Molar Incisor Hypomineralisation (MIH)
&
Hypomineralised Second Primary Molars (HSPM)

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Lecture Outcomes

- Define MIH and HSPM
- Describe the prevalence of both conditions
- Understand the clinical manifestations of both MIH and HSPM
- Explain the aetiological concepts of MIH
- Identify treatment options for teeth affecting by MIH and HSPM

Hypoplasia

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- Enamel hypoplasia is a **<u>quantitative deficiency</u>** of developmental defects of enamel, which usually arise from disruptions of matrix formation

- It may be expressed as:
  - pits
  - grooves
  - thin enamel
  - missing enamel

Clarkson & O'Mullane, 1989

Hypomineralisation

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- **<u>Qualitative enamel defect</u>**
- Usually associated with altered enamel mineralisation
- May be expressed as changes in the translucency or opacity of the enamel
- May be diffuse or demarcated, and colored white, yellow, or brown

Hypoplasia / Hypomineralisation

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Molar Incisor Hypomineralisation

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- Hypomineralisation of systemic origin affecting **one, two or three or all** first permanent molars and the permanent incisors

- Sometimes secondary primary molars and the tips of the permanent canines are also involved

(Weerheijm et al. 2001 and 2003)

Molar Incisor Hypomineralisation

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Prevalence

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- The world wide prevalence varies from 2.4 - 40.2%

  (Jälevik, 2010)

- Australia: 22 - 44 %

  (Arrow et al. 2008; Balmer et al. 2005)

- New Zealand: 14.9 - 18.8%

  (Mahoney & Morrison, 2009, 2011)

Prevalence

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> Int J Paediatr Dent. 2018 Mar;28(2):170-179. doi: 10.1111/ipd.12323. Epub 2017 Jul 21.

The prevalence of molar incisor hypomineralization: evidence from 70 studies

Dongdong Zhao [1], Bao Dong [1], Dandan Yu [1], Qiongqiong Ren [1], Yehuan Sun [1 2]

Affiliations + expand

PMID: 28732120 DOI: 10.1111/ipd.12323

Abstract

Objective: A growing number of studies have investigated the prevalence of Molar Incisor Hypomineralization (MIH) around the world. The aim of this study was to systematically estimate the pooled prevalence of MIH.

Methods: A comprehensive literature research was completed in English and Chinese databases. Random effect models were used to calculate the pooled prevalence. To address the heterogeneity, meta-regression, and sensitivity analyzes were conducted. Publication bias was estimated by trim and fill method.

Results: Seventy eligible studies were included. The pooled prevalence of MIH was 14.2% globally. In subgroup analysis, South America (18.0%, 95% CI: 13.8-22.2) and Spain (21.1%, 95% CI: 17.7-24.6) had the highest prevalence. There was no significant difference between males (14.3%, 95% CI: 12.0-16.6) and females (14.4%, 95% CI: 12.8-15.9). The prevalence of MIH among children 10 years of age or younger (15.1%, 95% CI: 12.1-18.2) was much higher than the prevalence of MIH among older children (12.1%, 95% CI: 8.0-16.3). Sample size explained 15.7% heterogeneity.

Conclusion: MIH has a high incidence globally, especially among children <10 years old. It is, therefore, imperative to develop more appropriate dental healthcare strategies to care for these children and to identify the etiology of MIH to prevent it occurring.

14%

or

1 in 7

Aetiology

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- **Unknown**

- **Pre-natal events** (Lygidakis et al 2008)
  - Mother hypertension
  - Drugs during delivery e.g. N_20
  - Assisted delivery/emergency caesarian

- **Peri-natal events** (Alaluusua 2010)
  - Foetal distress
  - Oxygen deprivation
  - Low birth weight / high birth weight/ premature birth

Aetiology

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Postnatal factors

- Environmental toxins (Jalevik et al. 2001)
- Disturbances in the calcium/phosphate metabolism (Jontell and Lindhe 1986)
- Prolonged use of antibiotics (Jalevik et al. 2001)
- Otitis media (Jalevik et al. 2001)
- Frequent febrile childhood disease (Jalevik et al. 2001)
- Respiratory disease including asthma (Jalevik et al. 2001)
- Genetic predisposition (SCUBE1 gene being shown to be associated with MIH) (Kuhnish et al. 2014)

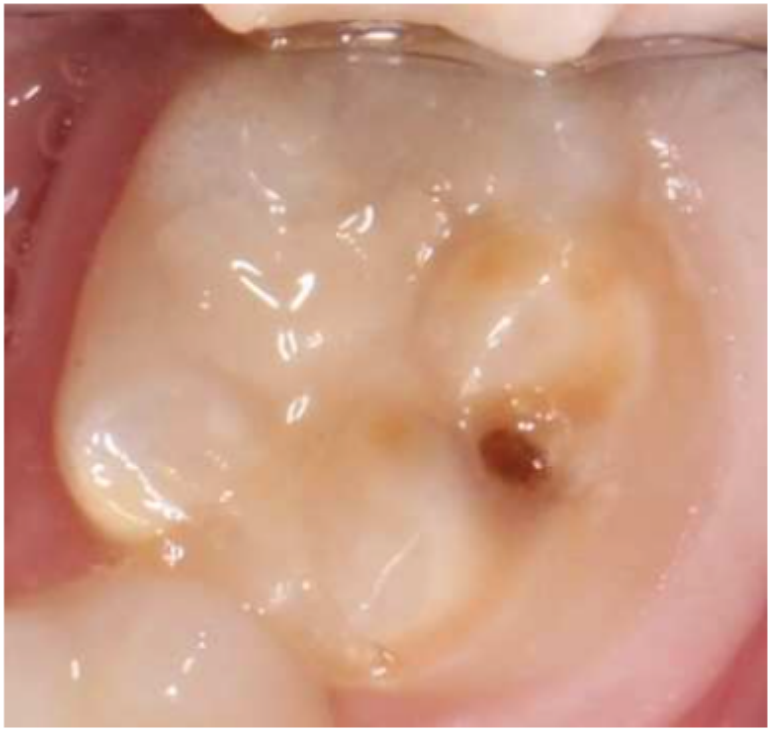
Clinical Features

MIH presents as demarcated enamel defects can be seen as an **abnormality in the translucency of the enamel** (opacity).

(Weerheijm et al. 2001 and 2003)

Severity of MIH vary greatly

- Demarcated opacities
- May or may not be associated with post eruptive enamel breakdown (PEB)
- Symmetrical: may be symmetrical or asymmetrical
- Color: white , creamy yellow, yellow, yellow brown or brown
- No. of molars affected: 1 to 4
- Incisors: may not be affected in mild cases or minimally affected
- Sensitive to cold, heat and tooth brushing (Fagrell 2008)



Composition

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- **Darker lesion**: less mineral (↓ Ca/P; ↑ carbon)
- **Brown enamel**: a 15–21-fold higher protein content than sound enamel
- **White/opaque and yellow enamel**: eight times higher protein content than sound enamel
- Protein found in MIH enamel is mainly serum proteins such as:
  - Albumin
  - alpha-1-antitrypsin and antithrombin III

Mahoney & Farah, 2014

Diagnosis

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- History
- Clinical examination of teeth
- Radiographic examination
- Associated medical conditions

Management

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Problems related with management

- Large immature pulps
- Crown height reduced
- Difficulty in achieving profound anaesthesia
- Enamel quality may preclude good bonding
- Restoration retention difficult
- Dental caries may progress faster

A Cross Section of an MIH-affected First Permanent Molar

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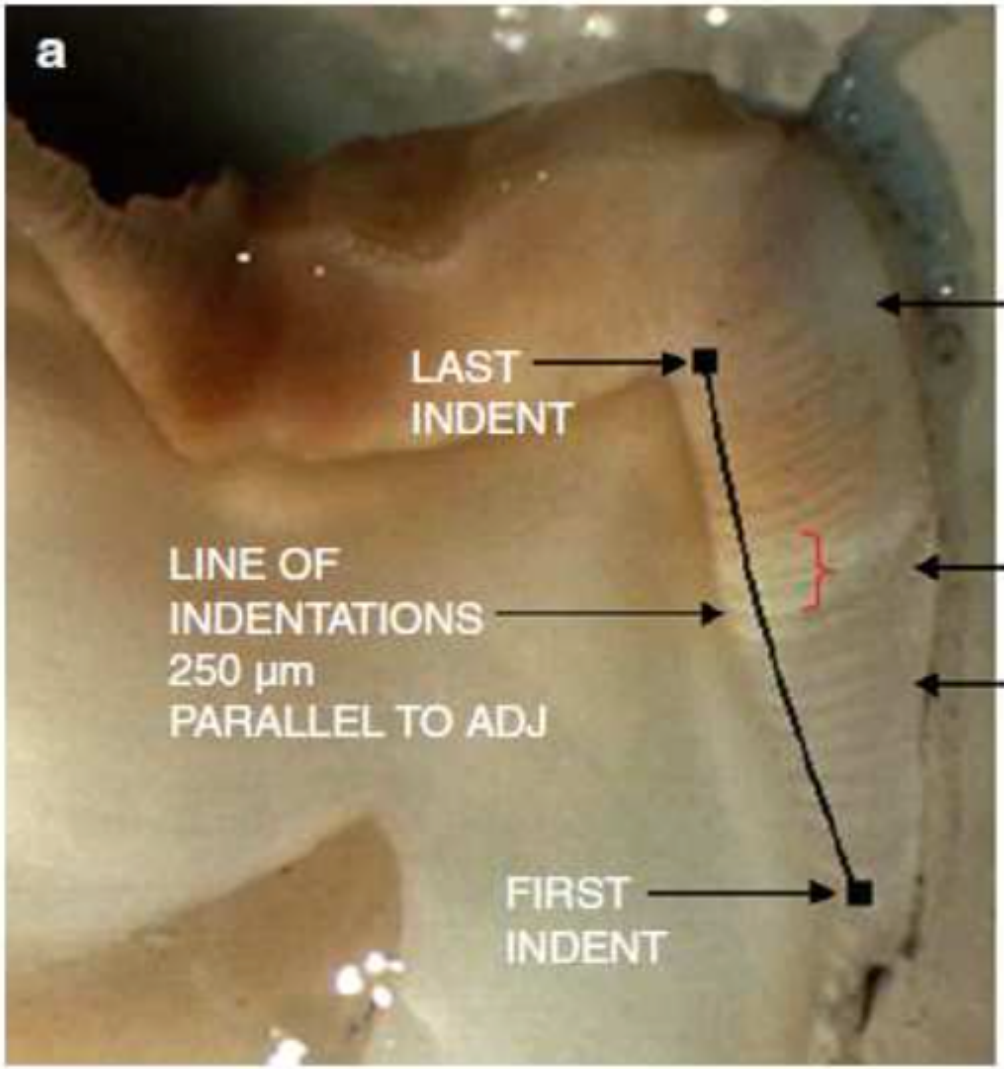

Mahoney & Farah, 2014

Prevention*

- Appropriate dietary advice
- Use of fluoride
  - Fluoride tooth paste (1000 ppm)
  - Fluoride varnish
  - Fluoride mouthwashes
- CPP-ACP
- Sugar free gums
- Fissure sealants
- Recall appointments

(William et al. 2006; Willmott et al. 2008)

*Prevention of sensitivity, PEB, secondary caries

Management of Sensitivity

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- Plaque removal (using soft tooth brush and warm water)
- Use of fluoride (Fluoride tooth paste 1000 ppm; Fluoride varnish; Fluoride mouthwashes)
- CPP-ACP (Tooth mousse Plus)
- Desensitizing tooth paste (Pro-Argin; Colgate)
- Sealing with resin
- Sealing with GIC
- Resin infiltration
- Compomers

Restorative Management

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- Resin composite
- Polyacid modified composite resins (compomers)
- Glass inomers
- Resin modified glass ionomers
- Stainless steel crowns SSC's
- Cast metal restoration- Gold or semi-precious metal onlays
- Porcelain fused to metal crowns

(Harley, 1999; Mejare et al. 2005; Kotsanos et al. 2003)

Restorative Management

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Restorative Management

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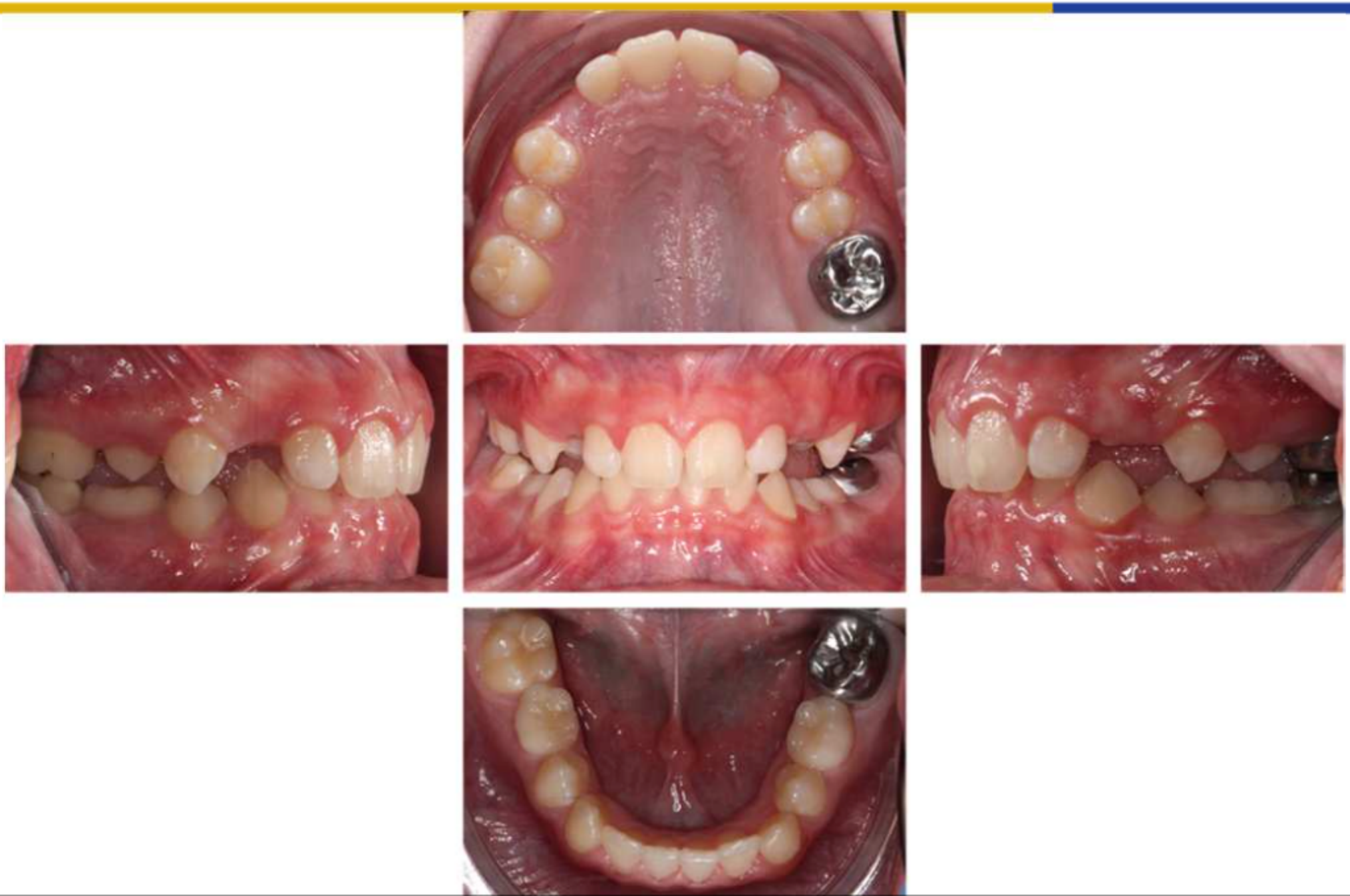

