ORIGINAL RESEARCH

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Molar-Incisor Hypomineralisation: a cross-sectional study focusing on knowledge, attitude, and clinical management methods among Romanian dentists within the first five years of practice.

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Abstract

Introduction. Molar-Incisor Hypomineralisation (MIH) stands out as one of the most challenging developmental enamel defects encountered in paediatric dental practice. Difficulties encountered in managing this condition, by early-career dentists, remains unexplored in Romania, despite high exposure of this category of clinicians to paediatric patients. Aim. This study aims to assess the knowledge, attitudes, and practices (KAP) regarding MIH among practitioners within their first five years of postgraduate practice. Materials and Methods. For the purpose of this study, a cross-sectional KAP survey was conducted among 200 dentists, half residents and half non-residents. Data were collected using a questionnaire comprising five key sections: demographics, knowledge, attitudes, clinical practice patterns, and educational needs. Mann-Whitney U, Kruskal-Wallis, Spearman correlation, Chi-square test and binary logistic regression were used to further analyse the data. Confirmatory factor analysis validated the knowledge subscale (CFI = 0.986, RMSEA = 0.048). Results. Dental Residency program, as a postgraduate training, was the strongest predictor of adequate MIH comprehension (OR = 7.13, 95% CI [2.27, 22.44], $p < 0.001$). The mean knowledge score was 6.31 ± 2.43 out of 9, with 59% of participants demonstrating adequate expertise (score ≥7), correlated with a significant association between the proficiency level and initial management approach ($X^2 = 43.2$, $p < 0.001$, Cramer's V = 0.657). Standardised diagnostic criteria were used only by 13% of participants, while 77% rated their undergraduate training, regarding MIH, as insufficient or only partially satisfactory. Conclusions. Among nascent professionals in dentistry, competency gaps and practice inconsistencies regarding MIH management were underlined. Dental residency emerged as the primary determinant of both evidence based clinical practices and knowledge adequacy. A finding that calls for objective, structured MIH education at both undergraduate and postgraduate levels was the absence of correlation between self-assessment and objective competence.

Keywords: molar-incisor hypomineralisation, dental residency, knowledge levels.

Introduction

Molar-Incisor Hypomineralisation (MIH) is a qualitative and quantitative developmental defect of enamel affecting one to four permanent first molars, frequently associated with affected permanent incisors [1,2,7]. Characteristic aspects found in MIH include colorimetric modifications of the enamel that can vary from creamy white spots with diffuse margins to yellow and even brown defects with distinct margins [4]. This condition was classified and named at the European Academy of Paediatric Dentistry (EAPD) Congress in Bergen [3].

Aetiologically, MIH is considered to be rooted in a multitude of factors such as prenatal and perinatal aspects, genetic predisposition and even postnatal determinants, making it that more relevant for clinicians to understand the appropriate diagnostic approach and to adopt an optimal, evidence-based treatment strategy [5,6,8].

Worldwide prevalence of MIH varies across multiple studies between 13.1% and 14.2%, with the highest number of patients in America and lowest in Asia [9,10,11]. Although national studies across children from Transylvania showcased a range of

prevalence between 38.1% and 66.7%, the absence of a large scale nationwide study for Romania further underscores the need for epidemiological research, as local data is essential for public health planning and educational priorities [12].

From a clinical management perspective, MIH entails a set of unique challenges that exceed beyond those encountered in routine paediatric dentistry. Affected teeth, frequently present marked hypersensitivity thereby reducing the predictability of local anaesthesia and complicating patient cooperation [13,14]. Severity ranging from mild demarcated enamel opacities to severe crown destruction raises the need for individualised treatment planning and comprehensive knowledge of a wide variety of preventive and restorative strategies. Early diagnosis is, therefore, essential in preventing significant irreversible hard dental structure loss and improving quality of life.

