

PREVALENCE OF DECIDUOUS MOLAR HYPOMINERALIZATION IN KADAPA DISTRICT OF ANDHRA PRADESH

Paediatric Dentistry

Dr. Meenu K Iyer*	Post Graduate Student, Department of Pediatric and Preventive Dentistry *Corresponding Author
Dr. Th. Kotaiah	Professor & HOD, Department of Pediatric and Preventive Dentistry
Dr. P. Lakshmi Prasanna	Associate Professor, Department of Pediatric and Preventive Dentistry
Dr. B. Jayachandra Reddy	Assistant Professor, Department of Pediatric and Preventive Dentistry
Dr. M. Deepika	Assistant professor, Department of Pediatric and Preventive Dentistry
Dr. Bandi Jyothsna	Post Graduate Student, Department of Pediatric and Preventive Dentistry

ABSTRACT

Background: Deciduous molar hypomineralization (DMH) is a qualitative enamel defect affecting second primary molars that can serve as a predictor for molar incisor hypomineralization (MIH) in permanent dentition. Despite growing recognition of this condition, limited data exists regarding its prevalence and clinical characteristics in the Indian population. This study was aimed to determine the prevalence of deciduous molar hypomineralization and characterize the clinical features of hypomineralization defects in primary dentition among school children in Kadapa district of Andhra Pradesh. **Methods:** In this cross-sectional observational study, we examined 500 school children aged 6-8 years from randomly selected schools in Kadapa district. A single trained examiner assessed all second primary molars using European Academy of Paediatric Dentistry (EAPD) criteria for hypomineralization, including demarcated opacities, post-eruptive breakdown, and atypical restorations. **Results:** The overall prevalence of DMH was 7.6% at child level and 4.7% at tooth level. Among affected children, 55.2% had two molars involved, while 60.6% exhibited severe hypomineralization. Post-eruptive breakdown was the most prevalent defect (36.36%), followed by demarcated opacities (34.09%). **Conclusions:** The prevalence of DMH in Kadapa district aligns with global trends, but the high proportion of severe cases warrants immediate clinical attention. The bilateral presentation and predominance of post-eruptive breakdown highlight the need for early identification and comprehensive management strategies. These findings provide essential baseline data for developing targeted prevention programs and clinical protocols for this regional population.

KEYWORDS

Deciduous Molar Hypomineralization, Enamel Defects, Post-eruptive Breakdown, Molar Incisor Hypomineralization.

INTRODUCTION

Developmental abnormalities of enamel are commonly observed in both primary as well as permanent dentition posing a significant concern in pediatric dentistry globally. These defects are broadly classified into enamel hypoplasia which is a quantitative defect and enamel hypomineralization which is a qualitative defect (Jälevik & Norén, 2000). While enamel hypoplasia results from a disturbance to the ameloblasts during matrix formation, enamel hypomineralization results from disturbance during initial calcification and/or maturation (Jälevik & Norén, 2000). Clinically, the qualitative defects manifest as distinct creamy white or yellowish-brown opacities with or without structural breakdown (Weerheijm et al., 2001).

The term Molar Incisor Hypomineralization was suggested to describe a specific form of enamel hypomineralization of systemic origin, which affects first permanent molars and permanent incisors (Weerheijm et al., 2001). According to European Academy of Paediatric Dentistry diagnostic criteria, MIH is diagnosed if either demarcated opacity, enamel breakdown or atypical restoration is identified on any of the first permanent molars with or without involvement of permanent incisors (Lygidakis et al., 2022). The index teeth for MIH are first permanent molars and permanent incisors because of which research on MIH is almost always confined to these teeth. But, there is a growing body of evidence that enamel hypoplasia affects other teeth of permanent and primary dentition as well (N. Mittal, 2016).

Enamel hypomineralization in primary teeth has been reported in second primary molars and is popularly known as hypomineralized second primary molars (HSPMs) or deciduous molar hypomineralization (DMH). There is an overlap in the period of maturation of first permanent molar and deciduous second molar as a result of which any insult during this critical developmental window can cause hypomineralization in both the teeth. Hence deciduous molar hypomineralization can serve as a predictor for MIH (Elfrink et al., 2012).

Although there are several studies that published data about MIH and

DMH, there is still lack of data regarding prevalence and clinical presentation of DMH in the southern part of India. Hence this study was conducted to understand the prevalence and characteristics of hypomineralization in the primary dentition.

