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KNOWLEDGE, ATTITUDE AND PRACTICE ON MOLAR INCISOR HYPOMINERALISATION (MIH) AMONG DENTAL STUDENTS IN TAMILNADU – A CROSS SECTIONAL STUDY

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Abstract

Background: Molar Incisor Hypominersalisation (MIH) presents a significant challenge in pediatric dentistry due to developmental enamel defects affecting the first permanent molars and incisors. These defects result in color changes, structural deficiencies, and increased susceptibility to caries and sensitivity. Despite its clinical importance and growing prevalence, there is a noticeable knowledge gap among dental students.

Objective: This study aims to evaluate the knowledge, attitudes, and practices regarding MIH among dental students in Tamil Nadu, providing insights into their understanding of MIH, including its etiology, clinical presentation, diagnostic criteria, and management strategies.

Methods: A cross-sectional survey was conducted with 324 dental students from various colleges in Tamil Nadu. Participants included third and fourth-year students and interns. The survey assessed students' familiarity with MIH, their ability to diagnose and manage the condition, and their perceptions of its prevalence and etiology. Data were analyzed using descriptive statistics and chi-square tests, with significance set at $p < 0.05$.

Results: The response rate was 94%. Most students (76.3%) were familiar with MIH, with 56% learning through books and 37.8% through lectures. While 79% were aware of the clinical features of MIH, 70% knew how to apply this knowledge, and 40% had the clinical ability to identify MIH. However, 59% found it challenging to differentiate MIH from other defects. Genetic and environmental factors were identified as significant etiological factors by 45.4% and 41.2% of students, respectively. Preformed crowns and composite restoration were the preferred treatment options among the students. The findings highlighted the need for enhanced training on MIH management.

Conclusion: The study underscores the importance of integrating comprehensive MIH education into the dental curriculum to equip future dental professionals with the necessary skills and competencies. Addressing the gaps in knowledge and practice will improve MIH management and patient outcomes in pediatric dentistry.

Keywords – MIH, KAP, undergraduates

Introduction:

The concept of Molar-Incisor Hypominersalisation (MIH) was first introduced by Weerheijm and colleagues in 2001.(1) They described it as a systemic origin of hypomineralisation, characterized by distinct, qualitative enamel defects affecting one to four first permanent molars, often accompanied by issues with the incisors.(2) Previously, this condition was referred to by various terms, such as non-fluoride enamel opacities, internal enamel hypoplasia, non-endemic mottling of enamel, idiopathic enamel opacities, and cheese molars. In 2003, MIH was more specifically defined as a developmental defect in enamel quality, resulting from decreased mineralization and inorganic enamel components, leading to enamel

discoloration and fractures in the affected teeth.(3) The global registered prevalence of MIH ranges from 2.4% to 40% and differs between countries. (4)

Molar Incisor Hypominersalisation (MIH) presents a significant challenge in pediatric dentistry, characterized by developmental defects in enamel affecting the first permanent molars and incisors(5). MIH manifests as enamel hypomineralisation, leading to color alterations, structural deficiencies, and increased susceptibility to caries and sensitivity.(6). The severity of molar-incisor hypomineralisation (MIH) can vary within the same patient, potentially affecting one to four first permanent molars. Diagnosing MIH can be challenging, as it may be mistaken for other conditions like enamel hypoplasia, fluorosis, or amelogenesis imperfecta. The presence of carious lesions, which form and progress rapidly, can further complicate the diagnosis. (7)Despite its growing prevalence and clinical significance, MIH remains poorly understood among dental students, reflecting a gap in their knowledge, attitudes, and practices regarding this condition.

This article explores dental students' knowledge, attitudes, and practices concerning Molar Incisor Hypominersalisation (MIH). It highlights the importance of early diagnosis and intervention to improve patient outcomes. Enhancing awareness and competence among dental students can significantly improve care quality for MIH-affected individuals. Improving dental education on MIH supports pediatric dental research and evidence-based practices.

Materials and methods

A questionnaire was developed to gather valuable insights from dental students regarding their understanding about Molar Incisor Hypominersalisation. This survey was specifically aimed at dental students, who are actively engaged in hands-on patient care, in Tamil Nadu . The study took place in July 2023, providing a snapshot of current perceptions and practices among the students. The study was approved by the Institutional Review Board of the Faculty of Dentistry.

The online questionnaire was distributed to 330 undergraduate students. A social media application (WhatsApp Messenger, Mountain View, CA) and e-mail were used to share the questionnaire link. The survey was opened for 6 months, and the data were collected using Google Forms. Each participant in the study was provided with a pre-validated questionnaire containing 15 closed-ended questions. These questions were carefully crafted to cover various aspects about the prevalence, etiology and treatment plan for MIH .

The questionnaire format primarily consisted of multiple-choice questions, offering respondents a structured framework to express their opinions and choices. Upon collection of the completed questionnaires, the data underwent thorough analysis. The responses were meticulously entered into Microsoft Excel, a widely used software tool for organizing and processing data. The obtained data were collected, tabulated and the results were interpreted using SPSS 26.0 software. Utilizing Excel's functionalities, the data was examined to identify trends, patterns, and correlations among the responses provided by the dental students. This

presentation format enabled a clear and concise depiction of the distribution of responses across different questions and categories.

