



Prevalence Of Molar Incisor Hypomineralisation And Its Arch Wise And Gender Wise Distribution In 7 – 10 - Year-Old School Going Children Of Jaipur City, Rajasthan

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Abstract

Background

MIH is considered to be a global dental problem as it might affect patients’ quality of life as well as create treatment challenges to dentists due to a number of problems like poor aesthetics, food retention in the

defective enamel area, and higher sensitivity of the exposed dentin and burden of treatment costs necessitating the dentist to identify the problem at the earliest so as to better manage the children and do the needful treatment at the earliest.

So, in the present study the aim was to determine prevalence and gender wise and arch wise distribution of molar incisor hypomineralization.

Material and Method

A cross-sectional study was conducted among the 544 children attending the government primary school of Jaipur city. The Weerheijm criteria (2003) were used for the assessment of molar incisor hypomineralisation. The proportions were compared by using chi square test.

Results

Out of 544 school children, 43 (7.90%) had molar incisor hypo-mineralisation with no gender predilection. Maxillary teeth are commonly affected (n=125) as compared to mandibular teeth (n=117).

In maxillary arch, central incisors and first molar were equally affected. While in mandibular arch the first molars were commonly affected. Total 113 children (20.77%) had demarcated opacity in maxillary arch while for mandibular arch 105 children (19.30%) had demarcated opacity.

Conclusion

The prevalence of MIH in 7-10-year-old children of Jaipur city was found to be 7.90% with no gender predilection. MIH was more significantly associated with maxillary teeth as compared to mandibular teeth.

Keywords

Molar incisor hypo-mineralisation, Enamel, School children, Prevalence, Developmental defects.

Key Message

MIH is a frequently occurring developmental dental anomaly regarding which parents and general population is not aware. Considering the demanding nature and the costs involved it is essential to formulate public awareness and preventive programs and a

nationwide survey is needed to get an exact status of MIH in India.

Introduction

MIH is defined as hypomineralization of systemic origin of one to four first permanent molars and is frequently associated with similarly affected permanent incisors (Weerheijm, 2001)^{1,2}. Epidemiological studies from different parts of the world show a wide variation in the prevalence of MIH which can range between 2.8 to 40.2%.³ Systemic or environmental insults during the maturation stage of enamel development as well as the possibility of genetic predisposition of ameloblasts to environmental stressors have been reported.^{4,5}

Clinically, MIH presents as opacities of different colors in the affected teeth that sometimes undergo post-eruptive breakdown due to the porous and weak enamel surface. Children with MIH demonstrate considerable management problems and higher treatment needs as teeth are difficult to anesthetize, pain, fear and anxiety, frequent dental visits, caries susceptibility, poor aesthetics and post-eruptive breakdown.^{1,2,6,7} MIH is considered to be a global dental problem and in-order to better manage these children it is wise to screen them earlier and do the needful treatment at the earliest so as to prevent the future complications like post-eruptive breakdown and psychological trauma to the child. Also, by providing awareness about associated risk factors and implementing a preventive protocol can help to dramatically reduce the burden of treatment costs. So, in the present study the aim was to determine the prevalence and the gender wise and arch wise distribution of molar incisor hypomineralization.

Objectives

➤ Gender wise distribution of MIH.

➤ Distribution of MIH among maxillary and mandibular arch.

Material and method

A cross-sectional study was conducted during 1st April 2016 - 1st April 2018 among the 544 children attending government primary school of Jaipur city. Before the commencement of the study, the study protocol was approved by the institutional ethical committee (N0. JDC/PO/2016/1999-A). Written informed consent was obtained from the parents/guardians of the children who participated in the study. Referral cards were provided to the parents of the children who had MIH for the necessary treatment and were referred to Jaipur dental college, Jaipur for the same.

Inclusion Criteria

Both male and female children in the age group of 7- 10 years were included in the study. Children with the fully erupted index teeth for MIH (all permanent 1st molars and incisors) were included in the study.

Exclusion Criteria

Those children having any systemic disease, children without parental consent and unco-operative children were excluded from the study.

Also, children with amelogenesis imperfecta, dentinogenesis imperfecta, white spot lesion, fluorosis, dental erosion, with orthodontic appliances, Turner's hypoplasia, tetracycline stains were excluded from the study.

To determine the sample size for the study, a pilot study was conducted among 80 school children of Jaipur city to calculate the prevalence rate of MIH. The prevalence of MIH was determined as 15%. Considering the prevalence of 15%, the sample size of 544 was obtained by using formula; $n = Z^2 * p * q / L^2$ where

allowable error was kept at 3%. Stratified random sampling method was employed in the present study. The city was geographically stratified into 5 zones (North, West, South, East and Central). Total 10 government primary schools (two schools from each zone) were randomly selected for the enrolment of the participants.

Training and Calibration

Before collecting the data, investigator was trained and calibrated under the supervision of senior faculty in the department of Pediatric and Preventive Dentistry of Jaipur dental college, Jaipur. The inter-examiner calibration was done using kappa statistics. The kappa value of 0.83 shows good level of agreement between two examiners.

