

**To assess the knowledge, perception and attitude towards molar-incisor hypo mineralisation (MIH) among dentists in Modi Nagar**

<sup>1</sup>Dr. Nidhi Agarwal, Professor and Head, Department of Pediatric Dentistry, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India

<sup>2</sup>Dr. Zohra Jabin, Professor, Department of Pediatric Dentistry, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India

<sup>3</sup>Dr. Ashish Anand, Reader, Department of Pediatric Dentistry, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India

<sup>4</sup>Dr. Smita Kumari, Postgraduate Student, Department of Pediatric Dentistry, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India

<sup>5</sup>Dr. Nandita Waikhom, Senior Lecturer, Department of Pediatric Dentistry, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India

**Corresponding author:** Dr. Nidhi Agarwal, Professor and Head, Department of Pediatric Dentistry, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India

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**Abstract**

**Background:** MIH is defined as a qualitative enamel developmental defect of systemic origin that affects one or more first permanent molars with or without the involvement of permanent incisors. There is little knowledge of about MIH condition, its clinical presentation and management in undergraduate curriculum. The purpose of the present study was to evaluate and compare the perceptions, knowledge, and clinical experiences of MIH in general dental

practitioners (GDPs), Interns, post graduates and faculty in Modinagar.

**Methods:** An online link with structured questionnaire was distributed to 256 dentists to collect the responses from dentists regarding their knowledge, perceptions and attitude towards about MIH. The level of knowledge regarding MIH was compared among the four groups (interns, post graduates, faculty, general practitioners).

**Results:** The majority of respondents had observed MIH in their clinical practice (85.4%). The participants who had a postgraduate degree had a significantly higher

knowledge score value than bachelor degree. There was significant difference in knowledge about MIH among four groups i.e., Faculty > PG student> GP> Intern.

**Conclusions:** Dentists with BDS degree reported less knowledge about MIH diagnosis which necessitates conducting continuing education, workshops courses to provide high- quality dental care for children with MIH.

**Keywords:** General Dental Practitioners, Molar-Incisor Hypo Mineralization, Perception, , Questionnaire

## Introduction

The term MIH was first characterized by Weerheijm et al. in 2001, and the term "molar incisor hypo mineralization" (MIH) was later approved by the international dental community at the European Academy of Paediatric Dentistry Congress in Athens in 2003.<sup>1</sup>

Molar-Incisor Hypo mineralization (MIH) is defined as "a qualitative defect of systematic origin of the enamel, involving one or more first permanent molars (FPMs)", which is usually associated with affected incisors.<sup>1</sup>

Similar lesions may be visible in second primary molars, and their presence has been stated as a predictive factor for MIH development.<sup>2</sup> It is known as hypo-mineralized second primary molar (HSPM) when it manifests in deciduous teeth, and it primarily affects the second molars and canines. It is thought to be a risk factor for MIH in the permanent teeth.<sup>3</sup>

The terms and definitions for enamel defects in hypo-mineralized molars, with or without post-eruptive enamel fractures have been used in a wide range of ways in the dental literature such as enamel opacity not caused by fluoride, internal enamel hypoplasia, non-endemic enamel speckling, opaque stains, idiopathic enamel opacities, and enamel opacity. While some titles only refer to the pathology, others also identify the causative

agent<sup>4</sup>. The causes of MIH are still unknown despite numerous reports on its aetiology.<sup>5</sup>

Clinically, MIH-affected teeth may appear in different ways and to varying degrees in the same patient, ranging from moderate opacities to severe post-eruptive disintegration that may impact one to four first permanent molars.<sup>6</sup> The diagnosis of MIH can be challenging, as it can be mistaken for enamel hypoplasia, fluorosis and amelogenesis imperfecta. The enamel opacities seen in fluorosis are diffuse and symmetrical, in contrast to the well-demarcated lesions of the enamel in MIH; lesions due to amelogenesis affect all the teeth as this is a hereditary, genetic disorder, whereas lesions due to MIH only affect some of the teeth. Due to the quick onset and development in a very porous substrate, secondary cavity lesions may also make the diagnosis more difficult.<sup>7</sup>

Early diagnosis of MIH by dentists includes six-step approach of MIH management (risk identification, early diagnosis, remineralization, prevention of dental caries, restorations or extractions, and maintenance).<sup>8</sup> However, it is observed that clinicians find the identification and diagnosis of MIH difficult and challenging due to limited knowledge about this entity.