MATERIALS AND METHODS

This cross-sectional observational study was conducted in Kadapa district of Andhra Pradesh in Southern India. Approval was obtained from the institutional ethics committee and review board in accordance to Declaration of Helsinki. Written requests were submitted to the administrative departments of schools to obtain permission to undertake an oral examination procedure. Parental written consent was obtained by school authorities.

500 school going children from randomly selected schools in Kadapa district of Andhra Pradesh were selected for the study. Children between the age of 6 to 8 years with approved informed consent, present in school on the day of examination were included. Children with special healthcare needs and children with missing teeth (if reasons for the absence of teeth could not be determined) were excluded from the study.

A single trained examiner performed all dental check-ups after being trained to assess the EAPD MIH judgement criteria (Lygidakis et al., 2022), which included: well-defined opacities larger than 1 mm in size, lesions of hypomineralization with tissue destruction, atypical restorations with opacities at the periphery, and early absence of permanent molars due to extraction as a result of MIH.

Children were asked to rinse their mouths prior to examination to clean the teeth of any loose debris thereby allowing a clear view of every tooth. All teeth present in the patient's oral cavity were examined using a mouth mirror and blunt end probe under an external light source. The buccal, occlusal, mesial, distal and palatal/lingual surfaces of second primary molars were recorded separately for presence of hypomineralization defects (N. Mittal et al., 2024) and recorded according to EAPD judgement criteria. Evidence of post eruptive breakdown (PEB) and atypical restorations/carries (restoration/carries

incongruent with the caries risk of the child and not conforming to the normal pit and fissure caries pattern) were also recorded. In case of grossly carious primary second molars, a careful assessment of hypomineralisation at the borders of the carious lesions was done and were considered to be affected only when there was evidence of definitive hypomineralization (Goyal et al., 2019). Approximately, 10% of the sample was re-examined on the last day of clinical examination in each school to calculate the intra-examiner reliability (N. Mittal et al., 2024).

Data Handling and Statistical Analysis

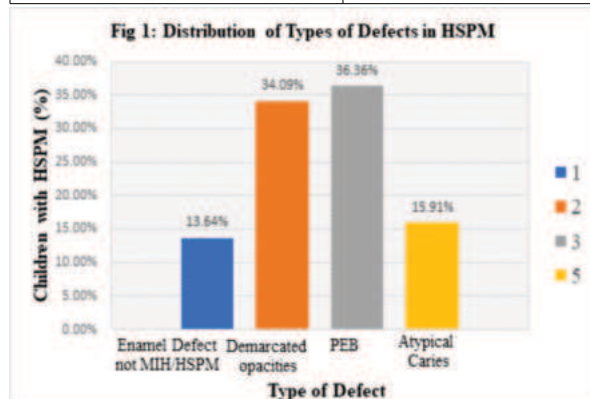
The data was recorded in prestructured and preprinted proformas with the provision to record demographic and clinical examination details of study participants. This data was then transported to Excel spreadsheets (Microsoft Office, Microsoft, Redmond, Washington, United States of America) and data analysis was done.

RESULTS

After considering inclusion and exclusion criteria a total of 500 school going children aged between 6-8 years were examined for this study. The mean age of the study participants were 6.9 years and there were more females (55.8%) than males (44.2%). 44 out of 500 children showed hypomineralized lesions in primary molars among which 38 belonged to the category of DMH/HSPM resulting in an overall prevalence of 7.6%. 95 out of 2000 second molars were affected resulting in a tooth-wise prevalence of 4.7%. Among the children who exhibited HSPM, 39.4% had mild hypomineralization whereas 60.6% had severe hypomineralization. Maximum number of subjects had two affected molars (55.2%). [Table. 1].

The distribution of types of defects are shown in Fig 1. Demarcated opacities and post eruptive breakdown were the most prevalent defects (34.09% and 36.36% respectively). 15.91% subjects showed atypical carious lesions. No atypical restorations were observed. Demarcated opacities were seen on the buccal surfaces of maxillary and mandibular primary molars. Occlusal surfaces of primary molars were most commonly affected with PEB [Fig1.]

