



Comparison of Fear of Dentistry between Children with Molar-Incisor Hypomineralization and Children with Permanent First Molars without Hypoplasia

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Abstract

Background: Molar incisor hypomineralization (MIH) is a developmental enamel defect of the incisor and molars that can lead to fear of dentistry in children. This study aimed to compare the dental fear of children aged 8 to 12 years with MIH and children with permanent first molars without hypoplasia in 2020 in Isfahan, Iran.

Methods: In this descriptive-analytical cross-sectional study, the participants included 200 students aged 8-12 years old in Isfahan, who were randomly selected from the second to sixth-grade students referred to the clinics. The examination was performed by a dentistry intern using a disposable dental mirror and dental probe on the unit. Fifty-two children with MIH and 148 children with permanent first molars without hypoplasia were enrolled. The Dental Subscale of the Children's Fear Survey Schedule (CFSS-DS) questionnaire was used to collect information, which includes two sections: demographic information and 15 questions on different areas of fear of dental treatment in children. Data were analysed through SPSS 20 software and using descriptive-statistical tests (frequency and percentage, mean), *t* test, chi-square test, and logistic regression test. $P < 0.05$ was defined as a statistically significant level.

Results: The mean score of dental fear was 15 ± 35 (ranged from 15 to 75) which indicated moderate level of dental fear in the participating children. In whole, 62.5% of children were afraid of dentistry. The rate of dental fear in girls was 9 times higher than in boys ($P < 0.05$). Also, the rate of dental fear in children with MIH was 46 times higher than in children who did not have this disorder ($P < 0.05$). The frequency of dental fear in children with severe disorders was significantly higher than in children with mild defects ($P = 0.000$). There was no statistically significant difference in terms of dental fear among different age groups ($P = 0.313$). Also, with increasing the number of dental visits, dental fear increased by 1.2 times ($P < 0.05$), which was statistically significant.

Conclusion: Fear of dentistry in children with MIH was significantly higher than in children with molar teeth without hypoplasia.

Keywords: Dental Fear, Molar incisor hypomineralization, Hypoplasia, Questionnaire, Children

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Introduction

Molar incisor hypomineralization (MIH) is a term that came to be known as demineralization following its first report in Sweden in 1970 (1,2). Defects vary in size and colour and can include one to all of the first permanent molars and incisors, and even the permanent canine and second deciduous molars (3,4). Since ameloblasts are one of the most sensitive cells in the body, the presence of even minor changes in the body (fever, hypocalcemia, changes in ambient pH (5,6)) can cause temporary or permanent damage and hypoplasia and hypomineralization or hypocalcification (4).

MIH has become more important today due to the overall reduction of caries in people with healthy permanent first molars and the increase of caries in the teeth of affected children (4,7). In various studies, the

prevalence of MIH has been reported between 2.4% to 40.2%. The reason for this variety of statistics is the use of different examinations and observation tools, as well as the different age range of studied subjects in each research (3,8). The complaint of most patients with MIH in posterior teeth is tooth fracture, while in anterior teeth, it is cosmetic reduction (4).

These lesions are classified by the European Academy of Paediatric Dentistry (EAPD) index based on the type of extension and colour of the lesion, which includes mild (only discoloration), moderate (with loss of enamel), and severe (dentin involvement), or diffuse, hypoplasia, and sometimes teeth with extensive abnormal restorations, such as buccal restorations on incisors without a history of trauma, teeth extracted due to MIH, and teeth not erupting (2,4,7).



Despite the introduction of numerous and unknown causes in the development of this disorder, the causes of the above lesion can be divided into the three groups of medical factors (before birth, during birth and after birth), environmental pollutants and genetic factors (6).

Prenatal factors include multiple periods of maternal fever, prolonged maternal vomiting, diabetes mellitus, and long-term use of antispasmodics, ion mass spectrometry, and X-ray microanalysis. During birth factors include cesarean section, premature infant, low birth weight, and twins. The etiological factors after birth include recurrent episodes of febrile fever, respiratory problems, seizures, medication such as antibiotics, vaccination of the first three years of life, the presence of calcium-phosphorus metabolic diseases, postnatal nutrition and socioeconomic status of the family, fluoride consumption, the presence of dioxin in breast milk and harmful toxin released from plastic milk bottles (5,9).

Treatment of this disorder can include a wide range of fissure sealants in the initial stage, bleaching and microabrasion to improve beauty, tooth restoration, root canal treatment, veneers, cast restorations and even tooth extraction, depending on the extent and severity of the involvement (5).