Management with Extractions

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Decision based on following:

- Degree & extend of hypomineralisation/hypoplasia
- Post-eruptive breakdown
- Sensitivity
- Age & co-operation of the child
- Any developing malocclusion
- No. of teeth missing/present (third molars)

Management with Extractions

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Three main options:

1. Immediate extraction: infective, severely broken down

2. Delay extraction to optimize the eruption of surrounding teeth (to allow 7's to move in their place)

3. Extract them as part of orthodontics

Management with Extractions

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Contraindications for extraction

- Class II malocclusion
- Deep bite
- Lip trap
- Brachyfacial type
- Spacing

Management with Extractions

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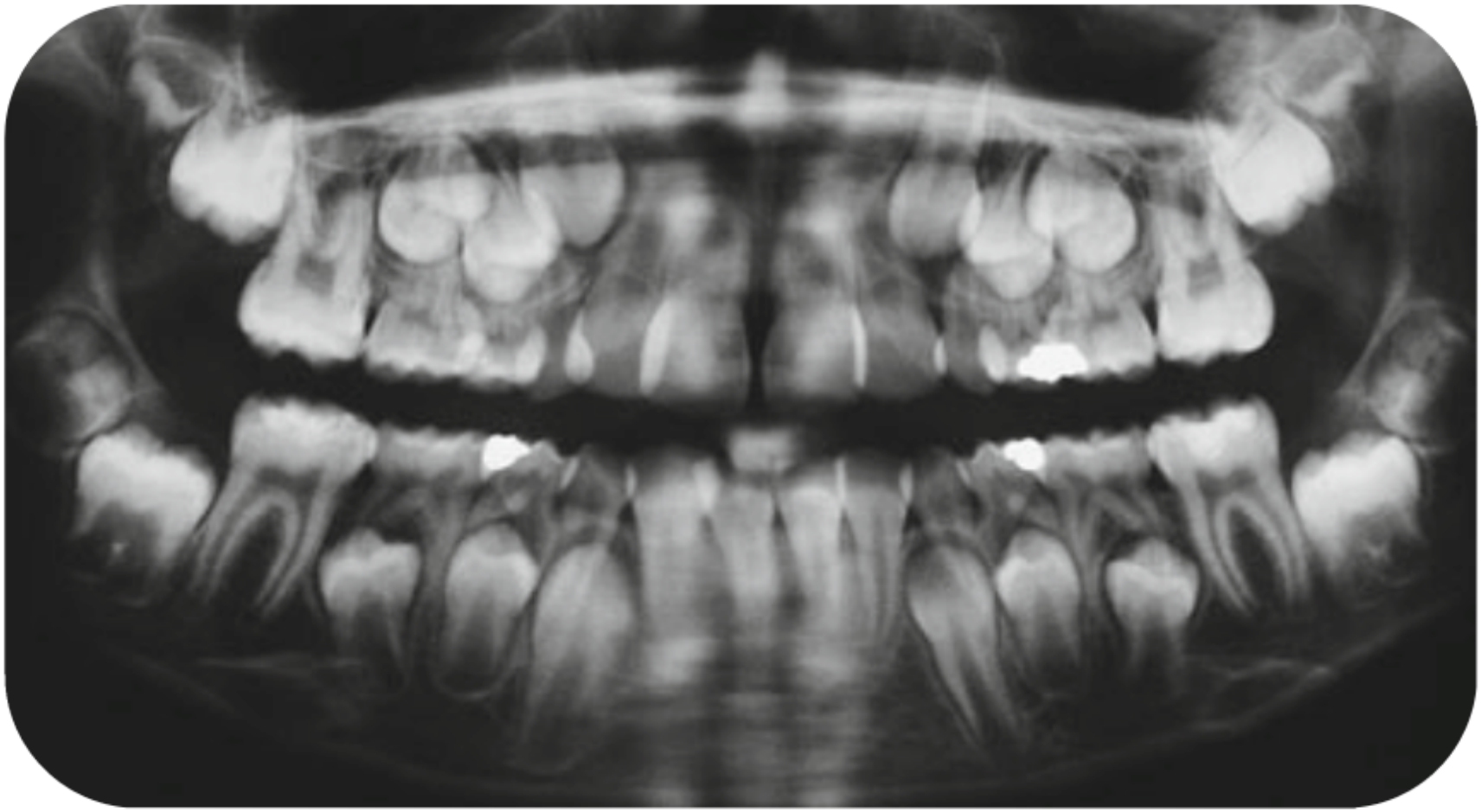
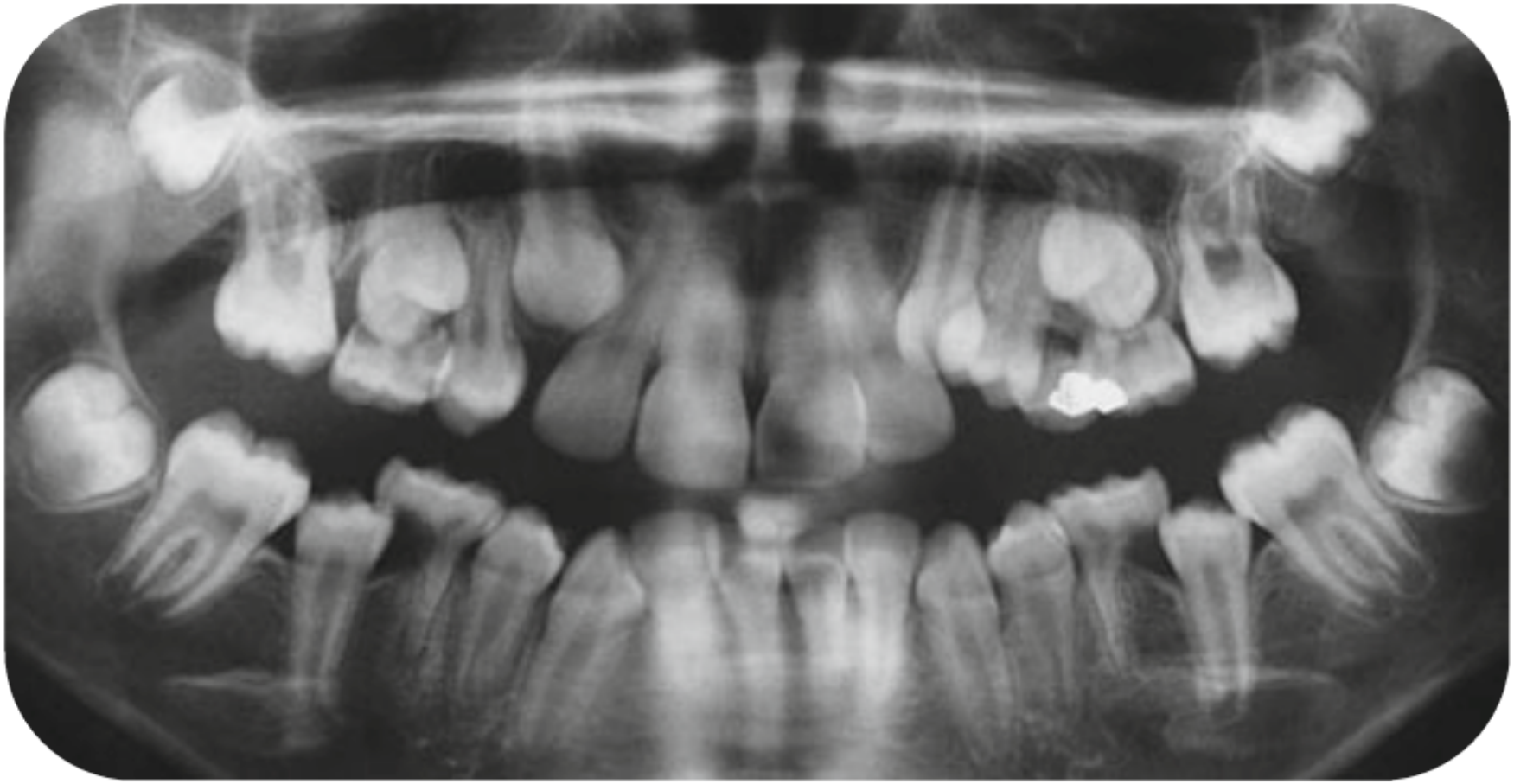


Panoramic radiograph of 9-year-old female with an orthodontic plan to have all first molars extracted (severe hypomineralisation). Note positions of lower second premolars

Drummond & Harding, 2014

Management with Extractions



Panoramic 3 years after the extractions. Note eruption paths of lower second premolars

Drummond & Harding, 2014

Management of Anterior Teeth

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Permanent teeth

- Micro-abrasion (with or without bleaching)
- PMMA resin
- Composite veneers
- Zirconia veneers/ crowns

(Ashkenazi and Sarnat ,2000; Welbury 1991; Wong and Winter, 2002; Wright, 2002)

Management of Anterior Teeth - Microabrasion

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Hanlin et al. 2014

Management of Anterior Teeth – Composite veneers

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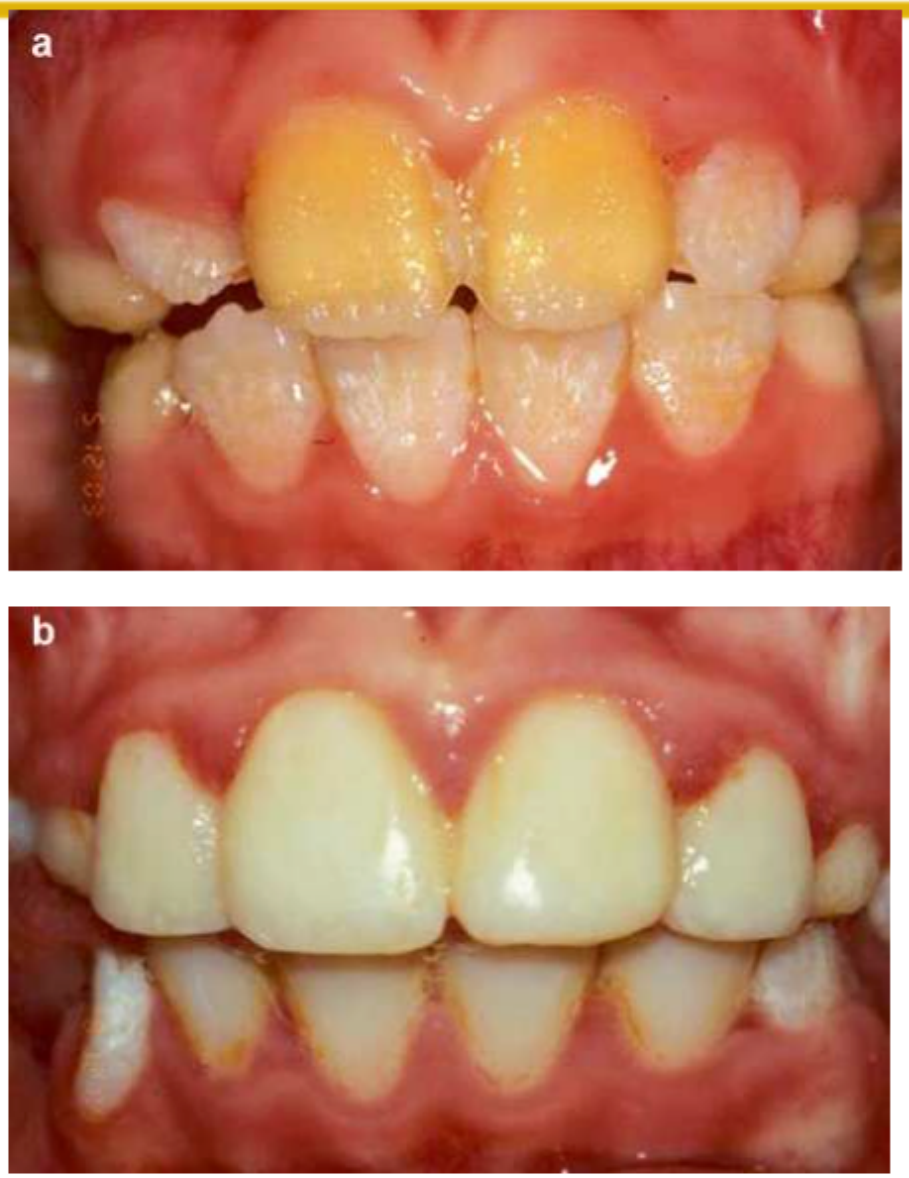

Hanlin et al. 2014

Management Decisions

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Extraction

- **Immediate**
  - Severe pain or infection
- **Intermediate**
  - Extract when 7's are in correct position
  - Manage sensitivity, pulp, enamel fractures
- **Long term**
  - Extract as part of ortho treatment
  - Manage sensitivity, pulp, enamel fractures

Long Term restoration

- **Immediate**
  - Compomer , SSC, GIC
- **Intermediate**
  - SSC, Composite
- **Long term**
  - Gold /metal overlay, full crowns

