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Knowledge, awareness and attitudes among a group of Turkish dental students regarding molar incisor hypomineralization: a cross-sectional study

Özbey İpek Hilal^{1*} and Bolaca Arif¹

Abstract

Background Molar incisor hypomineralization (MIH) is estimated to affect more than 800 million people worldwide. The clinical management of MIH can be challenging. For dentists, to provide effective and high-quality dental care to people affected by MIH, it is essential that they improve their awareness, ability to describe the clinical situation, and knowledge of treatment modalities. Previous surveys conducted with students showed that only a limited number are confident in diagnosing MIH. The aim of the study was to assess the clinical knowledge and perceptions of 4th- and 5th-year dental students regarding the distribution, severity, etiology and treatment modalities of MIH.

Methods In this cross-sectional study, a total of 194 students studying in the 4th- (85 students) and 5th- (109 students) years participated in the survey. The survey had 23 questions and two sections, the first of which was intended to gather demographic information about the students. The second part consisted of questions about the diagnosis, etiology, and treatment of MIH. The independent t test and the chi-square test was used to compare qualitative data.

Results The majority of students (78.87%) stated that they had known about MIH. 5th-year students had known about MIH at a statistically significantly higher rate compared to 4th-year students ($p=0.0001$). While only 19.69% of the participants stated that they could diagnose a patient with MIH, the proportion of 5th-year students who could make such a diagnosis was statistically significantly higher ($p=0.0001$). The majority of the participants (96.39%) stated that they wanted MIH-related practices to be included more in their clinical education. The most desired topic to be included was diagnosis (91.98%).

Conclusions The current study showed that students have some knowledge about MIH, but this knowledge is not sufficient, especially in terms of diagnosis and treatment. The students clearly wanted to develop their knowledge of MIH both theoretically and practically.

Keywords MIH, Molar incisor hypomineralization, Knowledge, Dental students, Survey

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Background

Molar incisor hypomineralization (MIH) is defined as a developmental disorder that is observed when a patient has hypomineralized enamel lesions on the first permanent molars, and sometimes the incisors [1]. The worldwide prevalence of MIH varies between 2% and 40% [2], and the estimated average global prevalence has been reported to be 14.2% [3]. In epidemiological studies conducted in Turkey, this rate varies between 7.7% and 14.9% [4, 5]. Although the etiology of MIH has not been clearly established, it is thought to be caused by factors such as genetic factors, environmental factors, drug use/smoking/diseases experienced by the mother during pregnancy, and drug use/vitamin D deficiency/being born with low birth weight/birth complications/diseases experienced by the child in the first 3 years after birth [6, 7]. MIH presents as white to yellow-brown opaque lesions. There is often a distinct line between the lesion and healthy enamel. Depending on the severity of MIH, affected teeth may exhibit rapid wear, disintegration and rapid enamel loss after eruption, restoration loss, tooth loss and severe sensitivity [2, 8–10]. In addition, MIH poses a higher risk of caries in both the permanent and primary dentition, and teeth affected by MIH are, 5 to 10 times more likely to require dental treatment than healthy teeth [2]. In addition, studies have shown that MIH has an impact on the quality of life of children [11, 12]. MIH is estimated to affect more than 800 million people worldwide and the high cost of treatment constitutes a potential public health problem [13]. The European Academy of Paediatric Dentistry (EAPD) states that early diagnosis is the first important step in the management of MIH, which causes many problems [14]. The clinical management of MIH can be challenging. For dentists, to provide effective and high-quality dental care to people affected by MIH, it is essential that they improve their awareness, ability to describe the clinical situation, and knowledge of treatment modalities [15]. Today, there is a scientific opinion that MIH should be one of the core subjects that should be taught in the undergraduate dental education curriculum [16]. Since MIH has been included in the dental education curriculum in recent years, it is thought that recent graduates and new dentists have more knowledge about MIH than those who graduated 10 or more years ago [17]. However, the content currently taught is still insufficient. An examination of the literature on the subject revealed that around half of dentists are confident in diagnosing MIH [17–24]. Previous surveys conducted with students showed that only a limited number are confident in diagnosing MIH [11, 17, 24]. In different studies, it was stated that students did not know how to implement the MIH criteria, at rates ranging from 18% to 75.2% [17, 21, 23, 24]. In many studies in the literature, students indicated

that they needed to receive more education on diagnosis and treatment of MIH [17, 21–24]. All these studies suggest that students do not have sufficient knowledge about MIH and that there may be deficiencies in the current curriculum in terms of learning and assessment. In our dental faculty, theoretical training in pediatric dentistry is given in the 3rd and 4th-years, and clinical training is given in the last 2 years of education, during the 4th- and 5th-years.

