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ORIGINAL RESEARCH

Prevalence and diversity of dental anomalies in Turkish children aged 7–15 with molar incisor hypomineralization

Gokcen Deniz Bayrak[1,]*

[1]Department of Pediatric Dentistry, Faculty of Dentistry, Yeditepe University, 34728 Istanbul, Turkey

***Correspondence**
deniz.bayrak@yeditepe.edu.tr
(Gokcen Deniz Bayrak)

Abstract

Background: Molar incisor hypomineralization (MIH) is believed to be linked to developmental dental anomalies due to their shared etiological factors and environmental influences during the process of dental development. The aim of this study is to compare the prevalence and diversity of dental anomalies in children with MIH and without MIH. **Methods**: A pediatric dentist evaluated the panoramic radiographs of 136 Turkish children, including 68 with MIH and 68 without MIH (control group), aged 7–15 years, for dental anomalies. The presence and characteristics of dental anomalies were determined. Data analysis was performed using the Mann-Whitney U test, Pearson chi-square test, and Binary Logistic Regression model ($p < 0.05$). **Results**: Dilaceration (16.2%) was the most frequently observed anomaly in the MIH group, while palatally displaced canine (8.8%) was the most common in the control group. However, no significant difference was found in the prevalence of developmental dental anomalies between the MIH and control groups ($p > 0.05$), except for infraocclusion of primary molars. Infraocclusion of primary molars was significantly higher in the control group compared to the MIH group ($p = 0.036$). When anomalies were categorized under specific headings, shape anomalies were significantly more common in the MIH group (76%) than in the control group (35%) ($p < 0.05$). **Conclusions**: Among Turkish children aged 7–15 years, dilaceration was most frequently observed in the MIH group, while no significant difference was found between the MIH and control groups. The shape anomalies were significantly higher in the MIH group. The predisposition to shape anomalies in MIH-affected teeth may pose challenges in treatment, particularly for these teeth, which frequently require pulp therapies. Therefore, a detailed evaluation of dental radiographs is crucial to ensure accurate and effective treatment management.

Keywords

Developmental dental anomaly; Molar incisor hypomineralization; Panoramic radiograph

1. Introduction

Molar incisor hypomineralization (MIH) is defined as the condition in which at least one first permanent molar tooth shows hypomineralization, along with situations in which one or more permanent incisors may be affected [1]. The prevalence of MIH varies between 2.4% and 40.2%, with an estimated global prevalence of 13% [2, 3]. In Istanbul, MIH prevalence was found as 14.2% in children [4].

A variety of factors can affect ameloblasts during the process of enamel formation. The mineralization of the first permanent molars usually begins around birth and is typically completed by the age of 4 to 5 years. Any disturbances during the maturation phase of enamel development can result in enamel hypomineralization [5]. Although the exact etiology of MIH remains unclear, it is likely influenced by genetic, epigenetic, and environmental factors [6].

The diagnosis of MIH follows the criteria established by the European Academy of Pediatric Dentistry (EAPD) in 2003, which include demarcated opacities, post-eruptive enamel breakdown, atypical restorations, molar extractions due to MIH and unerupted teeth [7]. These criteria were modified in 2010 [8], and in recent years, Ghanim *et al*. [9] have proposed more detailed diagnostic guidelines. To ensure consistent diagnosis, a calibration training manual was published in 2017, which played a crucial role in standardizing MIH diagnoses and enhancing both intra-examiner and inter-examiner calibration in global studies [10].

A wide range of developmental dental anomalies can be observed in pediatric dentistry, appearing as shape, size, number, position or structure anomalies, resulting from irregularities and disruptions during dental development [11, 12]. As with

MIH, the etiology of developmental dental anomalies is not yet fully understood. However, numerous studies have explored the genetic, epigenetic and environmental factors contributing to these anomalies [13, 14]. Recent findings have suggested potential similarities in the etiology of both conditions, raising questions about a possible association between them [15, 16].

