



Prevalence of Molar Incisor Hypomineralization among Primary School Children in Baquba City

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Abstract

Background: Molar incisor hypomineralization is a clinical symptom of general hypomineralization affecting a single or multiple first permanent molars, which is generally accompanied with incisors.

Objective: To determine the prevalence of molar incisor hypomineralization among 12 years students in Baquba city.

Patients and Methods: This study was conducted from middle of January 2022 till the end of May 2022 in Baqubah city/Diyalla Governorate/Iraq. The sample excluded all students who had other enamel defects (fluorosis or hypoplasia, uncooperative students and students who refuse to participate.

Results: Out of 700 participants, 52.43% of them were females and the rest were males. About 13% of the total sample showed a molar incisor hypomineralization, with significant association between gender, in which male were significantly more affected than females. The data showed 13% of the total sample had a demarcated opacities. Also the results showed that the upper centrals were more affected by hypomineralization than other teeth.

Conclusion: However, the study revealed that demarcated opacity was the most common form of defect with a significant correlation, with a frequency of 13%. The upper central tooth was always the most commonly impacted by molar incisor hypomineralization.

Keywords: MIH, hypomineralization, Demarcated opacity.

Introduction

Molar incisor hypomineralization (MIH) is a significant medical issue encountered by both adult and children's dentists. Due to the condition manifesting early in childhood, severe morbidity leading to handicapped dentition at a young age, the complexity of the disease as well as its treatment, the poor prognosis of restorations and the need for long-term follow-up, and the associated

behavioral problems, children are more likely to seek dental care at a younger age [1].

Tooth hypoplasia is a developmental disorder that affects the quality with the quantity of tooth structure. MIH was lately piqued the curiosity of the pediatric dental society [2]. MIH is a kind of dental hypoplasia known as "systemic hypomineralization of one to four permanent first molars frequently associated with affected incisors" [3].

Unexplained enamel deficient mineral in permanent first-molar teeth is additionally referred to as idiopathic enamel opacities in permanent first molars. Idiopathic enamel opacities in the first permanent molars, non-fluoride enamel hypomineralization in first permanent molars, and nonendemic mottling of permanent first molar enamel. Suggested term for this medical condition is molar incisor hypomineralization [4].

Molar hypoplasia (MH) is a comparable disorder that demonstrates hypomineralization (loss of minerals) of first permanent molars only without the association of the permanent incisors. MIH and MH are believed to be members of a MIH scope, with MIH being a more severe version of the disorder than MH [5].

Affected teeth with molar incisor hypomineralization are extremely porous, promoting plaque production and decay vulnerability. Furthermore, these porous teeth are extremely sensitive. Making it challenging to maintain efficient plaque control [6]. Dental caries risk is increased by these conditions [7].

Environmental toxins, pre/peri and postnatal issues, fluoride exposure, frequent childhood diseases, and medically fragile infants have all been proposed as probable reasons by researchers. Regardless of the realization that we are aware of the etiological elements, further evidence is still required to confirm the effect they have. We need to conduct experimental dose/response studies on the molecular basis of ameloblasts to improve our comprehension of the components that are now presumptively involved. Prospective studies are also

required to uncover additional variables that may be relevant [8].

Pneumonia, dioxins in mother's milk, asthma, upper respiratory tract infections, antibiotics, otitis media, children exanthematous fevers and tonsillitis and tonsillectomy all been proposed as probable causes of MIH by different authors [9].

Others speculated that polychlorinated biphenyl diet, birth and neonatal circumstances, acute or chronic childhood illness/treatment, nursing or fluoride were all influences. Other authors have proposed high fever, hypoxia, hypocalcaemia, antibiotic (amoxicillin) exposure, and dioxin exposure as risk factors [10].

The prevalence of defects ranges from 2.4 to 40.2%. It appears to differ among areas and birth cohorts. Cross-comparison of results from multiple research is challenging due to the use of different indicators and criteria, examination variability, recording techniques, and age groupings. Preterm children had a higher rate of molar incisor hypomineralization than controls (38% vs 16%), as did enamel developmental abnormalities (69.5% vs 51%) [11]. MIH risk increases with low gestational age and birth weight [12]. Also the prevalence of MIH in a group of Iranian children was 20.2 [13]. Furthermore a previous study conducted in university of Baghdad /college of dentistry reported that the prevalence of MIH in patients attending the pedodontic clinic was about 9.25% of the sample [14].