Result

Out of the 330 students invited to participate in the study, all responded. Six surveys were excluded due to incomplete responses, leading to a response rate of 94%. At the time of the survey, 87 students (26.8%) were in their 3rd year,110 students (33.8%) were in their 4th year and 126 students (38.4%) were in their internship period (Table 1).

The survey revealed that a significant majority of students 76.3%(n= 248) were familiar with Molar Incisor Hypominersalisation (MIH). Most students 56 %, (n=182) had learned about MIH through books, and 37.8% (n=123) encountered the topic during lectures. Although 79% of students were aware of the clinical features of MIH, 70% (n=223) knew how to apply this knowledge in practice, and 40 % reported having the clinical ability to identify MIH . In terms of confidence in diagnosing MIH 30% have slight confidence in diagnosis. Furthermore, 59% of students reported difficulties distinguishing MIH from other developmental defects, particularly amelogenesis imperfecta (39.1%, n=125) and enamel hypoplasia (61%, n=192).

Regarding the etiology of MIH, 45.4% (n=187) of students identified "genetic factors" as the most common cause, followed by environmental factors 41.2% (n= 161) . Only 36.2% (n= 113) of participants felt confident about the prevalence of MIH in India.

When questioned about other teeth affected by MIH, about 38% students have mentioned that the condition could be seen in permanent canines, premolars, 2nd molar and primary 2nd molar.

When questioned about treatment options for MIH molars, 47.6% (n=186) preferred preformed crowns followed by composite restoration 44.7% (n -144). Only 15% of the students have suggested the use of resin infiltration as a treatment of choice.

Nearly all students (78.3%, n= 255) recognized MIH as a clinical issue, and for almost two-thirds (64%, n=219) of them needed furthermore training on the management.

Table 1- Knowledge of the undergraduates regarding MIH

S NO	Questions	Overall response	3rd Year	4th Year	Intern	p value
1	Familiar with MIH					
	Yes	251	35	96	118	0.000
	No	75	53	15	9	
2	How did you know about it *					
	Journals	28	6	8	14	0.104
	Books	182	36	68	78	
	Lectures	123	24	40	59	
	Other sources	58	13	18	27	
3	Prevalence of MIH in India					
	6%	70	16	24	30	0.148
	8%	120	29	47	44	
	10%	118	37	35	46	
	20%	18	7	4	7	
4	Knowledge on clinical features					
	Yes	194	18	70	106	0.000
	No	129	69	40	20	
5	Ability to identify MIH in clinical settings					
	Yes	107	14	39	60	0.000
	No	108	36	24	24	
	Maybe	109	37	39	33	
6	Knowledge on criteria to diagnose MIH					
	Yes	173	27	66	86	0.000
	No	151	59	45	47	
7	Difficulty in diagnosing MIH with other developmental defects					
	Yes	120	14	46	60	
	No	84	35	24	24	
	Maybe	119	37	39	43	
8	Developmental anomalies that mimics MIH					
	Dental fluorosis	118	38	48	32	0.013
	Enamel Hypoplasia	192	75	48	69	
	Amelogenesis imperfecta	125	22	35	68	

	Dentinogenesis imperfecta	36	9	15	12	
9	Frequency of noticing MIH					
	Weekly once or more than once	36	8	12	16	0.001
	Monthly once or more	87	25	23	37	
	Rare	145	30	51	64	
	Never seen.	51	20	22	9	
10	Most frequently noticed feature of MIH?					
	White demarcation	57	6	17	34	0.001
	Brown/ yellow demarcation	41	14	33	38	
	Enamel breakdown.	21	6	8	7	
	All the above	192	39	86	76	
11	Etiology of MIH					
	Genetic factors	187	35	65	87	0.001
	Environmental factors	161	35	55	81	
	Fluoride exposure	178	34	67	77	
	Etiology unknown	142	42	35	65	
12	Other teeth that will affected by MIH ?					
	Canines	42	13	15	14	0.000
	Premolars	40	7	19	14	
	2nd molars	72	22	23	27	
	Primary 2nd molars	231	46	83	102	
	All the above	184	46	65	73	
13	Treatment of choice for MIH					
	Amalgam restoration	76	29	34	16	0.000
	Glass Ionomer Cement	74	27	27	20	
	Composite	144	38	43	63	
	Preformed crowns	186	34	54	98	
	Resin Infiltration	49	11	15	23	
14	Is MIH a clinical problem					
	Yes	183	43	68	72	0.454
	No	68	17	22	29	
	Maybe	69	24	19	26	
15	Need on exclusive training on management of MIH					
	Yes	205	44	74	87	0.050
	No	43	14	18	11	
	Maybe	73	27	18	28	

Discussion

The study assesses students' understanding of MIH's etiology, clinical presentation, diagnostic criteria, and management strategies. It evaluates their ability to differentiate MIH from other dental conditions and its implications for oral health. The article also examines students' perceptions of MIH, its impact on patient quality of life, and the role of early detection and interventions. By exploring students' practical application of MIH knowledge, the study seeks to identify gaps and opportunities for improvement in dental education. Equipping future dental professionals with the necessary skills to manage MIH effectively is essential for optimal patient care and advancing pediatric dental practice.