A person may have multiple dental anomalies, some of which may be interrelated [17, 18]. A previous study found that patients with hypodontia were more likely to exhibit taurodontism [19]. Other studies have suggested that hypomineralization and hypoplasia defects may be associated with dental anomalies such as missing teeth, supernumerary teeth, and ectopic eruption [20–22]. Furthermore, a recent study reported that 29% of children with MIH had at least one additional dental anomaly [15]. Nevertheless, studies on dental anomalies in children with MIH are still scarce [15, 16, 23, 24]. Therefore, this study aimed to evaluate the presence and variety of developmental dental anomalies in children both with and without MIH. The null hypothesis was that subjects with MIH do not demonstrate a significantly increased prevalence of other dental anomalies.

2. Materials and methods

2.1 Ethical approval, study design and population

The study protocol was approved by the Clinical Research Ethics Committee of the School of Medicine of Yeditepe University (2020-No: 1287). This retrospective and cross-sectional study included children aged 7–15 who applied to Yeditepe University, Faculty of Dentistry, Pediatric Dentistry Department for routine dental care between August 2021 and June 2023. Informed consent was properly obtained from the parents or legal guardians of all children *involved* in the study before their participation. Before starting the study, a single pediatric dentist performed a calibration exercise with the aid of ten MIH clinical photographs along with other enamel defects such as diffuse opacities, hypoplasia, and amelogenesis imperfecta, according to a study published by Ghanim *et al*. [10]. Training and calibration for diagnosing dental anomalies were conducted using ten randomly selected panoramic radiographs. After two weeks, the reproducibility of MIH scoring was completed, and the same panoramic films were re-evaluated for dental anomalies, and full intra-observer agreement was found (kappa (κ): equal to 1).

2.2 Sample size and sampling criteria

The sample size for each group was determined using an alpha of 0.05 and a beta of 0.25 to attain 80% power, relying on previously reported prevalence rates of MIH [25]. The calculation indicated that a minimum of 63 patients was required for each group. Patients without systemic diseases who had pre-existing digital panoramic radiographs taken as part of their routine treatment, rather than specifically for this study, were included. Exclusion criteria were children undergoing fixed orthodontic treatment or wearing a fixed space maintainer, those with a history of dental and/or craniofacial trauma, cleft lip and palate, other craniofacial anomalies, metabolic disorders, genetic syndromes or those with poor-quality radiographs.

2.3 Evaluation of MIH and developmental dental anomalies

MIH diagnosis was formulated according to the EAPD criteria modified by Ghanim *et al*. [9]. A single pediatric dentist determined the presence and characteristics of dental anomalies in panoramic radiographs of 68 children with MIH (study group) and 68 children without MIH (control group).

The criteria used for diagnosing developmental dental anomalies were as follows:

2.3.1 Number anomalies

☐ Hypodontia: the absence of any permanent tooth, except for the third molar, and no evidence of tooth loss due to trauma, caries, periodontal issues, or orthodontic treatments in the child's dental records was considered hypodontia [26].

☐ Supernumerary teeth: cases in which additional teeth were present alongside the normal dentition [27].

2.3.2 Shape anomalies

☐ Dilaceration: it is an unusual angle or curvature in the alignment of the tooth's crown and root. In this study, apical deviations of 20° or more between the root and the normal axis of the tooth were considered dilaceration, according to Chohayeb's definition [28].

☐ Peg-shaped maxillary lateral incisors: it was identified when the mesiodistal width at the incisal edge was smaller than the cervical width of the crown [29].

☐ Taurodontism: it is a condition where the crown and pulp chamber exhibit vertical enlargement, with the bifurcation progressing in an apical direction. Shifman and Chanannel's criteria was used to determine taurodontism [30].

☐ Fusion: it occurs when two separate tooth germs unite, resulting in the formation of a single, enlarged tooth. The dental count shows the absence of one tooth when the fused tooth is considered as a single unit.