Management Options

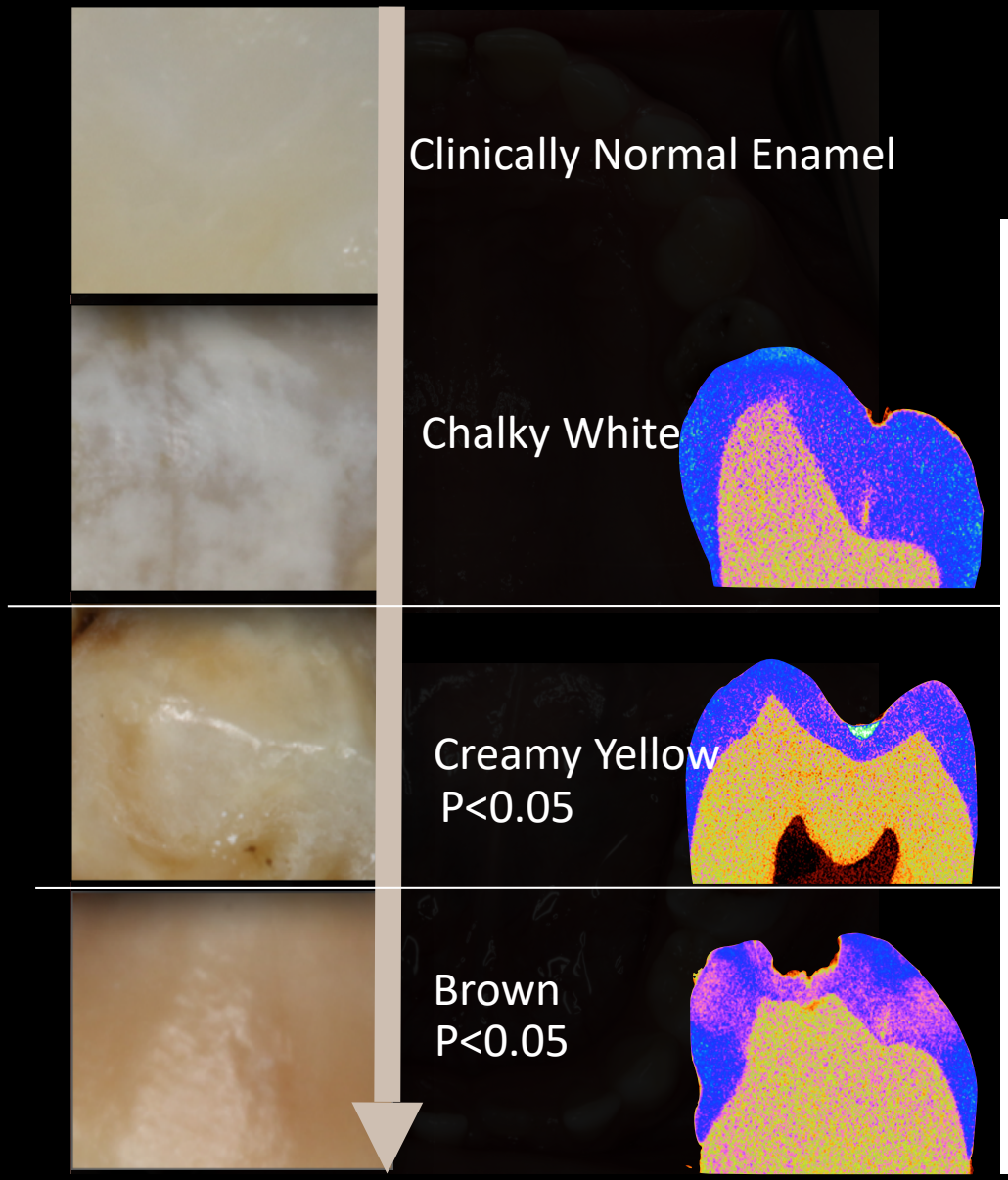
Management strategies for hypomineralised teeth

(revised Dec 2018)

Mild Defects		Moderate/Severe Defects	
Enamel opacties (white/yellow), no post-eruptive breakdown, no/slight sensitivity, mild aesthetic problems, no secondary caries		Enamel opacities (brown), post-eruptive breakdown, atypical restorations, sensitivity, secondary caries, aesthetic problems	
Molars	*Incisors*	*Molars*	*Incisors*
Application of fluoride varnish and consider use of CPP-ACP products for home use	In whiteish defects; microabrasion or resin infiltration and if needed this can be followed by a resin composite restoration	Early referral to specialist paediatric dental services (ideally before 8 years of age)	Resin composite restorations or veneers following micro-abrasion, reduction and intermediate opaque resins
Fissure Sealants of partially erupted teeth with glass-ionomer cements and resin composite sealants of erupted teeth using adequate isolation	In yellow-brown defects; etch-bleach-seal technique	Consider extractions following multidisciplinary paediatric and orthodontic consultation	Porcelain veneers, if required, in adulthood
Resin composite restorations with adequate isolation if localised breakdown or secondary caries is observed*	Resin composite restorations with conservative enamel reduction	Full coverage restorations including stainless steel crowns in children and adolescents	
Ongoing preventive care and clinical reviews for all cases			

**Multi-surface glass ionomer restorations are NOT recommended*

Patel 2018



> Eur Arch Paediatr Dent. 2017 Dec;18(6):377-383. doi: 10.1007/s40368-017-0306-8. Epub 2017 Oct 28.

Tooth mineral density of different types of hypomineralised molars: a micro-CT analysis

C Neboda [1], R P Anthonappa [2], N M King [1]

Affiliations + expand

PMID: 29081019 DOI: 10.1007/s40368-017-0306-8

Abstract

Aim: This study sought to evaluate the tooth mineral density (TMD) for the different lesion types in hypomineralised first permanent molars (FPMs) and compare them to unaffected enamel in clinically sound FPMs.

Design: Eighteen FPMs with varying degrees of hypomineralised enamel were grouped into brown, yellow/creamy and white lesion types. Micro-CT was used to determine the TMD for each lesion type, and for unaffected enamel at different locations in the outer, middle, and inner-third of the enamel.

Results: The average TMD for brown, yellow/creamy, white and unaffected enamel was 1.79, 2.21, 2.43 and 2.46 g/cm^3, respectively. Brown and yellow/creamy lesions exhibited a statistically significant difference when compared to white lesions and unaffected enamel. However, no statistical difference was evident in TMD between white lesions and unaffected enamel. The TMD increased from the outer-third to inner-third for brown and yellow/creamy lesions ($p < 0.05$), while in white lesions and unaffected enamel, the TMD decreased from the outer-third to inner-third ($p < 0.05$).

Conclusion: TMD was lowest for brown lesions followed by yellow/creamy lesions while the TMD for white lesions was similar to unaffected enamel.

Keywords: Hypomineralisation; Molar-incisor hypomineralisation; Permanent molars; Tooth mineral density.

Hypomineralised Second Primary Molars!

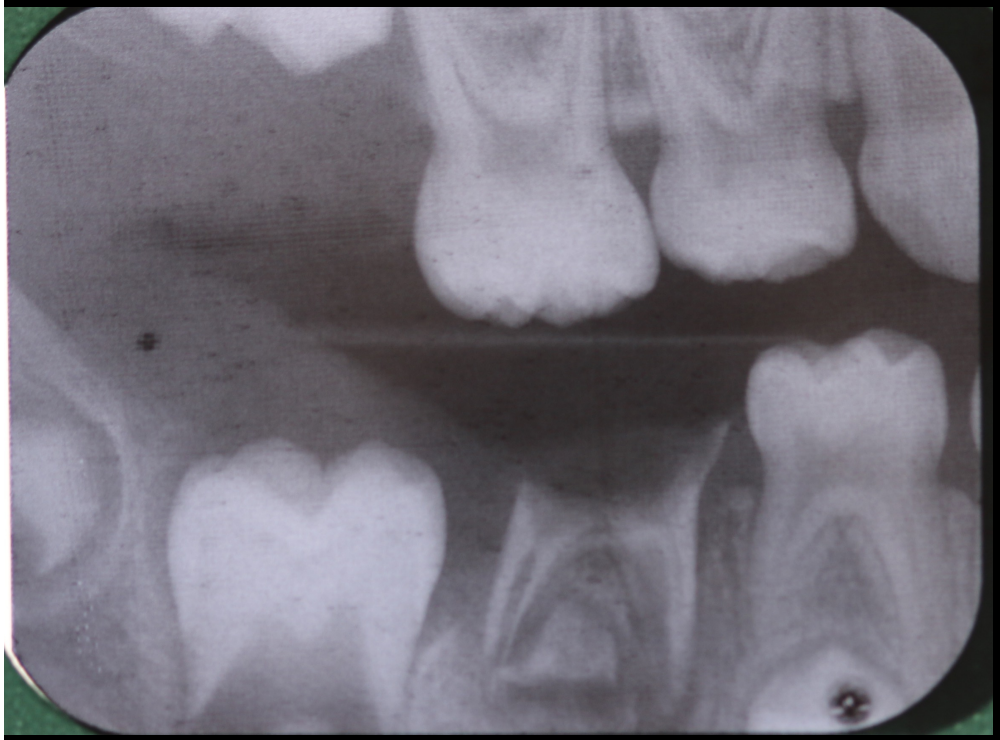
- Prevalence: ~10% (14% reported by a recent Australian study)

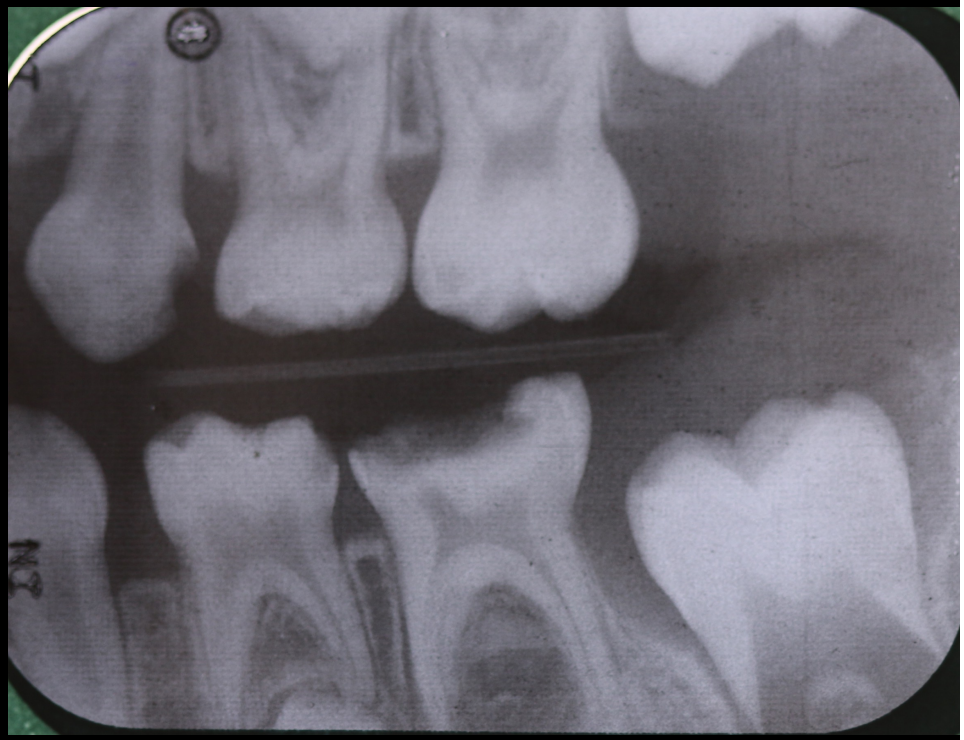
Owen et al. 2017

- *Are hypomineralised lesions on second primary molars (HSPM) a predictive sign of molar incisor hypomineralisation (MIH)?*
  - OR 4.66, Co-occurence prevalence ~20%

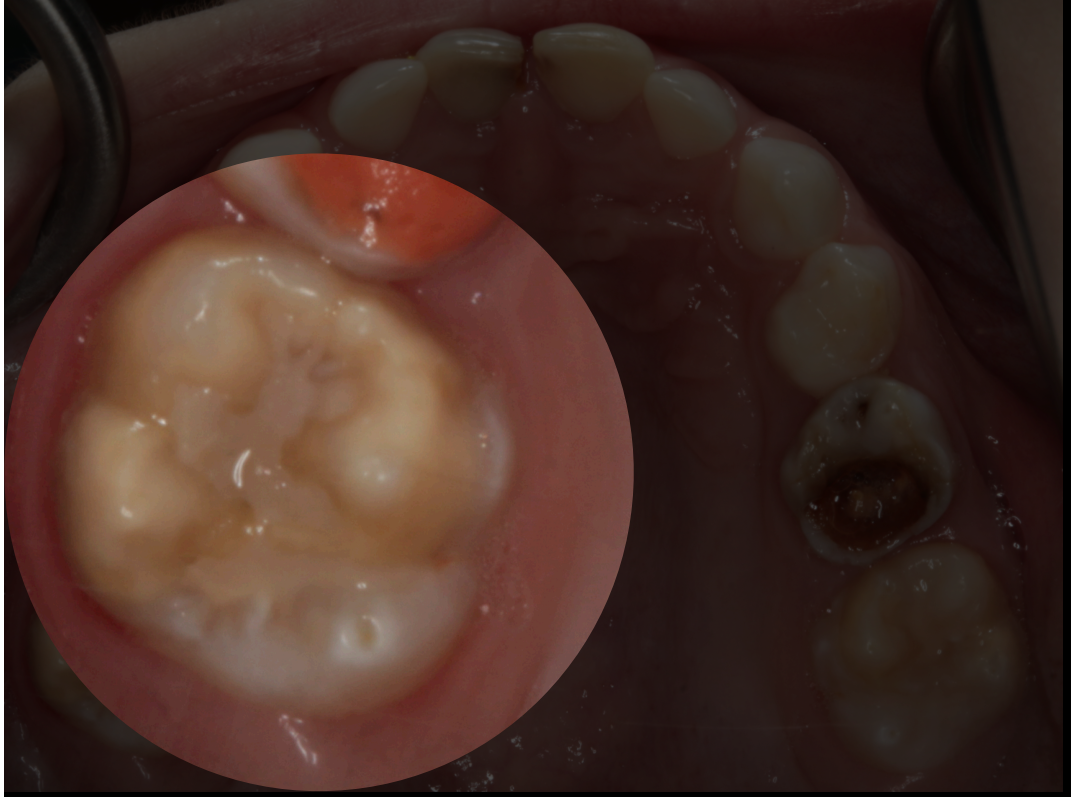
Garot et al. 2018

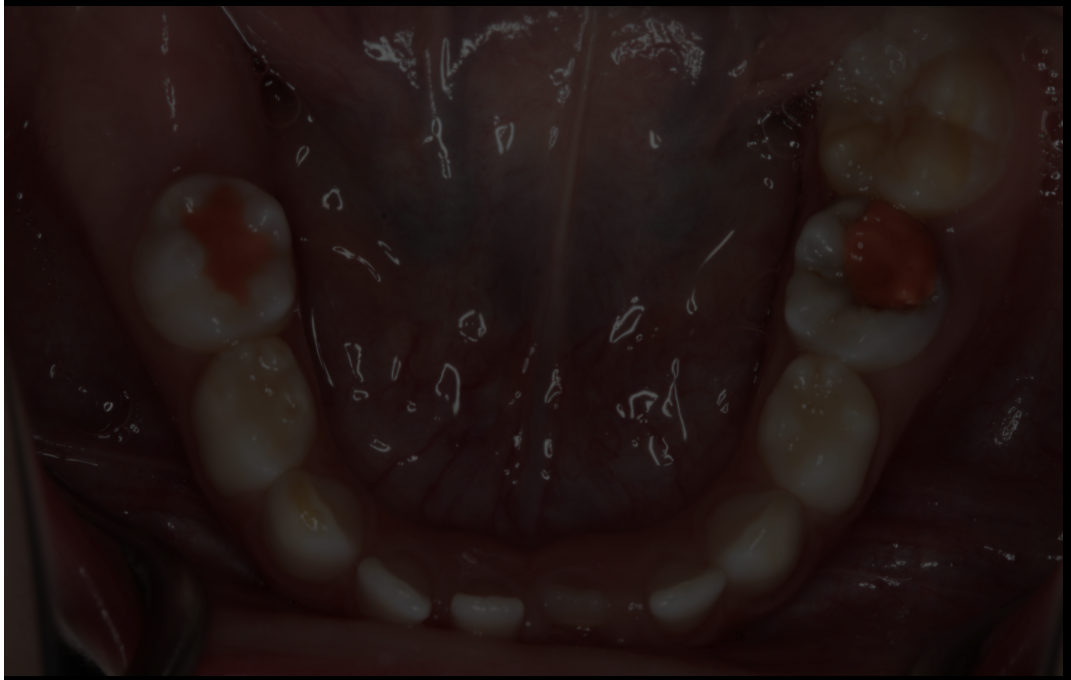
- Association between HSPM and hypomineralised primary canines…





Case Study





PREVALENCE

Zhao et al. 2018

Int J Paediatr Dent. 2018 Mar;28(2):170-179. doi: 10.1111/ipd.12323. Epub 2017 Jul 21.

