ORIGINAL ARTICLE

Prevalence and Pattern of Hypomineralized Second Primary Molars in Children in Delhi–NCR

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Abstract

Background: Developmental defects of enamel especially enamel hypomineralization are prevalent among children. Hypomineralized second primary molars (HSPM) present a serious clinical dilemma for the current practitioners. It represents as a potential predictive factor for molar incisal hypomineralization (MIH). The reported prevalence of HSPMs in India however still remains uncertain.

Methodology: A total of 649 children aged 6–10 years were randomly selected from various schools in Delhi NCR. The teeth were indexed for developmental defects of enamel using modified European Academy of Paediatric Dentistry judgment criteria given by Ghanim et al.

Results: A total of 83 HSPMs were observed in 33 of the 649 subjects examined, with a prevalence of 5%. Molars affected had prevalence of 62.88%, with two deciduous molars being most commonly affected. Of the defects present, creamy white opacities were most common followed by yellowish brown opacities. Posteruptive breakdowns (PEB) were more commonly associated with yellowish brown opacities.

Conclusion: The prevalence of HSPMs in Delhi, NCR was 5%. Creamy white opacities were the most common lesion present.

Keywords: Demarcated opacities, Developmental defects of enamel (DDE), European Academy of Paediatric Dentistry (EAPD), Hypomineralized second primary molar (HSPM), Molar-incisor hypomineralization (MIH).

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Introduction

Developmental defect of enamel (DDE) is currently one of the most prevalent condition affecting children worldwide. Most researches have concentrated on enamel defects in first permanent molars with no significance being given to deciduous dentition.[1–3] There is no valuable literature on enamel defects in primary dentition. Most studies conducted have been regarding enamel hypoplasia, with no attention been given to hypomineralization in primary dentition. Also, studies done on hypomineralization in deciduous dentition have been grouped as diffused and non-diffused enamel defects together. In recent times, there has been a significant increase in the occurrence of non-fluoride associated developmental defects of enamel.[2] Hypomineralized second primary molar (HSPM) is the current term being used for the condition previously described as deciduous molar hypomineralization.[4,5] It is a structural developmental qualitative defect resulting from disruption of enamel during formation.[6] It usually presents as clear demarcated opacity in the enamel translucency.[4] This opacity may vary to several degrees from opaque white, yellow, to brown-colored lesion of enamel.[7,8]

A spectrum of enamel defects in enamel in permanent dentition is termed as molar incisor hypomineralization (MIH).[6] Hypomineralized primary molars have a very similar clinical presentation as MIH.[9] This may be due to a shared period of amelogenesis by second primary molars and first permanent molars. Hypomineralized second primary molar is not just a related phenomenon to MIH but presents as a unique predictive factor occurrence of MIH.[4,5,10]

Enamel lesion in HSPMs are further classified into demarcated creamy white or yellow brown opacities associated with post-eruptive breakdown (PEB) or atypical restorations. There is a likelihood of HSPMs being associated with PEB and being more prone to caries.[11,12] Therefore, an improved understanding of HSPMs and their prevalence in India is needed.

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Aim: To study the prevalence of hypomineralized second primary–molars in 6- to 10-year-old schoolchildren in Delhi region.

Sample: The present study was a cross-sectional study conducted in various schools in Delhi region. A total of 649 children fulfilling the following inclusion criteria were examined.

- Normal healthy co-operative children
- Age range 6–10 years
- Children born/residing in Delhi for past 10 years
- Proper consent form duly signed by parents/guardians

Non-cooperative children or children affected with any systemic diseases were excluded from the study and the children affected with hypodontia, anodontia and amelogenesis imperfecta were excluded.

Clinical diagnosis: Prior to the onset of clinical examinations, one examiner was extensively trained for diagnosing HSPM using photographs showing varying clinical presentations of the

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condition. Clinical examinations of the children were carried out by the examiner under natural light, seated on a school chair using a mouth mirror, and a dental probe.

A trained assistant was used to record findings during intra-oral examinations.

The buccal, lingual/palatal, and occlusal surfaces of teeth were examined under natural light, and debris, if however present, were removed with the help of a gauze swab before examination. The children were examined based on modified EAPD scoring criteria given by Ghanim et al.[13]

Charting method proposed by Ghanim et al. was used for grading the clinical status and extent of HSPM. Enamel defects less than 2 mm in diameter were not recorded or considered normal. HSPM was classified as mild only if opacities were present, as moderate with presence of PEB (post eruptive break-down) and severe HSPM in case of atypical restorations (AR).

Statistical Analysis

Data collected from charts were entered into Microsoft excel. The data were recorded, and statistical analysis was done for prevalence and distribution of HSPM. Pearson's chi-square test, Spearman's correlation, and one-way analysis of variance test were used. A p value of <0.05 was considered statistically significant.

Results

Prevalence

A total of 664 subjects were examined. A total of 33 subjects presented with demarcated hypomineralized enamel lesions in second primary second molars. The male children affected were 18, whereas female children affected were 15 (Table 1). There was no significant gender difference. The overall prevalence of HSPMs in the current study population was 5%.

Extent and Distribution of Demarcated Hypomineralized Enamel Lesions in HSPMs

A total of molars affected were 83 (62.88%) of 132. The maxillary molars affected were 34 and mandibular molars affected were 49 (Table 2). The mandibular molars affected were more in comparison with maxillary deciduous second molars (p value <0.01). There was no significant difference between right and left sides.