The aim of the study was to assess the clinical knowledge and perceptions of 4th- and 5th-year dental students regarding the distribution, severity, etiology and treatment modalities of MIH. The hypothesis of the present study was that the 5th-year dental students have a higher level of knowledge regarding MIH than the students in the 4th-year.

Methods

Study design and sample size

This cross-sectional study was approved by the Ethical Committee of Pamukkale University, Faculty of Medicine (No.07; 02/04/2024) and all the procedures performed in the study were conducted in accordance with the ethical standards given in the Declaration of Helsinki. It was reported (Additional File) in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [25]. Pamukkale University Faculty of Dentistry 4th- and 5th-year students who attended the MIH lecture and were receiving training in the clinic were included in the study.

In the power analysis of our study conducted with the G*power 3.1 program (University of Kiel, Kiel, Germany), the effect size obtained in the reference study [26] was found to be 0.22. In the sample size analysis performed by taking alpha error probability=0.05 and power value as 0.80, the total sample size required was calculated as a minimum of 163.

There were a total of 202 4th- and 5th-year students studying at the dental faculty, and 194 of these students agreed to participate in the survey.

Validity of the survey

A questionnaire comprised of 23 questions that has been validated in English and German was used [17, 21, 26]. A native Turkish speaker translated the original English survey into Turkish, which was then back translated into English by an independent English native speaker. The final questionnaire was piloted amongst 3rd year dental students, ensuring that it was easy to understand. To estimate the intra-rater reliability, 3rd year dental students were asked to answer the questionnaire again after one month. Intra-rater reliability was good ($\kappa=0.78$).

Administration of the survey

The inclusion criteria for participation in the study were being a student in the fourth or fifth year of the dentistry degree program and understanding the Turkish language. The exclusion criterion for the study was not consenting to complete the survey. A brief explanation was given to the students and they were advised that participation in the study was voluntarily. They were allowed to complete the survey in written form before pedodontics exams, and they were informed that their answers would remain confidential. Data were collected between May and June 2024. The survey had two sections, the first of which was intended to gather demographic information about the students. The second part consisted of questions about the diagnosis, etiology, and treatment of MIH.

Statistical analysis

In this study, statistical analyses were performed with the NCSS (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA) package program. In the evaluation of the data, in addition to descriptive statistical methods (frequency and percentage distributions, mean, standard deviation), the distribution of the variables was examined with the Shapiro-Wilk normality test. The independent t test was used to compare pairwise groups of normally distributed variables, and the chi-square test was used to compare qualitative data. The results were evaluated at the significance level of $p < 0.05$.

Results

A total of 202 students were asked to participate in the survey, 194 of whom agreed and gave consent (response rate: 96%). The mean age of the survey participants was 23.23 ± 1.25 and 59.28% were female and 40.72% were male. At the time of the survey, 85 students (43.81%) were in their 4th-year and 109 students (56.19%) were in their 5th-year. Tables 1 and 2 show the responses of the participants to the survey.

The majority of students (78.87%) stated that they had known about MIH. 5th-year students had known about MIH at a statistically significantly higher rate compared to 4th-year students ($p = 0.0001$). Most of them had learned about MIH from lecture notes (69.07%) and the clinic (35.05%). The “lecture notes” and “clinic” answers given by 5th-year students to this question were found to be statistically significantly higher than 4th-year students ($p = 0.0001$). A total of 60.62% students stated that they knew about the clinical features of MIH, but 70.10% of them stated that they had difficulty distinguishing it from other enamel defects. The one they had the most difficulty distinguishing was enamel hypoplasia (54.12%). (Table 1).