The prevalence of molar incisor hypomineralization: evidence from 70 studies

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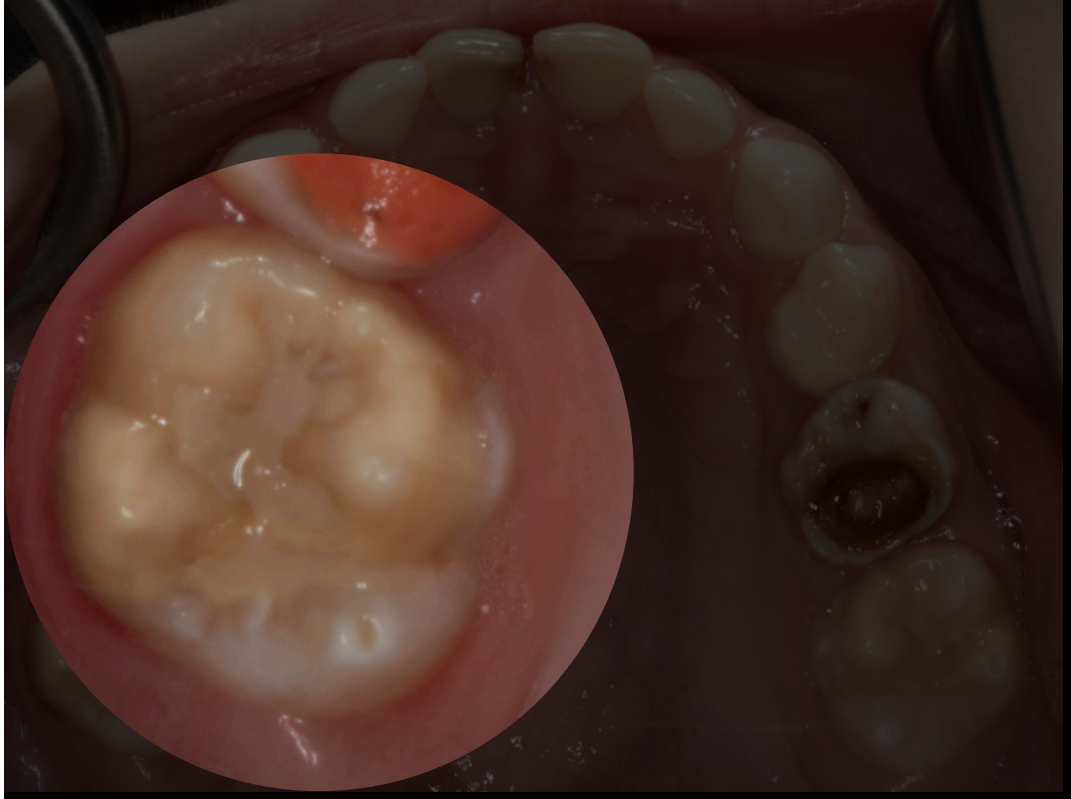
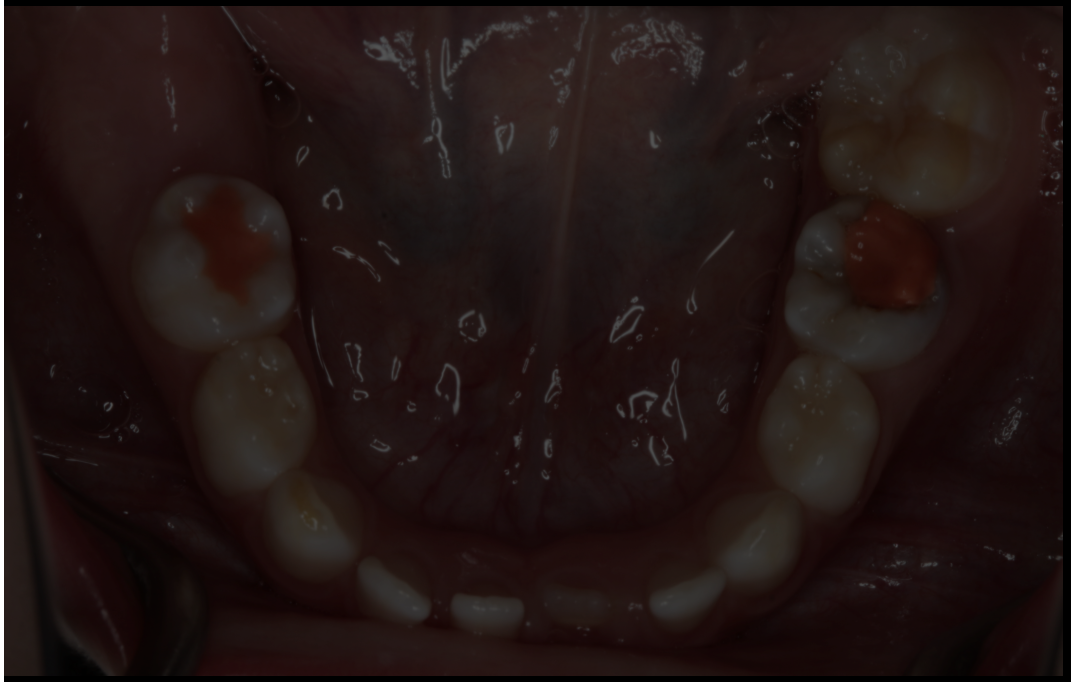




JUDGEMENT CRITERIA

Weerheijm et al. 2003

Demarcated opacity

A demarcated defect involving an alteration in the translucency of the enamel, variable in degree. The defective enamel is of normal thickness with a smooth surface and can be white, yellow or brown in colour.

Posteruptive Enamel Breakdown (PEB)

A defect that indicates deficiency of the surface after eruption of the tooth. Loss of initially formed surface enamel after tooth eruption. The loss is often associated with a pre-existing demarcated opacity.

Atypical restoration

The size and shape of restoration are not conform the temporary caries picture. In most cases in molars it will handle about restorations extended to the buccal or palatinal smooth surface. At the border of the restorations frequently an opacity can be noticed. In incisors a buccal restoration can be noticed not related to a trauma.

Extracted molar due to MIH

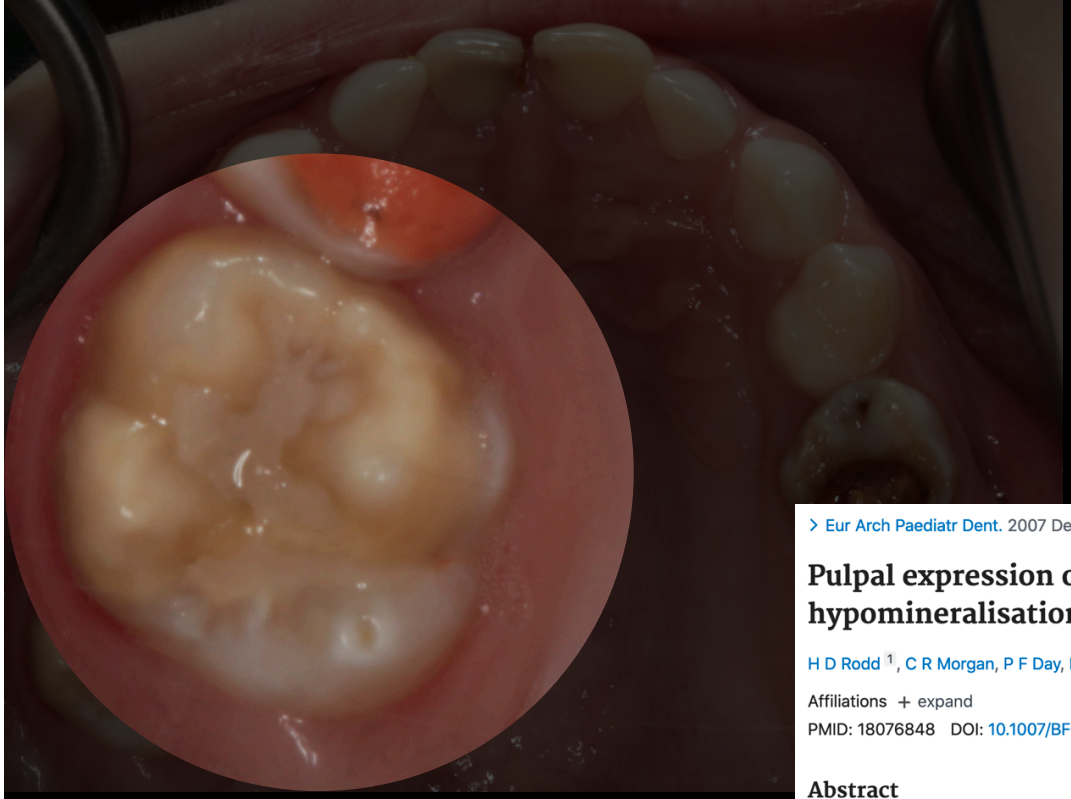
Absence of a first permanent molar should be related to the other teeth of the dentition. Suspected for extraction due to MIH are: opacities or atypical restorations in the other first permanent molars combined with absence of a first permanent molar. Also the absence of first permanent molars in a sound dentition in combination with demarcated opacities on the incisors is suspected for MIH. It is not likely that incisors will be extracted due to MIH.

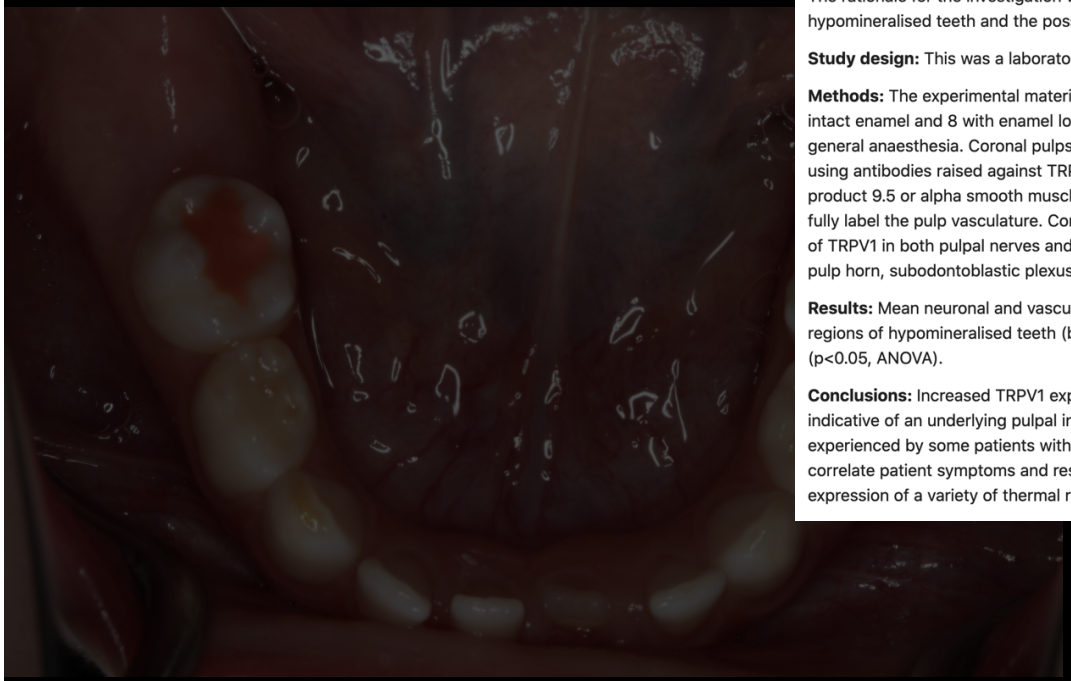
Unerupted

The first permanent molar or the incisor to be examined are not yet erupted.

Notes: in case of a large caries lesion with demarcated opacities at the border of the cavity or on the non caries surfaces these teeth should be judged as MIH. Other changes in dental enamel such amelogenesis imperfecta, hypoplasia, diffuse opacities, white spot lesions, tetracycline staining, erosion, fluorosis, white cuspal and marginal ridges should be excluded from the types of enamel defects outlined as above.

TABLE 1 - *Definitions of the judgement criteria to be used in diagnosing Molar Incisor Hypomineralisation (MIH) for prevalence studies*.





Ultra-structural considerations

Rodd et al. 2007

Eur Arch Paediatr Dent. 2007 Dec;8(4):184-8. doi: 10.1007/BF03262594.

Pulpal expression of TRPV1 in molar incisor hypomineralisation

H D Rodd [1], C R Morgan, P F Day, F M Boissonade

Affiliations + expand

PMID: 18076848 DOI: 10.1007/BF03262594

Abstract

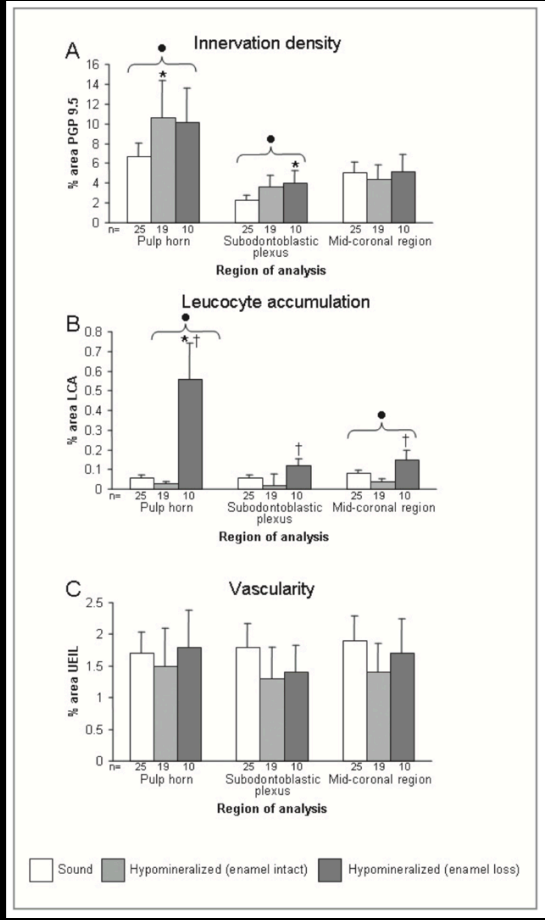
Aim: This was to compare the pulpal expression of the transient receptor potential ion channel (TRPV1), a noxious heat receptor, in sound and hypomineralised human first permanent molars. The rationale for the investigation was to gain further insight into pulpal changes in hypomineralised teeth and the possible biological mechanisms underlying thermal hypersensitivity.

