



Prevalence of molar incisor hypomineralization in Egypt as measured by enamel defect index a cross sectional study

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ABSTRACT

Aim: This study aimed to estimate the prevalence of molar incisor hypomineralization (MIH) in a group of Egyptian children the aged from 8 to 12 years, using both enamel defect index (EDI) and the diagnostic criteria.

Subjects and methods: Sampling was done per unit of time (convenience sample) from 1st of December 2014 till 30th of November 2015 (one year). Clinical visual examination took place on the dental unit, using natural light, teeth were cleaned gently using gauze and were wet with saliva when examined. After dental screening of children, (MIH) data was scored including 12 indexed teeth using the EDI, diagnostic criteria and severity index. Statistical analysis was performed using IBM® SPSS® and data was presented as frequency and percentages.

Results: 1001 children were included in the study (49.85%) males (50.14%) females. Prevalence rate calculated in the studied group was (2.3%); males (39.1%) and females (60.9%). The most prevalent clinical defect of MIH was the opacity. Among affected teeth it was found (77%) of the observed affected teeth were mildly affected while (23%) were severely affected.

Conclusion: EDI and diagnostic criteria deliver an acceptable estimate for MIH in the Egyptian population, however further studies are recommended.

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1. Introduction

Molar incisor hypomineralization (MIH) refers to hypomineralization of systemic origin, which affects first permanent molars and is frequently associated with permanent incisors [1]. The condition is simply related to the disruption of ameloblastic action during the transitional and maturational stages of amelogenesis [2]. These disruptions may be the result of some systematic conditions during the child's first years of life which coincides with the periods of crowns' mineralization.

The prevalence of MIH worldwide was reported from 2.4% to 40.2% this difference in the rates is due to the lack of both a consistent classification index and a standardized methodology of assessment for MIH. Most of the prevalence studies of MIH have

been carried out in the European countries. Knowledge about the magnitude of MIH seems desirable as it is vulnerable for consequences like rapid caries development, early enamel loss, soft structure and sensitivity.

In 2003 the EAPD had published the diagnostic criteria for the clinical status of MIH which was the approach of choice for many prevalence studies since then [3–10]. Scoring took place in the manner of either the absence or the presence of each element of the diagnostic criteria.

The clinical picture of MIH along with its diagnostic criteria decided and agreed on during the workshop held in May 2009 by the EAPD [11]:

- **Demarcated opacities:** The affected teeth show clearly demarcated opacities at the occlusal and buccal part of the crown. The defects vary in colour and size. The colour can be white, creamy or yellow to brownish. The defect can be negligible or comprise the major part of the crown. It is recommended that defects less than 1 mm are not to be reported.

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- **Enamel disintegration** (post eruptive enamel loss): The degree of porosity of the hypomineralized opaque areas varies. Severely affected enamel subjected to masticatory forces soon breaks down, leading to unprotected dentine and rapid caries development.
- **Atypical restorations:** FPM and incisors with restorations revealing similar extensions as MIH are recommended to be judged as affected.
- **Tooth sensitivity:** The affected teeth may be reported as sensitive, ranging from a mild response to external stimuli to spontaneous hypersensitivity; these teeth are usually difficult to anaesthetize.
- **Extracted teeth:** Extracted teeth can be defined as having MIH only in cases where it is noted in the records or there are demarcated opacities on the other FPM. Otherwise it is not possible to diagnose MIH.

As a new approach, the Enamel Defects Index (EDI) was created based on the principle of each category scored independently as present [1] or absent [0], simplifying decision making. The basic-level categories are hypoplasia, opacity, and posteruptive breakdown as shown in Table 1 scored by clinical diagnosis, resulting in a three-digit score per tooth surface examined, ranging from 000 to 111 [12].

Severity should be recorded as mild or severe in order to help the clinician. In mild cases there are demarcated enamel opacities without enamel breakdown, occasional sensitivity to external stimuli e.g. air/water but not brushing and only mild aesthetic concerns on discolouration of the incisors. In severe cases there are demarcated enamel opacities with breakdown, caries, persistent/spontaneous hypersensitivity affecting function e.g. during brushing and finally strong aesthetic concerns that may have socio-psychological impact [13,14].

MIH is challenging when it comes to management, it depends mainly on early diagnosis. Proper data regarding prevalence allows for better understanding of the disease which reflects on the clinical judgment. Therefore, conducting such a study in Egypt is of prime importance. This study is an attempt for precise data collection relevant to the disease which could be the base for further research in relation to proper management and better care that concern clinicians along with the knowledge and awareness about the possible etiological factors among the community.

2. Aim of the study

This study aimed to estimate the prevalence of molar incisor hypomineralization (MIH) in a group of Egyptian children the aged from 8 to 12 years, using both enamel defect index (EDI) and the diagnostic criteria.

3. Subjects and methods

3.1. Ethical approval

Methodology of this study was primarily revised and approved by the ethical committee of Faculty of Oral and Dental Medicine,

Cairo University.

3.2. Consent

Prior to clinical examination the aim of the study was explained to the mother and informed consent was obtained. Referred patients were called and the aim of the study was explained by telephone. Only those who showed up in the examination appointments and met the inclusion criteria during the one year duration period of the study were considered part of the sample.

3.3. Setting and location

Clinics at Pediatric Departments at educational dental hospital of Faculty of Oral and Dental Medicine Cairo university and those at Future University in Egypt.

3.4. Operator

Single evaluator, Master Degree student in Department Pediatric of Dentistry and Dental Public Health, Cairo University and a teaching assistant at Department Pediatric of Dentistry and Dental Public Health, Future University in Egypt.

3.5. Calibration

Theoretical training for MIH was performed. Intra examiner calibration took place using 30 photographs of 18 patients with MIH and 12 cases with other enamel defects were used to calibrate the examiner [15] before the beginning of the study and after six months. The selection of photographs and supervision of the theoretical training and calibration was done executed by the help of a clinical pathologist at the Department of Oral Pathology, Future University in Egypt.

During the first 6 months sampling took place at the outpatient clinic of Future University in Egypt. Three other pediatric dentists at Department Pediatric of Dentistry and Dental Public Health, Future University in Egypt went through the theoretical training mentioned above. They were asked to refer any suspected or preliminary diagnosed case of MIH.

During the last 6 months sampling took place at the outpatient clinic of Cairo University, Department Pediatric of Dentistry and Dental Public Health, Due to the increased number of residents performing diagnosis and referral, theoretical training was not applicable and accordingly they were asked to refer any case with visible enamel defect to be evaluated by the calibrated examiner.

3.6. Population

Sampling was done per unit of time (convenience sample) from 1st of December 2014 till 30th of November 2015 (one year) in the same pattern as [16].

During the first 6 months (1st December 2014–31st of May 2015) 400 patients were examined ranging in age from 8 to 12 years who were seeking dental care at educational dental hospital of Faculty of Oral and Dental Medicine, Future University in Egypt.

Table 1
Category definitions of the basic version of the Enamel Defects Index.

Hypoplasia	A defect involving the surface of enamel and associated with a reduced thickness; this may be translucent or opaque
Opacity	A defect involving an alteration in the translucency of enamel, which can be variable in degree. The enamel is of normal thickness, with a smooth surface. The opacity may be white, yellow or brown in colour, with a demarcated or diffuse border.
Posteruptive breakdown	A defect including the loss of surface enamel after tooth eruption

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