The number of 5th-year students who knew the clinical features of MIH ($p = 0.0001$) and had difficulty in

distinguishing it from enamel hypoplasia ($p = 0.147$) was statistically significantly higher compared to 4th-year students. Genetic factors (70.62%) and chronic diseases affecting the mother during pregnancy (60.82%) were the most frequently marked factors in the etiology of MIH, and the number of 5th-year students who marked these factors was statistically significantly higher compared to 4th-year students ($p = 0.004$, $p = 0.002$). While the majority of students (94.33%) did not have information about the prevalence of MIH in their country, 89.69% thought that investigating the prevalence would be useful. While only 19.69% of the participants stated that they could diagnose a patient with MIH, the proportion of 5th-year students who could make such a diagnosis was statistically significantly higher ($p = 0.0001$). The percentage of students who stated that they encountered MIH teeth in less than 10% of their patients was 87.18%. A total of 76.92% students stated that they were somewhat confident in making a MIH diagnosis. While composite was used in the treatment of MIH teeth in 47.22% of cases, glass ionomer cement was used in 38.89% of cases. Compared to 4th-year students, 5th-year students stated that they used composite at a statistically significantly higher rate ($p = 0.011$). The factors that affected the students' choice of restorative material the most were remineralization properties (63.16%), durability (57.89%) and esthetics (57.89%). The majority of the participants (96.39%) stated that they wanted MIH-related practices to be included more in their clinical education. The most desired topic to be included was diagnosis (91.98%). (Tables 1 and 2).

Discussion

MIH is known to pose many challenges for both dentists and patients [27]. As the severity of MIH increases, it can affect the quality of life of children, and if preventive measures are not taken, the cost of treating MIH will be very high for countries and individuals [28, 29]. Considering the high prevalence of MIH, it can be assumed that most dentists will encounter teeth affected by MIH at some point in their careers. Since the knowledge and experience gained at the undergraduate level are thought to be important in shaping the careers of students, it is important to investigate the awareness, attitude and knowledge levels of future dentists regarding MIH. Therefore, this study aimed to evaluate the clinical awareness, attitude and knowledge levels of 4th- and 5th-year undergraduate students attending the Pamukkale University Faculty of Dentistry regarding the prevalence, etiology, diagnosis and treatment methods of MIH.

In this study, it was found that students were mostly familiar with MIH, while 5th-year students were more familiar. In similar studies conducted in Austria, Egypt, Germany, Switzerland and Turkey [17, 21, 23, 24, 26],

Table 1 Students' responses on their knowledge, awareness and attitudes about MIH diagnosis and prevalence