Patients generally complain about the existence of faulty molars and/or incisors. Due to the fact that the lesions are visually and clinically appears to be similar to cheese in color and structure/consistency, they are

commonly referred to as "cheese molars." Evermore, based on the stage of the illness, the age of the etiological agent's contact, and the age of the patient's presentation to the dental clinic, Symptoms include sensitivity to air, cold, warm, and mechanical stimuli; difficulty consuming foodstuff; and decayed dentition and their consequences. In advanced cases, patients have reported being unable to clean their teeth owing to dental pain [15]. Patients may even complain about several or unsuccessful repairs [16].

On examination, one or multiple permanent first molars and incisors may show hypoplasia. Hypoplasia in the maxilla are more common than in the mandible .Usually affected areas are the occlusal surfaces. Enamel with hypomineralization is appears to be fragile and porous, and it sometimes breaks down, resulting in atypical nondecayed frank cavities . This fast decay of the teeth frequently necessitates costly restorative operations. Caries can develop fast in MIH molars [17].

There is a need for early identification, planning of therapy, and prediction of hypomineralized first molars. The risk assessment, remineralization and desensitization, prompt diagnosis, caries prevention and post-eruption breakdown, restorations and removals and ongoing care steps are defined as a six-step management technique [18].

Risk factor calculation has been created for anthers depending on the color of enamel opacities. They measured enamel opacities based on white, yellow, and brown color shades, allowing them to determine vulnerability to structural deterioration over time [19]. It was determined that teeth with

brown and yellow opacities were more vulnerable than those lighter ones. Findings found to be helpful to assist doctors in developing a risk-based remedy plan for MIH suffering childrens. Deciduous molar hypomineralization (DMH) can also be utilized therapeutically as a prospective predictor of MIH. Proper early preparation & intervention may halt the progression of the illness [20].

Thorough treatment for pediatric illnesses has to tackle both emotions and behaviors with the objective of delivering sustained recovery in free of pain environments. Inadequate pain management, complicated cavity designs, and restorative material preference (Repairs for molars with hypomineralization seem to be failing on a regular basis) among the problems. There is no agreement to help clinicians make clinical judgments about cavity design and material selection [21]. Many treatment methods described in various research include restorations by composite, glass ionomer cement, full veneer metal-ceramic crowns, stainless steel crowns, implants and fixed-removable partial dentures [22].

For injured incisors, aesthetic alternatives in younger age groups patients includes porcelain veneer to porcelain crowns or composite and microabrasion in minimum cases , while in older patients metal-ceramic full veneer crowns [23]. If teeth cannot be saved, extraction should be thought about. Additionally, in situations of removal, an orthodontic strategy should be established for the management of space and regaining of function in children [24].

The null hypothesis of the present study was that molar incisor hypomineralization

would not be significantly different in the prevalence among genders in Iraqi population.

Patients and Methods

This study was an observational cross-sectional analytical design. The moral and ethical clearance board of the Faculty of Dentistry, University of Baghdad, has given their permission (no 556 in 7-4-2022) .To calculate the adequate sample size in the prevalence studies there is a simple formula ($n=Z^2P(1-P)/d^2$), in which n is the number of samples tested, Z is the level of trust statistic, P indicates anticipated prevalence (which can be gathered from comparable investigations or a pilot investigation undertaken by the investigators), & d is precision (equivalent to the effect size).. Performing a pilot study for MIH for 50 subjects with percentage about 20% and Using G power 3.1.9.7, alpha error =0.05 , and calculating the sample according to t so the sample size is 683 students, thus 700 students is enough [25].

Employing EpiTools software to randomly select subjects from each school and splitting the number of males and females from each school on the total number of students in that school and multiplying this percentage with the number of selected students from it to get the number of males and females from that school, 418 males and 282 females are

selected from 61 schools, resulting in 418 males and 282 females being selected from 61 schools. Because 85 males refused to participate in the study, only 333 males participated, while the 85 subjects were added to 282 females, for a total of 367 females.

This study was conducted from middle of January 2022 till the end of May 2022 in Baaqubah city/Diyalla Governorate/Iraq .Herein, all patients were evaluated and examined by the researcher, oral examinations were performed according to world health origination guidelines [26].

Each student was examined in an appropriate room in his school, sat in a straight chair with a lofty back on which the student's head could be supported. During the inspection, a portable light was utilized for illumination [27], and the equipment were sanitized in a hot air oven at 160 degrees Celsius for one hour [28]. The criteria used to assess the MIH is the European Academy of Pediatric Dentistry that is scored as 0 ,1,2,3,4 and 5 ,interpreted as Normal, Demarcated opacity, Posteruptive enamel breakdown, A typical restoration and Extraction molar due to MIH and Unerupted molar due to MIH ,respectively [29].Figure (1) showed normal and affected tooth.



Figure (1): normal and affected molar byMIH.