Study design: This was a laboratory study using a quantitative immuncocytochemical approach.

Methods: The experimental material comprised 17 sound and 18 hypomineralised molars (10 with intact enamel and 8 with enamel loss), obtained from children requiring dental extractions under general anaesthesia. Coronal pulps were removed and processed for indirect immunofluorescence using antibodies raised against TRPV1 and either the general neuronal marker, protein gene-product 9.5 or alpha smooth muscle actin in conjunction with Ulex europaeus agglutinin 1 lectin to fully label the pulp vasculature. Computerised image analysis was used to quantify the expression of TRPV1 in both pulpal nerves and blood vessels within different regions of the pulp including the pulp horn, subodontoblastic plexus and mid-coronal region.

Results: Mean neuronal and vascular TRPV1 expression was significantly greater in some pulpal regions of hypomineralised teeth (both with and without enamel loss) than for sound samples ($p<0.05$, ANOVA).

Conclusions: Increased TRPV1 expression within the pulps of hypomineralised teeth may be indicative of an underlying pulpal inflammation and may help to explain the heat sensitivity experienced by some patients with this condition. However, future lines of enquiry should seek to correlate patient symptoms and responses to controlled hot and cold stimuli with pulpal expression of a variety of thermal receptors to gain further insight into dental pain mechanisms.



Ultra-structural considerations

Fagrell et al. 2008

> Int J Paediatr Dent. 2008 Sep;18(5):333-40. doi: 10.1111/j.1365-263X.2007.00908.x. Epub 2008 Mar 6.

Bacterial invasion of dentinal tubules beneath apparently intact but hypomineralized enamel in molar teeth with molar incisor hypomineralization

Tobias G Fagrell [1], Peter Lingström, Stina Olsson, Frank Steiniger, Jörgen G Norén

Affiliations + expand

PMID: 18328044 DOI: 10.1111/j.1365-263X.2007.00908.x

Abstract

Background: The most common problems for a patient with molar incisor hypomineralization (MIH) are the collapse of enamel and cavitations, loss of fillings, and secondary caries, but most of all, severe hypersensitivity.

Objective: The aim of this paper was therefore to histologically study possible bacterial invasion of dentinal tubules beneath apparently intact, but hypomineralized enamel in permanent molars with MIH.

Material and methods: Five extracted permanent first molars diagnosed with MIH were fixated, demineralized, and sagittally serially sectioned in a bucco-lingual direction in a microtome with a thickness of 4-5 microm. Sections were stained with a modified Brown and Benn staining for bacteria, unstained sections were analysed in field emission SEM.

Results: Stained sections from the cuspal areas, below the hypomineralized enamel, the staining indicated the presence of bacteria in the dentinal tubules. The HTX staining showed that the pulp in sections without any findings was normal and free from bacteria or infiltrates from inflammatory cells. In sections where bacteria were found in the cuspal areas or deeper in the dentin, a zone of reparative dentin was found, and in sections from one tooth, the coronal pulp showed an inflammatory reaction with inflammatory cells. In sections adjacent to those without any bacterial staining, the SEM analyses revealed empty dentinal tubules without any odontoblast processes or signs of bacteria. When odontoblast processes were found, the dentinal tubules were filled with bacteria located on the surface of the odontoblast processes. In some areas, a large number of tubules were found with bacteria. No bacteria were found close to the pulp. The odontoblast processes appeared larger in areas where bacteria were found.

Conclusions: The presence of bacteria in the dentinal tubules and inflammatory reactions in the pulp indicate that oral bacteria may penetrate through the hypomineralized enamel into the dentin, thus possibly contribute to hypersensitivity of teeth with MIH.

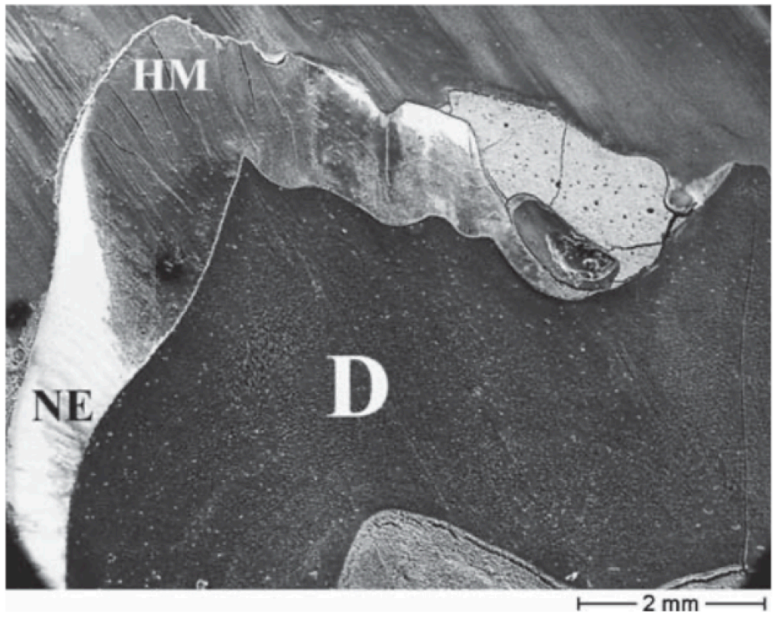
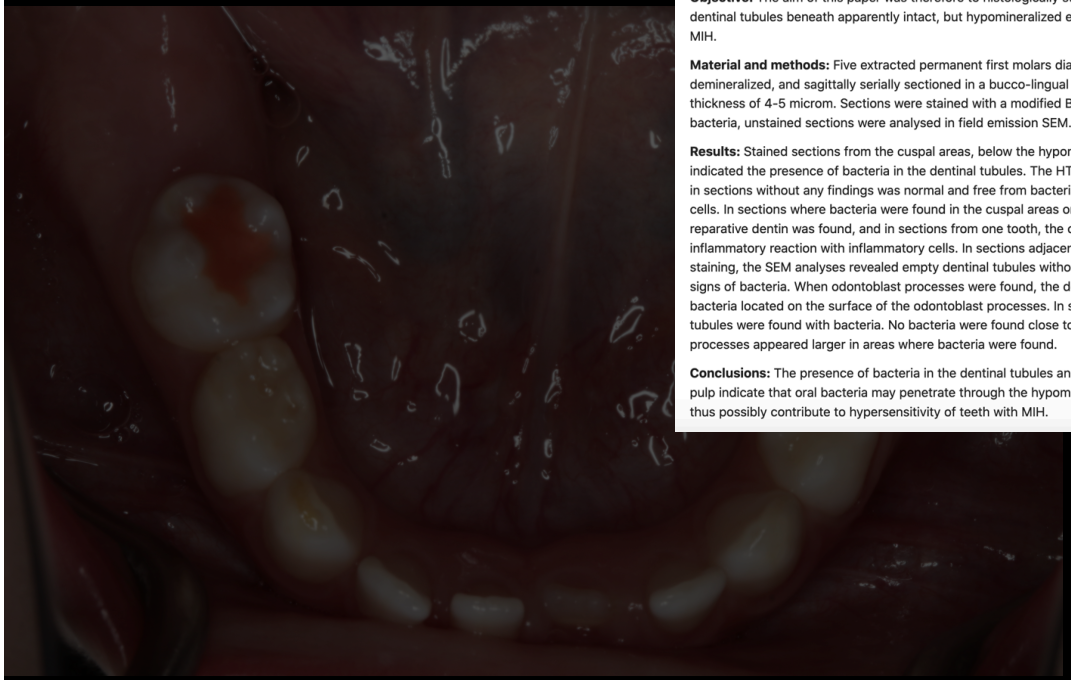
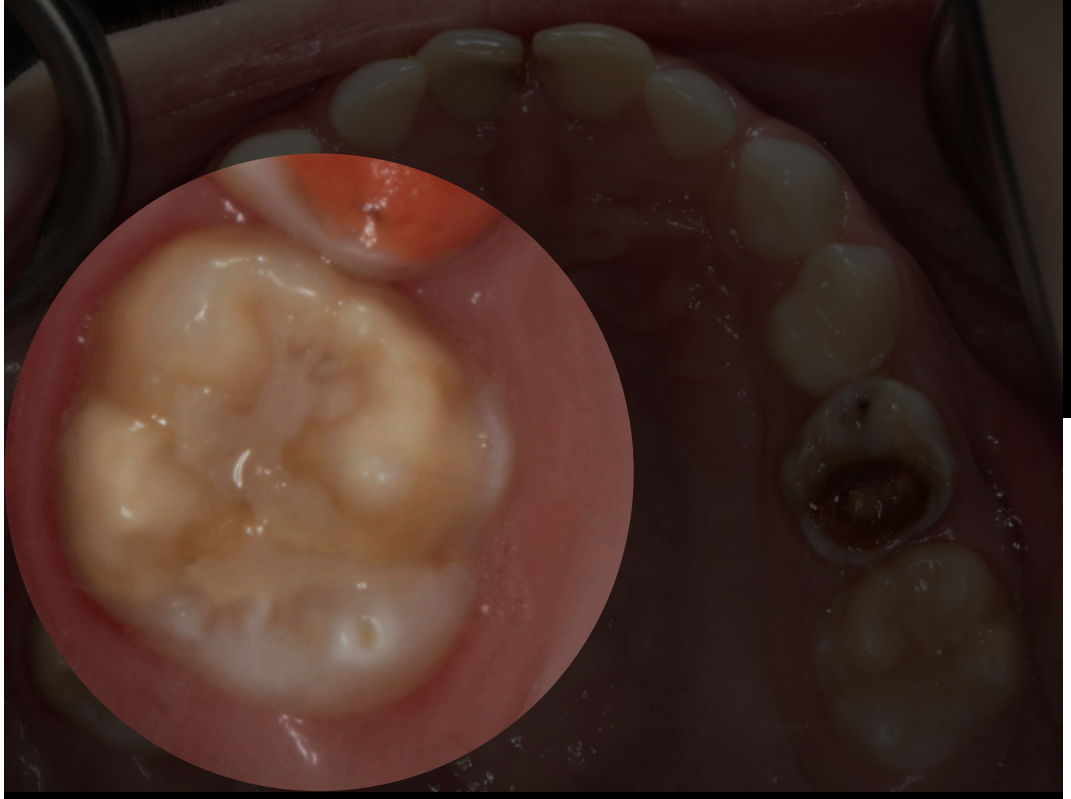
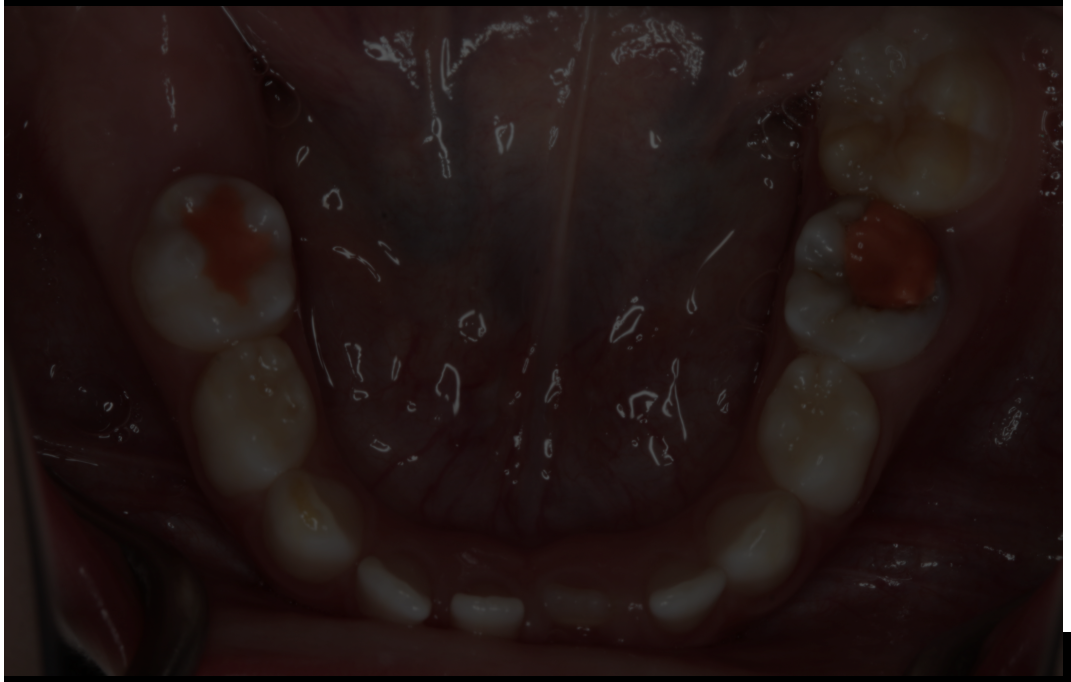


Figure 2. Low-magnification SEM image of a permanent first molar with normal and hypomineralized enamel. NE = normal enamel; HM = hypomineralized enamel; D = dentin.







Behavioural considerations

Jalevik et al. 2012

Comparative Study > Int J Paediatr Dent. 2012 Mar;22(2):85-91.
doi: 10.1111/j.1365-263X.2011.01161.x. Epub 2011 Jul 22.