Therefore, the purpose of this study is to assess the knowledge of general dental practitioners, interns, postgraduate students, faculty of various departments in Modinagar, about MIH clinical condition considering its diagnosis, prevalence, severity and clinical management.

## Materials and methods

### Study design

The present cross-sectional study employed a survey to solicit responses from dentists with BDS and MDS degree including interns, post-graduate students, and faculty of the Institute of Dental studies and technology along with general practitioners in Modinagar about

their knowledge regarding MIH. Ethical approval was sought from the Institutional ethical board.

A Google based questionnaire (Figure 1) was designed to assess the awareness and knowledge of MIH among study subjects. The purpose of the study was explained to the participants through mail and their consent for the participation was obtained. Few reminders about form completion was also sent to them. Link for the questionnaire was sent to 256 dentists. The survey was online for 3 months from January 2022 to March 2022.

A pilot version of the questionnaire was tested randomly on both BDS and MDS students along with few faculties from different departments to ensure the questions had been correctly prepared, was easily understandable and did not entail a prolonged response time.

#### **Survey instrument**

The questionnaire was divided into two main sections. The first section covered demographics (age group, years of practice, occupational sector, qualification. In the second section of the questionnaire, clinical appearance (severity of MIH lesions, similar lesions in the second primary molar), prevalence (how often do they see MIH lesions, how many patients they deal), perception (changes in the incidence of MIH lesions in recent years), participant's attitudes, knowledge (etiology) and practice in MIH management and, finally, restorative options in MIH management (types of restoration material and factors that influence the choice) were asked.

#### **Analysis**

A descriptive profile for the dentists was provided as first part of data analysis then the responses of the four groups of dentists (dental practitioners, interns, post graduates and faculty) were compared using one way ANOVA test. Independent t test was used for comparison of correct answer of BDS and MDS. Only

complete responses were counted in statistical analysis. In all tests, the significance level was determined to be p-value equal or less than 0.05.

#### **Results**

Of the total 256 dentists that were sent questionnaire through online link, 105 responded. Two participants were excluded because they handed incomplete question resulting in a response rate of 40.23% (n = 103).

Table 1 shows the demographic characteristics of the participants. Most respondents were females (53.4%); slightly more than males (46.6%). On the basis of qualification, 68% participants had bachelor degree whereas 2% had master degree. The sample included Interns (24.3%), post graduates (39.8%), faculty (6.8% and general practitioners (29.1%).

Knowledge and perception of respondents about MIH are illustrated in Table 2. When enquired about MIH, most respondents (85.4%) have encountered MIH cases during their practice and were aware of this clinical condition where as 7.8% of respondents had no idea about it.

More than half of the respondents (78.6%) consider MIH as a developmental defect. 61.2% of respondents stated that MIH is not related to dental caries in any form. Also 19.4% respondents said they were not able to differentiate between MIH and caries.

Nearly half of the respondents (58.3%) have encountered this lesion in first permanent molars and incisors. The knowledge of respondents regarding the etiology of MIH was variable. Most respondents consider developmental defect (59.2%) as a causative factor for MIH and this difference was statistically significant.

In terms of prevalence, 41.8% respondents have agreed that they see MIH cases frequently during their day-to-day practice and 45.6 % dentists denied about the frequency.

Regarding MIH management considerations, the majority of the respondents (63.1%) believed that early examination is important to treat MIH. Mostly respondents choose fluoride varnish (55.3%) followed by stainless steel crown (21.4%) & 19.4% respondents chose composite restoration as the treatment of choice. Most respondents refer internet (38.8%) to acquire knowledge about MIH followed by textbook (34%) journal or lecture (13.6%).

On comparing the mean values of BDS and MDS category, no statistically significant difference (-6.17%) was found. (TABLE 3, GRAPH 1). When compared the mean value among the categories in TABLE 4 (Faculty, PG student, GP, Intern) ; there was significant difference in correct answers among the four groups. (p<0.05). TABLE 5, GRAPH 2 shows pair wise comparison between the categories with a statistically significant difference.

**TO ASSESS THE KNOWLEDGE, PERCEPTIONS AND ATTITUDE TOWARDS MOLAR HYPOMINERALISATION (MIH) AMONG DENTISTS**

NAME: \_\_\_\_\_ GENDER: \_\_\_\_\_ EMAIL ID: \_\_\_\_\_

EDUCATION LEVEL:

- BDS
- MDS
- PHD

QUALIFICATION:

- INTERN
- PG STUDENT \_\_\_\_\_
- FACULTY
- GENERAL PRACTITIONER

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1. DO YOU KNOW WHAT MIH IS?

