, Brusevold IJ. Knowledge, experience and perception regarding molar incisor hypomineralisation (MIH) among dentists and dental hygienists in Oslo, Norway. *Eur Arch Paediatr Dent.* 2021 Oct;22(5):851-860. doi: 10.10kaare 07/s40368-021-00649-8. Epub 2021 Aug 12. PMID: 34386932; PMCID: PMC8526464.
8. Alhowaish L, Baidas L, Aldhubaiban M, Bello LL, Al-Hammad N. Etiology of Molar-Incisor Hypomineralization (MIH): A Cross-Sectional Study of Saudi Children. *Children (Basel).* 2021 Jun 2;8(6):466. doi: 10.3390/children8060466. PMID: 34199358; PMCID: PMC8228630.