Survey Questions and Answer Options	All Students n (%)	Grades		p
		4th-Year Students n (%)	5th-Year Students n (%)	
Are you familiar with MIH?				
Yes	153 (78.87%)	51 (60.00%)	102 (93.58%)	0.0001
No	41 (21.13%)	34 (40.00%)	7 (6.42%)	
If yes, how did you find out about it? (Multiple answers possible)				
Lecture/Lecture notes	134 (69.07%)	41 (48.24%)	93 (85.32%)	0.0001
Dental clinic	68 (35.05%)	16 (18.82%)	52 (47.71%)	0.0001
Dental journals (printed or electronic)	7 (3.61%)	1 (1.18%)	6 (5.50%)	0.109
Books (printed or electronic)	15 (7.73%)	3 (3.53%)	12 (11.01%)	0.053
Brochures	0 (0.00%)	0 (0.00%)	0 (0.00%)	-
Internet	26 (13.40%)	5 (5.88%)	21 (19.27%)	0.007
Other students	19 (9.79%)	1 (1.18%)	18 (16.51%)	0.0001
Other	0 (0.00%)	0 (0.00%)	0 (0.00%)	-
Do you know the clinical characteristics of MIH?				
Yes	117 (60.31%)	29 (34.12%)	88 (80.73%)	0.0001
No	77 (39.69%)	56 (65.88%)	21 (19.27%)	
Do you have difficulties distinguishing MIH defects from other enamel defects?				
Yes	136 (70.10%)	55 (64.71%)	81 (74.31%)	0.147
No	58 (29.90%)	30 (35.29%)	28 (25.69%)	
If yes, which? (Multiple answers possible)				
Dental fluorosis	41 (21.13%)	20 (23.53%)	21 (19.27%)	0.470
Enamel hypoplasia	105 (54.12%)	38 (44.71%)	67 (61.47%)	0.020
Amelogenesis imperfecta	48 (24.74%)	19 (22.35%)	29 (26.61%)	0.496
Dentinogenesis imperfecta	13 (6.70%)	7 (8.24%)	6 (5.50%)	0.450
Which factors do you think are involved in the etiology of MIH? (Multiple answers possible)				
Genetic factors	137 (70.62%)	51 (60.00%)	86 (78.90%)	0.004
Chronic disease(s) of the mother during pregnancy	118 (60.82%)	41 (48.24%)	77 (70.64%)	0.002
Chronic disease(s) of the affected child	56 (28.87%)	28 (32.94%)	28 (25.69%)	0.269
Antibiotic(s)/medication(s) taken by the mother during pregnancy	91 (46.91%)	25 (29.41%)	66 (60.55%)	0.0001
Antibiotic(s)/medication(s) taken by the affected child itself	59 (30.41%)	19 (22.35%)	40 (36.70%)	0.031
Environmental contaminants	19 (9.79%)	4 (4.71%)	15 (13.76%)	0.035
Acute medical condition(s) that the affected child experienced during the mother's pregnancy	78 (40.21%)	20 (23.53%)	58 (53.21%)	0.0001
Acute medical condition(s) of the affected child	43 (22.16%)	12 (14.12%)	31 (28.44%)	0.017
Fluoride exposure	21 (10.82%)	11 (12.94%)	10 (9.17%)	0.402
None	6 (3.09%)	5 (5.88%)	1 (0.92%)	0.047
Other	0 (0.00%)	0 (0.00%)	0 (0.00%)	-
Are you aware of the prevalence of MIH in Turkey?				
Yes	11 (5.67%)	3 (3.53%)	8 (7.34%)	0.255
No	183 (94.33%)	82 (96.47%)	101 (92.66%)	
Do you think it would be worthwhile investigating the prevalence in Turkey?				
Yes	174 (89.69%)	78 (91.76%)	96 (88.07%)	0.541
No	20 (10.31%)	7 (8.24%)	13 (11.93%)	
Are you able to diagnose a patient with MIH?				
Yes	38 (19.69%)	7 (8.33%)	31 (28.44%)	0.0001
No (Continue with question 22)	84 (43.52%)	52 (61.90%)	32 (29.36%)	
I am not sure (Continue with question 22)	71 (36.79%)	25 (29.76%)	46 (42.20%)	

it was reported that most students had heard the term MIH. In contrast, in a study conducted in Saudi Arabia, 64% of students were not familiar with MIH [18]. This may be because the study was conducted in an earlier

period and knowledge of MIH as a disorder has become increasingly widespread over the years.

In the present study, the majority of the students stated that they learned about MIH from lecture notes and

Table 2 Students' responses on their clinical knowledge, awareness and attitudes about MIH and education need