Treatment outcomes and dental anxiety in 18-year-olds with MIH, comparisons with healthy controls – a longitudinal study

Birgitta Jälevik [1], Gunilla Klingberg

Affiliations + expand

PMID: 21781199 DOI: 10.1111/j.1365-263X.2011.01161.x

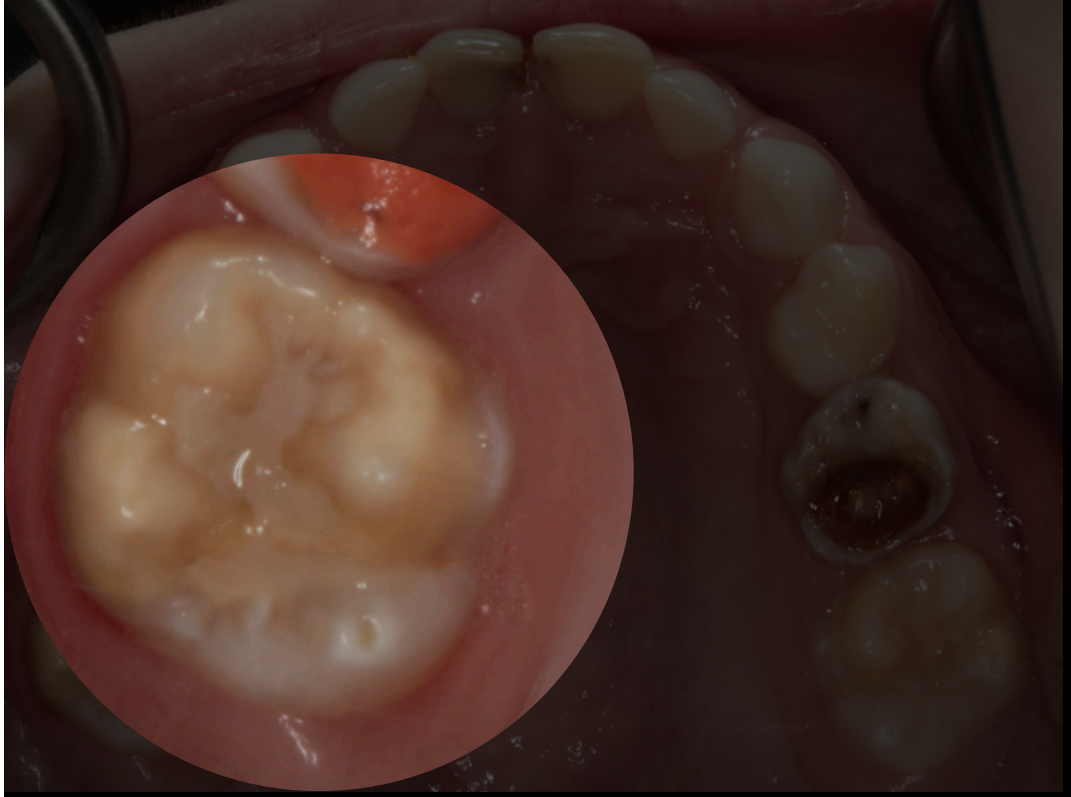
Abstract

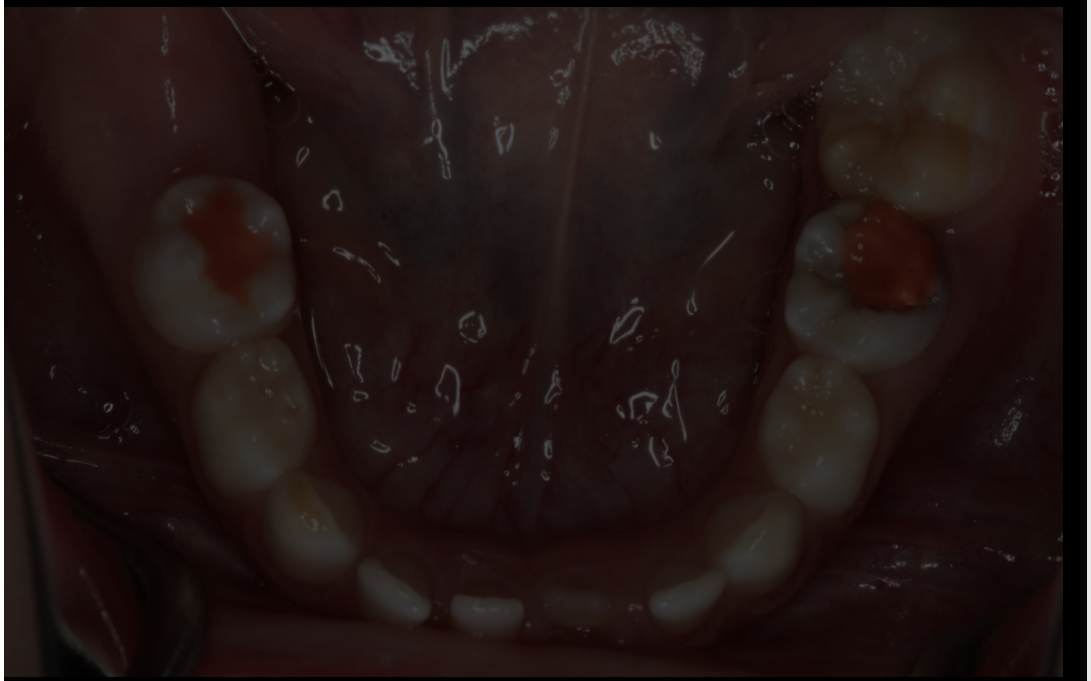
Background: In a previous study, 9-year-old children with severe Molar Incisor Hypomineralization (MIH) had undergone dental treatment of their first molars nearly ten times as often as children in a control group. They also showed more management problems (BMP) and fear and anxiety (DFA).

Aim: To assess the long-term outcomes of dental treatments, dental anxiety, and patients' satisfaction in adolescents with MIH.

Design: Sixty-seven patients, identical with those in the baseline study, were studied at age 18-years. The participants answered the Children's Fear Survey Schedule - Dental Subscale the Dental Visit Satisfaction Scale (DVSS). Data were compiled from the dental records concerning dental health, number of restorative treatments and BMP.

Results: Molar Incisor Hypomineralization group had a significantly higher DMFT, and had undergone treatment of their permanent first molars 4.2 times as often as the controls. BMP was still significantly more common in the MIH group. However, DFS was reduced in MIH group and increased in the control groups. The DVSS scores did not differ between the groups. Conclusions. Patients with severe MIH had a poorer dental health and were still more treatment consuming at age 18-years. However, their dental fear was now at the same level as the controls.

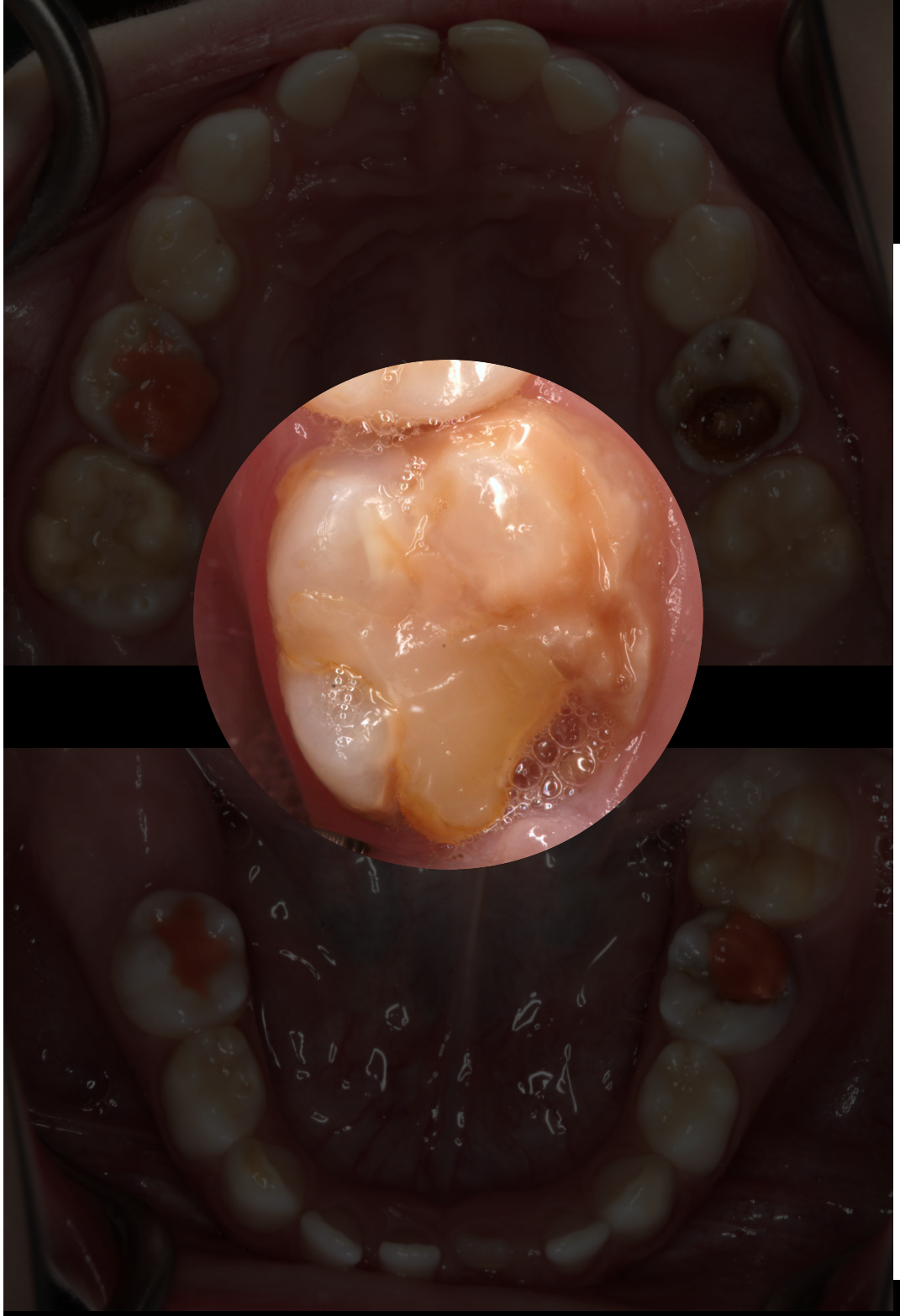




TREATMENT CRITERIA

Lygidakis et al. 2010

Level of Severity	Dental Age: Early Mixed	Dental Age: Late mixed	Dental Age: Full permanent
Mild	Prevention		
	Adhesive + sealant for restoration		
			Composite restoration
	Microabrasion, bleach + sealant for anterior		
Severe	Prevention & symptom control		
	Adhesive + sealant for posterior		
	Microabrasion, bleach + sealant for anterior		
	Glass ionomer restoration		
			Composite restoration
			Performed metal crown
	Orthodontic extraction		
			Cast restoration



TREATMENT

> Dent Mater. 2018 Feb;34(2):331-340. doi: 10.1016/j.dental.2017.11.015. Epub 2017 Dec 6.

Bonding strategies for MIH-affected enamel and dentin

Norbert Krämer [1], Ngoc-Han Nana Bui Khac [1], Susanne Lücker [2], Vitus Stachniss [3], Roland Frankenberger [4]

Affiliations + expand

PMID: 29208311 DOI: 10.1016/j.dental.2017.11.015

Abstract

Objectives: Aim of the present study was to evaluate resin composite adhesion to dental hard tissues affected by molar incisor hypomineralisation (MIH).

Methods: 94 freshly extracted human molars and incisors (53 suffering MIH) were used. 68 teeth (35 with MIH) were used for μ-TBS tests in enamel and dentin, 26 (18 with MIH) for qualitative evaluation. Specimens were bonded with Clearfil SE Bond, Scotchbond Universal, and OptiBond FL. For MIH affected enamel, additional OptiBond FL groups with NaOCl and NaOCl+Icon were investigated. Beside fractographic analysis, also qualitative evaluations were performed using SEM at different magnifications as well as histological sectioning.

Results: Highest μ-TBS values were recorded with dentin specimens (ANOVA, mod. LSD, $p<0.05$). Results were independent of adhesive and dentin substrate ($p>0.05$). Pre-test failures did not occur in dentin specimens. Sound enamel specimens exhibited significantly higher μ-TBS values than MIH enamel ($p<0.05$). The two-step self-etch adhesive (Clearfil SE Bond) and the two-step etch-and-rinse adhesive (Scotchbond Universal) showed the lowest values in affected enamel specimens ($p<0.05$) with most pre-test failures ($p<0.05$). OptiBond FL on affected enamel showed better results than Clearfil SE Bond ($p<0.05$). An additional pre-treatment of affected enamel with NaOCl or NaOCl and Icon did not enhance enamel bonding ($p>0.05$), however, it caused less pre-test failures ($p<0.05$). Micromorphological analyses revealed that conventional phosphoric acid etching produces a much less pronounced etching pattern in affected enamel and a porous structure as weak link for the resin-enamel bond was identified.

Significance: Bonding to porous hypomineralized MIH enamel is the limiting factor in adhesion to MIH teeth. MIH-affected dentin may be bonded conventionally.

Note Taking

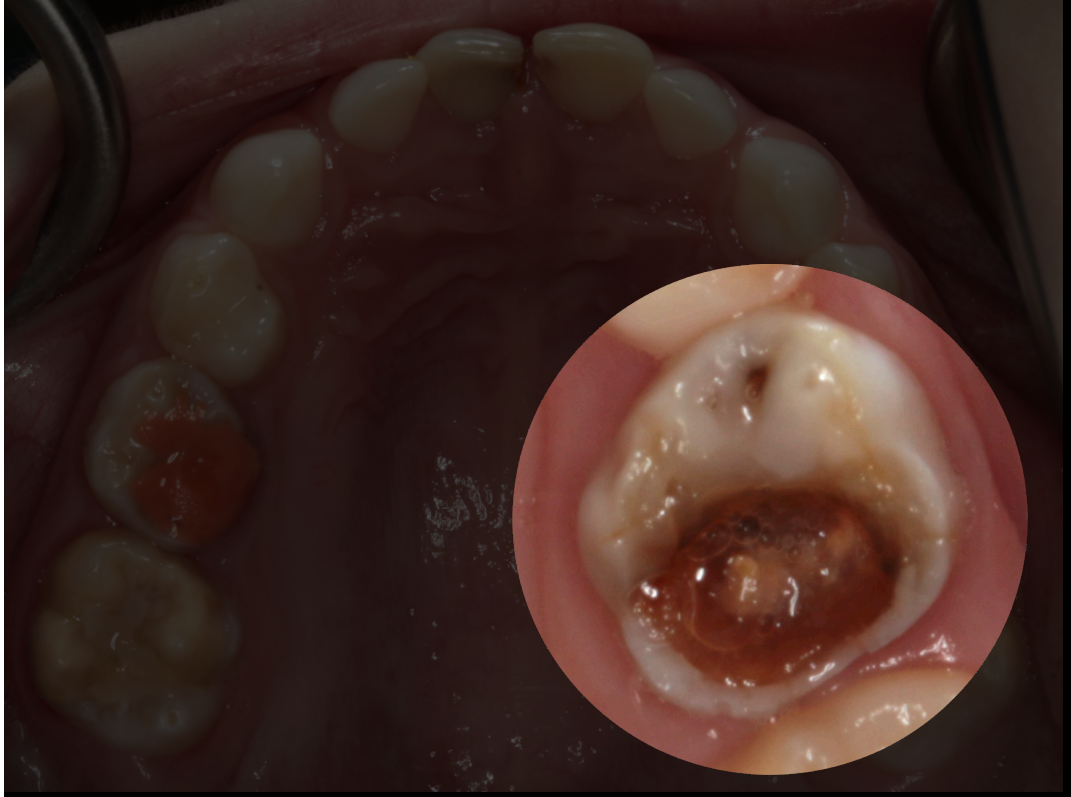
Qualitative vs Quantitative

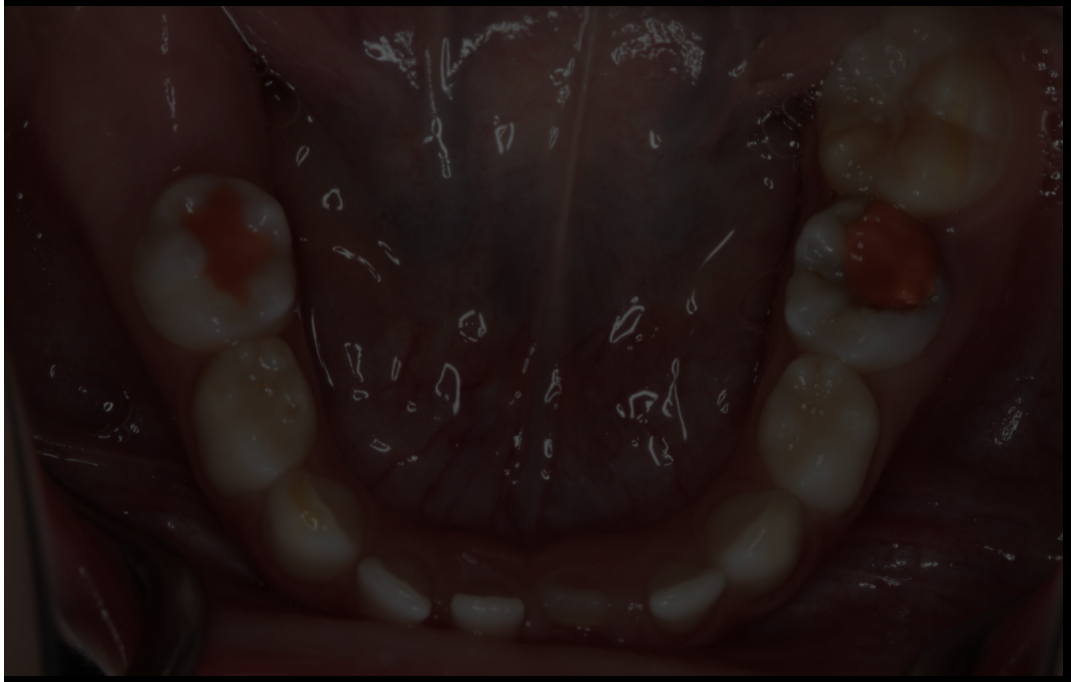
Colour

Severity/Post-eruptive Breakdown

Symptoms: sensitivity

16: creamy yellow opacities involving the majority of the coronal surface, mild MPal breakdown and + +sensitivity to air





