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ORIGINAL RESEARCH

Prevalence of Molar Incisor Hypomineralization and Dental Caries in 7–9-Year-Old Children of Srinagar City, Jammu and Kashmir, India

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ABSTRACT:

Introduction: Molar incisor hypomineralization (MIH) is defined as the systemic hypo-mineralization of one or more of the first four permanent molars and is often associated with affected incisors. Clinically hypomineralization in the translucency of enamel can be seen as an abnormality. MIH molars enamel looks soft and porous and looks like discolored chalk or old Dutch cheese. The available MIH data published in India is not much. This study was therefore conducted to determine the prevalence of MIH in Srinagar city, India's 7–9-year-old children and whether molar incisor hypomineralization is predisposed to dental caries. **Materials And Methods:** A cross-sectional epidemiological study was conducted in Srinagar, India from December 2018 to February 2019 on a random sample of 1,000 normal-healthy school children aged 7 to 9 years. **RESULTS:** MIH was presented to twenty-one children (2.1 percent). In total, it affected 24 incisors and 33 molars with involvement of a larger number of mandibular incisors. Compared to incisors (5.4 %), the severity of MIH was higher in molars (16.2 %) and the difference between the two is statistically significant. A higher number of children (33) had molar hypo-mineralization (MH) only. Twenty one children (2.1%) presented with MIH. In total, 24 incisors and 33 molars were affected. A higher number of mandibular incisors were involved. The severity of MIH was more in molars (16.2%) when compared to incisors (5.4%) and the difference between the two is statistically significant. A higher number (33) of children presented only with molar hypo-mineralization (MH). The prevalence of caries (DMFS > 0) in the sample was 12.9 %. **Conclusion:** Severe MIH affected teeth are more prone to caries.

Key words: Amelogenesis Imperfecta, Decayed missing filled surfaces, Molar incisor hypomineralization.

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INTRODUCTION:

Molar incisor hypomineralization (MIH) is defined as the systemic hypo-mineralization of one or more of the first four permanent molars and is often associated with affected incisors.¹ It is the result of a variety of environmental factors having an underlying genetic predisposition affecting the developing enamel. Specific MIH concerns not only relate to the dental outcomes, but also less awareness and knowledge about the cause and pathogenesis of this condition.

Clinically hypomineralization in the translucency of enamel can be seen as an abnormality. MIH molars 'enamel looks soft and porous and look like discolored chalk or old Dutch cheese. It is possible to see demarcated opacities of a different color, that is, opacities with a clear and distinct border adjacent to enamel. MIH is associated with the unexpected development of rapid caries in the first permanent molars that erupt.² Children may experience pain and hypersensitivity during brushing.

A wide range of prevalence (4%–40%) has been reported for MIH by various investigators in different countries. The highest prevalence was reported from Finland and Denmark.³ However, the published data on MIH available in India is not much. Hence this study was undertaken to determine the prevalence of MIH in 7–9-year-old children of Srinagar city, India and whether molar incisor hypomineralization predisposes to dental caries.

MATERIALS AND METHODS:

A cross-sectional epidemiological study was conducted on a random sample of 1000 normal-healthy school children aged between 7 and 9 years, in Srinagar, India. Children with enamel hypoplasia or amelogenesis imperfecta (AI) and under orthodontic treatment at the time of assessment were excluded from the study. This study was carried out between December 2018 and February 2019.

Prior to conduct of the study ethical clearance was obtained from the institutional review board. The sample size was calculated according to the WHO guidelines at 95% of confidence level with a relative precision (α) of 5%. MIH was diagnosed clinically based on the diagnostic criteria established by the EAPD 2003.^{4,5}

EAPD criteria 2003

- 0—Normal
- 1—Demarcated opacity
- 2—Posteruptive enamel breakdown
- 3—Atypical restorations
- 4—Extracted molar due to MIH
- 5—Unerupted molar due to MIH

The oral examination was performed under natural daylight with a sterilized disposable mouth mirror and blunt probe by a single trained calibrated examiner. Each incisor surface was examined and the first permanent molar was examined.

For caries diagnosis, the ICDAS II criteria were employed.⁶

ICDAS criteria:

- Grade 1: A white spot or visual change in the enamel is visible on drying the tooth
- Grade 2: The white spot is visible on the moist tooth
- Grade 3: Localized enamel breakdown (with no visible dentin) is observed

Grade 4: There is dentinal shadow (with no visible dentin)

Grade 5: A cavity with visible dentine

Grade 6: An extensive cavity with visible dentine affecting over half of a tooth surface

The teeth examined were MIH (permanent first molars and permanent incisors) index teeth. The DMFS index was calculated based on the sum of declined teeth (ICDAS codes 1 to 6), missing and filled teeth surfaces used to evaluate MIH.

