EFFECT OF MATERNAL AND EARLY CHILDHOOD ILLNESS ON MOLAR INCISOR HYPOMINERALISATION

1 BASMA ALSAKARNA, BDS, MDENTSCI, JDB Specialist Paediatric Dentist, Royal Medical Services
2 ENAS OTHMAN: BDS, JDB Specialist Paediatric Dentist, Royal Medical Services
3 SAMIR MOHAMED AL-OFEISHAT, Royal Medical Services, Specialist emergency medicine

ABSTRACT

The aim of the study was to investigate the effect of the medical status of the mother and the child during the period of first molar-incisor formation and development of hypomineralisation of these teeth.

The mothers of all patients who attended the pediatric dentistry department of Prince Hashim bin Al Hussein Hospital from April 2008 to January 2009 and who were diagnosed to have molar-incisor hypomineralisation (MIH) were asked to fill a questionnaire about the medical status of themselves or that of their children postnatal. The sample consists of 50 mothers and their 50 children, 32 females and 18 males between the ages of 7 and 13 years. The questionnaire composed of questions about prenatal, perinataly and postnatal illness.

18 (36%) of the mothers were suffering from medical problems prenatal and 6 (12%) had perinatal illness, 30 (60%) children have been subjected to disease postnatal, and 26 (52%) of the mothers and 20(40%) of the children did not suffer from any medical problem.

Several etiological factors can cause enamel defects and their occurrence may be related to prenatal or postnatal illnesses. It was found that there was a relationship between children with repeated illnesses in the first year of their life and prevalence of hypomineralisation defects on molars and incisors.

Key Words: Molar-incisor hypomineralisation, developmental defects of the enamel, maternal illness.

INTRODUCTION

Molar-Incisor Hypomineralisation (MIH) is a relatively common developmental condition characterised by hypomineralisation defects of the enamel.1

It is defined as hypomineralisation of systemic origin of one to four permanent first molars frequently associated with affected incisors.2

The defects range from whitish yellow or yellow-brown demarcated opacities to severely broken enamel, although MIH molars are well known by pedodontists and their occurrence is related in severe cases to major clinical problems. Only limited data of the etiology and size of the problem are available.

The prevalence of MIH in European countries ranges in the literature from 3.6 to 25% with the highest percentages in Nordic countries and seem to differ in certain regions and birth cohorts.2,3,4,5,6,7,8

On the first permanent molars these defects range from simple whitish yellow opacities to severely displastic enamel, which frequently breaks down rapidly following eruption. On the permanent incisors, the defective enamel usually seems less severely disrupted and less prone to break down. Incisal enamel defects are, however, frequently quite extensive and are most common on the buccal surfaces of the teeth, giving rise to cosmetic concerns.9
Patients with MIH often require multidisciplinary dental management. In some instances extraction of severely affected first permanent molars with or without active orthodontic intervention is indicated. In other instances, retention and restoration of the first permanent molars either in the medium or long term, is the treatment of choice. Restorative intervention to improve the appearance of affected permanent incisors may be desired by the patient.

An exact etiology of MIH has not been established but it is generally agreed that MIH is caused by a systemic factor. The aim of this cross sectional observational study was to survey some commonly implicated etiological factors in order to gain knowledge about possible pathogenesis of the enamel disturbances which could be compared with future epidemiological studies.

**METHODOLODOLOGY**

This study was carried out in the paediatric clinic, Dental Department at Prince Hashim bin Al-Hussein Hospital in Zerka-Jordan, from April 2008 to January 2009. Permission to carry out the study was obtained from the ‘Medical Research Committee’ of Royal Medical Services.

The sample consisted of (50) mothers and their (50) children who attended the pediatric clinic seeking treatment of their teeth and were diagnosed to have MIH were included in the study.

Thirty two (64%) were females and 18(36%) males between the age of 7 and 13 years with the mean age 9.04 ± 1.7 years (SD). Mothers of all patients aged between 25 and 40 years with mean 32.5 years were asked to fill a questionnaire about their medical status and their children prenataly, perinataly or postnataly.