> Caries Res. 2008;42(4):282-5. doi: 10.1159/000135674. Epub 2008 Jun 4.

Hypomineralized second primary molars: prevalence data in Dutch 5-year-olds

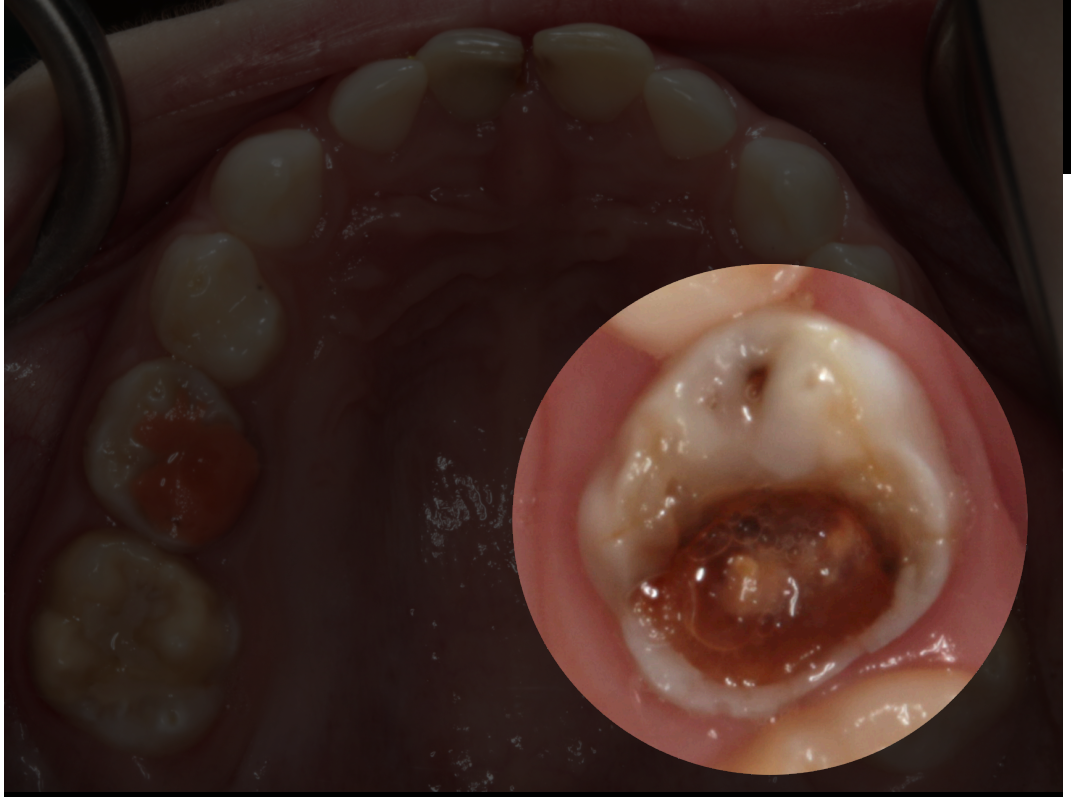
M E C Elfrink [1], A A Schuller, K L Weerheijm, J S J Veerkamp

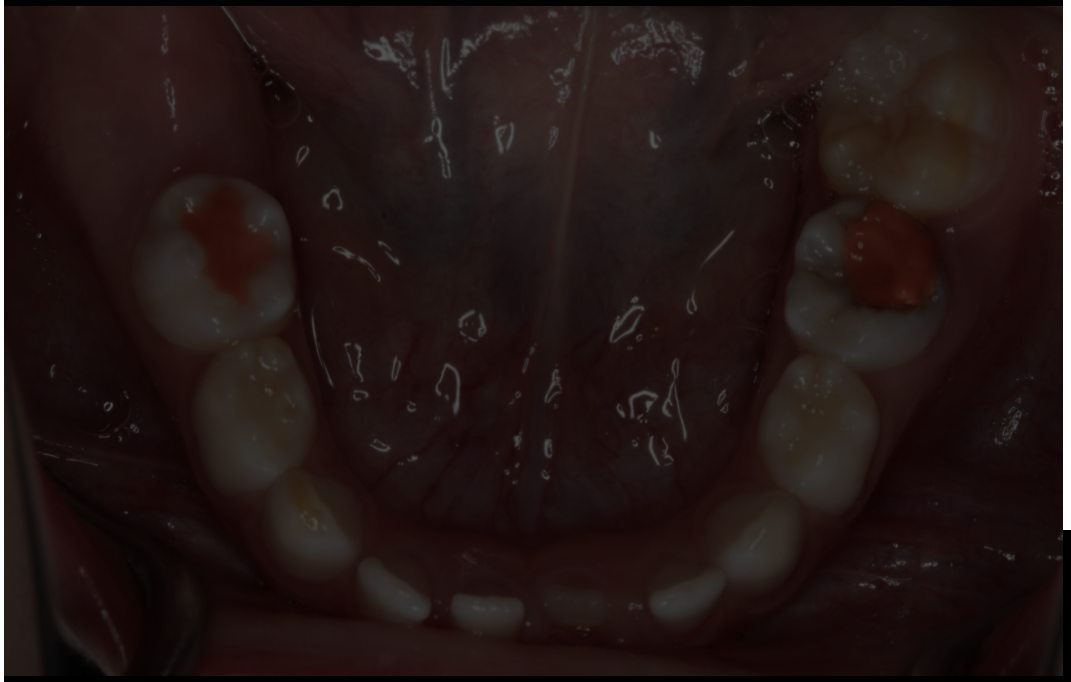
Affiliations + expand

PMID: 18523388 DOI: 10.1159/000135674

Abstract

The aim of this cross-sectional observational study was to report on the prevalence of hypomineralizations in second primary molars in 5-year-old Dutch children. In the study 386 (45% girls) 5-year-old Dutch children, all insured by a Health Insurance Fund, participated. Scoring criteria for molar incisor hypomineralization molars were adapted to score second primary molars. The prevalence of hypomineralized second primary molars (HSPM) was 4.9% at child level and 3.6% at tooth level. Most HSPMs (87%) showed demarcated opacities, followed by posteruptive enamel loss (40%).





> Aust Dent J. 2018 Mar;63(1):72-80. doi: 10.1111/adj.12567. Epub 2017 Oct 26.

Hypomineralized second primary molars: prevalence, defect characteristics and relationship with dental caries in Melbourne preschool children

M L Owen [1] [2], A Ghanim [1], D Elsby [1] [3], D J Manton [1]

Affiliations + expand

PMID: 28881480 DOI: 10.1111/adj.12567

Free article

Abstract

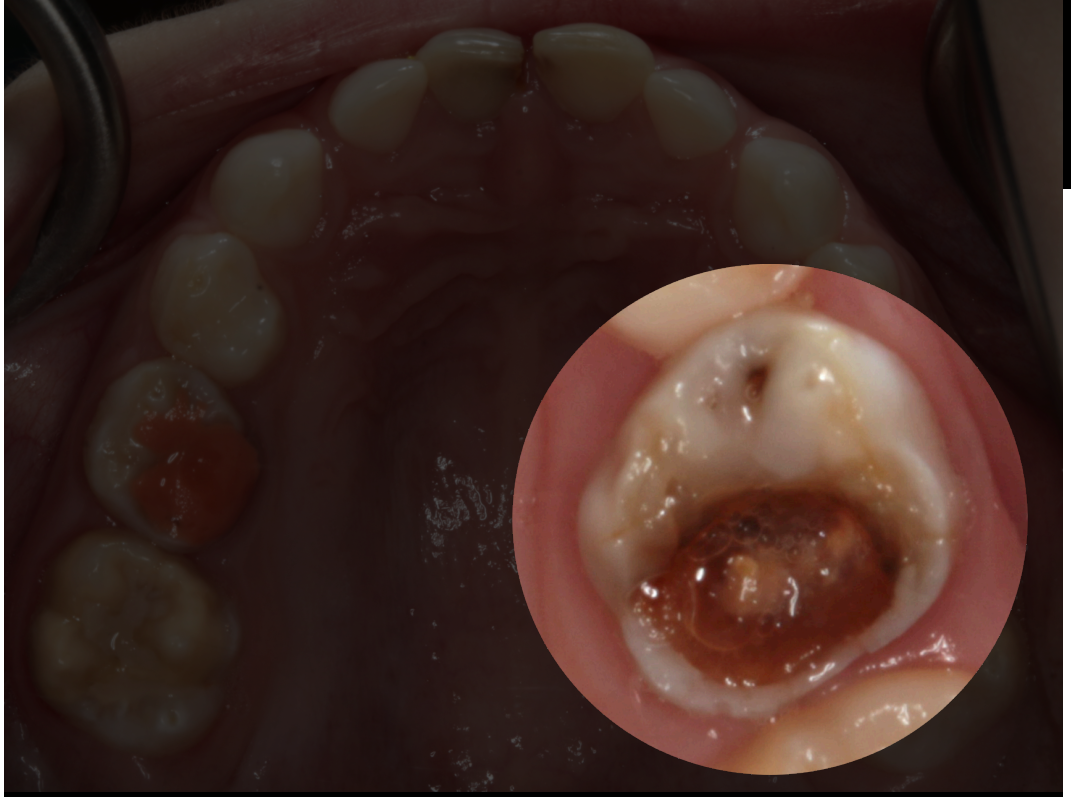
Background: Dental caries and enamel defects (DDE) are prevalent amongst children. The presence of DDE, especially enamel hypomineralization, may increase caries experience. The reported prevalence of hypomineralized second primary molars (HSPM) is 2.7-21.8%, although the occurrence in Australian children remains unknown. These HSPM represent a potential predictive factor for molar-incisor hypomineralization (MIH).

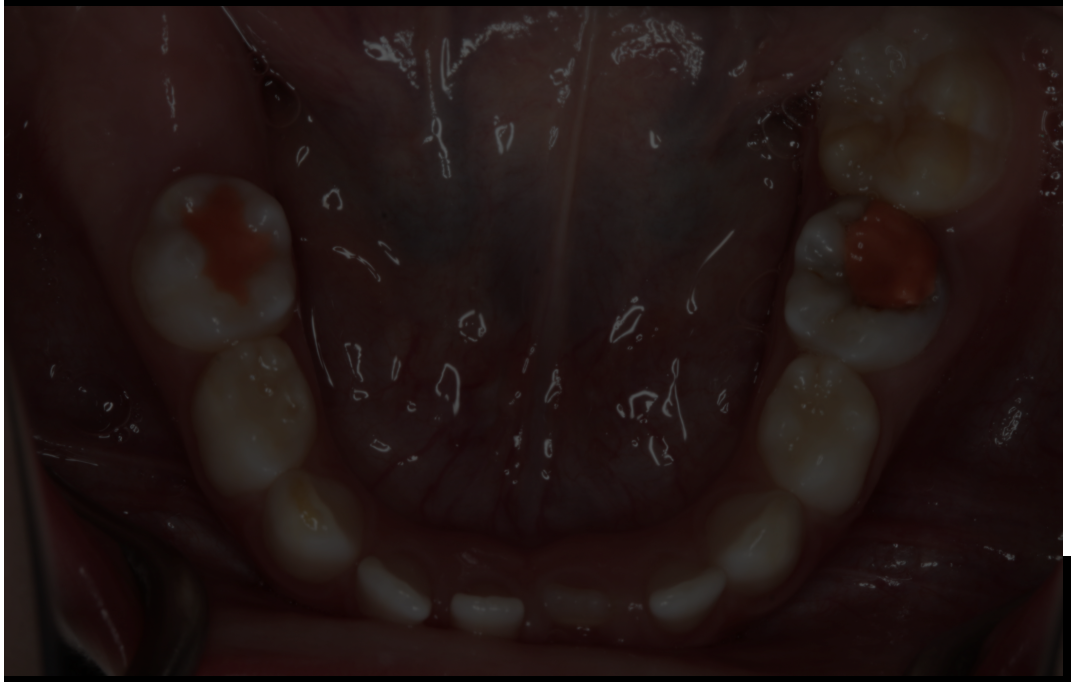
Methods: In total, 623 children aged 3-5 years from 30 randomly selected kindergartens participated. The HSPM were recorded using an index combining the European Academy of Paediatric Dentistry MIH Judgment Criteria and modified DDE Index. Caries was recorded using International Caries Detection and Assessment System criteria.

Results: In total, 144 HSPM were observed in 88 of the 623 (14.1%) children, a tooth-level prevalence of 5.8%. The prevalence of dentinal carious lesions was 13.2%, and caries prevalence (d_{2-6} mft > 0) was 36.4%. Cavitated carious lesions affected 30.7% of HSPM.

Conclusions: The relationship between an increase in HSPM lesion extent and increasing number of HSPM per child was statistically significant. A positive association between HSPM severity and extent at tooth level existed ($P < 0.05$). There was a positive relationship between the extent of HSPM and carious lesion severity ($P < 0.05$). In this population, children with HSPM did not have overall greater caries experience.