General dental practitioners play a key role in timely recognition and initial management of MIH, as they represent the primary entry point in dental care systems for the majority of paediatric patients. Practitioners' expertise in assessing MIH differentiate it from other enamel defects such as fluorosis or hypoplasia, and implementing evidence based management protocols is, therefore, of paramount importance. In Romania, this challenge is intensified by the absence of standardised MIH training on a national level. The early formative years of clinical practice are of high importance in this matter, forming and shaping future clinical behaviour patterns [15,16]. Although MIH related literature has expanded notably, several international studies have identified significant gaps in clinicians' levels of training and comprehension, consistently reporting inadequate understanding of MIH, low diagnostic confidence and substantial heterogeneity in therapeutic management strategies [15,16,17].

Therefore, the aim of this cross-sectional study was to assess the level of knowledge, attitudes, and clinical practices regarding MIH management among dental practitioners within the first five years of postgraduate practice in Romania, with the objective of identifying existing educational gaps and thereby contributing to the development of targeted training strategies for early-career clinicians.

Materials and methods

A cross-sectional questionnaire based study was carried between January and April of 2026 in Romania, and was conducted in accordance with the Declaration of Helsinki. All participants provided informed electronic consent prior to completing the questionnaire.

The target population comprised dental practitioners based in Romania, within their first five years of postgraduate clinical practice. Inclusion criteria were: graduate from a Romanian faculty of dentistry, a maximum of five years of postgraduate clinical experience at the time of data collection, and currently active in the field. Exclusion criteria were based on incomplete questionnaire response, age over 35 years, refusal to participate. Data were collected using a structured questionnaire developed specifically for this study and electronically distributed via Google Forms (Google LLC, Mountain View, CA, USA). Digital survey platforms have been widely validated for use in dental research, consistent with the methodology employed in similar KAP studies regarding MIH [16,18]. A sampling strategy was employed, with participants recruited through professional dental associations, postgraduate residency programmes, and social media groups dedicated to Romanian dental practitioners.

Section A of the questionnaire collected demographic and professional data such as age, years of clinical practice, type of practice setting, primary work environment, and proportion of paediatric patients. Section B assessed MIH related knowledge using nine multiple choice questions covering definition, etiology, clinical aspects and management principles. Each correct answer was scored 1 point, generating a total knowledge score between 0 and 9, and participants scoring at least 7 points were classified as demonstrating

adequate expertise, using a pre-established threshold of 70% for ranking. Section C appraised clinical practice patterns through eight items focused on diagnostic criteria, initial management, restorative materials used, application of remineralisation agents, specialist referral frequency and parental counselling regarding MIH. Section D evaluated attitudes in relation to MIH management using a seven-item Likert scale (1= strongly disagree, 5= strongly agree), and a three-item perception subscale composed of items related to specialist referral (D4), continuing professional development (D6) and perceived clinical difficulty (D7) established acceptable internal consistency (Cronbach's α = 0.724, McDonald's ω = 0.761) and was used for composite scoring. Section E addressed educational background and learning needs, including perceived adequacy of undergraduate MIH training, favoured didactic resource formats and primary information sources.

The knowledge subscale (Section B, questions B1-B9) was subjected to exploratory factor analysis (EFA) using principal axis factoring with oblimin rotation. Kaiser-Meyer-Olkin measure validated sampling adequacy (KMO = 0.785) and Bartlett's test of sphericity was significant ($x^2(36)$= 298, $p < 0.001$). EFA identified a significant unidimensional structure with one dominant factor explaining 34.7% of variance and Confirmatory factor analysis (CFA) using Full Information Maximum Likelihood estimation confirmed a seven-item knowledge model (B3-B9), after removing two items with factor loading below the conventional threshold of 0.40 (B1:λ= 0.142, B2:λ= 0.323), therefore revised model demonstrates excellent fit: CFI= 0.986, TLI= 0.980, RMSEA= 0.048 [90% CI:0.00, 0.113], SRMR= 0.048, $x^2(14)$=17.2, p= 0.245.