- YES
- NO
- NOT SURE

2. IS IT A DEVELOPMENTAL DEFECT?

- YES
- NO
- NOT SURE

3. IS MIH A FORM OF CARIES?

- YES
- NO
- NOT SURE

4. WHICH TEETH ARE AFFECTED IN MIH?

- ALL PRIMARY MOLARS AND INCISORS
- ALL PERMANENT MOLARS AND INCISORS
- ALL PRIMARY TEETH
- ALL PERMANENT TEETH

5. MIH IS CAUSED DUE TO

- DISTURBANCES AT THE TIME OF BIRTH
- LACK OF FLUORIDE AT THE TIME OF BIRTH
- POOR ORAL HYGIENE
- DEVELOPMENTAL DEFECT

6. HAVE YOU SEEN CASES OF MIH IN YOUR CLINICAL PRACTICE?

- YES
- NO
- NOT SURE

7. DO YOU BELIEVE MIH IS RESPONSIBLE FOR CARIES?

- YES
- NO
- NOT SURE

8. DO YOU THINK MIH CAN BE TREATED EARLY?

- YES
- NO
- NOT SURE

9. WHAT DO YOU THINK IS THE BEST METHOD FOR TREATING MIH?

- FLUORIDE VARNISH
- COMPOSITE RESTORATION
- STAINLESS STEEL CROWN
- NO TREATMENT

10. WHERE DO YOU LEARN ABOUT MIH?

- TEXTBOOK
- JOURNALS
- INTERNET
- LECTURES

Figure 1. Questionnaire

Table 1: Demographic details

Variable	Category	N	%
Gender	Male	48	46.6
	Female	55	53.4
Qualification	BDS	70	68
	MDS	33	32
Designation	Interns	25	24.3
	PG Students	41	39.8
	Faculty	7	6.8
	General Practitioners	30	29.1

Table 2: Distribution of responses for each question

Question	Response	N	%
Do you know what MIH is?	Yes	88	85.4
	No	7	6.8
	Not sure	8	7.8
Is it a developmental defect?	Yes	81	78.6
	No	8	8.7
	Not sure	14	3.6
Is MIH a form of caries?	Yes	20	19.4
	No	63	61.2
	Not sure	20	19.4
Which teeth are affected in MIH?	All first primary molars and incisors	30	29.1
	All first permanent molars and incisors	60	58.3
	All primary teeth	7	6.8
	All permanent teeth	6	5.8
MIH is caused due to	Developmental defect	61	59.2
	Disturbances at the time of birth	20	19.4

	Lack of fluoride at birth	16	15.5
	Poor oral hygiene	6	5.8
Have you seen any MIH case?	Yes	43	41.8
	No	47	45.6
	Not sure	13	12.6
Do you believe that MIH is responsible for caries?	Yes	77	74.8
	No	10	9.7
	Not sure	16	15.5
Do you think MIH can be treated early?	Yes	65	63.1
	No	6	5.8
	Not sure	32	31.1
What do you think is the best method for treating MIH?	Composite restoration	20	19.4
	Fluoride varnish	57	55.3
	Stainless steel crown	22	21.4
	No treatment	4	3.9
From where did you learn about MIH?	Textbook	35	34.0
	Journal	14	13.6
	Lecture	14	13.6
	Internet	40	38.8

Table 3: Comparison of correct answer % among BDS and MDS

Category	Mean	SD	Difference	p value
BDS	43.33	16.62	-6.17	0.087 (NS)
MDS	49.50	17.37		

Independent t test

Table 4: Comparison of correct answer % a/c to designation

Category	Mean	SD	p value
Intern	35.56	20.54	0.010*
PG student	48.78	16.46	
General practitioner	47.78	12.43	