Keywords: Australian preschool children; demarcated hypomineralized lesion of enamel; developmental enamel defects; early childhood caries; hypomineralized second primary molars.





J Dent Res. 2019 Jan;98(1):77-83. doi: 10.1177/0022034518792870. Epub 2018 Aug 3.

Etiology of Hypomineralized Second Primary Molars: A Prospective Twin Study

M J Silva [1 2], N M Kilpatrick [1 2], J M Craig [3 4], D J Manton [5], P Leong [2 4], D Burgner [2 6 7 8], K J Scurrah [1 9]

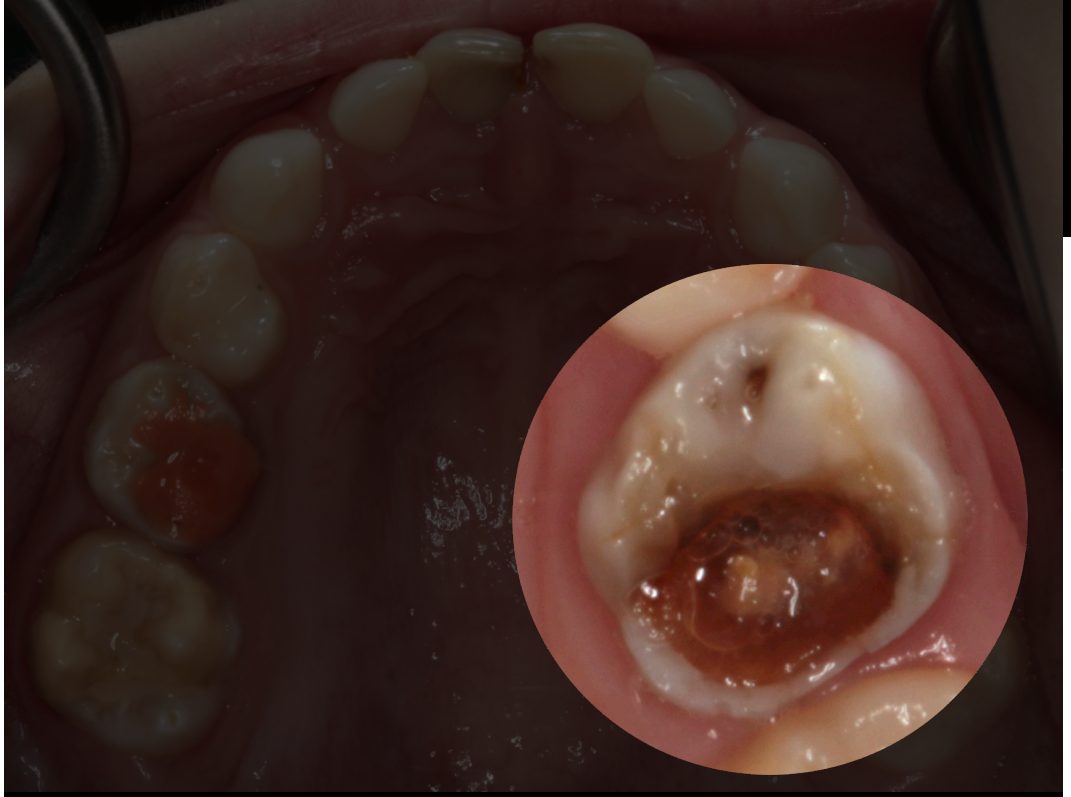
Affiliations + expand

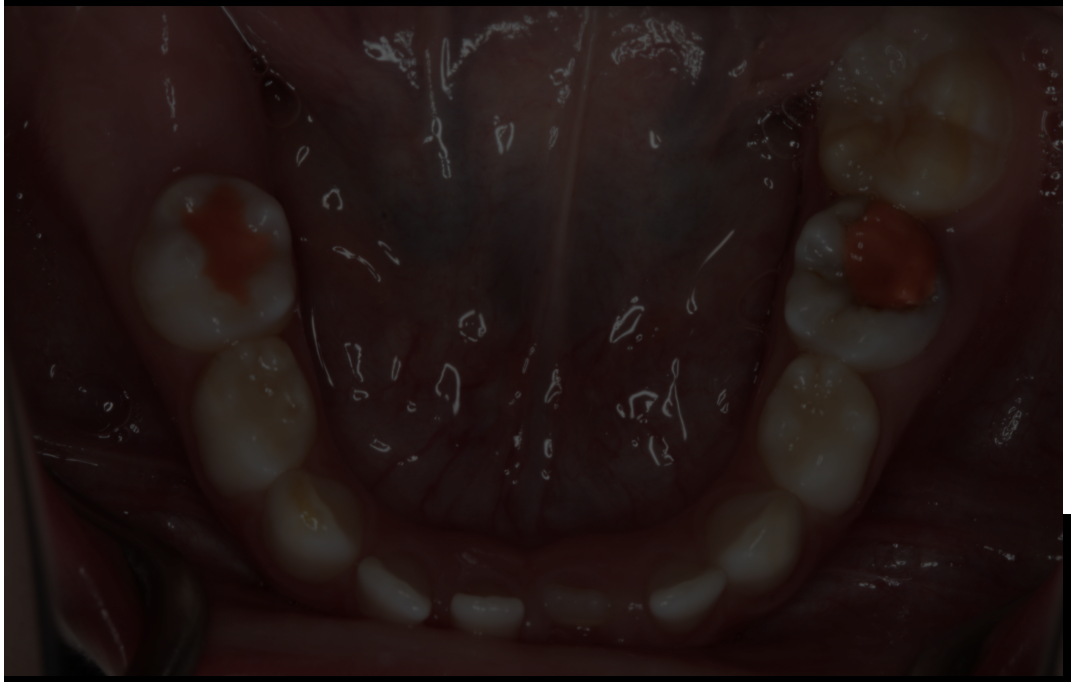
PMID: 30074848 PMCID: PMC6304715 DOI: 10.1177/0022034518792870

Free PMC article

Abstract

The etiology of hypomineralized second primary molars (HSPM) is unclear, but genetic and environmental factors have been proposed. The aim of this study was to investigate the relative contribution of genes and environment to the etiology of HSPM and to identify potential environmental risk factors in a longitudinal twin cohort. Children from twin pregnancies (N = 250) were recruited antenatally, and detailed demographic, health, and phenotypic data were collected at recruitment, 24- and 36-wk gestation, birth, and 18 mo of age. 25-Hydroxyvitamin D was quantified for mothers at 28-wk gestation and infants at birth. Dental examinations were conducted on the twins at 6 y of age to determine the presence, severity, and extent of HSPM per standardized criteria. To investigate associations of environmental risk factors with HSPM, multiple logistic regression models were fitted with generalized estimating equations to adjust for twin correlation. Within- and between-pair analyses were performed for unshared continuous variables: birthweight and birth 25-hydroxyvitamin D. Twin-twin concordance for monozygotic (MZ) and dizygotic (DZ) pairs was calculated and compared after adjusting for identified risk factors. A total of 344 twins underwent the 6-y-old dental assessment; HSPM occurred in 68 (19.8%). After adjusting for potential confounders, vitamin D levels at birth, infantile eczema, dizygosity, in vitro fertilization, socioeconomic position, and maternal smoking beyond the first trimester of pregnancy demonstrated the strongest associations with HSPM. Overall concordance for HSPM was 0.47 (95% CI, 0.32 to 0.62) with weak evidence (P = 0.078) of higher concordance in MZ twins (0.63; 95% CI, 0.38 to 0.89) as compared with DZ twins (0.41; 95% CI, 0.24 to 0.58). After adjusting for known risk factors, there was no evidence (P = 0.172) for an additive genetic influence. These findings suggest that shared and unshared environmental factors, such as maternal smoking later in pregnancy and infantile eczema, are important in the etiology of HSPM.





> Pediatr Dent. 2017 Nov 1;39(7):445-449.

Are Hypomineralized Primary Molars and Canines Associated with Molar-Incisor Hypomineralization?

Maria Jose da Silva Figueiredo Sé [1], Ana Paula Dias Ribeiro [2], Lourdes Aparecida Martins Dos Santos-Pinto [3], Rita de Cassia Loiola Cordeiro [3], Renata Nunes Cabral [1], Soraya Coelho Leal [4]

Affiliations + expand

PMID: 29335050

Abstract

Purpose: The purpose of this study was to evaluate the prevalence of and relationship between hypomineralized second primary molars (HSPM) and hypomineralized primary canines (HPC) with molar-incisor hypomineralization (MIH) in 1,963 schoolchildren.

Methods: The European Academy of Paediatric Dentistry (EAPD) criterion was used for scoring HSPM/HPC and MIH. Only children with four permanent first molars and eight incisors were considered in calculating MIH prevalence (n equals 858); for HSPM/HPC prevalence, only children with four primary second molars (n equals 1,590) and four primary canines (<small>n</small> equals 1,442) were considered. To evaluate the relationship between MIH/HSPM, only children meeting both criteria cited were considered (n equals 534), as was true of MIH/HPC (n equals 408) and HSPM/HPC (<small>n</small> equals 360; chi-square test and logistic regression).

Results: The prevalence of MIH was 14.69 percent (126 of 858 children). For HSPM and HPC, the prevalence was 6.48 percent (103 of 1,592) and 2.22 percent (32 of 1,442), respectively. A significant relationship was observed between MIH and both HSPM/HPC (P<0.001). The odds ratio for MIH based on HSPM was 6.31 (95 percent confidence interval [CI] equals 2.59 to 15.13) and for HPC was 6.02 (95 percent CI equals 1.08 to 33.05).

Conclusion: The results led to the conclusion that both hypomineralized second primary molars and hypomineralized primary canines are associated with molar-incisor hypomineralization, because children with HSPM/HPC are six times more likely to develop MIH.

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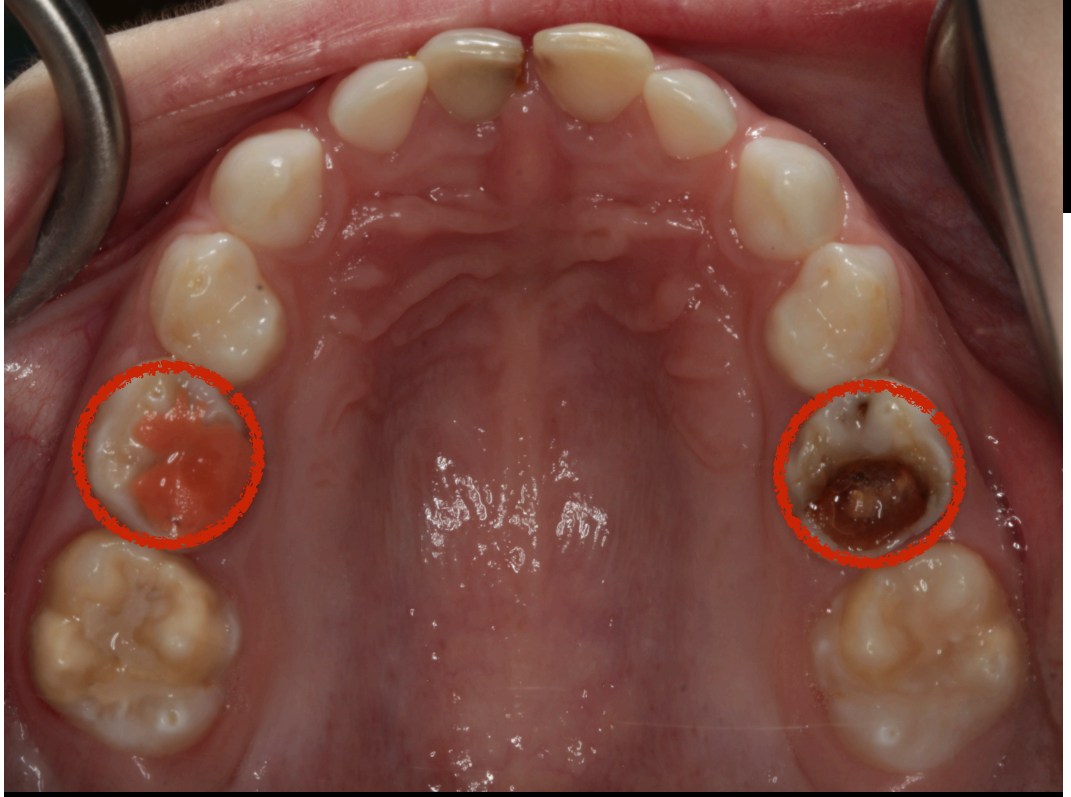

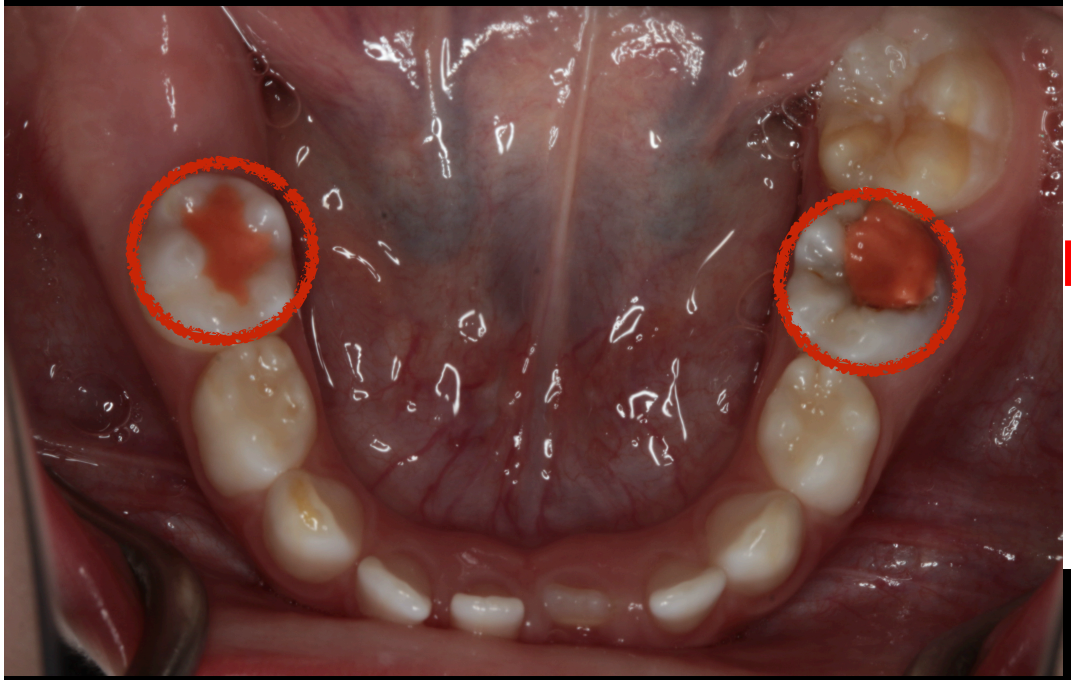

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Thank You