☐ Gemination: the duplication of a single dental germ, leading to the partial or complete development of two teeth that do not fully separate. Tooth counting remains normal when the duplicated tooth is counted as one [31].

☐ Hypercementosis: the presence of a radiopaque halo around the root of the tooth in the radiography is considered indicative of hypercementosis. In this study, hypercementosis was not histologically evaluated [32].

☐ Root malformation: Extra roots, abnormally short roots, or excessively long roots were recorded as root malformation [33].

2.3.3 Position anomalies

☐ Palatally displaced canine: the canine cusp tip is positioned either mesial to the long axis of the erupted lateral incisor root or overlapping the distal half of the lateral incisor root. The evaluation of ectopic canines was conducted using the method described by Lindauer *et al*. [34].

☐ Impacted/ectopic teeth: impacted teeth were described as teeth that do not erupt within the normal time and require orthodontic treatment or traction to emerge into the arch [35].

☐ Ectopic eruption of maxillary first permanent molars: it is characterized by mesial angulation or impaction beneath the distal aspect of the second primary molar, obstructing its normal eruption pathway [36].

☐ Infraocclusion of primary molars: it is a condition where the occlusal surface of the tooth is slightly below the occlusal plane. Odeh's method was used to evaluate infraocclusion of primary molars [37].

Panoramic radiographs were taken with a Morita Veraviewepocs 2D (X-ray unit, J Morita MFG Corp., Kyoto, Japan; kilovoltage peak 60–70 kV, milliampere 5–7 mA, exposure time 6–8 s) at the Oral and Maxillofacial Radiology Department of the School of Dentistry, Yeditepe University.

2.4 Statistical analysis

The data were analyzed using IBM SPSS V23 (IBM Corp. 2015, Armonk, NY, US). The Mann-Whitney U test was used to compare data that did not show a normal distribution between two groups. Yates correction and Pearson Chi-Square test were used for the comparison of categorical data. The Kappa test was used to examine intra-rater reliability. Binary Logistic Regression analysis was applied to assess the risk factors affecting MIH status. The level of significance was set at $p < 0.05$.

3. Results

The age and gender distribution of children with and without MIH is shown in Table 1. No significant differences were found between the groups for either condition ($p > 0.05$). Table 2 shows the presence of developmental dental anomalies in the study and control groups. No significant difference was found between the groups in the presence of developmental dental anomalies ($p > 0.05$).

There was no statistically significant difference between the prevalance of developmental dental anomalies between the study and control groups ($p < 0.05$), except for the infraocclusion of primary molars (Table 3). The prevalence of infraocclusion in primary molars was significantly greater in the control group than in the MIH group ($p = 0.036$). Dilaceration (16.2%) was the most frequently observed anomaly in the MIH group, whereas the control group had palatally displaced canine (8.8%) as the most common anomaly. Taurodontism (n = 4), and hypercementosis (n = 2), were detected only in the study group, while infraocclusion of primary molars (n = 4) was detected only in the control group.

Evaluation of the types of developmental dental anomalies (number, shape and position anomalies) revealed a significant difference between the study and control groups ($p = 0.003$) (Table 4). Shape anomalies were more prevalent in the MIH group than in the control group ($p < 0.05$), while position anomalies were significantly more frequent in the control group compared to the MIH group ($p < 0.05$).

Tables 5 and 6 present the outcomes of the univariate and multivariate logistic regression models employed to assess the risk factors linked to MIH in relation to dental anomalies. The developmental dental anomalies assessed individually in this study did not prove to be a significant risk factor for MIH ($p > 0.05$) (Table 5). When the types of dental anomalies were analyzed in the regression model, the univariate model showed that the risk of being in the MIH group was 3.379 times higher for individuals with shape anomalies compared to those without shape anomalies ($p = 0.012$). In the multivariate analysis, individuals with shape anomalies were 4.569 times more likely to be in the MIH group compared to those

TABLE 1. Comparison between MIH and control groups according to age and gender.