All analyses were performed using Jamovi (Version 2.7, jamovi project, 2025) and descriptive statistics were indicated as frequencies and percentages for categorical variables and as means with standard deviation for continuous variables. The Shapiro-Wilk test confirmed non-normal distribution of knowledge scores (W=0.861, $p<0.001$), consequently non-parametric tests were employed throughout. Group comparisons were performed utilising Mann-Whitney U test for two independent groups and the Kruskal-Wallis test with post-hoc Dunn's pairwise comparison for three or more groups. Effect sizes were reported as rank biserial correlation for Mann-Whitney and epsilon squared (ε^2) for Kruskal-Wallis tests; associations between categorical variables were examined using Pearson's Chi-square test, with Cramer's V reported as the effect size measure and interconnections between ordinal variables were evaluated using Spearman's rank correlation coefficient. Binary logistic regression was conducted to identify independent predictors of adequate MIH knowledge (score ≥7), with results reported as odds ratios (OR) with 95% confidence intervals and statistical significance was set at $p < 0.05$ for all analyses.

Results

A total of 200 dentists completed the questionnaire with a response rate of 100%, the demographics of the study sample being presented as follows. The majority of participants were aged between 28-35 years (62%) and 38% under the age of 28. In relation to clinical practice years after graduating, 7% reported to be newly graduates with less than one year of experience, 27% between one and two years, 34% with two to three years of experience, and 32% between three to five years in the dental field. Equal proportion of dentistry residents and non-residents were represented and the majority of participants had their primary workplace set in a multi-practitioner private clinic (61%), followed by hospitals or university settings (22%) and individual private practice having the least number of subjects (17%). Most participants were based in large urban areas with more than 100,000 inhabitants (47%) while rural settings had the lowest concentration of respondents (15%). Paediatric caseload ranged between 10-25% of patients in 30% of clinicians, 26-50% of patients in 29% of respondents and more

than 50% of paediatric patients were reported by 20% of subjects.

The mean MIH knowledge score was 6.31 ± 2.43 out of 9 (median = 7.00) and the Shapiro-Wilk test confirmed non-normal distribution (W= 0.861, p< 0.001) (Fig.1)

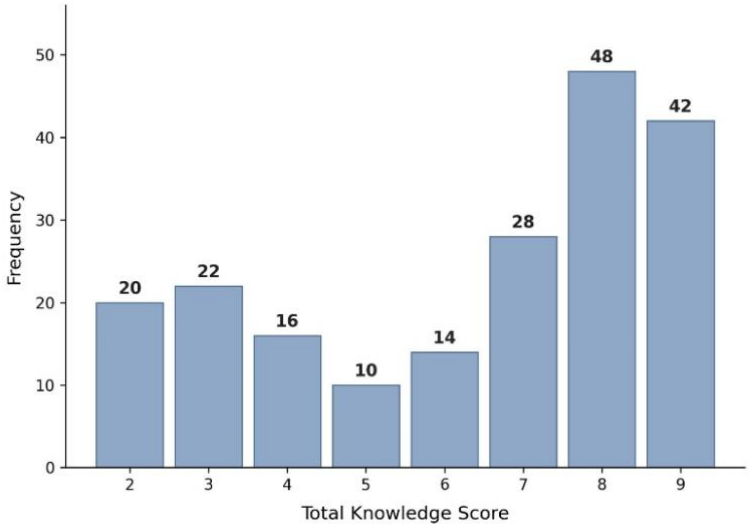

Figure 1. Distribution of MIH knowledge scores among study participants (N=200).

Overall only 59% of practitioners demonstrated adequate comprehension (score ≥ 7) and no missing data were recorded for the knowledge subscale. Item-level analysis related considerable variability in correct response rates across individual knowledge items, and the highest percentage of correct response was for items regarding definition while the lowest rates were registered for items concerning aetiology and mechanism of anaesthetic failure in severely affected teeth (Table 1).

Table 1. Correct response rates for individual MIH knowledge items (N=200)

Items	Content	Correct responses n (%)
B2	MIH typical clinical presentation	92
B1	Definition of MIH	87
B9	Frequently observed complications of MIH	77
B7	Initial preventive approach in mild MIH	73
B3	Clinical characteristics of MIH lesions	72
B6	Most likely diagnosis of a clinical scenario	72
B4	Differential diagnosis	65
B8	Mechanism of anaesthetic failure in severe MIH	52
B5	Aetiological factors associated with MIH	41
Total Mean knowledge score		**6.31 ± 2.43**

