# MOLAR INCISOR HYPOMINERALIZATION: A STUDY OF PREVALENCE IN A GROUP OF PORTUGUESE CHILDREN

**Barbosa C*, Barroso J**, Silva Carvalho C***, Andrade C****, Silva Cardoso C*****

*Specialization Course in Pediatric Dentistry - School of Dental Medicine, University of Porto (FMDUP)** Master in Pediatric Dentistry - Universitat Internacional de Catalunya ***Master in Public Health - School of Dental Medicine, University of Porto ; Specialization Course in Pediatric Dentistry - School of Dental Medicine, University of Porto (FMDUP); Master Course Teacher in Dental Medicine - University Fernando Pessoa****Ph.D. in iPediatric Dentistry - School of Dental Medicine, University of Porto; Teacher associated with agregation FMDUP*****Ph.D. in University Complutense de Madrid, Auxiliar Teacher in Pediatric Dentistry - University Fernando Pessoa.

## Introduction

Molar Incisor Hypomineralization (MIH) is a systemic pathology characterized by the reduction of the enamel's mineralization of one to four first permanent molars and frequently associated with permanent incisors. It is considered a universal clinical problem.[Weerheijm et.al. 2003; Willmott et al. 2008; Jasulaityte et al.2008]

In 2003, the following recommendations were published In order to unify the MIH diagnosis the first permanent molars and incisors must be examined when teeth are clean after oral hygiene; the best moment to perform the exam is at the age of 8 and for every tooth the following aspects must be registered: the absence or presence of demarcated opacities, post eruptive enamel breaches, existence of atypical restoration and extractions caused by situations such as MIH and molar or incisor eruption failure associated to MIH.[Weerheijm et.al. 2003]

The aim of this paper lies on the investigation of the prevalence and possible etiology related to the appearance of Molar Incisor Hypomineralisation in children aged between 7 and 9 years old. These children are patients in clinic of the Oporto University's Faculty of Dental Medicine.

**Keywords:** "Molar-Incisor-Hypomineralisation"; "MIH"; "Prevalence", "etiology", "diagnosis", "treatment".

## Materials and Methods

### SAMPLE:

The study population comprised of **70 pacientes**.

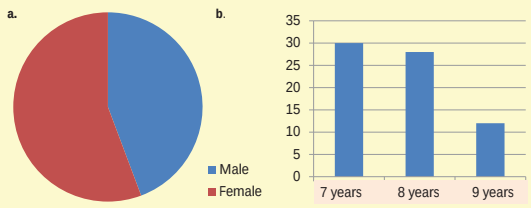



**Fig.1. a.** Distribution by gender groups; **b.** Distribution by ages group (n=70)

**EXCLUSION CRITERIA**

- ✓ Children with syndromes or developmental disabilities;
- ✓ Children did not have their four-first permanent molars fully erupted;
- ✓ Children having amelogenesis imperfecta, tetracycline staining or undergoing orthodontic treatment at the time of assessment;
- ✓ Parents did not agree to their participation in the study

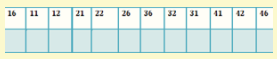
### STUDY DESIGN:

- ✓ Approval from the Ethics Committee of the FMDUP;
- ✓ Informed consent term;
- ✓ Every parent was given a **questionnaire on the behavior and physical well-being of the mother and fetus** during the prenatal period, peri-natal and postnatal care, in order to relate these events to the etiology of HIM. Information gathering : **Area of residence; Parents education level; Maternal age at birth of the child; Maternal disease before becoming pregnant; prolonged medication during last month; Twins; Premature birth-low birth weight; Episodes up to 4 years of age: repeated (>5) episodes of high fever, otitis, asthma, bronchitis, pneumonia, chickenpox, the use of antibiotics.**

### DIAGNOSIS:

Age: 7 years ☐ 8 years ☐ 9 years ☐

Sex: M ☐ F ☐




- ✓ Dental mirror
- ✓ Dental probe
- ✓ Air syringe

0 Enamel defect free
1 White / creamy demarcated opacities, no PEB
1 a White / creamy demarcated opacities, with PEB
2 Yellow / brown demarcated opacities, no PEB
2 a Yellow / brown demarcated opacities, with PEB
3 Atypical restoration
4 Missing because of MIH
5 Partially erupted (i.e., less than one-third of the crown high) with evidence of MIH
6 Unerupted / partially erupted with no evidence of MIH
7 Diffuse opacities (not MIH)
8 Hypoplasia (not MIH)
9 Combined lesion (diffuse opacities / hypoplasia with MIH)
10 Demarcated opacities in incisors only

For the diagnosis of MIH , the judgment criteria proposed by the **European Academy of Paediatric Dentistry (EAPD),** in 2003 by Weerheijm et al· was used.