Most of the children had two deciduous second molars affected n = 13 (39.34) followed by four deciduous molars affected n = 11 (33%). Presence of three deciduous molars affected was rare (Table 3).

Taking into consideration the surfaces involved, the occlusal surfaces were the most commonly effected 42.1% followed by buccal surfaces 38.6%. The lingual and palatal surfaces involved were less and almost equal (Table 4).

Table 1: Number of subjects effected

Subjects affected	*33*
Males	18
Females	15

Table 2: Number of molars affected

	Right	*Left*
Maxillary	18	16
Mandibular	24	25

In decreasing order of prevalence of characteristic defects, the presence of creamy white opacities was most common n = 47 (41.22%), followed by yellowish brown opacities n = 30 (26.3%), yellowish brown with PEB n = 16 (14.3%), creamy white with PEB n = 8 (7.02%), and atypical restorations were least n = 3 (2.63%) (Table 5).

Discussion

EAPD judgment criteria for developmental defects in enamel have caused a worldwide increased interest in investigations regarding the presence and prevalence of nonfluoridated enamel defects.[6] Much of these idiopathic enamel defects were identified as molar incisal hypomineralization. MIH was introduced in 2001 by Weeheijm et al. to describe idiopathic demarcated qualitative defects in enamel affecting one or more permanent molars and/or permanent incisors. The term hypomineralized second primary molar was coined by Elfrink et al. in 2008 to denote MIH-like demarcated opacities in second deciduous primary molars.[10] This may be due to sharing of a period of secondary mineralization during formation.[4]

The study was conducted in various schools in Delhi–NCR age-group of 6- to 10-year-old children. It showed a prevalence rate of 5% for HSPMs in Delhi region. This was comparable to studies conducted by Mittal et al. in Nagpur, Maharashtra, showing a 4.88% prevalence of HSPM.[2] However, another study done in the Netherlands reported a significantly high prevalence of HSPM.[4]

Non-fluoridated developmental defects of enamel have presented as a significant clinical dilemma for practitioners. Hypomineralization is a qualitative defect of enamel result due to disturbances in the secondary stage of maturation of enamel formation.[1]

Several studies done in other regions of the world have also reported the presence of clear demarcated opacities in deciduous dentition but with varying prevalence rates, i.e., Weeks et al., Kanchanakamol et al., Farsi, but due to variations in the charting or recording criteria, direct comparison has not been possible.[14–16]

Table 3: Number of molars affected per subject

Number of molars	*N*	*Value%*
1 molar	7	21
2 molars	13	39.3
3 molars	2	6
4 molars	11	33

Table 4: Number of surfaces affected/HSPM

Surfaces	*N = 114/249*	*Value% = 45.78*
Buccal	44	38.6
Occlusal	48	42.1
Lingual/palatal	23	20.18

Table 5: Prevalence of defect characteristics

Defects	*HSPM's surfaces*	*Value%*
Creamy white	47	41.22
Yellow brown	30	26.3
Yellow brown with PEB	16	14.3
Creamy white with PEB	8	7.02
Atypical restorations	3	2.63

The present study was done using modified EAPD criteria given by Ghanim et al. in 2015 to establish synchronicity in charting methods, as further reporting and comparison of HSPM in various regions of the world would be possible.[15]

In the present study sample, 33 of the subjects reported presence of HSPMs. There was no significant gender difference. Mandibular molars were more affected in comparison to maxillary molars. This was in accordance with studies conducted by Bhaskar and Hedge 2014 in Udaipur and Jasulaityte 2007 in Kaunas.[17,18] There was no significant difference between right and left sides affected.

Of all the subjects affected, molars affected showed prevalence of 62.88%. Most of the children had two deciduous second molars affected $n = 13$ (39.34), followed by four deciduous molars affected $n = 11$ (33%). Presence of three deciduous molars affected was rare. Recording of PEB is quintessential for DHLE diagnosis. The present study is one of the first studies to apply modified EAPD judgment criteria and developmental defect of enamel index Amalgamation given by Ghanim et al. No missing teeth due to HSPMs were attributed to in the present study.[13]

Taking into consideration the surfaces involved, the occlusal surfaces were the most commonly effected 42.1% followed by buccal surfaces 38.6%. The lingual and palatal surfaces involved were less and almost equal.

In decreasing order of prevalence of characteristic defects, the presence of creamy white opacities was most common $n = 47$ (41.22%), followed by yellowish brown opacities $n = 30$ (26.3%), yellowish brown with PEB $n = 16$ (14.3%), creamy white with PEB $n = 8$ (7.02%), and atypical restorations were least $n = 3$ (2.63%).

There was general trend of severity of HSPMs being in direct correlation with the numbers of molars affected. Thus, children with one or two molars affected were less likely to be associated with PEB, while participants with three or four molars affected were usually seen with moderate or severe HSPMs.

In the present study, the defect extent was more than severity of the lesion. This might have been due to the location of the opacities which were more commonly seen on the occlusal surfaces and cuspal tips.

The manner in which HSPMs are affecting primary teeth and the potential harm caused to dentition needs further investigation. Further research into different age-groups and population with different caries experiences may provide better understanding of the subject and it clinical management.

Conclusion

The prevalence of HSPMs in Delhi, NCR was 5%. Creamy white opacities were the most common lesion present.

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