Statistically significant differences in MIH knowledge scores were found between participants enrolled in a postgraduate residency program and those who were not (Mann-Whitney U = 626, p< 0.001, rank biserial correlation = -0.500) and also across practice settings (Kruskal-Wallis $x^2(2) = 10.2$, p= 0.006, $\varepsilon^2 = 0.103$), with post-hoc Dunn's analysis revealing significant higher scores among practitioners in hospital and university settings compared to those in multi-practitioner private clinics (p= 0.005). A notable association was also underlined between paediatric case load and knowledge scores (Kruskal-Wallis $x^2(3) =12.0$, p= 0.007, $\varepsilon^2= 0.121$) with clinicians treating more than 50% paediatric patients demonstrating significantly higher scores than those with 10-

25% caseload (p=0.006). Between years of clinical experience or residential environment and knowledge scores there were no significant associations (Table 2).

Table 2. Results of between-group comparisons for MIH knowledge scores

Variable	Test	Statistic	p	Effect size
Residency enrolment	Mann-Whitney U	626	<0.001	r = −0.500
Practice setting	Kruskal-Wallis	$\chi^2(2) = 10.2$	0.006	$\varepsilon^2 = 0.103$
Paediatric caseload	Kruskal-Wallis	$\chi^2(3) = 12.0$	0.007	$\varepsilon^2 = 0.121$
Residential setting	Kruskal-Wallis	$\chi^2(2) = 1.36$	0.507	$\varepsilon^2 = 0.014$
Years of experience	Spearman	rho = 0.132	0.191	-
Self-perceived competence (D1)	Spearman	rho = 0.009	0.933	-
Professional attitude subscale	Spearman	rho = 0.595	<0.001	-
Post-hoc Dunn's analysis: Hospital/university vs multi-practitioner private clinic: p = 0.005; 10–25% vs >50% paediatric caseload: p = 0.006				

Binary logistic regression identified residency enrolment as the strongest independent predictor of adequate MIH knowledge (OR = 7.13, 95% CI [2.27, 22.44], p <0.001) and the overall model explained 45.4% of variance in knowledge adequacy (Nagelkerke $R^2 = 0.454$, $x^2(9) = 41.1$, p <0.001), while type of practice setting and years of experience were not significant independent predictors with results shown in Table 3

Table 3. Binary logistic regression – predictors of adequate MIH knowledge (N=200)

Predictor	OR	95% CI	p
Residency enrolment (yes vs no)	7.13	2.27-22.44	<0.001
Paediatric caseload <10% vs 10–25%	18.61	2.57-134.78	0.004
Paediatric caseload 26–50% vs 10–25%	1.16	0.32-4.21	0.825
Paediatric caseload >50% vs 10–25%	2.87	0.64-12.91	0.168
Practice setting – hospital vs private	3.64	0.68-19.52	0.131
Practice setting – individual vs multi-practitioner	1.08	0.28-4.14	0.907
Years of experience	1.18	0.71-1.96	0.524
Model Fit	$R^2N = 0.454$	$\chi^2(9) = 41.1$	<.001

Mean Likert scores for individual attitude items are presented in Table 4, with the highest score recorded for the item addressing the perceived need for continuing education (D6:mean = 4.13±1.09) and 53% of respondents selected the highest agreement score. The lowest mean scores were identified in items addressing perceived adequacy of undergraduate training regarding MIH (D2: mean= 2.64±1.11) and self-perceived diagnostic competence (D1: mean= 3.36±1.06). The three-item professional attitude subscale (D4+D6+D7) ranked a mean score of 3.77± 0.981, with residents proving significantly more positive attitudes compared to non-residents (Mann-Whitney U= 699, p < 0.001, rank biserial correlation = -0.441). A notable moderate to strong positive correlation was identified between objective knowledge scores and professional attitude subscale (Spearman's rho= 0.595, p <0.001), in contrast no correlation was recorded between self-perceived diagnostic competence (D1) and objective knowledge scores (Spearman's rho= 0.009, p =0.933), nor between perceived difficulty of differential diagnosis

(D3) and knowledge scores (Spearman's rho= 0.106, p= 0.292).