Parents (mothers) questionnaire: Questions were asked about the health of mother and child during pregnancy, the time of gestation, birth complications; prolong delivery, prematurity, birth weight and any complications. They were also asked about the child’s health up to the age of four years, the length of time of breast-feeding.

Diagnostic criteria included all forms of enamel hypomineralisation affecting the central incisors and or the molars.

Exclusion criteria included children with hypomineralisation affecting all teeth (amelogenesis imperfecta) or patients with fluorosis.

Examination criteria: Special emphasis was put on MIH and the following criteria were used; Each molar and incisor was examined for the presence and severity of demarcated opacities. Accordingly, colour changes (white/opaque, yellow or brown) of smooth tooth surface were considered as mild defects. Loss of enamel without dentine involvement was considered as moderate defect and lesions affecting both the enamel and the dentine, atypical restorations replacing affected hard tissues and teeth extracted because of severe hypomineralisation were considered as having severe defects.

Teeth with less than half of their crown erupted were excluded and only lesions which were 2 mm in diameter or larger were included. A modified Developmental Defects of Enamel (DDE) Index was used in the evaluation of diffuse opacities and hypoplasia. Hypoplasia and post eruptive enamel breakdown was distinguished by means of visual inspection of the border of the defect. Round and smooth sharp edges indicated hypoplasia, while more irregular and sharp edges indicated post eruptive enamel loss.

Dental examinations were carried out by one investigator with sufficient illumination (halogen light), using mirrors and probes.

A database was constructed using Microsoft Excel (Microsoft, Redmond, WA) for analysis. Data were analyzed and presented in descriptive and tabular forms.

**RESULTS**

Eighteen (36%) of mothers suffered from prenatal illness such as hospitalization and long-term illness during pregnancy and 6(12%) suffered from perinatal illness such as long-time delivery and premature birth.

Thirty (60%) of children suffered from postnatal disease, most of them 18(36%) suffered from asthma, 6(12%) male and 12(24%) female respectively, 10(20%) of children suffered from fever and were admitted in the hospital for days and 2(4%) of children had malnutrition.

Twenty six (52%) of mothers and 20(40%) of their children did not suffer from any medical problems prenatal, perinatal or postnataly, but they had MIH as seen in Table 1 and Table 2.
Maternal illness and Molar incisor hypomineralisation of teeth

Only 4(8%) of mothers suffered from prenatal illness and their children suffered from postnatal illness, 4(8%) mothers suffered from perinatal illness and there children suffered from postnatal illness; 2(4%) mothers suffered from prenatal and perinatal illness. 2(4%) mothers suffered from prenatal, perinatal illness and there children suffered from postnatal illness.

Breast-feeding history was similar in children with and without enamel defects. An overall number of 50 patients and 332 first permanent molars and incisors were examined for MIH, 290 teeth had enamel defects.

14(28%) patients had four first permanent molars and four central incisors affected with MIH, 14(28%) patients had three first permanent molars and two upper central incisors affected with MIH, 6(12%) patients had two upper first permanent molars and two lower central incisors affected with MIH, 8(16%) patients had three first permanent molars and two upper central incisors and one lower central incisor affected with MIH, 4 (8%) patients had two first permanent molars and one upper central incisor affected with MIH, 4 (8%) patients had four first permanent molars teeth and one upper central incisor and one lower central incisor only were affected with MIH.

The average number of hypomineralized teeth was 5.8 per patient. Hypomineralisation of 2, 3, or all 4 molars were demonstratable in 6.9% (10 patients), 22.7% (22 patients), and 24.8% (18 patients) respectively. In 50 patients 290 teeth showed enamel defects, 182 (62.8%) of these showed mild enamel lesions, in 36(12.4%) teeth lesions were moderate and 72 (24.8%) teeth had severe enamel defects.