Survey Questions and Answer Options	Grades			p
	All Students n (%)	4th-Year Students n (%)	5th-Year Students n (%)	
How often do you notice these teeth in the clinic? (Choose one option)				
Weekly	1 (2.50%)	0 (0.00%)	1 (3.13%)	0.668
Monthly	10 (25.00%)	2 (25.00%)	8 (25.00%)	
Yearly	20 (50.00%)	3 (37.50%)	17 (53.13%)	
Never	9 (22.50%)	3 (37.50%)	6 (18.75%)	
In what proportion of patients do you observe MIH teeth?				
< 10%	34 (87.18%)	6 (85.71%)	28 (87.50%)	0.898
10–25%	5 (12.82%)	1 (14.29%)	4 (12.50%)	
> 25%	0 (0.00%)	0 (0.00%)	0 (0.00%)	
Which of the following features do you most frequently notice regarding the severity of the defect? (Choose one option)				
White defects	21 (53.85%)	4 (57.14%)	17 (53.13%)	0.605
Yellow/brown defects	15 (38.46%)	2 (28.57%)	13 (40.63%)	
Post eruptive enamel breakdown	1 (2.56%)	0 (0.00%)	1 (3.13%)	
Other	2 (5.13%)	1 (14.29%)	1 (3.13%)	
How confident do you feel when diagnosing MIH?				
Confident	5 (12.82%)	0 (0.00%)	5 (15.63%)	0.271
Very confident	2 (5.13%)	1 (14.29)	1 (3.13%)	
Slightly confident	30 (76.92%)	5 (71.43%)	25 (78.13%)	
Not confident at all	2 (5.13%)	1 (14.29%)	1 (3.13%)	
Do you know if there are clinical criteria to diagnose MIH? (Choose one option)				
Yes and I know how to apply them clinically	17 (43.59%)	2 (28.57%)	15 (46.88%)	0.287
Yes, but I do not know how to apply them	18 (46.15%)	5 (71.43%)	13 (40.63%)	
No	4 (10.26%)	0 (0.00%)	4 (12.50%)	
In the clinic, have you encountered demarcated hypomineralized defects in permanent teeth other than the first permanent molars and incisors?				
Yes	17 (43.59%)	2 (28.57%)	15 (46.88%)	0.563
No	22 (56.41%)	5 (71.43%)	17 (53.13%)	
If yes, please name the tooth/teeth?				
Canines	12 (57.14%)	2 (66.67%)	10 (55.56%)	0.652
Premolars	5 (23.81%)	1 (33.33%)	4 (22.22%)	
Second permanent molars	4 (19.05%)	0 (0.00%)	4 (22.22%)	
How frequently do you notice demarcated hypomineralized lesions in the second deciduous molars compared to the first permanent molars? (Choose one option)				
More often	2 (5.26%)	0 (0.00%)	2 (6.45%)	0.643
Rarely	20 (52.63%)	5 (71.43%)	15 (48.39%)	
Just as common as with the first permanent molar	5 (13.16%)	1 (14.29%)	4 (12.90%)	
Never seen	11 (28.95%)	1 (14.29%)	10 (32.26%)	
Which material do you use most in treating MIH molars?				
Amalgam	2 (5.56%)	0 (0.00%)	2 (6.67%)	0.515
Composite	17 (47.22%)	0 (0.00%)	17 (56.67%)	0.011
Flowable composite	11 (30.56%)	3 (50.00%)	8 (26.67%)	0.257
Glass ionomer cement	14 (38.89%)	2 (33.33%)	12 (40.00%)	0.760
Resin modified glass ionomer cement	12 (33.33%)	1 (16.67%)	11 (36.67%)	0.343
Compomer	5 (13.89%)	1 (16.67%)	4 (13.33%)	0.829
Preformed steel crowns	6 (16.67%)	0 (0.00%)	6 (20.00%)	0.230
Other	1 (2.78%)	0 (0.00%)	1 (3.33%)	0.650
Which factors influence your choice of restorative material? (Multiple answers possible)				
Adhesion	16 (42.11%)	3 (42.86%)	13 (41.94%)	0.964
Aesthetics	22 (57.89%)	4 (57.14%)	18 (58.06%)	0.946
Patient/parent preference	1 (2.63%)	0 (0.00%)	1 (3.23%)	0.630

Table 2 (continued)

Survey Questions and Answer Options	Grades			p
	All Students n (%)	4th-Year Students n (%)	5th-Year Students n (%)	
Durability	22 (57.89%)	4 (57.14%)	18 (58.06%)	0.964
Remineralization potential	24 (63.16%)	3 (42.86%)	21 (67.74%)	0.218
Hypersensitivity	5 (13.16%)	1 (14.29%)	4 (12.90%)	0.922
Personal experience	4 (10.53%)	0 (0.00%)	4 (12.90%)	0.315
Research results	6 (15.79%)	2 (28.57%)	4 (12.90%)	0.305
Do you think MIH is a clinically relevant problem?				
Yes	34 (87.17%)	5 (71.42%)	29 (90.62%)	0.206
No	5 (12.83%)	2 (28.58%)	3 (9.38%)	
If so, what is giving you difficulties? (Multiple answers possible)				
Diagnosis	13 (6,70%)	3 (3.53%)	10 (9.17%)	0.119
Aesthetics	19 (51,35%)	4 (57.14%)	15 (50.00%)	0.734
Achieving adequate local anesthesia	5 (13,51%)	0 (0.00%)	5 (16.67%)	0.245
Determination of the restoration margins of the affected enamel	21 (56,76%)	4 (57.14%)	17 (56.67%)	0.982
Provision of adequate restorations	11 (29,73%)	4 (57.14%)	7 (23.33%)	0.078
Long-term success of restorations	16 (43,24%)	2 (28.57%)	14 (46.67%)	0.384
Achieving patient comfort (function, oral hygiene)	4 (10,81%)	1 (14.29%)	3 (10.00%)	0.742
Would you suggest including clinical training regarding MIH in your dental course?				
Yes	187 (96.39%)	81 (95.29%)	106 (97.25%)	0.469
No	7 (3.61%)	4 (4.71%)	3 (2.75%)	
If yes, in which area(s) do you think you need to know/be taught about the most? (Multiple answers possible)				
Diagnosis	172 (91.98%)	70 (86.42%)	102 (96.23%)	0.014
Etiology	89 (47.59%)	37 (45.68%)	52 (49.06%)	0.647
Treatment	159 (85.03%)	69 (85.19%)	90 (84.91%)	0.958
Other	3 (1.60%)	1 (1.23%)	2 (1.89%)	0.725