	MIH group	Control group	$p^{\#}$
Total	68	68	
Age (yr)			
Mean ± SD	9.85 ± 2.23	9.57 ± 2.05	0.638*
Gender: F/M	35/33	44/24	0.118**

**Mann Whitney U test, **Pearson chi-square test.*
SD: standard deviation; F/M: female/male; MIH: Molar incisor hypomineralization.
#significance was $p < 0.05$.

TABLE 2. Presence of developmental dental anomalies in the MIH and control groups.

Presence of dental anomalies	Group		Total n (%)	$p^{\#}$
	MIH n (%)	Control n (%)		
Children without dental anomalies	43 (63.2)	48 (70.6)	91 (66.9)	0.466*
Children with dental anomalies	25 (36.8)	20 (29.4)	45 (33.1)	

**Yates' Correction.*
n: number; %: percentage; MIH: Molar incisor hypomineralization.
#significance was $p < 0.05$.

TABLE 3. Prevalance of developmental dental anomalies in children with and without MIH.

Dental anomalies	Group		Total n (%)	$p^{\#}$
	MIH n (%)	Control n (%)		
Number anomalies				
Hypodontia				
Yes	2 (2.9)	1 (1.5)	3 (2.2)	1.000**
No	66 (97.1)	67 (98.5)	133 (97.8)	
Supernumerary				
Yes	2 (2.9)	2 (2.9)	4 (2.9)	1.000**
No	66 (97.1)	66 (97.1)	132 (97.1)	
Shape anomalies				
Dilaceration				
Yes	11 (16.2)	4 (5.9)	15 (11.0)	0.101***
No	57 (83.8)	64 (94.1)	121 (89.0)	
Peg-shaped maxillary lateral incisors				
Yes	1 (1.5)	2 (2.9)	3 (2.2)	1.000**
No	67 (98.5)	66 (97.1)	133 (97.8)	
Taurodontism				
Yes	4 (5.9)	0 (0.0)	4 (2.9)	0.119**
No	64 (94.1)	68 (100.0)	132 (97.1)	
Fusion				
Yes	0 (0.0)	0 (0.0)	0 (0.0)	---
No	68 (100.0)	68 (100.0)	136 (100.0)	---
Gemination				
Yes	0 (0.0)	0 (0.0)	0 (0.0)	---
No	68 (100.0)	68 (100.0)	136 (100.0)	---
Hypercementosis				
Yes	2 (2.9)	0 (0.0)	2 (1.5)	0.496**
No	66 (97.1)	68 (100.0)	134 (98.5)	
Root malformation				
Yes	3 (4.4)	1 (1.5)	4 (2.9)	0.619**
No	65 (95.6)	67 (98.5)	132 (97.1)	
Position anomalies				
Palatally displaced canine				
Yes	4 (5.9)	6 (8.8)	10 (7.4)	0.743*
No	64 (94.1)	62 (91.2)	126 (92.6)	
Impacted/ectopic teeth				
Yes	3 (4.4)	1 (1.5)	4 (2.9)	0.619**
No	65 (95.6)	67 (98.5)	132 (97.1)	
Ectopic eruption of maxillary first permanent molars				
Yes	1 (1.5)	3 (4.4)	4 (2.9)	
No	41 (60.3)	50 (73.5)	91 (66.9)	0.081****
Absent primary molars	26 (38.2)	15 (22.1)	41 (30.1)	
Infraocclusion of primary molars				
Yes	0 (0.0)^{a}	4 (5.9)^{b}	4 (2.9)	
No	41 (60.3)	47 (69.1)	88 (64.7)	**0.036******
Absent primary molars	27 (39.7)	17 (25.0)	44 (32.4)	

**Pearson's chi-squared test, **Fisher's Exact test, ***Yates' Correction, ****Fisher Freeman Halton test.*
n: number; %: percentage; MIH: Molar incisor hypomineralization.
---: not applicable.
Bold font indicates statistically significant differences.
Different superscript letters in each row indicate significant differences.
$^{\#}$significance was $p < 0.05$.