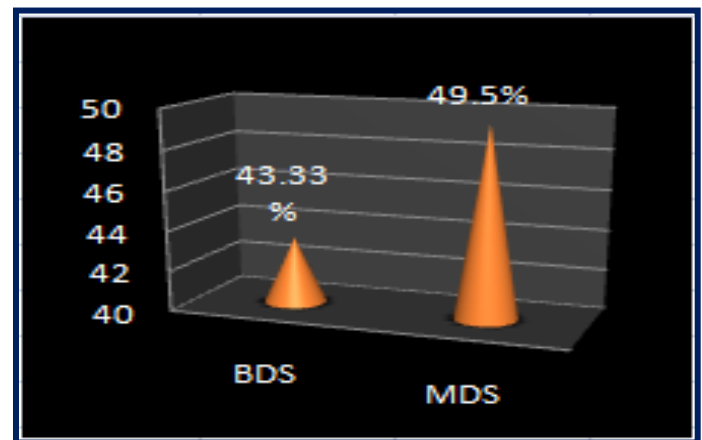
Faculty	49.20	12.60	
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One-way ANOVA test; \* indicates significant difference at  $p \leq 0.05$

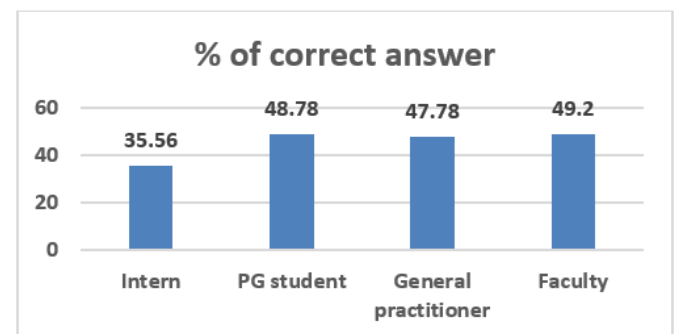
% of correct answer: Faculty > PG student > GP > Intern and there was significant difference in correct answers among four groups

Table 5: Pairwise comparison of % of correct answer

Category	p value
Intern vs PG	0.010*
Intern vs GP	0.034*
Intern vs Faculty	0.045*
PG vs GP	0.994 (NS)
PG vs Faculty	1.000 (NS)
GP vs Faculty	0.997 (NS)



Graph 1



Graph 2

**Discussion**

The study investigates the awareness, knowledge, and clinical experiences of MIH condition among BDS and

MDS degree holders be it general dental practitioners, interns, post graduates and faculty Of different departments. This study highlights the knowledge regarding diagnosis of MIH, its prevalence, Etiology and management of MIH that need to be improved to increase the understanding about its treatment management.

In the present study, it was seen that dentists with MDS degree showed better knowledge than the dentists with the BDS degree regarding identification of MIH, its cause and management. Exposure to more number of clinical cases, journals, workshops and research methods during masters might be the reason for this difference which is mainly not seen with students at BDS level.

Although MIH is a multifactorial clinical condition, majority of the dentists considered it as developmental defect. In some of the studies, genetic factors were frequently identified by dentists as a possible cause for MIH. Studies have indicated that genetic factors play a significant role in MIH<sup>9,10</sup>. Among the evaluated genetic variants, SNP rs2245803 in the MMP20 gene in a homozygous form in a recessive model was associated with MIH development with the genotype distribution of TT(3), TG(6) or GG(13) in children with MIH and distribution of TT(18), TG(42) or GG(31) in children without MIH.<sup>11,12</sup>

There are many treatment options for the restoration of teeth with MIH lesions: fluoride and/or CPP-ACP remineralization systems, silver diamine fluoride, pit and fissure sealants, resin infiltrations, conventional and modified glass ionomers with resin, resin composite, amalgam, preformed crowns, and even extractions, always depending on the severity of the lesion.<sup>8</sup> However, a recent systematic review showed that the failure rate of restorative materials in the treatment of MIH is higher with the use of amalgams and glass

ionomers, and the highest success rate is achieved with indirect restorations, preformed stainless steel crowns (SSC) and composite restoration.<sup>13,14</sup>

It is reassuring that both continuous professional development and recent dental journals were frequently used by the dentists with post-graduation degree as information sources whereas dentists with BDS degree were dependent on old editioned books and internet sources which are not reliable.

The results of this study showed that, despite increasing occurrence of MIH, there is little mention in undergraduate curricula which suggests that there is a need to include it in graduate in dental curricula about MIH. Given that lectures were the primary source of knowledge for students on MIH, it is possible that dental curricula give a strong theoretical foundation but lack practical exposure. This has led to a significant difference in knowledge of BDS and MDS category.