Statistical Analysis

The Statistical Procedure and Statistics for Social Sciences (SPSS version -22, Chicago,

Illinois, USA) was employed during statistical evaluation.

Results

A total sample of 700 (100%) students were involved in the study, the number and

percentage of male students was 333 (47.57%), while the number and percentage of female students was 367 (52.43%).

Table (1): Distribution of the total sample by gender.

Gender	Number	%
Male	333	47.57
Female	367	52.43
Total	700	100

Based on the distribution of the sample, results illustrates the prevalence of MIH in the total sample. It was found that 91(13%) of subjects were affected by MIH, distributed

in 52 males and 39 females with significant association between gender and MIH ($P < 0.05$) Table (2).

Table (2): Descriptive and statistical test of Molar incisor hypomineralization among gender.

Gender					Chi square	P value
	Free		With			
	N.	%	N.	%		
Male	281	46.14	52	57.14	3.842	0.0499*
Female	328	53.86	39	42.86		
Total	609	87	91	13		

**=significant at $p < 0.05$

Results in Table (3) illustrates Demarcated opacity and Atypical restoration are higher in males than females with significant association for Demarcated opacity ($P < 0.05$), while no significant association for Atypical

restoration ($P > 0.05$). On the other hand, Enamel breakdown and Extracted molar due to MIH were higher in females than males but with no significant association ($P > 0.05$).

Table (3): Distribution and statistical test of Molar incisor hypomineralization scores among gender.

Variables	Gender				Statistics	P value	Total	
	Male		Female				N	%
	N	%	N	%				
Demarcated opacity ^a	52	7.43	39	5.57	3.842	0.049*	91	13.00
Post eruptive enamel breakdown	17	2.43	21	3	0.129	0.719	38	5.43
Atypical restoration ^b	3	0.43	1	0.14	1.214	0.351	4	0.57
Extracted molar due to MIH ^b	1	0.14	2	0.29	0.245	1.00	3	0.43

*=significant at $p < 0.05$

* a=chi square, b=Fisher exact

Results in Figure (2) illustrates that in regarding to the gender. Males reports the highest percentage of tooth affected by MIH was (upper right central incisor) and the least affected tooth was (lower left central incisor),

while in female the highest percentage of tooth affected by MIH was (upper right central incisor) and the lowest percentage was reported in the lower left lateral incisor.

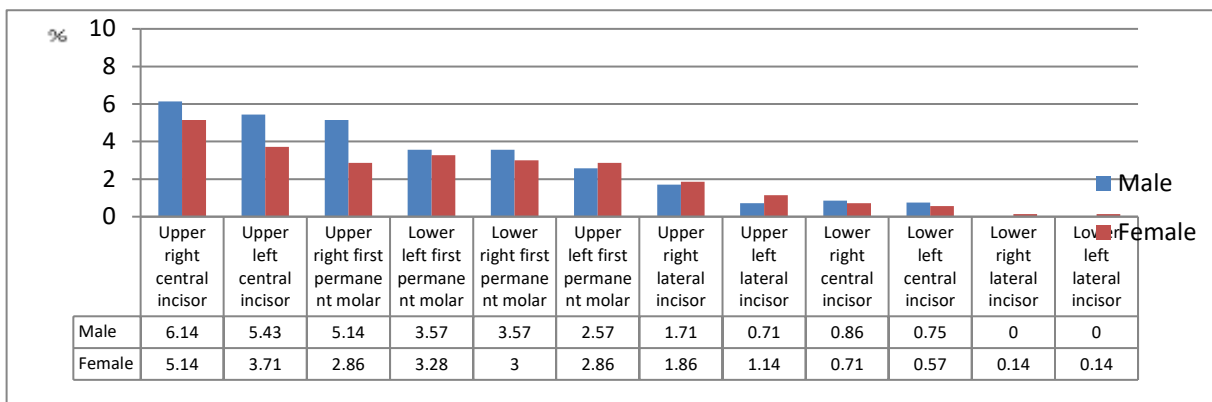


Figure (2): Distribution of Molar incisor hypomineralization by Teeth type.

Discussion

Results of current study revealed , based on total sample level , prevalence of MIH is 13%, this finding seems to agree with the findings of several other study who reported a percentage of MIH in School children varied from 13.6% to 35% [5,30,31,32].Furthermore similar findings were observed in Iran, a prevalence of 12.7% was reported [33], and this may be due to the geographical location of Dayla to Iran ,that influences to form a similar water qualities shared by the underground water supply in that geographical zone. However the findings is higher than a what been reported in a study conducted in 2016 for the same age ,that found prevalence of MIH was 9.7% in the child population residing in Chennai ,India [34] and this is mostly due to the fact that most of the region water floriation is within the optimum level according to a study conducted in that area in 2013 [35].

