

Prevalence of molar incisor hypomineralization among primary schoolchildren of three villages of Jaipur city, Rajasthan, India

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Abstract

Background: Molar incisor hypomineralization (MIH) occurs due to defect during the developmental stages of tooth. The prevalence of MIH is reported to vary between 2.4% and 40.2%. Studies on MIH in Jaipur city are not available till date.

Aim: This study aims to determine the prevalence of MIH among primary schoolchildren of three villages of Jaipur city, Rajasthan, India.

Materials and Methods: A cross-sectional epidemiological study was carried out in three government primary schools of Gunawata, Toda Meena, and Basna villages under school dental camp program of Jaipur Dental College. A total of 430 children age between 6 and 9 years were examined and MIH was found in 18 children. Among the affected children, there were 12 girls and 6 boys.

Conclusion: The prevalence of MIH among primary schoolchildren of three villages of Jaipur city was 4.19% without gender predilection.

Introduction

Molar incisor hypomineralization (MIH) occurs as a result of environmental factors affecting the developing enamel with underlying genetic predisposition. It occurs due to disturbances in the function of ameloblasts at the later phase of mineralization during amelogenesis resulting in defective enamel. Clinically, the affected enamel appears as demarcated opacities ranging from white to brown. The word MIH was coined by Weerheijm *et al.*, in 2001. Weerheijm *et al.* (2001) defined MIH as the hypomineralization of systemic origin of one to four permanent first molars frequently associated with affected incisors.^[1] During brushing, children experience pain and hypersensitivity on the affected teeth even when the enamel is intact. MIH is related to the unexpected development of rapid caries in erupting permanent first molars.

MIH is probably caused by a disturbance in the initial calcification and/or during the maturation phase of amelogenesis, causing demarcated opacities. In MIH, these opacities contain more carbon and less calcium and phosphate. In MIH-affected molars, the density of enamel in the hypomineralized areas is lower than that of unaffected sound areas. The enamel of the affected molars appears soft, porous and has the appearance of discolored chalk or old Dutch cheese.

Risk factors related to the etiology of MIH include problems during pregnancy, premature birth, diseases of early childhood such as viral and bacterial infections, and indiscriminate antibiotic therapy. These factors probably cause an alteration in the calcium-phosphate balance or insufficient oxygen supply to ameloblasts, leading to enamel defects.

According to Modified Developmental Defects of Enamel index (FDI) 1992, MIH is categorized into mild, moderate, and severe: Mild – <30% of tooth enamel surface area visibly disrupted; moderate – 31–49% of enamel surface area visibly disrupted; and severe – more than 50% of enamel surface area visibly disrupted.^[2] According to the European Academy of Paediatric Dentistry (2003), score is given against each criterion, as shown in Table 1^[3] for diagnosis of MIH.

The prevalence of MIH varies from one geographical location to another with lowest 2.4% in China to highest 40.2% in Brazil.^[4,5] Not much data related to MIH are available in India. During epidemiological survey for the prevalence of dental caries in India, children are not routinely examined for the presence of MIH. In one study, the prevalence of MIH in 7–9-year-old children of Bengaluru city was estimated to be 0.48%.^[6] No such study of Jaipur city is published till date.

Hence, the present study is to determine the prevalence of MIH among primary schoolchildren between 6 and 9 years of three villages, namely, Gunawata, Toda Meena, and Basna of Jaipur city, Rajasthan.

Materials and Methods

A cross-sectional epidemiological study was conducted between the month of August and September 2019 on a random sample of 430 normal healthy primary schoolchildren with age ranging between 6 and 9 years, in three villages, namely, Gunawata (20 boys and 28 girls), Toda Meena (78 boys and 238 girls), and Basna (33 boys and 33 girls) of Jaipur city, Rajasthan, India. The study was conducted during school dental camp program of Jaipur Dental College. Permission was taken from the head of school to carry out an oral examination of the children. The written consent was taken for parents of each participating children. The inclusion criteria were children with 6–9 years of age with at least one of their permanent first molars with minimum one-third of clinical crown height. Children with generalized enamel defects such as amelogenesis imperfecta and fluorosis were excluded from the study. Children wearing fixed appliances were also excluded from the study. The oral examination was carried out under natural daylight with sterilized mouth mirror and blunt probe. MIH was diagnosed using criteria given by Weerheijm *et al.* Every surface of the incisors and permanent first molar were examined.

A descriptive analysis of the prevalence and distribution of the clinical findings were performed from the collected data. Fischer's exact test and Chi-square test were used to calculate the pattern of distribution among boys and girls. $P < 0.05$ was considered as statistically significant.