Study Setting

The permission to conduct the oral examination was sought from the School Principal. After obtaining the permission, the school children were allowed to sit comfortably on the chair within the school premises and the Type 3 oral examination was done by using plain mouth mirror and explorer under natural day light. The tooth surface was cleaned to remove the oral debris (if any) with the help of cotton rolls. Defects less than 1mm were not recorded.

Clinical Examination and diagnosis of MIH

1st permanent molars and incisors were diagnosed clinically based on MIH diagnostic criteria (Weerheijm et al, 2003)^{3,8} Table: 1

Teeth that were erupted less than 1/3rd of the crown height were considered as unerupted. Only defects greater than 1mm in diameter were recorded.

Table 1^{3,8}

Demarcated opacity	A demarcated 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.
Posteruptive breakdown (PEB)	A defect that indicates 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	The size and shape of restorations are not conforming to the temporary caries picture. In most cases, in molars there will be restorations extended to the buccal or palatal smooth surface. At the border of the restorations frequently an opacity can be noticed. In incisors a buccal restoration can be noticed not related to trauma.
Extracted molar due to MIH	Absence of a 1 st permanent molar should be related to other teeth of the dentition. Suspected for extraction due to MIH are: opacities or atypical restorations in the other 1 st permanent molars combined with absence of a 1 st permanent molar. Also, the absence of 1 st permanent molars in a sound dentition in combination with demarcated opacities on the incisors is suspected for MIH. It is not likely that incisors will be extracted due to MIH.
Unerupted	The 1 st permanent molar or the incisor to be examined is not yet erupted.

Statistical Analysis

The data were presented as proportions. Descriptive statistics was done to compare the frequency distribution of MIH according to gender, type of teeth and arch. The proportions were compared by using chi square test. Statistical Package for Social Science (SPSS version 22, IBM Corporation, Armonk, NY, USA) was used for analysis. The level of significance was kept at 5%.

Results

Table 2 shows gender wise distribution of MIH in school children. Out of 544 school children, 43 (7.90%) had MIH. The prevalence of MIH among male and female school children was 3.49% (n=19) and 4.41% (n=24) respectively. This result was statistically not significant (P=0.57) MIH prevalence is less in the 7 years old (1.29%, n=5) children as compared to children of 8 year (2.39%, n=13), 9 year (2.39%, n=13) and 10 years (2.20%, n=12).

The defects of MIH affecting the maxillary and mandibular teeth are shown in Figure 1 and 2 respectively. Maxillary teeth are commonly affected (n=125) as compared to mandibular teeth (n=117).

The distribution of school children having defects in both maxillary and mandibular arch is shown in Table 3. In maxillary arch the central incisors and first molar are equally affected. While in mandibular arch the first molars were commonly affected. There was no significant difference (P>0.05) in maxillary and mandibular arch when the proportion were compared among the types of teeth.

The prevalence of MIH in maxillary and mandibular arch is shown in Table 4. Total 113 children (20.77%) had demarcated opacity in maxillary arch while for mandibular arch 105 children (19.30%) had demarcated opacity. There was no significant difference (P>0.05) observed both in maxillary and mandibular arch.

Discussion

MIH leads to a number of problems like poor esthetics, food retention in the defective enamel area, and higher sensitivity of the exposed dentin, tooth brushing may initiate pain in such teeth necessitating the dentist to identify the problem at the earliest.^{1,2,6,7}

In the present study, Children of 7-10 years were selected because all four 1st permanent molars and incisors would have erupted into the oral cavity.

There has been a great variation in the worldwide prevalence of MIH. In a study done by Priya Subramaniam et al⁹ in 2016, prevalence of MIH in 7-9 year old children of Bengaluru city was reported to be 0.48% with no gender predilection⁹. In the study done by Singh Rashi et al¹⁰, 2020, prevalence of MIH in the Delhi NCR region was found to be 15%.¹⁰

In the study done by Singh, Pheiroijam Herojit et al¹¹, 2019 prevalence of MIH in 3 villages of Jaipur was found to be 4.19% with no gender predilection, MIH was more prevalent in mandibular arch than maxillary arch.¹¹ In the present study, Prevalence of MIH was found to be 7.90% with no gender predilection and maxillary teeth are commonly affected (n=125) as compared to mandibular teeth (n=117). In a study done by Parikh D.R. et al¹² in 2012, prevalence of MIH was found to be 9.2% in Gandhinagar, Gujarat with no gender predilection.¹²

Older children seem to have more severe lesions than younger ones. This point may, however, be

explained by the fact that the condition does seem to be progressive. Thus, the affected FPM can suffer post eruptive breakdown of enamel as a child ages and the older children will exhibit more severe defects.^{13,14} In our study boys: girls ratio was 7:9 that showed 7.22% of the boys and 8.54% of the girls showed the MIH prevalence showing no significant difference. The majority of published research studies seem to show that there is no difference in prevalence between the sexes.^{9,11,12}

In a study done by Priya Subramaniam et al⁹ in 2016, MIH in 7-9 year old children of Bengaluru city was more frequently associated with mandibular molars (29.41%) than maxillary molars (27.94%)⁹. In the study done by Singh Rashi et al¹⁰ in the Delhi NCR region in the year 2020, distribution of MIH was more common in the mandibular molars than the maxillary molars.¹⁰ In the present study, maxillary teeth are commonly affected (n=125) as compared to mandibular teeth (n=117).