Table 4. Descriptive statistics for individual attitude items (N=200)

Item	Content	Mean	SD	Median
D6	Continuing education on MIH is necessary and useful	4.13	1.09	5.00
D4	Specialist referral for MIH patients is justified	3.79	1.25	4.00
D5	Available resources are sufficient for MIH treatment	3.49	1.21	3.50
D7	MIH management is more challenging than non-MIH cases	3.38	1.32	3.00
D1	I feel adequately prepared to diagnose MIH	3.36	1.06	3.00
D3	Differential diagnosis between MIH and caries/fluorosis is difficult	2.64	1.11	3.00
D2	Undergraduate training provided adequate MIH information	2.64	1.11	3.00
Attitude subscale	(D4,D6,D7)	3.77	0.981	4.00

Of the 200 participants, 48% reported having previously encountered MIH cases in their clinical practice and 22% were uncertain. A significant association was identified between prior MIH exposure and paediatric caseload proportion ($x^2(6)=20.4$, p=0.002, Cramer's V= 0.319) and in relation to diagnostic criteria only 13% of participants related to using standardised instruments such as the MIH index or EAPD criteria, 33% relied on personal clinical judgement while 20% had no defined diagnostic protocol. In terms of initial management, 55% reported applying topical fluoride and remineralisation agents as a first line intervention, 24% indicated immediate specialist referral without intervention and 21% proceeded with immediate restoration. Of the resident responers, 70% selected evidence based preventive measures compared to only 40% of non-residents, whereas none of the residents selected immediate restoration as an initial management step compared to 42% non-residents, thus residency enrolment was significantly associated with initial management approach ($x^2(2)= 26.6$, p<0.001, Cramer's V= 0.516), (Fig 2).

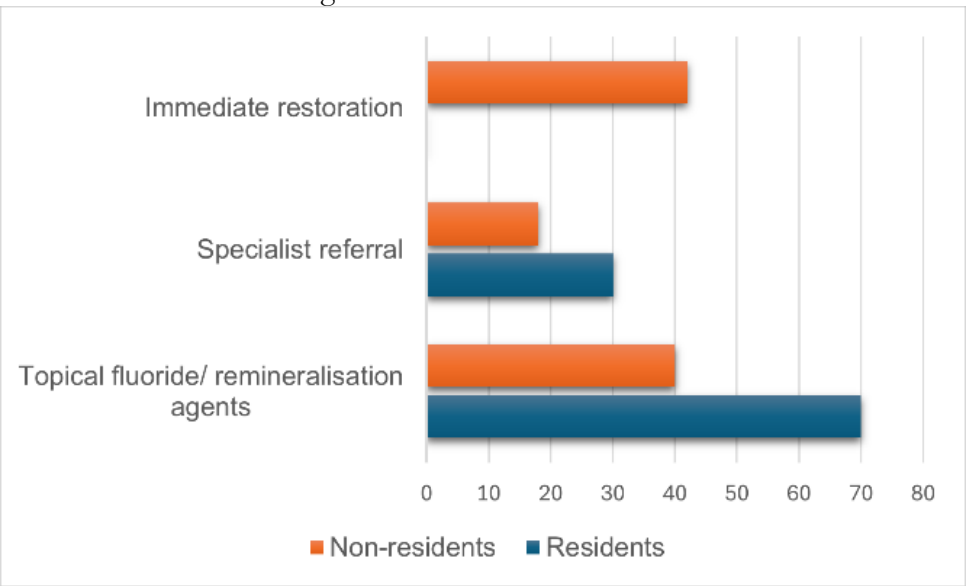

Figure 2. Initial MIH management approach by residency enrolment status (N=200).

Knowledge levels were significantly associated with initial management approach ($x^2(2)=43.2$, $p<0.001$, Cramer's V= 0.657), with 79.7% of clinicians showcasing adequate comprehension, selecting topical fluoride application, compared to only 19.5% of those with insufficient expertise, who mostly inclined to choose immediate restorations as first approach (48.8%) (Table 5).