TABLE 4. Comparison of the types of developmental dental anomalies between the MIH and control groups.

Categories of dental anomalies	Group		Total n (%)	$p^{\#}$
	MIH n (%)	Control n (%)		
Number anomalies	4 (16)	3 (15)	7 (16)	
Shape anomalies	19 (76)^{a}	7 (35)^{b}	26 (58)	**0.003***
Position anomalies	8 (32)^{a}	14 (70)^{b}	22 (49)	

**Pearson's chi-squared test.*
n: number; %: percentage; MIH: Molar incisor hypomineralization.
Bold font indicates statistically significant differences.
Different superscript letters in each row indicate significant differences.
#significance was $p < 0.05$.

TABLE 5. Evaluation of risk factors associated with MIH in terms of dental anomalies.

Dental anomalies	Univariate		Multivariate†	
	OR (95% CI)	$p^{*,\#}$	OR (95% CI)	$p^{*,\#}$
Hypodontia	2.030 (0.180–22.933)	0.567	1.797 (0.116–27.903)	0.675
Supernumerary	1.000 (0.137–7.311)	1.000	0.537 (0.057–5.060)	0.587
Dilaceration	3.088 (0.931–10.239)	0.065	3.882 (1.003–15.030)	0.050
Peg-shaped maxillary lateral incisors	0.493 (0.044–5.563)	0.567	0.130 (0.005–3.287)	0.216
Taurodontism	---	---	---	---
Fusion	---	---	---	---
Gemination	---	---	---	---
Hypercementosis	---	---	---	---
Root malformation	3.092 (0.314–30.498)	0.334	7.061 (0.504–98.957)	0.147
Palatally displaced canine	0.646 (0.174–2.400)	0.514	0.627 (0.152–2.582)	0.518
Impacted/ectopic teeth	3.092 (0.314–30.498)	0.334	6.393 (0.283–144.440)	0.244
Ectopic eruption of maxillary first permanent molars	0.407 (0.041–4.057)	0.443	---	---
Infraocclusion of primary molars	---	---	---	---

†Each anomaly is included in the model separately.
**Binary logistic regression.*
---: not applicable.
OR: odds ratio; CI: confidence interval.
#significance was $p < 0.05$.

TABLE 6. Evaluation of risk factors associated with MIH regarding the types of dental anomalies.

Categories of dental anomalies	Univariate		Multivariate‡	
	OR (95% CI)	$p^{*,\#}$	OR (95% CI)	$p^{*,\#}$
Number anomalies	1.354 (0.291–6.293)	0.699	1.069 (0.206–5.537)	0.937
Shape anomalies	3.379 (1.314–8.690)	**0.012**	4.569 (1.570–13.297)	**0.005**
Position anomalies	0.514 (0.200–1.321)	0.167	0.365 (0.130–1.024)	0.055
Any anomalies	1.395 (0.681–2.860)	0.363		

‡Number, shape and position anomalies are included in the model.
**Binary logistic regression.*
OR: odds ratio; CI: confidence interval.
Bold font indicates statistically significant differences.
#significance was $p < 0.05$.

without such anomalies ($p = 0.005$). Other variables had no statistically significant effect on being in the MIH group ($p > 0.05$) (Table 6).

4. Discussion

Multiple dental anomalies can manifest in the same individual. Studies have shown that people with agenesis are more prone to developing additional dental anomalies, including peg-shaped lateral incisors, infraocclusion of primary molars and ectopic eruption of maxillary canines [17, 18, 38]. Recently, there has been growing interest in the possible presence of dental anomalies associated with MIH. Therefore, this study focused on the likelihood of developmental dental anomalies in individuals with and without MIH.

