Prevalence and Predictors of Molar Incisor Hypomineralization (MIH) among Rural Children in Northern Iran

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Dear Editor-in-Chief

Molar incisor hypomineralization (MIH) is an enamel defect in permanent first molar and incisor teeth. The defects may vary from white, to yellow-brown demarcated opacities that may easily break (post-eruptive breakdown) and results in extensive caries or early extraction of the teeth. The unaesthetic appearance of anterior teeth, sensitivity, pain, and difficulties in achieving local anesthesia, and providing proper restorations are of MIH complications (1). The MIH prevalence varies from 2.4% to 40.2% globally (2). The etiology is not clear. However, it seems as a multifactorial entity caused by several etiologic factors of systemic origin that intensify each other. First permanent molar, the most important functional unit of mastication, has a calcification window from 20 wk in utero to three yr of life. The upper and lower incisors, and to a lesser degree canines have some synchrony in hard tissue formation with first molar. Hence, pre, peri, and post-natal complication during this critical period in hard tissue formation, may cause temporary or permanent damages to the ameloblasts, the responsible cells for enamel formation, and induce enamel defects (3, 4). There is a lack of enough information on MIH among Iranian children especially in rural populations.

The aim of the present study was to determine the prevalence and potential predisposing factors of MIH in 6-13-yr-old children living in rural areas of Masal and Shanderman, Guilan, an almost restricted and unspoiled community, in Northern Iran.

The study population consisted of 553 children aged 6-13-yrs old recruited from the schools. The socio-economic status was almost similar and rated low moderate according to parental education and occupation. A cluster sampling method was used in this study (schools as clusters). All dental examinations conducted in the schools using a headlight, and flat dental mirrors. After cleaning the teeth with gauze, the wet teeth were examined by a calibrated examiner (D.A). The European Academy of Paediatric Dentistry (EAPD) 2003 criteria used for diagnosis (5). During calibration sessions, a kappa value of 91% reached by the examiner (D.A). The prevalence was determined first. In the next stage, the data on probable predicting factors gathered by questionnaire and interview with mothers in a case-control design.

One hundred and two subjects (18.4%) diagnosed as MIH, included 47.1% males and 52.9% females. The mean number of affected teeth per child was 6.5 including 3.7 molars and 2.8 inci-

sors. Children at ages 10-11 had both the highest prevalence (18.6%) and severity of defects.

Tables 1 and 2 demonstrate the characteristics of defects in anterior and posterior teeth. Demarcated opacities comprised the predominant type of defects. Tooth destructions were more severe in the lower molars than in upper ones. Out of 204 subjects, 188 (92.2%) mentioned at least the history of one disease. No statistically significant relationship was found between the MIH and maternal disorders in late pregnancy ($P=0.67$),

type of delivery (cesarean section or natural delivery) ($P=0.67$), preterm birth ($P=0.44$), twinning ($P=0.14$), infantile jaundice ($P=0.11$), feeding pattern (breastfed, bottle fed, or both) $P=0.88$, and pacifier using ($P=0.48$). Significant relationship was found between the duration of breastfeeding and MIH ($P=0.009$), urinary tract infection ($P=0.001$), Dermatitis of allergic origin ($P=0.026$), and exposure to pesticides due to parental occupation in farmland ($P=0.001$) chi-square test.

Table 1: Distribution of MIH lesions in anterior teeth according to the severity of defects

MIH	Sound	Demarcated opacity	Post Eruptive Breakdown	Atypical caries/ restoration /missing	Unerupted	Total
Upper incisors Teeth 11,12,21,22	267(65.5)	119(29.1)	12(2.9)	0(0)	10(2.5)	484(100%)
Lower incisors Teeth 31,32,41,42	316(77.4)	88(21.6)	4(1)	0(0)	0(0)	484(100%)

Table 2: Distribution of MIH in first permanent molars according to the severity of defects

MIH	Sound	Demarcated opacity	Post Eruptive Breakdown	Atypical caries/ restoration /missing	Extracted	Unerupted	Total
Upper molars Teeth 16,26	24(11.8)	131(64.2)	34(16.7)	9(4.4)	2(1)	4(1.9)	204(100)
Lower molars Teeth 35,46	9(4.4)	106(52)	47(23)	37(18.1)	3(1.5)	2(1)	204(100)

Multivariate logistic regression showed that the breastfeeding beyond one year remained the significant variable in the final model, OR: 1.4, [95%CI: 1.04-1.80, $P=0.01$]. Hence, the rural life style of this almost isolated population, such as consumption of domestic dairies due to their farm landing and live stocking career, and probably lack of environmental pollutions may result in protective effect of breastfeeding.

The effect of breastfeeding is controversial (6). In contrast to our findings, some authors believe breast milk play a role in development of MIH due to inadequacy of vitamin D, and resultant disruption of calcium and phosphorus metabolism (7). The other consideration is chronically stored environmental pollutants such as Dioxin

in adipose tissue and its transmition to breastfed infants (8). Larger scale, prospective studies advised to answer this question.

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