MIH, molar incisor hypomineralisation; PEB, post-eruptive enamel breakdown.

Fig.2. a. Atypical restoration ; b. Permanent incisor with enamel demarcated opacity; c.Posteruptive enamel breakdown associated with demarcated opacity in palate in occlusal surfaces; d. Absence of first permanent molar (36) related to other teeth of the dentition with enamel opacity and posteruptive breakdown.

## Results

### I - CHARACTERISTICS OF HIM IN THE PRESENT STUDY

| | HIM | | | | | | |
|---|---|---|---|---|---|---|---|
| | Total (n=70) | | Absent (n=61,87%) | | Present (n=9;13%) | | |
| | n | (%) | n | (%) | n | (%) | p |
| Age (years) | | | | | | | |
| 7 | 30 | (43) | 28 | (46) | 2 | (22) | 0,507*** |
| 8 | 28 | (40) | 23 | (38) | 5 | (56) | |
| 9 | 12 | (17) | 10 | (16) | 2 | (22) | |
| Gender | | | | | | | |
| Male | 31 | (44) | 28 | (46) | 3 | (33) | 0,721** |
| Female | 39 | (56) | 33 | (54) | 6 | (67) | |
| Teeth | | | | | | | |
| Maxillary | | | 61 | (87) | 9 | (13) | |
| Mandibular | | | 64 | (91) | 6 | (9) | |

**Teste Exacto de Fisher; ***Teste Exacto do Qui-quadrado.

Table 1- Distribution and prevalence of the demarcated hipomineralisation defect by gender and age groups

| | HIM | | | |
|---|---|---|---|---|
| | Absent | | Present | |
| | n | (%) | n | (%) |
| Tooth | | | | |
| 16 | 63 | (90) | 7 | (10) |
| 11 | 65 | (93) | 5 | (7) |
| 12 | 68 | (97) | 2 | (3) |
| 21 | 65 | (93) | 5 | (7) |
| 22 | 67 | (96) | 3 | (4) |
| 26 | 65 | (93) | 5 | (7) |
| 36 | 64 | (91) | 6 | (9) |
| 32 | 70 | (100) | 0 | (0) |
| 31 | 69 | (99) | 1 | (1) |
| 41 | 69 | (99) | 1 | (1) |
| 42 | 70 | (100) | 0 | (0) |
| 46 | 63 | (91) | 6 | (9) |

Table 2- Distribution of demarcated hipomineralisation defect by is type

### II - Evaluation of prenatal medical history

- ✓ Urinary infections;
- ✓ Maternal diabetes
- ✓ Anaemia
- ✓ Bronchial Asthma*
- ✓ Epilepsy*

*Only one case in each disease

### III -Evaluation of postnatal medical history

Fever illness Infection disease Exposition to toxic envirnoments Otitiss Asthma

Chickenpox Bronchiolitis** Urinary infection** Pneumonia ** Antibiotic amoxicillin **