Table 5. Chi-square analyses – associations between clinical practices and key variables

Association	χ^2	df	p	Cramer's V
Vs Residency enrolment				
Initial management approach (C4)	26.6	2	<0.001	0.516
Use of remineralisation agents (C6)	9.48	2	0.009	0.308
Specialist referral frequency (C7)	9.58	3	0.022	0.310
Parental counselling practices (C8)	11.5	3	0.009	0.339
Continuing education attitude (D6)	14.6	4	0.006	0.382
Specialist referral attitude (D4)	15.3	4	0.004	0.391
Vs Knowledge level				
Initial management approach (C4)	43.2	2	<0.001	0.657
Use of remineralisation agents (C6)	17.8	2	<0.001	0.422
Parental counselling practices (C8)	23.1	3	<0.001	0.481
Specialist referral frequency (C7)	7.28	3	0.063	0.270
Vs Paediatric caseload				
Prior MIH clinical exposure (C1)	20.4	6	0.002	0.319

In regards to restorative materials, 41% of subjects had not treated any MIH case; among those who had, composite resin was the most frequently used material (28%), followed by conventional glass-ionomer (21%), while stainless steel crowns were selected by only 3% of clinicians. Remineralisation and desensitising agents were employed by 59% and their usage was significantly associated with both residency enrolment ($x^2(2)=9.48$, $p=0.009$, Cramer's V=0.308) and knowledge level ($x^2(2)=17.8$, $p<0.001$, Cramer's V=0.422). Concerning specialist referral, 48% stated to always recommend specialist consultation in severe MIH cases, while 33% had never referred any patient. Parental counselling was systematically provided with detailed explanation by 51% of respondents and was significantly associated with both residency enrolment ($x^2(3)=11.5$, $p=0.009$, Cramer's V= 0.339) and knowledge level ($x^2(3)=23.1$, $p<0.001$, Cramer's V= 0.481).

The majority of participants rated their undergraduate MIH training as insufficient (37%) or only partially satisfactory (40%) with only 21% stating adequate preparation and just 2% rating it as very good. No significant association was identified between perceived adequacy of undergraduate training and either residency enrolment or comprehension levels. The most frequently cited source of information regarding MIH were colleagues and mentors, and postgraduate residency training was cited as primary educational resource by only 16% (Fig. 3).

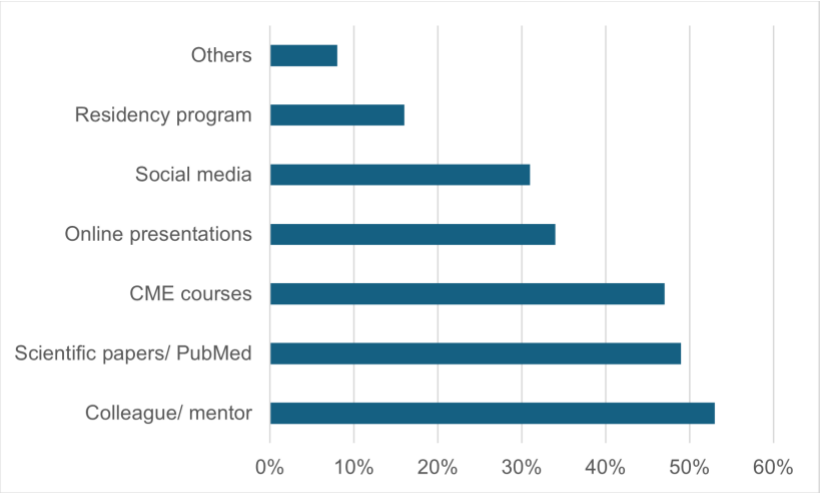

Figure 3. Primary sources of MIH-related information reported by study participants (N=200, multiple responses permitted).

In regard to didactic resources for future practice, the most useful and preferred resource was clinical treatment protocols stratified according to severity levels and the least desired method was online webinars (Fig. 4).