clinics. Similarly, in many studies conducted in different countries, lectures were reported to be the primary sources of knowledge [22, 30, 31]. In our study, 60.62% of the students knew the clinical features of MIH and the number of 5th-year students ($p=0.0001$) was statistically significantly higher. Parallel to our study, in studies conducted in different countries, it was reported that senior students had more knowledge of the clinical features of MIH [17, 21, 22, 32]. It was determined that the level of knowledge of students about the clinical features of MIH increased as their education year progressed.

In the present study, the effective factors in the etiology of MIH were “genetic factors”, “chronic diseases of the mother during pregnancy” and “antibiotics/medications taken by the mother during pregnancy”, which were marked in the first three places for both grades. Similar results were found in many other studies [18, 23, 26, 33, 34]. In other survey studies, factors that have also been marked in the first three places include “chronic medical conditions that affect the child” and “environmental contaminants” [32, 35]. Considering that the etiology of MIH in the literature remains unclear today, it can be said that these small differences in the studies are normal.

In the present study, the vast majority of students did not have knowledge about the prevalence of MIH in Turkey, and again the vast majority thought that it would be useful to investigate this further. In parallel with our study, students in many studies stated that they did not know the prevalence of MIH in their country and thought that it would be worthwhile to investigate [17, 21, 23, 26, 33]. Although there are many studies on the prevalence of MIH in the literature, it can be said that the reason why students do not have knowledge is a deficiency in the education curriculum.

In the current study, half of the survey participants stated that they encountered MIH once a year. Bekes et al. [23], Elhennawy et al. [21] and Elshiekh et al. [33] stated that students mostly encountered MIH once a year, parallel to our study. Considering that these studies were conducted with students and that students treated a small number of patients from each specialty, it can be said that it is normal for them not to encounter a large number of MIH cases. There are also studies stating that students’ either “never” encountered MIH [17, 26] or on a “monthly” basis [18].

In the present study, only 19.69% of the participants stated that they could diagnose a patient with MIH, while

a statistically significantly higher proportion of 5th-year students stated that they could make such a diagnosis. The majority of these students (76.92%) stated that they were “somewhat confident” in diagnosing the disorder. Similarly, in the study of Silva et al. [18], 67.1% of the 4th-year students and 67.2% of the 5th-year students stated that they could not diagnose MIH. In the studies of Bekes et al. [23] and Hamza et al. [17], students similarly stated that they were “somewhat confident”. In studies conducted in Germany, Kuwait and Turkey, survey participants stated that they were not confident [21, 26, 36]. Contrary to our study, in the study of Tarazano-Valero et al. [34], 62.7% of the students stated that they were confident in diagnosing MIH. In addition, although 89.74% of the students in our study knew about the clinical criteria for diagnosing MIH, almost half of them did not know how to apply them. In many studies, similar to the present study, it was found that the majority of students knew the criteria, however it was reported that the students who did not know how to implement the criteria ranged from 18% to 75.2% [17, 21, 23, 24, 26, 33]. For this reason, more importance can be given to this issue when providing MIH training to students.