Walshaw *et al*. [15] were the first to evaluate panoramic radiographs of 101 children with MIH for other dental anomalies; however, no comparison was made with a control group. The most common anomaly observed was hypodontia. A more recent study also found hypodontia to be the most common dental anomaly among patients with MIH [23]. Şen Yavuz *et al*. [16] compared the presence of dental anomalies in patients with and without MIH, and hypodontia was most common in both groups. However, no significant difference was found in the presence of hypodontia between the MIH and non-MIH groups, suggesting that hypodontia was unrelated to MIH. Unlike these studies, in this study, the most common anomaly in the MIH group was dilaceration, whereas palatally displaced canine was the most frequent anomaly in the control group.

Some researchers define dilaceration as a condition where the angle between the root and the long axis of the tooth is 90° degrees or greater. In contrast, others consider it dilaceration if the deviation is 20° degrees or greater [28, 39]. The presence of dilaceration in individuals with MIH has been investigated in only one study, and it was not found to be associated with MIH [16]. In the current study, dilaceration was the most frequently observed anomaly overall. The high prevalence of dilaceration in this study may be due to the classification of a deviation of 20° or more as dilaceration. Interestingly, it was found that dilaceration is more common in the roots of the maxillary first permanent molars in the MIH group. Typically, performing root canal treatment on teeth with MIH can present challenges, and the presence of root dilaceration may complicate the treatment further. Therefore, detailed radiographic examination before treatment is of significant importance.

In a previous study, no significant difference was found between MIH and control groups in the presence and frequency of dental anomalies, but a significant difference was observed in their distribution [16]. Similarly, a recent study stated that no significant associations were identified between MIH and dental anomalies regarding dental agenesis and infraocclusion of deciduous molar anomalies [24]. Unlike the previous studies, Fernandes and Santos [23] reported a significant association between the prevalence of dental anomalies and MIH, and individuals with MIH had a 2.95 times greater chance of having dental anomalies. In the current study, there were no statistical differences in the prevalence of dental anomalies between MIH and control groups, except for the infraocclusion of primary molars. Infraocclusion of primary molars was statistically more prevalent in the control group compared to the MIH group ($p = 0.036$). Notably, this anomaly was entirely absent in the MIH group. Due to the wide age range in this study, there were patients whose primary molars had already exfoliated or extracted, and the number of patients without primary molars was higher in the MIH group. Unlike the present study, Marcianes *et al*. [24] investigated infraocclusion in primary molars under the condition that all primary molars were present and reported no association between MIH and non-MIH cases. Thus, the higher absence of primary molars in the MIH group might have influenced the results of this study.

Şen Yavuz *et al*. [16] evaluated dental anomalies both individually and under the categories of size, position, number and shape. They revealed a significant difference in the distribution of shape anomalies between the MIH and control groups, along with a notable increase in taurodontism within the MIH group. Likewise, the current study revealed a significantly higher prevalence of shape anomalies in the MIH group. Moreover; dilaceration, taurodontism and root malformation were the most common shape anomalies in the MIH group, respectively. Although there was a tendency for shape anomalies in the MIH group, when dental anomalies were examined individually, no direct association with MIH was found. Therefore, the null hypothesis was accepted.

The prevalence and types of dental anomalies can vary across ethnic groups [40]. Studies from Turkey highlight this variability; while some identified hypodontia as the most common anomaly, others reported position anomalies as the most frequent [41, 42]. Similarly, studies conducted in Iran and Libya identified dilaceration and displacement, respectively, as the most prevalent anomalies [43, 44], while research on Finnish children reported infraocclusion of primary molars as the most common [45]. As seen in the studies above, there is diversity in dental anomalies even within the same country. Therefore, the anomalies thought to be associated with MIH may also show variability. On the other hand, these results may be attributed to methodological differences between studies. There are also variations in the findings of studies examining dental anomalies potentially associated with MIH [15, 16, 23, 24]. To date, only one study has been conducted on Turkish children regarding this subject in the literature. That study reported a predisposition to shape anomalies in children with MIH, aligning with the findings of the present study [16]. This suggests that the prevalence of shape anomalies may be higher in children with MIH within the Turkish population. Nonetheless, additional studies using similar methodologies are necessary to validate this observation. Although Turkey is not included, a large-scale multicenter study currently in development, *involving* 22 research groups from 15 countries across all continents, could provide valuable insights into dental anomalies potentially associated with MIH in different regions and may help clarify the reasons for these differences [46].