In this study, we investigated the knowledge and evaluation skills of dental students concerning MIH. This condition is well-known and poses substantial clinical challenges for many patients, especially when it comes to delivering high-quality restorative treatment. Given that MIH is a globally concerning issue and developing countries bear most of its burden, it is crucial to understand the etiology, prevalence and its management. This topic has received significant attention in various European and Middle East countries like Germany, Austria, Saudi Arabia. (8–11)

Almost all the participants have known the presence of MIH in their studies which was consistent from the previous studies. Over two-thirds of the respondents were either unaware of or did not answer the question concerning the prevalence of MIH. In Saudi Arabia 43% dental students from the 4th year and 28% of the dental students from the 5th year had heard of MIH, in Germany these percentages were 95% and 99%.(9,11) 95% of the Austrian students from the 11th semester and 98.6% of the students from the 12th semester reported there were familiar with MIH.(10) More than 2 thirds of respondents don’t know about the prevalence of MIH in India which correlates with the other studies. Most of the respondents got to know about MIH through lecture classes followed by books and journals.

When it came to the etiology of MIH, opinions varied among the students. Nearly half of the students (48%) pointed to genetic factors, while around half believed environmental contaminants (41%) played a role followed by fluoride exposure (29%). In a similar study conducted among German students and Austrian students nearly 67% of the students and 70% of the students respectively have pointed out that MIH caused due to genetic factors. On equal percentage, they have also pointed out that the causation could be of environmental factors. A study conducted among Syrian GDPs and Pediatric dentists 65% and 45% of them respectively believed that the cause will be due to genetic factors and acute infections to mother during pregnancy could also be responsible for MIH.

In our study, about 58% could identify the problem clinically but one third of the students (29%) find difficulty in differentiating with other developmental defects .(12) Similarly about 20% of the German students find hard to distinguish the condition and about 57% of the Austrian students are not sure about the diagnosis.

Little is known about the condition of MIH in Egypt, where 50% of pediatric dentists (PDs) are informed about MIH, compared to only 40.2% of general practitioners (GPs) and 26.7%

of other specialties. This contrasts with a study by Elhennawy et al. (2020), which examined the academic community of Germany to assess the knowledge, attitudes, and beliefs of final-year students from all German universities. The study found that most participants were familiar with MIH terminology and diagnostic criteria, with 91.7% of students being aware of the risk factors associated with the MIH condition.

Regarding MIH treatment, the decision-making process should be multidisciplinary, involving various specialties. When it comes to the treatment team for MIH, approximately one-third of participants have preferred preformed crowns and composite restoration as treatment of choice

Molar-incisor hypomineralisation (MIH) poses numerous clinical issues, notably post-eruptive breakdown (PEB). Once a fracture occurs, the affected teeth become sensitive to cold, heat, and brushing. This sensitivity can promote plaque accumulation and increase the risk of caries. The exposed porous subsurface also allows bacteria to penetrate, complicating the administration of anesthesia. (13)In a study conducted by Haidar et al (2018) comparing the anaesthetic efficacy between 4% articaine and 2% lidocaine, they concluded stating that both of them have equal effect on anaesthetizing the tooth affected by MIH. (14)

For the treatment of posterior teeth the preferred choice among 3rd year, final year and interns is stainless-steel crowns, with percentages of 62.5%, 36.2%, and 25.6%, respectively. These findings are consistent with Ghanim et al, who also reported that for posterior teeth, stainless-steel crowns were the preferred treatment option for PDs, GPs, and other specialties, with percentages of 82.9%, 64.3%, and 49.2%, respectively.(15) For anterior teeth, the treatment choice was composite resin, with percentages of 26.8%, 42.6%, and 26.2%, respectively.

The data collected indicate that more than half of the students encounter MIH very rarely. These findings are inconsistent with Serna-Muñoz et al. (2020), who reported that 72% of PDs encounter MIH weekly and 59.46% of GPs encounter it monthly. (16)However, these findings are in line with Alanzi et al. (2018), who found that 48.8% of PDs and 44.4% of GPs notice MIH every month during their practice.(17) These variations in research data can be attributed to different diagnostic criteria and prevalence rates.

European Academy of Pediatric Dentistry have given diagnostic criterion for molar incisor hypomineralisation which eases the treatment planning.(18) The students should be taught about the recent advances about any conditions so that they will be able to diagnose and plan the treatment in accordance.

Conclusion

MIH seemed to be a topic of interest dental students as the majority of all respondents are in favor of deepening their knowledge regarding this topic. It is necessary to offer students opportunities to deepen their knowledge in the field of MIH both during and after their studies. The results suggest that the MIH topic should be more deeply implemented in the

dental curriculum, moreover, a standardized international curriculum might ensure a worldwide spread of knowledge about MIH.

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