TABLE 1: NUMBER OF EFFECTED MOTHERS WHOSE CHILDREN SHOWED MIH

<table>
<thead>
<tr>
<th>Medical Problem</th>
<th>Number of affected mothers</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prenatal illness</td>
<td>18</td>
<td>36%</td>
</tr>
<tr>
<td>Perinatal illness</td>
<td>6</td>
<td>12%</td>
</tr>
<tr>
<td>No Problem</td>
<td>26</td>
<td>52%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

TABLE 2: DISTRIBUTION OF ILLNESSES FROM WHICH CHILDREN WITH MIH SUFFERED

<table>
<thead>
<tr>
<th>Postnatal illnesses</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>6(12%)</td>
<td>12(24%)</td>
<td>18(36%)</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>2(4%)</td>
<td>—</td>
<td>2(4%)</td>
</tr>
<tr>
<td>Fever and Hospitalization</td>
<td>4(8%)</td>
<td>6(12%)</td>
<td>10(20%)</td>
</tr>
<tr>
<td>No illness</td>
<td>6(12%)</td>
<td>14(28%)</td>
<td>20(40%)</td>
</tr>
<tr>
<td>Total number of patients</td>
<td>18</td>
<td>32</td>
<td>50</td>
</tr>
</tbody>
</table>

The hypomineralized porous enamel can chip off easily, leading to unprotected dentine and also to an unexpectedly rapid caries development.1

In cases of hypoplasia the borders of the normal enamel are mostly smooth, while in MIH, where the enamel matrix is initially formed to its normal shape, the borders of the normal enamel are irregular when post eruptive enamel loss had occurred.

In MIH, the lesions in the first permanent molars are often seen together with those in maxillary incisors. These findings indicate a systemic upset during the first years of a child’s life, more precisely during the period in which the crowns of permanent first molars and incisors are mineralised.

The etiology of hypomineralized first molars is not yet fully understood, in the literature a number of possible causes for MIH are mentioned, such as environmental changes.3,7 Respiratory diseases and oxygen shortage of the ameloblasts have been mentioned as possible causative factors.11,12

In this study, it was found that the affected child with MIH, especially the girls, were reported to have had more health problems, in particular asthma. 12 cases (24%), during the first year of life were noted. The result is in agreement with other study13 who reported in his study that health problems in infancy, especially respiratory diseases, seem to be involved.
Nevertheless in the present study showed that 26(52%) mothers and 20(40%) of their children did not suffer from any medical problems prenatal, perinatal or postnataly, but they were affected with MIH as seen in the Table 1 and Table 2. There had probably been an interacting disturbance of short duration of systemic origin of the activity of the ameloblasts during the first 2 years of the child’s life, resulting in chronological dispersed hypomineralized demarcated opacities in the developing teeth.¹²

Others have suggested that exposure to dioxine by prolonged breast feeding could lead to an increase in the risk of MIH.⁴,¹¹ In the present study there was no correlation between prolong breastfeeding (more than one year) and the number of hypomineralised teeth,¹³,¹⁵,¹⁶

Similarly in oxygen shortage combined with low birth weight,¹³ disturbances in the calcium/phosphate metabolism¹⁷ and more frequent childhood diseases like otitis media or high fever¹⁵ could possibly lead to this condition and was in agreement with the present study where 8% of male suffering from fever and 12% of female during early stage of their life got MIH. Knowledge of the type of disease that might be involved in the development of such molars is still inadequate, but there appears to be an association with pneumonia, otitis media and high fevers.⁷

Some times the use of the antibiotics has been mentioned, but as antibiotics are in most cases related to the occurrence of the disease, it is difficult to distinguish whether the association with MIH was caused by the antibiotic use or by the illness itself.

In the present study the defects of the incisors are milder than those of the molars. As masticatory forces on the opacities in incisors are absent, the enamel substance does not disintegrate so easily after eruption. When more molars are affected, the relative risk of incisors showing opacities increases.²,³,⁶ This was in agreement with the present study.

CONCLUSION

It seems that several etiological factors can cause the enamel defects and that their occurrence may be related to prenatal, perinatal or postnatal illnesses. The etiology of hypomineralized first molars is not yet fully understood, but based on the results of this retrospective study, health problems in infancy, especially respiratory diseases, seem to be involved.

It was found that there is a relationship between children who have repeated illnesses in the first year of their life and hypomineralisation defects on molars and incisors.

REFERENCES