**Most occurred in the first year of life..

## Discussion

| AUTHORS | YEAR | STATE | STANDARD | Population | SAMPLE SIZE | AGE | CALIBRATION | FREQUENCY % |
|---|---|---|---|---|---|---|---|---|
| **Calderara et al.** | **2005** | **Italy** | **mDDE** | **No** | **227** | **7-8** | **Yes** | **13,7%** |
| **Arrow et al.** | 2006 | Austrália | mDDE | Yes | 511 | 7,1 | Yes | 22% |
| **Jasulaityte et al.** | 2007 | Lithuania | EAPD2003 | No | 1,277 | 6.5-8.5 | Yes | 9,7% |
| **Lygidakis et al.** | 2008 | Greece | EAPD2003 | No | 3518 | 5.5-12 | Yes | 10,20% |
| **Shiu-Yin Cho et al.** | 2008 | China | mDDE | Yes | 2635 | 12 | Yes | 2,80% |
| **Muratbegovic et al.** | 2008 | Bosnian Herzegovina | EAPD 2003 | Yes | 560 | 12 | NR | 12,30% |
| **Cho et al.** | 2008 | Hong Kong | EAPD 2003 | No | 2635 | 11-14 | NR | 2,8% |
| **Kuscu etal.** | 2008 | Turkey | EAPD 2003 | No | 147 | 7-9 | NR | 14,90% |
| **Kukleva et al.** | 2008 | Bulgária | EAPD 2003 | Yes | 2970 | 7- 14 | | 3,60% |
| **Soviero et al.** | **2009** | **Brazil** | **EAPD 2003** | **No** | **249** | **7-13** | **Yes** | **40,20%** |
| **Kuscu et al.** | 2009 | Turkey | EAPD 2003 | No | 109 | 7 | Yes | 9,10% |
| **Cristiane Maria da Costa e Silva et al.** | 2010 | Brazil | EAPD 2003 | Yes | 1126 | 6-12 | Yes | 19,80% |
| **Zawaideh FI et al.** | 2011 | Jordan | EAPD 2003 | No | 570 | 7-9 | NR | 34,40% |
| **Ghanim et al.** | 2011 | Austrália | EAPD 2003 | No | 823 | 7-9 | NR | 21,50% |
| **Gómez Teresita et al.** | 2011 | Spain | EAPD 2003 | No | 505 | 6-14 | Yes | 17,85% |

Table 3. Summary of scientific studies on the prevalence of HIM

- ✓ When we compared our prevalence result (13%) with other studies using the same diagnostic criteria, similar rates are obtained;
- ✓ The gender of participating children was higher for female (67%) [2,6,7,8,9], but in most published studies the gender of participating children was equally distributed [Weerheijm et.al. 2003 William et al. 2006; Ogden et al, 2008; Jalevik et al.2010];
- ✓ Although in the present study more maxillary teeth in total were affected compared to the mandibular, when molars were evaluated, mandibular teeth were much more affected than maxillary teeth. This finding is in agreement with previous reports [Willmott et al, 2008; Jalevik et al.2010; Gómez et al.2012; Ahmadi et al. 2012];
- ✓ The most frequently affected tooth was the first maxillary right molar (16), which is consistent with findings from previous studies [ Soviero et al. 2009; Costa Silva CM et al. 2011; Kukleva MP et al. 2008];
- ✓ The mild defcts were the most prevalent type (89%), this was in agreement with some other preceding studies [Jeremias et al. 2010; Parikh Dr et al.2012; Zawaideh FI et al. 2011].

## Clinical Implications

Epidemiological studies suggest that the prevalence of MIH is increasing. It is important that professionals are able to establish a difference between different enamel defects, clinical signs must be carefully evaluated for the treatment success.

Although the **etiology of MIH remains undefined**, it seems to be a common understanding in literature that systemic factors are possible etiological factors, associated with a genetic pre-disposing condition, since the third pregnancy trimester until 3 years of age (dental crown mineralization) [Alaluusua et al. 2010]

## Conclusion

- Thirteen (**13%**.) children showed MIH in clinic of the Oporto University's Faculty of Dental Medicine;
- The HIM defects were observed in majority in **females**, in **maxillary teeth** in **8 years old**, having been more **mild defects**, although these differences were not statistically significant.
- Despite the limitations of this study, a statistically significant **relationship between** the appearance of **HIM and postnatal medical history** it was seen, specifically in cases of **pneumonia, bronchiolitis or urinary infection and taking antibiotics**.
- More studies should be conducted with more representative sample to draw more conclusions.

Fig.3. a. First permanent molars (16 e 26) and incisor (11) with hypomineralisation; b. First permanent molars with hypomineralizations (36 e 46); c. X-ray of the tooth do 36 with atypical restoration.

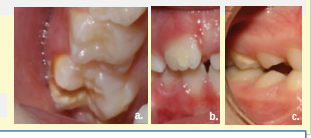


Fig.4. a,b,c. Teeth with defects of MIH

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