

Molar Incisor Hypomineralization: Prevalence and Severity in 6-12 Years Old Ahmedabad Children

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ABSTRACT

Background: Enamel defects are alterations that can be easily detected in clinical examinations. One alteration of great clinical importance is Molar incisor Hypomineralization (MIH). No data on prevalence of MIH among school children of Ahmedabad city is available. The objectives of the present survey were to assess the prevalence and severity of MIH among 6-12 years old school children of Ahmedabad city, Gujarat.

Materials and Method: A total of 800 children aged 6-12 years were screened for the present study from randomly selected five schools. Clinical examination was done inside the respective schools.

Results: The prevalence of MIH in the present study was 4.3%. Only grade I defects i.e. demarcated opacity and grade II defects i.e. post-eruptive enamel breakdown were seen.

Conclusion: The study concludes that MIH is a condition that can have far reaching consequences for both the child and the dentist. Hence, at this juncture, we recommend that it is important to identify the children with MIH as early as possible and managed appropriately.

Keywords: Hypomineralization, Hypoplasia, School, Prevalence.

INTRODUCTION

Dental Enamel is a unique, highly mineralized tissue of ectodermal origin. It is characterized by a lack of metabolic activity once formed, meaning disturbances during development can manifest as permanent defects in the erupted tooth. Enamel defects are alterations that can be easily detected in clinical examinations. One alteration of great clinical importance is Molar incisor Hypomineralization (MIH). MIH can be defined as "Hypomineralization of systemic origin, which affects 1-4 first permanent molars and is frequently associated with permanent incisors".¹ MIH differs from enamel hypoplasia or quantitative defects because it is a qualitative defect

visually identified as an anomaly of enamel translucency, also called enamel opacity.

Clinically, the severity of MIH lesions may vary from demarcated opacity to structural loss that result in atypical restorations or crown destructions often followed by extractions. Hence, significant challenges to clinicians are posed by MIH, with contemporary approaches to its restorative management remaining relatively ineffective. MIH was first described in late 70's in Switzerland. The prevalence varies considerably throughout the world, ranging from 2.5% in China to 40.2% in Brazil.² Many factors have been related to MIH origin, such as problems during gestation, pre-term delivery, cyanosis, diseases of early childhood and the frequent use of antibiotics.³

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Hence, the present study was designed to assess the prevalence and severity of MIH among 6-12 years old school children of Ahmedabad city, Gujarat.

MATERIALS & METHODS

A cross sectional epidemiological study was planned to assess the prevalence and severity of Molar Incisor Hypomineralization (MIH) among 6-12 years old school children of Ahmedabad city, Gujarat. The study protocol was reviewed and approved by the Human Research Review Board of Ahmedabad Dental College and Hospital and the ethical approval was obtained by the Ethics Committee, Ahmedabad Dental College and Hospital. Sample size of 800 has been calculated based on approximate average of the prevalence found in baseline study conducted by Da Costa-Silva CM et al in 2010^{2,4,5}. Participants were informed of

the purpose and design of the study through an information sheet, and a consent was obtained from them. ADA type III examination technique^{6,7} was used. Oral examination was carried out by single examiner wearing mask and gloves. Each child was examined on an ordinary upright chair with the help of mouth mirror in an adequate natural light. Prior to examination, the child was asked to rinse the mouth thoroughly. The teeth were then cleaned and dried with cotton roll to eliminate confusing effects of food debris and saliva. The examination was done by single examiner to eliminate error. It was carried out in the uniform manner, starting from the most posterior tooth in maxillary right quadrant and then in a clockwise direction. Judgement criteria proposed by European Academy of Pediatric Dentistry (EAPD)¹ was used to assess the prevalence and severity of MIH. 40-50 children were examined each day.