Table 1: Distribution of DMH/HSPM at Child and Tooth Level	
Children	38/500 (7.6%)
No. of Molars affected	95/2000 (4.7%)
1 molar affected	13.1%
2 molars affected	55.2%
3 molars affected	0
4 molars affected	31.5%
Severity of hypomineralisation	
Mild	39.4%
Severe	60.6%



DISCUSSION

The present study investigated the prevalence of deciduous molar hypomineralization (DMH) in 6-8 year old school children from Kadapa district of Andhra Pradesh, revealing an overall prevalence of 7.6% at the child level and 4.7% at the tooth level. These findings contribute significantly to the limited body of literature on DMH prevalence in the Indian subcontinent and provide valuable insights into the clinical characteristics of hypomineralization defects in primary dentition.

The prevalence of DMH at 7.6% falls within the range reported in previous studies, though direct comparisons remain challenging due to variations in diagnostic criteria, age groups, and geographical populations. Elfrink et al. (Elfrink et al., 2012) reported a prevalence of

8.6% in Dutch children, which is comparable to our findings. Similarly, Goyal et al. (Goyal et al., 2019) found a prevalence of 7.9% in 3-6 year old children in Northern India and Mittal N et al. (N. Mittal et al., 2024) found a prevalence rate of 6.22%. Mittal R et al. (R. Mittal et al., 2016) reported a prevalence of 4.88% of HSPM in children of Nagpur, Maharashtra, while Singh et al. (Singh et al., 2020) found similar prevalence rates (5%) in Delhi-NCR region. The variations in prevalence may be attributed to differences in environmental factors, genetic predisposition, nutritional status, and socioeconomic conditions of the study populations.

The tooth-level prevalence of 4.7% in our study aligns with global findings and reinforces that DMH affects a significant proportion of primary second molars worldwide (McCarra et al., 2022; Zhang et al., 2024). This consistency supports the hypothesis that common etiological factors may be responsible for the development of hypomineralization defects in primary dentition across diverse geographical locations.

The distribution of hypomineralization defects observed in our study reveals important clinical insights. The finding that 55.2% of affected children had two molars involved suggests a bilateral presentation pattern, which is consistent with the systemic nature of the disturbances that cause enamel hypomineralization. This bilateral involvement pattern has been previously documented by Jälevik and Norén (2000), who emphasized that enamel hypomineralization typically results from systemic disturbances during the critical period of enamel maturation (Jälevik & Norén, 2000).

Post-eruptive breakdown (PEB) was identified as one of the most prevalent defects (36.36%) in our study, predominantly affecting the occlusal surfaces of primary molars. This finding is clinically significant as PEB represents the most severe form of hypomineralization and is associated with increased susceptibility to dental caries and structural failure (Weerheijm et al., 2001). The high prevalence of PEB in our population indicates that a substantial number of affected children are at risk of developing rapid caries progression and require early intervention.

The severity distribution in our study showed that 60.6% of cases were classified as severe, while 39.4% were mild. This high proportion of severe cases is concerning from a clinical perspective, as severe hypomineralization is associated with increased risk of post-eruptive breakdown, rapid caries progression, and potential need for extensive restorative treatment. The predominance of severe cases in our population may reflect delayed diagnosis, limited access to preventive care, or the presence of more intense etiological factors during the critical period of enamel development.

The clinical significance of these findings extends beyond immediate treatment needs. Multiple studies have demonstrated a strong correlation between deciduous molar hypomineralization and the subsequent development of molar incisor hypomineralization (MIH) in permanent dentition. Elfrink et al. (Elfrink et al., 2012) demonstrated this predictive relationship with an odds ratio of 4.4 (95% CI: 3.1-6.4). Mittal et al. (R. Mittal et al., 2016) identified that approximately half of the first permanent molars affected by MIH were associated with HSPM and that the likelihood of development of caries increased with the severity of hypomineralization defect. This conclusive evidence transforms the diagnosis of DMH from an isolated finding into a critical marker for a child's long-term oral health trajectory. Children with DMH are a high-risk group for developing MIH, which presents significant clinical challenges, including hypersensitivity, rapid caries progression, and difficulties with restorative treatments (Rai et al., 2018). This predictive power means that identifying DMH in primary school children provides a crucial window for targeted, long-term preventive strategies and monitoring into adolescence, potentially mitigating the severe consequences of MIH.