In this study, dental anomalies were evaluated solely using panoramic radiographs. Size and structure anomalies were excluded as their diagnosis was more appropriately made through intraoral examination. The dental anomalies evaluated in this study were determined based on previous studies on similar topics [15, 16, 24]. If dental anomalies had also been examined intraorally, features of tooth crowns (*e.g.*, cusps, grooves, ridges) could have also been assessed, as in the study by Chowdhry *et al*. [47]. Dental crown traits, which vary among individuals due to genetic factors, may be associated with MIH. However, the high prevalence of caries in MIH-affected teeth, particularly in posterior molars, along with the extensive size of the lesions, can pose challenges in distinguishing crown traits.

Kapoor *et al*. [48] reported differences in tooth crown characteristics based on gender. However, Chowdhry *et al*. [47], stated that sexual dimorphism was not significant and suggested that it is appropriate to examine anomalies without separating them by gender. In the current study, although there was a numerical difference between genders in the control group, its impact on the results may be minimal. Additionally, no statistically significant differences were found between the groups based on gender.

According to Weerheijm *et al*. [49], the ideal age for identifying MIH is reported to be 8 years. At this stage, the four first permanent molars and permanent incisors have erupted, and assessing MIH at a later age may lead to misdiagnosis due to enamel loss, caries, or extractions. However, the finding from a previous study that the diagnosis of MIH is both possible and reliable in adults may suggest that the likelihood of misdiagnosis in MIH is low in this study, where the age range was extended [50].

The limitations of this study were the small sample size and the evaluation of dental anomalies only by panoramic radiography. In this study, MIH was diagnosed through clinical examination, whereas dental anomalies were identified retrospectively using only panoramic radiographs and they were not assessed in the clinical examination. For future research, it would be beneficial to assess dental anomalies during intraoral examinations in addition to MIH, supported by findings from panoramic radiographs. Additionally, the retrospective and cross-sectional design restricts the possibility of conducting longitudinal analyses. Another limitation is that the study focused on a single geographical region while encompassing a broad age range. Given that dental development and eruption are ongoing processes in children, it would be more diagnostically accurate to examine specific dental anomalies at defined age intervals, as exemplified in the following sentences. For example, evaluation of ectopic eruption of canine is more appropriate after the age of 12. For taurodontism to be evaluated, root development of the teeth must be completed. Although not examined in this study, if the agenesis of third molars is to be evaluated, the critical age is 14, and the examination should be conducted in patients aged 14 or older. In this study, the age range was broadened to increase the sample size. In future studies, instead of including multiple dental anomalies, it would be more appropriate to focus on 2–3 specific anomalies specifically hypodontia and shape anomalies for diagnosis in a particular age group.

5. Conclusions

While no significant relationships were observed between MIH and the dental anomalies assessed in this study, shape anomalies were significantly more prevalent in the MIH group when categorized under specific headings. This suggests that Turkish children with MIH may be more prone to shape anomalies, which may warrant more comprehensive radiographic evaluation. Furthermore, awareness of this potential association could aid in early diagnosis and intervention by dentists.

AVAILABILITY OF DATA AND MATERIALS

The data used to support the findings of this study can be made available upon request to the corresponding author.

AUTHOR CONTRIBUTIONS

GDB—designed the study, collected the data, analysed the data, wrote the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was received from the Clinical Research Ethics Committee of the School of Medicine of Yeditepe University (2020-No: 1287). Informed consent was properly obtained from the parents or legal guardians of all children *involved* in the study before their participation.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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