Table 1: Judgement Criteria for Molar Incisor Hypomineralization (Weerheijmet *al*, 2003)¹

Observed Condition	Description
Demarcated Opacity	A defect involving an alteration in the translucency of the enamel, variable in degree. The defective enamel is of normal thickness with a smooth surface and can be white, yellow or brown in color. The border of the lesions is demarcated.
Post-eruptive enamel breakdown	A defect that indicated deficiency of the surface after eruption of the tooth. Loss of initially formed surface enamel after tooth eruption. The loss is often associated with a pre-existing demarcated opacity.
Atypical restoration	Size and shape of restoration do not conforming to the temporary caries picture. In most cases in molars restorations will be extended to the buccal or the palatal smooth surface. At the border of the restoration frequently opacity can be noticed. In incisors buccal restorations can be noticed not related to trauma.
Extracted molar due to MIH	Absence of a first permanent molar should be related to the other teeth of the dentition. Suspected for extraction due to MIH are: opacities or atypical restorations in the other first permanent molars combined with absence of a first permanent molar in a sound dentition in combination with demarcated opacities on the incisors suspected to be MIH. It's not likely that incisors will be extracted due to MIH.
Unerupted	The first permanent molars or incisors to be examined are not yet erupted.

The data recorded was transferred to a computer. A master chart was created in Microsoft ® Excel (2010) for the purpose of data analysis. Prevalence and severity of MIH was assessed by determining the percentage of children affected.

The probability value equal to or less than 0.05 ($p \leq 0.05$) was set to know the significance level. The data was analyzed using the Statistical Package for Social Sciences (SPSS) (Version 21.0).

RESULTS

A cross sectional epidemiological study was planned to assess the prevalence and severity of Molar Incisor Hypomineralization (MIH) among 6-12 years old school children of Ahmedabad city, Gujarat. Judgement criteria proposed by European Academy of Pediatric Dentistry (EAPD) was used to assess the prevalence and severity of Molar Incisor Hypomineralization. Total sample size comprised of 800 children. The prevalence of MIH in the present study was 4.3%. Out of 800 children examined, 34 were suffering from Molar Incisor Hypomineralization (Figure 1). Out of these 34 children, 19 were males and 15 were females(Figure 2).

In our study out of 34 subjects with Molar Incisor Hypomineralization, 27 children had grade I defects i.e. demarcated opacity and 7 children had grade II defects i.e. post-eruptive enamel breakdown. None of the subjects reported with atypical restorations or extractions due to Molar Incisor Hypomineralization (Figure 3). Present study demonstrated that permanent central incisors were more commonly affected than the permanent molars and the most commonly affected surface was the vestibular surface.

Fig 1: Shows distribution of subjects based on prevalence of MIH.

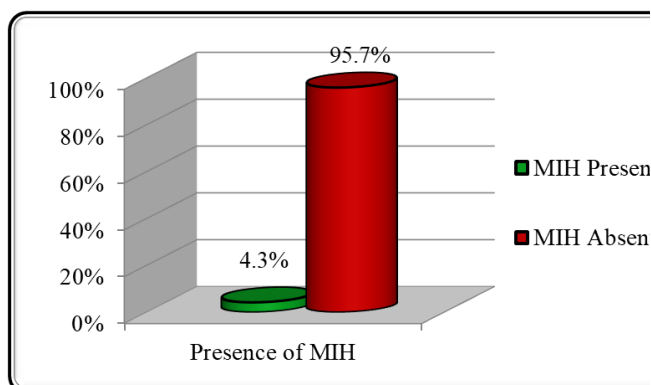


Fig 2: Shows gender based distribution of subjects with MIH.

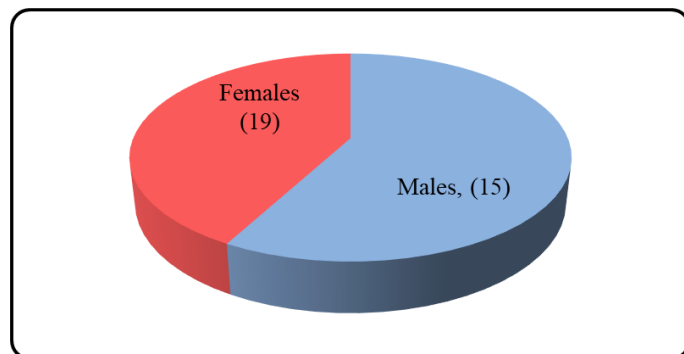
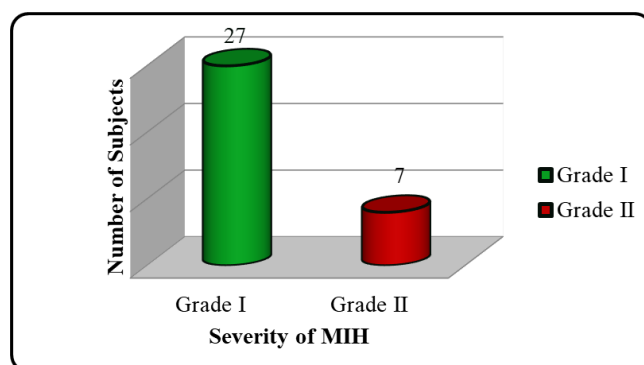


Fig 3: Shows severity-based distribution of subjects with MIH.