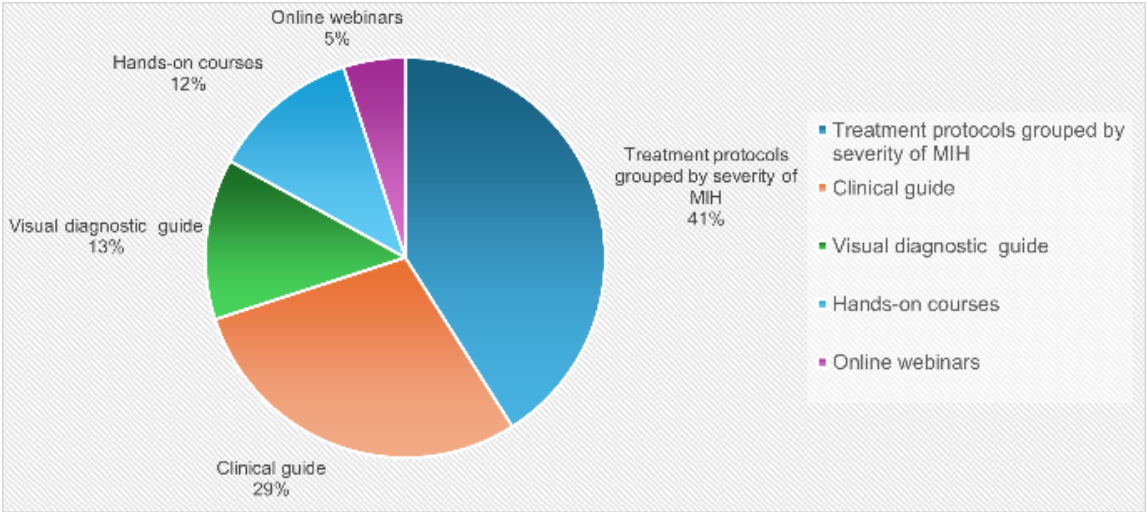

Figure 4. Preferred educational resource formats for MIH management among study participants (N=200).

Discussion

This cross-sectional KAP study investigated the knowledge, attitudes, and clinical practices regarding MIH management among 200 early-career dental practitioners in Romania and, to the best of our knowledge, this is among the first studies of its kind performed in the Eastern European region. Findings reveal knowledge gaps, inconsistent clinical practices, and a widespread dissatisfaction with undergraduate MIH education. A strong positive association between postgraduate residency training and evidence-based clinical behaviour was also underscored. The mean knowledge score of 6.31 out of 9, with 59% of participants demonstrating adequate knowledge, is consistent with findings reported in similar KAP studies conducted in other countries [16,17]. Studies from Norway, France, and Spain have similarly identified insufficient MIH knowledge levels among general dental practitioners. A wide variability in diagnostic and management approaches has also been reported in studies conducted in Syria and Egypt, where general dental practitioners consistently demonstrated lower knowledge scores compared to paediatric dental specialists [19,21]. The lower correct response rates observed for items addressing

