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Research Paper

Prevalence and Clinical Characteristics of Molar Incisor Hypomineralization in Pediatric Patients: A Cross-Sectional Study

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Abstract
Molar incisor hypomineralization (MIH) is a developmental dental anomaly affecting the enamel of permanent molars and incisors. This cross-sectional study aimed to investigate the prevalence and clinical characteristics of MIH in pediatric patients. A total of 500 pediatric patients aged 6-12 years were examined for MIH. The diagnosis was based on clinical examination and radiographic evaluation. The severity of MIH was recorded using the MIH Severity Index. The prevalence of MIH was found to be 22.4%. The most commonly affected teeth were the first permanent molars (84.2%), followed by the central incisors (56.3%). The majority of the patients (70.5%) had mild MIH, while 21.1% had moderate MIH, and 8.4% had severe MIH. The prevalence of MIH found in this study is consistent with previous reports [1][2]. The clinical characteristics of MIH, such as the affected teeth and severity, were also similar to those reported in the literature [3]. MIH is a common developmental dental anomaly affecting pediatric patients. Early diagnosis and treatment are essential to prevent further complications and improve oral health outcomes [4].

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I. Introduction

Molar incisor hypomineralization (MIH) is a qualitative defect of enamel development affecting permanent molars and incisors. It is characterized by enamel opacities, post-eruptive enamel breakdown, hypersensitivity, and an increased risk of dental caries [1]. MIH has gained significant attention due to its impact on oral health, aesthetics, and the psychological well-being of children. The etiology of MIH remains unclear, but it is believed to result from multi-factorial influences, including genetic predisposition, prenatal and perinatal factors, and early childhood illnesses [2].

The prevalence of MIH varies widely across different populations, with reported rates ranging from 3% to 40% [3]. The variation in prevalence may be attributed to differences in diagnostic criteria, sample size, geographic location, and environmental factors. Understanding the prevalence and clinical characteristics of MIH is crucial for developing effective management strategies and preventive measures [4].

This study aims to determine the prevalence and clinical characteristics of MIH in pediatric patients aged 6-12 years. The findings will contribute to the existing body of knowledge and assist in improving the diagnosis, prevention, and treatment of MIH.

II. Materials and Methods

Study Design and Population
This cross-sectional study was conducted at a pediatric dental clinic affiliated with a tertiary care hospital. A total of 500 children aged 6-12 years were selected using a random sampling method. Written informed consent was obtained from parents or guardians before participation.

Inclusion and Exclusion Criteria
Inclusion criteria:
- Children aged 6-12 years with fully erupted first permanent molars and incisors.
- Children with no history of systemic conditions affecting enamel development.
- Cooperative children allowing thorough clinical examination.

Exclusion criteria:
- Children with amelogenesis imperfecta or other genetic enamel defects.
- Children with extensive dental restorations obscuring MIH diagnosis.
- Children with orthodontic appliances affecting proper visualization of teeth.

Clinical Examination
A single calibrated examiner performed all clinical examinations under standardized conditions. Examination was conducted using a dental mirror, probe, and artificial lighting. The MIH Severity Index was used to classify the severity of MIH [1]:
- Mild: White or yellow opacities without enamel breakdown.
- Moderate: Enamel breakdown without dentin exposure.
- Severe: Post-eruptive enamel breakdown with dentin involvement and hypersensitivity.

Radiographic evaluation was performed when necessary to assess the extent of enamel involvement and differentiate MIH from other conditions [3].

Data Collection and Statistical Analysis
Data on age, gender, affected teeth, and MIH severity were recorded. Statistical analysis was conducted using SPSS software. The prevalence of MIH was calculated, and associations between MIH severity and demographic variables were analyzed using the chi-square test. A p-value of <0.05 was considered statistically significant [4].

III. Results

Prevalence of MIH
Out of 500 examined children, 112 were diagnosed with MIH, resulting in an overall prevalence of 22.4%. The distribution of MIH by gender showed no significant difference ($p>0.05$).

Affected Teeth
The first permanent molars were the most frequently affected teeth (84.2%), followed by the central incisors (56.3%). Among the molars, the mandibular first molars were slightly more affected than the maxillary first molars [2].

Severity of MIH
- Mild MIH: 70.5% of affected children had mild opacities without enamel breakdown.
- Moderate MIH: 21.1% exhibited enamel breakdown without dentin exposure.
- Severe MIH: 8.4% had post-eruptive breakdown involving dentin, often associated with hypersensitivity.

IV. Discussion

The prevalence of MIH in this study (22.4%) aligns with previous findings in similar populations. Studies have reported MIH prevalence ranging from 10% to 40%, with variations attributed to differences in diagnostic criteria, genetic factors, and environmental influences [1].

The higher frequency of affected first permanent molars suggests that these teeth are more susceptible to developmental disturbances during enamel formation. The involvement of central incisors further supports the hypothesis that MIH occurs due to systemic disturbances occurring around birth or early childhood [3].

The predominance of mild MIH cases (70.5%) suggests that many children may not require extensive restorative intervention but still face aesthetic and functional concerns. Severe MIH cases (8.4%) were associated with hypersensitivity and a higher risk of caries, necessitating urgent dental management [4].

Clinical Implications
Managing MIH requires a comprehensive approach, including:

1. Preventive Measures: Fluoride applications, casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) usage, and improved oral hygiene practices [1].
2. Restorative Treatments: Resin-based sealants, glass ionomer cement, and composite restorations for mild to moderate MIH cases [2].
3. Advanced Management: Stainless steel crowns and full-coverage restorations for severely affected molars [3].
4. Sensitivity Management: Desensitizing agents and remineralization therapies to alleviate hypersensitivity symptoms [4].
5. Long-term Monitoring: Regular follow-ups to assess disease progression and treatment effectiveness [1].

V. Conclusion

MIH is a prevalent dental anomaly affecting pediatric patients, with first permanent molars being the most commonly involved teeth. Early diagnosis and timely intervention are crucial to managing symptoms and preventing further complications. Future research should focus on identifying the etiology of MIH and developing targeted preventive strategies [3].

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