Fear of dentistry is common in children with MIH, which is reported in approximately 2% to 25% of children (10), so that these children often have fear of opening their mouths and using air spray during their dental examinations, injections and use of equipment inside their mouths during the course of dental treatment. Many factors such as internal factors (puberty and personality), external factors (parents, siblings, and friends) and factors related to the dental staff (10), unpleasant experience, history of hospitalization, child anxiety, and maternal factors affect this fear in children. Clinical signs of child fear include palm sweating, palpitations, nausea, muscle stiffness, paleness, restlessness, hypertension, etc (11). Accordingly, some researchers have managed the treatment of these children using distraction, modelling, desensitization, roll playing, and Tell-Show-Do and HOM (hand on mouth) techniques. Also, medication and treatment under sedation and anaesthesia have been recommended (3,10,12,13).

In 2018, Alsadat and colleagues examined the fear of dentistry in 1546 pre-schoolers and investigated its association with the rate of dental caries using the Dental Subscale of the Children's Fear Survey Schedule (CFSS-DS) tool. They concluded that dental fear was directly related to permanently decayed teeth and inversely related to restored permanent teeth (14). Bahrololoomi et al examined the relationship of MIH with body mass index and dental caries index in 645 children in Yazd, Iran and concluded that MIH was more common in children with normal height and weight and due to the structural defects of enamel, these children had more caries (7).

In 2017, Negre-Barber et al studied the severity of MIH and its relationship to dental caries. Finally, the existence of a significant linear relationship between the increase of DMFS and MIH was proved (15). In 2019, Özükoç examined the relationship between MIH severity and paediatric dental fear using the CFSS-DS questionnaire. As a result, it was shown that children with severe MIH are more afraid of dentists, drill noises, injections, and insertion of instruments into the mouth, respectively. In addition, the severity of MIH and fear of dentistry were interrelated (12).

The teeth of children with MIH are prone to decay and have high sensitivities. In addition, the treatment of hypomineralized teeth is challenging for dentists due to the extreme discomfort of these children. Also, because these teeth are difficult to be anesthetized, these children often suffer from more pain during the treatment (4,7) and a specific treatment plan has not yet been introduced for these teeth; therefore, all of these factors can contribute to the fear of dentistry in children with MIH. This study was performed to compare the dental fear of children with hypomineralized molar-incisor and children with permanent first molars without hypoplasia using the CFSS-DS questionnaire; so that we will be able to seek for the best clinical anaesthesia techniques for pain reduction in these children and because of anaesthetic problems we have to inform parents to be more careful about their children's oral health.

Methods

In this descriptive-analytical cross-sectional study conducted in Isfahan-Iran, out of 420 students examined accidentally in dental clinics, 200 students aged 8-12 years were selected based on the inclusion criteria (12). This study was approved by the ethics committee of Kerman University of Medical Sciences (ID: IR.KMU.REC.1399.162). Students who were in general and mental health, had at least one of their permanent first molars involved in hypomineralization and had at least one dental treatment visit were included in the case group. The inclusion criteria in the control group were the same as in the case group, except that their first molar teeth were without hypoplasia and MIH. Students who had experienced medical treatment or chronic systemic disease, as well as children who had multiple sessions of dental treatment other than permanent first molar treatment or children who underwent only preventive treatment such as fissure sealant without local anaesthesia were excluded. The number of male and female students participating in the study was equal. First, informed consent was obtained from the parents. Demographic information including age, sex, medical history, history of dental visits, date of last visit and type of dental services received, DMFT (decayed, missing, and filled *teeth*) of permanent first incisors and permanent first molars were

recorded in the demographic information form. The diagnostic criteria used to record caries were based on criteria published by WHO (16).

All filled, decayed and lost teeth due to caries were recorded for permanent teeth. Paediatric examination was performed using a disposable dental mirror and flashlight to illuminate the oral cavity. Cotton rolls were also used to clean the tooth surface for better visibility (11). The MIH diagnostic criteria were based on criteria introduced by the EAPD in 2003 (17). Then, CFSS-DS questionnaire was given to the student's parents and they were given 15 minutes to complete it.

The CFSS-DS questionnaire, which is a standard questionnaire, has been translated into Persian in the study of Safari et al (18) and has been evaluated and approved in terms of apparent validity, content validity and reliability. It is used to collect information in two sections: demographic information and 15 questions in different areas of fear of dental treatment in children and is scored as follows:

Not afraid at all=1; a little scared=2; relatively scared=3; completely afraid=4; very scared=5. The total number of scores varies from 15 to 75. CFSS-DS score ≥ 38 is defined as dental fear and is statistically significant with $P < 0.05$ (11). A score between 15 and 25 indicates no dental fear, a score of 26-32 indicates mild dental fear that can be kept under control, a score of 33-38 indicates moderate dental fear and anxiety, and a score of 38 and above indicates severe fear and anxiety (12). Data were analysed through SPSS 20 software and using descriptive statistics (frequency and percentage, mean and standard deviation), *t* test, chi-square test and logistic regression test.