Table 1: Criteria for scoring MIH according to the European Academy of Paediatric Dentistry

Code	Criteria
0	Enamel defect free
1	White/creamy demarcated opacities, no PEB
1a	White/creamy demarcated opacities, with PEB
2	Yellow/brown demarcated opacities, no PEB
2a	Yellow/brown demarcated opacities, with PEB
3	Atypical restoration
4	Missing because of MIH
5	Partially erupted (<1/3 of crown height) with evidence of MIH
6	Unerupted/partially erupted with no evidence of MIH
7	Diffuse opacities (not MIH)
8	Hypoplasia (not MIH)
9	Combined lesion (diffuse opacities/hypoplasia with MIH)
10	Demarcated opacities in incisors only

In 2009, these criteria were updated to simplify the use of MIH score. MIH: Molar incisor hypomineralization, PEB: Post-eruptive breakdown

Results

Out of the 430 children, MIH was found in 18 children. Among these 18 children, 6 children were boys and remaining 12 children were girls. The prevalence of MIH was found to be 4.19%. The distribution pattern and prevalence of MIH are summarized in Table 2. Involvement of only molars was more prevalent in girls and the combined involvement of both molar and incisor was more prevalent in boys. This difference was statistically significant ($P < 0.05$) [Table 2].

Discussion

This study shows that the prevalence of MIH among schoolchildren in three villages of Jaipur city was found to be 4.19%. This was greater than that observed in children of Bengaluru city. The difference in the study of the prevalence rate in different regions could be related to difference in ethnicity, age group, and the different diagnostic criteria involved. The age group of 6–9 years was predominantly selected in the present because during this age group, at least one of the first molars would have already been erupted and large carious lesion on permanent molars would be less present.

In the findings of the present study, there was no gender predilection with MIH which is in agreement with other authors. The varying degree of MIH in the permanent first molars and incisors suggests that all these teeth have different sensitivity to

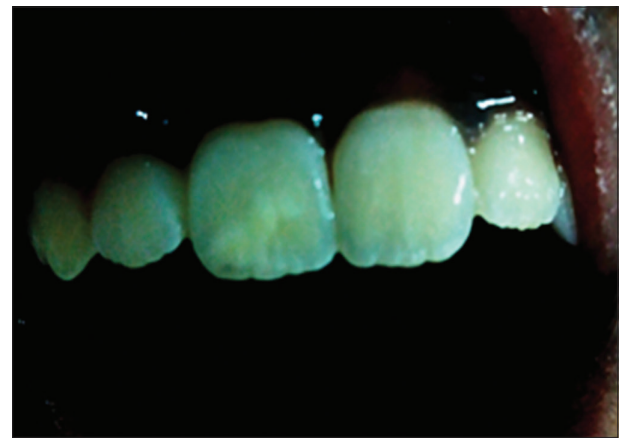


Figure 1: Molar incisor hypomineralization affected incisor with white/creamy demarcated opacity without post-eruptive breakdown

Table 2: Distribution and prevalence of MIH by gender

Affected	Boys	Girls	Total
Only molars*	1	10	11
Molars and incisors*	5	2	7
Total MIH [†]	6	12	18
Total non-MIH [†]	129	287	416

*Fischer's exact test, $P=0.0128$; [†]Fischer's exact test, $P=0.8$. MIH: Molar incisor hypomineralization

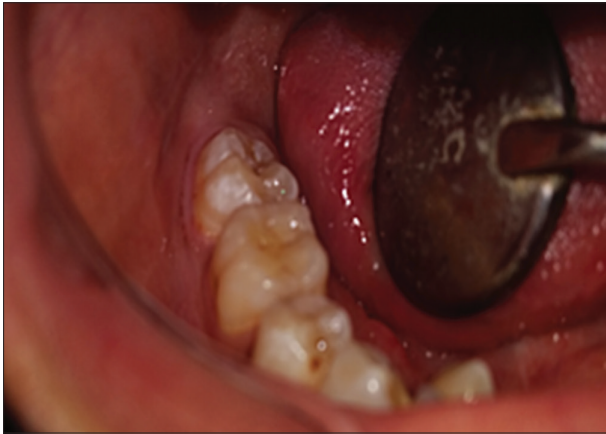


Figure 2: Molar incisor hypomineralization affected molar with white/creamy demarcated opacity without post-eruptive breakdown



Figure 4: Molar incisor hypomineralization affected molar with yellow/brown demarcated opacity with post-eruptive breakdown



Figure 3: Molar incisor hypomineralization affected molar with dentin breakdown due to caries

developmental disturbances. The frequency of demarcated opacities was the most predominant type of MIH in the present study and the yellow/brown demarcated opacities [Figures 1 and 2] were more common than white/creamy ones [Figures 3 and 4]. It is stated that the yellow/brown opacities have greater hypomineralized tissue porosities and weaker enamel, thus having greater risk of post-eruptive breakdown. In the present study, it was found that mandibular first permanent molars were affected significantly more than maxillary molars with hypomineralized defects.

Conclusion

The prevalence of MIH among primary schoolchildren of three villages of Jaipur city was found to be 4.19%. The

incidence of MIH was more prevalent in mandibular than in the maxillary teeth. The defective enamel was more prone to breakdown and caries which increased with age and there was no gender predilection. Further studies are required to determine the prevalence and etiology of MIH in other parts of Jaipur city.

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