However the results disagree with findings of a previous Iraqi study conducted in AL Najef government , that reported a prevalence of Molar Incisor Hypo mineralisation of about 22.9%, this might be attributed to differences in mathematical calculation and the age groups included within the study [36].

Gender wise an increase in the percentage of males to females with MIH with a percentage of 57.14 % to 42.86% respectively, with significant association in between gender. Furthermore the findings are agree with findings of other study reported, that MIH was more in males than females [37, 38].However These findings disagree with previous Iraqi study who reported females were higher in the percentage of affected in the MIH [39]. These results may be due to the fact that males are less involved in the oral health care than females and males are less protective for their teeth than females [40].

Results shows a low percentage of extracted teeth due to MIH and these findings agrees with findings of previous study [41], this is might be related due to the devolving in the process of early detection of the MIH and the management of condition by preventive and conservative techniques . These finding do agree with the findings of previous studies, demarcated opacity were the most common type of the defect with significant association, [42,43], this might be explained in part by the inclusion of younger children in the present research, since a number of those delineated opacities may break with period of time. This theory is backed by past research findings [44].

Regarding differences in the percentage of tooth mostly affected by MIH results shows males had higher percentage of upper central affected by MIH were higher in both gender than what been reported in lateral incisors and these findings agrees with previous studies that stated central incisors were more affected than the laterals in both jaws , even more upper central incisors founds to be more affected than the lower central incisors [45].These findings may be attributed to the sample selection criteria and the geographical properties of the area of examination .

Conclusions

Molar incisor hypomineralization (MIH) exhibits a substantial prevalence on a global scale, particularly in those under the age of 10. Hence, it is crucial to formulate more suitable dental healthcare methods for the purpose of addressing the needs of these youngsters and discerning the underlying causes of the condition in order to prevent its occurrence.

Recommendations

Molar incisor hypomineralization it's an evident problem within the Iraqi population , but this study does not represent the Iraqi population as all due to the differences in the economical levels and living standers between different cities within Iraq , due to this the researchers recommend to run a similar studies on different Iraqi cities and to run different other studies with different age groups and utilizing other parameters to investigate the validity and reliability of each other diagnostic parameter.

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Ethical clearance: This study was conducted according to the approval of College of Medicine/ University of Diyala and in accordance with the ethical guidelines of the Declaration of ethical committee of the College (Document no. 2023SEA781).

Conflict of interest: Nil

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مدى انتشار حالة نقص الاملاح والتمعدن في الاضرار والقواطع الامامية في الاطفال عمر ال ١٢ سنة ضمن مدارس مدينة بعقوبة

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الملخص

خلفية الدراسة: نقص تمعدن الاضرار والقواطع الامامية هو أحد الأعراض السريرية لنقص التمعدن العام الذي يؤثر على ضرس أو عدة أضرار دائمية أولى، والتي تكون مصحوبة بشكل عام بالقواطع.
اهداف الدراسة: لتحديد مدى انتشار نقص تمعدن الاضرار والقواطع الامامية بين طلاب ١٢ سنة في مدينة بعقوبة.
المرضى والطرائق: أجريت هذه الدراسة من منتصف كانون الثاني ٢٠٢٢ حتى نهاية أيار ٢٠٢٢ في مدينة بعقوبة/ محافظة ديالى/ العراق. استبعدت العينة جميع الطلاب الذين لديهم عيوب أخرى في المينا (التسمم بالفلورايد أو نقص التنسج في طبقه المينا، الطلاب غير المتعاونين والطلاب الذين يرفضون المشاركة في هذه الدراسة.
النتائج: من بين ٧٠٠ مشارك، ٥٢,٤٣٪ منهم إناث والباقي ذكور. حوالي ١٣٪ من إجمالي العينة أظهرت النتائج نقص تمعدن الاضرار والقواطع الامامية مع وجود ارتباط معنوي بين الجنس حيث كان الذكور أكثر تأثراً من الإناث بشكل ملحوظ، وأظهرت البيانات أن ١٣٪ من إجمالي العينة لديهم عتامة محددة، كما أظهرت النتائج أن القواطع العلوية كانت أكثر تأثراً بنقص التمعدن من بقية الاسنان.
الاستنتاجات: كشفت الدراسة أن العتامة المحددة هي الشكل الأكثر شيوعاً لهذه الحالة (نقص التمعدن) مع وجود ارتباط كبير، بتكرار ١٣٪، وكان السن القاطع العلوي دائماً هو الأكثر شيوعاً في تأثر نقص تمعدن الاضرار والقواطع.
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