Results

A total of 200 children (equal number of boys and girls) aged 8 to 12 years participated in this study. From all, 74% had healthy molars and 26% had MIH. In terms of fear of dentistry, 62.5% of the participated children were afraid of dentistry treatment (Table 1). Table 2 shows the central indicators and distribution of age variables, number of dental visits, DMFT and dental fear score. The results showed no statistically significant difference in terms of dental fear among different age groups ($P=0.313$). Tooth fear was significantly higher in girls than in boys ($P=0.000$).

Comparison of the frequency of dental fear based on the number of dental visits showed that the frequency of dental fear in children who had 5 or more dental visits per year was significantly higher than in children who had 4 visits and less ($P=0.005$). The results showed that the frequency of dental fear in children with severe disorder was significantly higher than in children without disorder ($P=0.000$). Comparison of dental fear based on the presence or absence of MIH in children showed that the

Table 1. The frequency distribution of studied children based on demographic factors

Demographic factors	No.	(%)
Age	8	36 (18%)
	9	35 (17.5%)
	10	58 (29%)
	11	35 (17.5%)
	12	36 (18%)
Gender	Girl	100 (50%)
	Boy	100 (50%)
Infection with MIH	Yes	52 (26%)
	No	148 (74%)
MIH Intensity	Mild	23 (11.5%)
	Severe	29 (14.5%)
Number of dentistry visits per year	0-4 Times	121 (60.5%)
	More and equal to 5 times	79 (39.5%)
Fear of dentistry	Yes	125 (62.5%)
	No	75 (37.5%)

MIH, molar incisor hypomineralization.

Table 2. Central indicators and dispersion of age variables, number of dental visits, DMFT and Dental fear score

Variable	Dental visits	DMFT	Dental fear score
Frequency	200	200	200
Average	4.52	2.78	35.9400
Standard deviation	3.534	1.027	15.2535
Middle	4.00	3.00	32.0000
Maximum	20	4	75.00
Minimum	1	0	15.00

DMFT: decayed, missing, and filled teeth.

level of dental fear in children with MIH was significantly higher than in children without the disorder ($P=0.000$). The results have been presented in Table 3.

Table 4 shows the comparison of the average number of dental visits and DMFT based on the presence or absence of dental fear and as it is seen, the average number of visits and DMFT is significantly higher in children with dental fear (95% CI=3.03-27.5). As it is seen in Table 5, dental fear in girls were 9 times higher than in boys (27.5-3.03=95% CI, $P=0.001$, OR=9.14). Also, dental fear in children with MIH was 46 times higher than in children who did not have this disorder (95% CI=13.7-158.6, $P=0.001$, OR=46.7) and with increasing the number of dental visits, the chance of dental fear increased by 1.2 times (95% CI=1.1-05.42, $P=0.009$, OR=1.22).

Discussion

In this study, it was found that the fear of dentistry in children with MIH was significantly higher than in children with permanent first molars without hypoplasia and it increased with more dental visits.

Table 3. Comparison of paediatric dental fear by demographic factors

Demographic factors	Dental Fear	Frequency No. (%)	P value*	
Age	8	Has	19 (52.8%)	0.313
		Has not	17 (47.2%)	
	9	Has	11 (31.4%)	0.313
		Has not	24 (68.6%)	
	10	Has	21 (36.2%)	0.313
		Has not	37 (63.8%)	
11	Has	11 (31.4%)	0.313	
	Has not	24 (68.8%)		
12	Has	13 (36.1%)	0.313	
	Has not	23 (63.9%)		
Gender	Girl	Has	50 (50%)	0.000
		Has not	50 (50%)	
	Boy	Has	25 (25%)	0.000
		Has not	75 (75%)	
Infection with MIH	Yes	Has	44 (84.6%)	0.000
		Has not	8 (15.4%)	
	No	Has	31 (20.9%)	0.000
		Has not	117 (79.1%)	
MIH Intensity	Mild	Has	18 (78.3%)	0.000
		Has not	5 (21.7%)	
	Severe	Has	26 (89.7%)	0.000
		Has not	3 (10.3%)	
Number of dental visits per year	0-4 Times	Has	36 (29.8%)	0.005
		Has not	85 (70.2%)	
	More and equal 5 times	Has	39 (49.4%)	0.005
		Has not	40 (50.6%)	

MIH, molar incisor hypomineralization.