Without comprehensive clinical exposure to MIH in undergraduate training, future dentists will face similar challenges in terms of managing patients with MIH. The lack of clinical experience is also likely to account for the preference for further training in diagnosis, as students are as yet not familiar with its clinical presentation and are also unlikely to be aware about the significant challenges involved in managing patients with MIH. So, there should be conduction of workshops and continuing dental education on MIH for undergraduates and general dental practioners at regular intervals.

### **Limitations**

The study had some limitations. First, the response rate was low. The relatively low response rate of dentists through the online administration method was the most apparent shortcoming. Secondly, questionnaire could have been better. More clinical questions could have

been incorporated. Additionally, response bias was not counted that may have affected the responses.

### Conclusion

This study shows that molar incisor hypo-mineralization is a condition commonly encountered by dentists. Postgraduate education among dental professionals has a positive impact on MIH knowledge diagnosis and treatment. Regarding the treatment for teeth impacted by MIH, a variety of opinions were seen. To guarantee the best possible care for kids whose teeth have been impacted by MIH, proper continuing education, workshops courses on MIH are necessary.

### References

1. Weerheijm KL, Duggal M, Mejare I, Papagiannoulis L, Koch G, Martens LC, et al. Judgement criteria for molar incisor hypo mineralisation (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. Elfrink MEC, Ten Cate JM, Jaddoe VWV et al. Deciduous molar hypo mineralization and molar incisor hypomineralization. *J Dent Res.* 2012; 91:551–555.
3. Elfrink MEC, ten Cate JM, Jaddoe VWV, Hofman A, Moll HA, Veerkamp JSJ. Deciduous molar hypomineralization and molar incisor hypomineralization. *J Dent Res.* 2012; 91:551–5
4. Weerheijm KL, Jalevik B, Alaluusua S. Molar-incisor hypomineralisation. *Caries Res.* 2001; 35:390–1.
5. Serna C, Vicente A, Finke C, Ortiz AJ. Drugs related to the etiology of molar incisor hypomineralization: a systematic review. *J Am Dent Assoc.* 2016;147: 120–30
6. Meligy OAESE, Alaki SM, Allazzam SM. Molar incisor hypomineralization in children: a review of literature. *J Oral Hyg Health.* 2014; 2:1–5.
7. Garg N, Jain AK, Saha S, Singh J. Essentiality of early diagnosis of molar incisor hypomineralization in children and review of its clinical presentation, etiology and management. *Int J Clin Pediatr Dent.* 2012; 5:190–6
8. Garg N, Saha S, Jain AK, Singh J. Essentiality of early diagnosis of molar incisor hypomineralization in children and review of its clinical presentation, etiology and management. *Int J Clin Pediatr Dent.* 2012; 5:190–196. <https://doi.org/10.5005/jp-journals-10005-1164>
9. Jeremias F, Koruyucu M, Ku'chler EC, et al. Genes expressed in dental enamel development are associated with molar incisor hypomineralization. *Arch Oral Biol.* 2013; 58:1434–42.
10. Ku'hnisch J, Thiering E, Heitmu'ller D, et al. Genome-wide association study (GWAS) for molar incisor hypomineralization (MIH). *Clin Oral Investig.* 2014; 18:677–82
11. Pang L, Li X, Wang K, Tao Y, Cui T, Xu Q, et al. Interactions with the aquaporin 5 gene increase the susceptibility to molar-incisor hypomineralization. *Arch Oral Biol.* 2020; 111:104637 Epub 2019/12/31. [10.1016/j.archoralbio.2019.104637](https://doi.org/10.1016/j.archoralbio.2019.104637).
12. Bussaneli DG, Restrepo M, Fragelli CMB, Santos-Pinto L, Jeremias F, Cordeiro RCL, et al. Genes Regulating Immune Response and Amelogenesis Interact in Increasing the Susceptibility to Molar-Incisor Hypomineralization. *Caries Res.* 2019;53(2):217–27. Epub 2018/08/22. [10.1159/000491644](https://doi.org/10.1159/000491644).

13. Hussein AS, Ghanim AM, Abu-Hassan MI, Manton DJ (2014) Knowledge, management and perceived barriers to treatment of molar-incisor hypomineralisation in general dental practitioners and dental nurses in Malaysia. *Eur Arch Paediatr Dent* 15:301–307. <https://doi.org/10.1007/s40368-014-0115-2>
14. Tagelsir A, Dean JA, Eckert GJ, Martinez-Mier EA (2018) U.S. pediatric dentists' perception of molar incisor hypomineralization. *Pediatr Dent* 40:272–278