Study Limitations and Future Directions

While our study provides valuable insights into prevalence of DMH in Kadapa district of Andhra Pradesh, certain limitations should be acknowledged. The cross-sectional design limits our ability to establish temporal relationships and track the progression of hypomineralization defects over time. Additionally, the exclusion of children with special healthcare needs may have resulted in an underestimation of the true prevalence in the general population.

Future longitudinal studies are needed to understand the natural history of DMH and its relationship with subsequent MIH development in this population. Investigation of specific etiological factors, including maternal health history, perinatal factors, and early childhood exposures, would provide valuable insights into preventive strategies. Additionally, research into effective treatment modalities and their long-term outcomes in the Indian context would guide clinical practice.

CONCLUSION

The prevalence of deciduous molar hypomineralization in Kadapa district (7.6%) is consistent with global trends, but the high proportion of severe cases warrants immediate attention from healthcare policymakers and practitioners. The clinical characteristics observed in our study, particularly the predominance of post-eruptive breakdown and bilateral involvement, highlight the need for early identification and comprehensive management strategies. These findings provide a foundation for developing targeted prevention programs and clinical protocols specific to the regional population, ultimately improving oral health outcomes for affected children.

REFERENCES

1. Elfrink, M. E., Ten Cate, J. M., Jaddoe, V. W. V., Hofman, A., Moll, H. A., & Veerkamp, J. S. J. (2012). Deciduous molar hypomineralization and molar incisor hypomineralization. *Journal of dental research*, 91(6), 551-555.
2. Goyal, A., Dhareula, A., Gauba, K., & Bhatia, S. K. (2019). Prevalence, defect characteristics and distribution of other phenotypes in 3-to 6-year-old children affected with hypomineralised second primary molars. *European Archives of Paediatric Dentistry*, 20(6), 585-593.
3. Jälevik, B., & Norén, J. G. (2000). Enamel hypomineralization of permanent first molars: a morphological study and survey of possible aetiological factors. *International journal of paediatric dentistry*, 10(4), 278-289.
4. Lygidakis, N. A., Garot, E., Somani, C., Taylor, G. D., Rouas, P., & Wong, F. S. L. (2022). Best clinical practice guidance for clinicians dealing with children presenting with molar-incisor-hypomineralisation (MIH): an updated European Academy of Paediatric Dentistry policy document. *European Archives of Paediatric Dentistry*, 23(1), 3-21.
5. McCarra C, Olegário IC, O'Connell AC, Leith R. Prevalence of hypomineralised second primary molars (HSPM): a systematic review and meta-analysis. *International Journal of Paediatric Dentistry*. 2022 May;32(3):367-82.
6. Mittal N. Phenotypes of enamel hypomineralization and molar incisor hypomineralization in permanent dentition: identification, quantification and proposal for classification. *Journal of Clinical Pediatric Dentistry*. 2016 Jun 1;40(5):367-74.
7. Mittal, N., Gupta, N., & Goyal, A. (2024). Enamel Hypomineralization: Prevalence, Defect Characteristics in Primary Dentition in a Northern Indian Region. *International Journal of Clinical Pediatric Dentistry*, 17(Suppl 1), S67.
8. Mittal, R., Chandak, S., Chandwani, M., Singh, P., & Pimpale, J. (2016). Assessment of association between molar incisor hypomineralization and hypomineralized second primary molar. *Journal of International Society of Preventive and Community Dentistry*, 6(1), 34-39.
9. Rai, A., Singh, A., Menon, I., Singh, J., Rai, V., & Aswal, G. S. (2018). Molar incisor hypomineralization: prevalence and risk factors among 7-9 years old school children in Muradnagar, Ghaziabad. *The open dentistry journal*, 12, 714.
10. Singh, R., Srivastava, B., & Gupta, N. (2020). Prevalence and pattern of hypomineralized second primary molars in children in Delhi-NCR. *International Journal of Clinical Pediatric Dentistry*, 13(5), 501.
11. Weerheijm, K. L., Jälevik, B., & Alaluusua, S. (2001). Molar-incisor hypomineralisation. *Caries research*, 35(5).
12. Zhang, Z., Liu, Y., Zhu, Y., Guo, J., Yang, M., Lu, Y., ... & Jia, J. (2025). Association of molar incisor hypomineralization with hypomineralized second primary molars: an updated systematic review with a meta-analysis and trial sequential analysis. *Caries Research*, 59(1), 58-70.