Conclusion

The prevalence of MIH in 7-10-year-old children of Jaipur city was found to be 7.90% with no gender predilection. MIH was more significantly associated with maxillary teeth as compared to mandibular teeth.

Considering the demanding nature and the costs involved it is essential to formulate public awareness and preventive programs and a nationwide survey is needed to get an exact status of MIH in India.

Table 2. Gender wise distribution of MIH in school children

Gender	MIH absent n (%)	MIH present n (%)	Total n (%)	P Value
Male	244 (44.85)	19 (3.49)	263 (48.34)	0.57
Female	257 (47.24)	24 (4.41)	281 (51.65)	
Total n (%)	501 (92.10)	43 (7.90)	544 (100)	

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Total n (%)	501 (92.10)	43 (7.90)	544 (100)	

Table 3. Distribution of school children having defects in both maxillary and mandibular arch

Arch	Teeth	MIH absent n (%)	MIH present n (%)	P Value
Maxillary	Central Incisors	502 (92.28)	42 (7.72)	0.51
	Lateral Incisors	511 (93.93)	33 (6.07)	
	First molar	503 (92.46)	41 (7.54)	
Mandibular	Central Incisors	512 (94.12)	32 (5.88)	0.33
	Lateral Incisors	511 (93.93)	33 (6.07)	
	First molar	501 (92.10)	43 (7.90)	

Table 4. The prevalence of MIH in maxillary and mandibular arch

	Central Incisor n (%)	Lateral Incisor n (%)	First molar n (%)	P Value
Maxillary arch				
MIH free	502 (92.28)	511 (93.93)	503 (92.46)	0.30
Demarcated opacity	42 (7.72)	33 (6.07)	38 (6.99)	
Post-eruptive enamel breakdown	0	0	0	
Atypical restoration	0	0	2 (0.37)	
Extraction due to MIH	0	0	1 (0.18)	
Failure of eruption of a molar or incisor	0	0	0	
Total	544 (100)	544 (100)	544 (100)	
Mandibular arch				
MIH free	512 (94.12)	511 (93.93)	501 (92.10)	0.30
Demarcated opacity	32 (5.88)	33 (6.07)	40 (7.35)	
Post-eruptive enamel breakdown	0	0	1 (0.18)	
Atypical restoration	0	0	2 (0.37)	
Extraction due to MIH	0	0	0	
Failure of eruption of a molar or incisor	0	0	0	
Total	544 (100)	544 (100)	544 (100)	

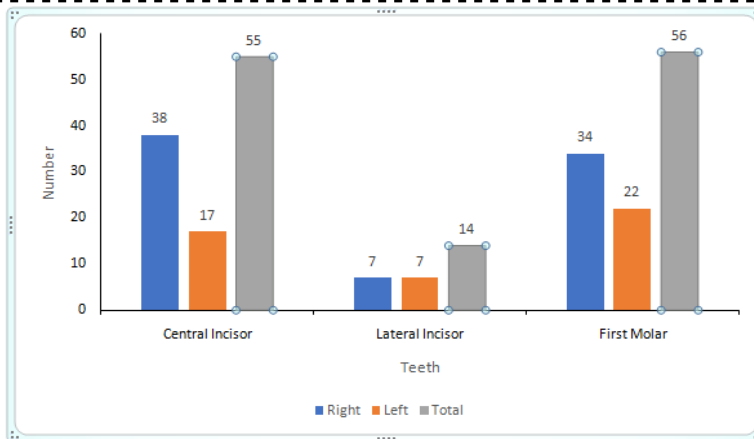


Figure 1: Distribution of MIH in teeth of maxillary arch

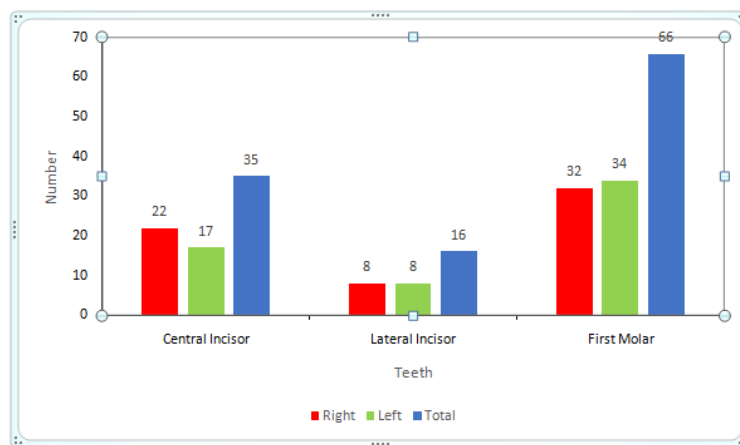


Figure 2: Distribution of MIH in teeth of mandibular arch

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