The teeth were first examined when wet and then dried for MIH diagnosis with cotton swabs and for caries diagnosis with the air jet of the equipment, if necessary.

The exam chart used included a section of demographic variables such as name, age, gender and an entry chart for MIH and dental caries diagnosis and severity.

Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS 20.0 version, Delaware, Chicago, IL, USA). The significance level was considered as $P \leq 0.05$.

RESULTS:

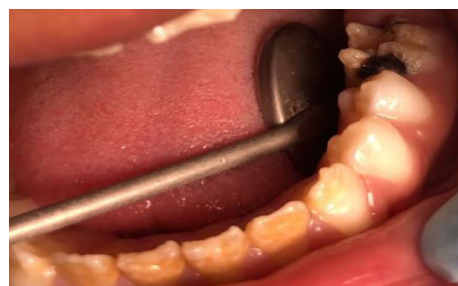
Twenty one children (2.1%) presented with MIH. In total, 24 incisors and 33 molars were affected. Involved a larger number of mandibular incisors. A higher number (33) of children presented solely with molar hypo-mineralization (MH) (Table I). The severity of MIH was more in molars (16.2%) when compared to incisors (5.4%) and the difference between the two is statistically significant. (Table II)

The prevalence of caries (DMFS > 0) in the sample was 12.9%. In children with MIH and without MIH, however, no statistically significant differences were seen. However, significant differences in caries prevalence when comparing children with MIH according to the degree of severity.

For children with mild MIH and those with severe MIH, the DMFS index score was 1.08 and 2.21 respectively. There were no statistically significant differences in the ratio for surfaces without hypomineralization between the three groups or for surfaces affected by mild hypomineralization between children with mild MIH and severe MIH.



Maxillary and mandibular incisors with MIH



Mandibular first permanent molar with MIH

TABLE I : PERCENTAGE OF CHILDREN WITH MOLAR INCISORHYPOMINERALIZATION AND MOLAR HYPOMINERALIZATION

	Males	Females	Total
No of children examined	635	365	1000
Number of children with molar incisor hypomineralization	12	9	21
Number of children with molar hypomineralization (without incisors)	17	16	33

TABLE II: DISTRIBUTION OF MOLARS AND INCISORS AFFECTED WITH MOLAR INCISOR HYPOMINERALIZATION

Maxilla (n%)		Mandible(n%)	
Incisors	Molars	Incisors	Molars
9(14.7)	8(10.25)	8(12.4)	10(16.4)
8(12-6)	10(13.21)	7(10.3)	10(15.7)

DISCUSSION:

Enamel hypoplasia is a quantitative defect resulting from disturbance of the enamel-forming cells during the matrix formation stage, whereas hypomineralization is a qualitative defect resulting from disturbance during the enamel formation stage. Hypoplasia of internal enamel, cheese molars, mottling of non-endemic enamel, idiopathic demarcated opacity and nonfluoride.⁷Weerheijm called it MIH in 2001, however, because first permanent molars with hypomineralization are often associated with affected permanent upper incisors and rarely lower incisors⁸

As hypomineralized molars are more susceptible to plaque accumulation and dental caries, these defects affect a child's overall well-being. Poor esthetics, food retention in the defective enamel area, and higher exposed dentine sensitivity may be faced by children with MIH and, as such, dentists need to identify this problem as early as possible.

Children aged 7–9 years were selected in this study as all four first permanent molars and incisors would have erupted at this age in the children's oral cavity, and children over 9 years of age are at higher risk of developing caries. Furthermore, the risks that caries would mask enamel hypomineralization would be minimal.^{9,10}

Compared to non-hypomineralized molars, dental caries was a more frequent finding in hypomineralized molars in the present study. Hypomineralization has been shown to play a vital role in the development of caries in primary dentition. In permanent dentition, the rapid spread of caries in hypomineralized molars has been reported. Combined with compromised, defective enamel, this increased incidence of dental caries results in substantial dental morbidity that poses a challenge to the clinician. This is consistent with several other studies that have shown that children with MIH need more dental treatment (whether urgent, non-urgent or preventive) than those without MIH and MIH.^{11,12,13}

There was no statistically significant difference between children without MIH and those with mild MIH in DMFS. This was according to Heitmulleret al.¹⁴ study, however, in children with severe MIH the caries scores were significantly higher compared to those with mild MIH or no MIH

Early diagnosis of MIH is essential for adequate treatment that varies with the severity of the abnormality, which can be either preventive or curative. The treatments include the application of fluoride through gels or lacquers, glass ionomer cement (GIC) restorations, modified GIC with resin and composite resin.¹⁵

In order to determine whether there are real differences between maxillary and mandibular teeth and the reasons behind it, further studies on larger populations are required. More mandibular incisors have been affected, as reported by several other authors, compared to maxillary incisors.

CONCLUSION: Severe teeth affected by MIH are more susceptible to caries.

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