DISCUSSION

The lack of reliable and detailed baseline data regarding burden of Molar Incisor Hypomineralization (MIH) on the school children of Ahmedabad city prompted us to do this survey. The purpose of this study is to determine the prevalence and severity of Molar Incisor Hypomineralization in 6-12 years old school children of Ahmedabad city, Gujarat. Judgement criteria proposed by European Academy of Pediatric Dentistry (EAPD)¹ was used to assess the prevalence and severity of MIH using a mouth mirror.

The present study demonstrated 4.3% prevalence of Molar Incisor Hypomineralization in 6 to 12 years old children of Ahmedabad city, Gujarat. Higher prevalence has been reported in the literature by Jasulaityte L (2008)⁴, Soviero V (2009)³ and Da Costa-Silva CM (2010)². Cho SY (2008)⁶ found lower prevalence as compared to the present study. Defects on permanent incisors are usually not related to structural loss, as reported in present study because of absence of masticatory forces on the incisors.⁸

A number of problems are posed due to MIH such as:

- poor aesthetics
- food retention leading to plaque accumulation. Hence, MIH is also termed as 'Caries Risk Indicator'.
- higher sensitivity leading to behavioral problems

The etiology of demarcated opacities in 1st molars and incisors is not fully understood. Possible causal factors mentioned in the literature are medical problems related to the child's birth, low birth weight, or health problems during the early years, such as asthma, otitis, tonsillitis, pneumonia, or bronchitis⁹. Other factors which are considered responsible are complications during pregnancy and the association with environmental contaminants, such as exposure to dioxin or dioxin like compounds⁹ and long-term exposure to polychlorinated biphenyls (PBCs)¹⁰.

Some of the studies have limitations, such as collection of information about past childhood exposure after a relatively long interval after the exposure, when parental recall is likely to be poor, and when more appropriate information was available, small sample size limited the ability to differentiate the effects of exposures on specific type of defects.

Hence, the paucity of information on the possible causal factors in the occurrence of enamel defects in the first permanent molars suggests a need for further investigations into the causes of the defects. Identification of possible risk factors will add to the body of knowledge on the occurrence of enamel defects and may assist in implementing strategies to limit their occurrence. Management of MIH poses significant challenges to the clinician, with contemporary approaches to its restorative management remaining relatively ineffective. However advances in dental materials have provided clinical solutions in cases that were regarded as un-restorable in the past.

Table 2: Proposed treatment decision plan for MIH teeth (Lygidakis NA, 2010)¹¹

Mild Defects		Moderate/Severe Defects	
Enamel opacities without break-down, no/slight sensitivity, mild aesthetic problems, no caries		Enamel break-down, atypical restorations, sensitivity, caries, aesthetic problems	
Molars	Incisors if needed	Molars	Incisors if needed
Fluoride varnish in partially erupted teeth	In brownish-yellow defects, etch-bleach-seal approach in younger children, or chair-side bleaching with 10% carbamide peroxide in older.	Consider extractions	Wait until the defect gets better, since a degree of enamel mineralisation may occur in the salivary environment
When fully erupted, sealants with prior adhesives	In whitish defects, micro-abrasion followed if needed by CR restoration	Fluoride varnish or GIC in partially erupted teeth	CR restorations or veneers following micro-abrasion or enamel reduction and intermediate opaque resins
CR restorations if break-down or caries occur	CR restorations following enamel reduction	CR restorations for up to 3 surfaces	Porcelain veneers if needed in adulthood
Full porcelain crowns, if needed, in adulthood		PM crowns or copings for more than 3 surfaces Full porcelain crowns in adulthood	
Ongoing preventive care for all cases			

CONCLUSION

The present study suggests that the MIH is a common condition that can have far reaching consequences for both the child and the dentist. At this juncture, we recommend that it is important to

identify the children with MIH as early as possible and managed appropriately. Further ultrastructural and biochemical studies are needed for better understanding of the etiological factors of MIH.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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