When the findings of the study were examined, it was seen that most of the students had difficulty distinguishing MIH from other enamel defects, especially enamel hypoplasia (54.12%) and amelogenesis imperfecta (24.74%). Many studies have also reported that survey participants had difficulty in distinguishing MIH from other dental anomalies [15, 22, 26]. In different studies, the enamel defects that students had the most difficulty distinguishing from MIH were amelogenesis imperfecta [17, 21, 23] and enamel hypoplasia [24, 26, 33, 34]. Therefore, it may be appropriate to give more information about these two dental conditions in particular when educating students about MIH.

In the study of Hamza et al. [22] it was reported that senior dental students preferred stainless steel crowns (40.6%) and composite (40%) in the treatment of MIH molars. In the studies of Gunay et al. [26] and Bekes et al. [23] composite resin was the preferred material for the treatment of teeth with MIH. In the present study, composite and glass ionomer cement were the most commonly preferred materials in the treatment of MIH teeth, and 5th-year students preferred composite at a statistically significantly higher rate. The factors that most affected the students’ choice of restorative material were listed as remineralization properties (63.16%), esthetics (57.89%) and durability (57.89%). In the literature, in most survey studies conducted on this subject, “esthetics”, “durability” or “adhesion” were marked as the most important factors among those that most affected the students’ choice of restorative material [17, 21–24, 26, 33]. It is known that composite restorations, preformed

metal crowns and laboratory indirect restorations have high success rates in the treatment of posterior teeth with MIH [14]. In our study, although the first choice of the students was composite, their second choice was glass ionomer cement due to the importance they gave to remineralization. It can be deduced from these findings that the high success rates of crown restorations should be emphasized when giving MIH training in the lectures.

In most studies, MIH was seen as a clinically relevant problem and the most challenging situations for students were reported to be “long term success of restorations” [17, 21–23, 33] and “esthetics” [24, 26]. Similarly, in our study, most students viewed MIH as a clinically relevant problem.

In the present study, the majority of participants indicated that they wanted MIH-related practices to be included more in their clinical education. The most requested topics to be included were diagnosis and treatment. The results were similar in many studies in the literature, where students indicated that they wanted to receive more education on diagnosis and treatment [17, 21–24, 33, 34].

Limitations and strengths of the study

The current study was conducted in a single dental education institution, which can be considered as a limitation of the study. Additionally, the numbers of 4th-year and 5th-year students were not distributed homogeneously. This may have affected the study results. Conducting studies with a large number of students in more than one dental education institution can provide more accurate results for the country. Survey questions can be improved in future studies to obtain more detailed and accurate responses. In addition, survey studies can be conducted with newly graduated students or dentists receiving post-graduate education in different specialties and the results can be compared. As another limitation of the study, students may have provided the desired responses being aware that their answers were being evaluated in a study. However, the anonymity of respondents should have limited this source of bias. In addition to the limitations, the study also has strengths. One of them is that a validated survey was used and therefore, the results are comparable to other countries and other studies. In addition, the present study provides a database for future researchers in this topic.

This study showed some deficiencies about MIH in the dentistry education curriculum of a group of students in Turkey. It is obvious that there has been an increasing awareness of and interest in MIH over the years, but despite this, it has not yet been deeply integrated into the dental curriculum. The students’ answers to some questions indicate that they have good theoretical knowledge, and this level of knowledge usually improves as the

academic year progresses. With these findings, it can be concluded that the present study hypothesis is approved. However, students have low confidence in diagnosing MIH, indicating their clinical inadequacy. Therefore it is clear that updates are needed regarding MIH training.

Conclusions

The current study showed that students have some knowledge about MIH which increases as the academic year progresses, but this knowledge is not sufficient, especially in terms of diagnosis and treatment. The students clearly wanted to develop their knowledge of MIH both theoretically and practically. Therefore, education about MIH should be updated, making it more detailed and systematic, and especially giving lectures focusing on case photographs may prepare students to treat MIH patients clinically and make them more confident.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-024-05401-4>.

Supplementary Material 1

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Not applicable.

Author contributions

All authors contributed to the study conception and design. The surveys were administered to the students by HÖI and AB. Analysis was performed by HÖI and AB. HÖI was a major contributor in writing the manuscript. All authors read and approved the manuscript.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was performed in line with the principles of the Declaration of Helsinki. Ethical approval was approved by the Ethical Committee of Pamukkale University, Faculty of Medicine (Date:02.04.2024/Number:07). Written informed consent was obtained from the participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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