* $P < 0.01$ is acceptable.**Table 4.** Comparison of the average number of dental visits and DMFT based on the presence or absence of dental fear

Variable	Dental fear	Number	Average	Standard deviation	P value*
dental visits	yes	75	6.13	4.668	0.000
	no	125	3.55	2.127	0.000
DMFT	yes	75	3.11	1.021	0.001
	no	125	2.59	0.985	0.001

* $P < 0.01$ is acceptable.**Table 5.** Evaluation of dental fear predictors in children

	B	OR	95% CI for OR	P value*
DMFT	0.273	1.31	0.88-1.96	0.182
MIH	3.844	46.7	13.7-158.6	0.001
Gender	2.213	9.14	3.03-27.5	0.001
Number of dental visits	0.202	1.22	1.05-1.42	0.009

MIH: molar incisor hypomineralization; OR: odds ratio; DMFT: decayed, missing, and filled teeth.

* $P < 0.01$ is acceptable.

Fear of dentistry is a natural reaction that is due to the stressful stimuli such as anaesthesia, turbine sound, tooth grinding, white gowning, waiting in the office and pain, and can cause excessive sweating, restlessness, trembling hands and knees, lack of cooperation of the child and heart palpitations (19). Studies on different populations have reported that the prevalence of paediatric dental fear is 5 to 28% (1,3). In line with the results of the present study, studies by Baghi et al, Lygidakis et al, Özükoç, and Fayle on children have shown that fear of dentistry is a common occurrence in children with MIH, so that these children often have fear of opening their mouths and use of air spray during the examination and use of devices inside their mouths during the dental treatment process (3,10,12,13).

Due to the presence of structural defects and the presence of porous enamel in hypomineralized teeth, caries of these teeth are common, so early detection of these disorders and performing restorative and preventive measures are very effective in reducing the child's fear (4,7,9,17,20,21).

The results of the present study showed that the level of fear intensifies with increase in the intensity of MIH, which was consistent with the results of Özükoç and Alsadat et al (12,14); even though, in Kosma and colleagues' study there was no difference in the level of fear in infected and healthy children (21). In the present study, the mean score of dental fear based on CFSS-DS tool indicated moderate dental fear and anxiety in studied children.

In this study, it was found that both groups of children with MIH and children with healthy molar were respectively afraid of anaesthesia, tooth preparation and shaving sound; while in the Klinberg study in Europe, Nakai in Japan, and Özükoç in Istanbul, subjects were respectively afraid of injections, the opening of the mouth and the tools used by dentists (12,23,24). In Safari et al study, the highest scores of fear of dentistry were respectively for injecting and seeing the dental instruments (18).

In Greenbaum and colleagues' study, the highest level of fear of dentistry was the fear of suffocation and in Arapostathis and colleagues' study, it was going to the hospital (25,26). Yamada et al have reported the highest level of fear for injecting and filling (27).

In the present study, the relationship between paediatric dental fear and gender showed that the severity of dental fear in girls was significantly higher than in boys which is similar with the results reported in Shim et al (28) and Alsadat et al studies (14); while in Baghi and colleagues' study, no significant relationship has been found between gender and fear (10).

The results of the present study showed that children who had more visits to the dental clinics experienced more fear, while in the Morowatisharifabad and colleagues'

study, it has been reported that people with more dental visits had less dental anxiety (29). The probable reason for the difference in the results can be attributed to the fact that in the mentioned study, the adult age group and the level of anxiety have been studied. Anxiety is due to the unknown issues that can be reduced by increasing awareness, but fear is due to the awareness of the problem, which increases with the number of times children go to the dentist and experience problems during the treatment.

The results of this study showed that with increasing DMFT, the fear of dentistry increases, which is similar to the results of Esa et al and Olak et al studies (30,31); while Beena did not find any association between DMFT and dental fear in her study (11). Likely, the reason for the increased fear of dentistry in children with higher DMFT is that these children had more visits to the dental clinics and were more likely to have more pain and discomfort due to the dental sensitivity during dental treatment. With this awareness, we can choose the best clinical anaesthesia techniques for pain reduction in these children and because of anaesthetic problems we have to inform parents to be more careful about their children's oral health.

One of the limitations of this study was difficulty in collecting samples due to the small number of children with MIH. There were also cases of lack of cooperation and consent of parents for examining their children's mouths and teeth.

Conclusion

The results of this study showed that fear of dentistry in children with MIH was significantly higher than in children without hypoplasia in their permanent first molars. In addition, dental fear was significantly higher in children with severe MIH, girls and children who had more dental visits during the year.

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Authors' Contribution

Conceptualization: FSS, Methodology: FSS, Validation: FSS, Formal Analysis: HA, Investigation: EFS, Resources: FSS, Elnaz Fallahian Sichani, Data Curation: EFS, Writing—Original Draft Preparation: EFS, Writing—Review and Editing: FSS, Visualization: FSS, Supervision: FSS, Project Administration: FSS, Funding Acquisition: FSS

Conflict of Interests

The authors have no conflict of interest.

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