aetiological factors (B5: 41%) and anaesthetic failure mechanisms (B8: 52%) generate clinical concerns; inadequate knowledge of critical developmental period during which MIH occurs may limit practitioners ability to obtain a thorough medical history and counsel families regarding the systemic origins of the condition [14]. Furthermore, unfamiliarity with pulpal inflammatory changes associated with MIH may result in ineffective pain management strategies, as highlighted in a recent systematic review on anaesthetic challenges in MIH-affected teeth [22,23]. Residency enrolment was the strongest independent predictor of adequate MIH knowledge in the present study (OR = 7.13, $p < 0.001$). This finding is aligned with the broader medical education literature stating the superiority of structured postgraduate training over informal clinical experience in developing evidence-based competencies. Residents also revealed more positive professional attitudes ($p < 0.001$) and were much more likely to adopt evidence-based initial management approaches. None of the residents chose immediate restoration as a first-line measure compared to 42% of non-residents. All of these findings suggest that structured postgraduate education provides not only theoretical knowledge but also shapes clinical decision-making in a manner consistent with current EAPD guidelines [5]. However, residency training was cited as a primary source of MIH-related information by only 16% of participants, despite constituting 50% of the sample; this apparent paradox may reflect the variable coverage of MIH within different residency curricula, and highlights once again the need for standardised MIH-related content across postgraduate training programmes in Romania. A major finding of this study was the significant positive correlation between objective knowledge scores and the professional attitude subscale (Spearman's rho = 0.595, $p < 0.001$), indicating consistency within the KAP framework. Practitioners with higher knowledge levels were significantly more likely to acknowledge the clinical complexity of MIH management, recognise the need for specialist referral and appreciate the value of continuing professional education. In contrast, practitioners with lower knowledge scores revealed a systematic underestimation of MIH's clinical burden. The same behaviour was encountered between Irish general dental practitioners who similarly reported low confidence and variability in management approaches [30]. Perhaps the most clinically significant finding of the present study was the high association between knowledge level and initial management approach (Cramer's V = 0.657), with 79.7% of knowledgeable practitioners selecting evidence-based preventive measures compared to only 19.5% of those with insufficient knowledge who most frequently opted for immediate restoration. This pattern provides strong empirical support for the argument that educational interventions targeting knowledge improvement will yield measurable changes in clinical practice, in line with EAPD management recommendations [5]. An important finding was the lack of correlation between how practitioners rated their own diagnostic skills and their actual knowledge scores (Spearman's rho = 0.009, $p = 0.933$). This suggests that early-career practitioners lack the metacognitive awareness necessary to accurately evaluate their own MIH-related competence. Practitioners who felt most confident were not, in fact, better performers a misalignment that mirrors the Dunning-Kruger effect [25,26]. Limited expertise, in a paradoxical way, tends to inflate self-assessment, a bias documented in dental students evaluated specifically in paediatric dentistry contexts [26]. Practitioners who felt less prepared were more likely to report difficulty in differential diagnosis (Spearman's rho = −0.380, $p < 0.001$). Even so, this self-reported difficulty did not translate into correspondingly lower objective scores, suggesting that subjective confidence is an unreliable proxy for clinical readiness, these results reinforce the need for objective, structured assessment of MIH-related competencies rather than reliance on self-reported confidence measures. Amongst participants only 13% reported using standardised diagnostic instruments such as the MIH index or EAPD criteria, raising concerns and representing one of the most action oriented gaps identified in this study. The

diversity in diagnostic approaches with a preference for personal clinical judgement and informal consultation with colleagues mirrors the heterogeneity observed in MIH prevalence data globally, which has been attributed in part to inconsistent application of diagnostic criteria and on the other hand to standardised diagnostic training [24]. Training programmes should therefore prioritise the introduction of validated diagnostic indices and photographic atlases at both undergraduate and postgraduate levels, as recommended by Spanish and other European KAP studies that documented similar deficits [20]. The underuse of stainless steel crowns (3%) despite being recommended by EAPD guidelines, for severely affected permanent molars in young patients, reflects a pattern of practice inconsistency that extends beyond knowledge alone with current evidence supporting the use of preformed metal crowns and indirect restorations as providing high success rates for posterior teeth with extensive MIH involvement [27]. While 59% of participants reported using remineralisation and desensitising agents, the remaining 41% either lacked awareness of their application in MIH or chose not to use them and this represents a significant missed opportunity for non-invasive management. Recent systematic reviews and randomised clinical trials have proved the efficacy of Casein Phosphopeptide-Amorphous Calcium Phosphate (CPP-ACP) and fluoride varnish in reducing hypersensitivity and supporting remineralisation in MIH-affected teeth; supporting their clinical value and the importance of larger scale use [28,29]. Of the participants, 77% rated their undergraduate MIH training as insufficient or only partially satisfactory, evenly distributed across knowledge levels and residency status, highlighting a systemic educational gap that deserves attention. Dental schools across Europe appear to share this gap, which makes it a systemic rather than a national issue and suggests that MIH education across dental curricula internationally could benefit from improvements [19]. The strong preference for practically-oriented educational resources, particularly clinical treatment protocols stratified by severity (41%) and practical clinical guides (29%), provides clear guidance for educational programme developers. Thus, it is suggested that pedagogical interventions should prioritise case-based learning, standardised diagnostic training and hands-on clinical exposure.

Several limitations of the present study should be acknowledged: the use of a convenience sampling strategy limits the generalisability of findings to the broader population of early-career Romanian dental practitioners; self-reported practice data are subject to social desirability bias, potentially overestimating adherence to evidence-based practices; the cross-sectional design precludes causal inferences regarding the relationship between training and practice patterns; the unexpected finding of higher knowledge scores among practitioners with fewer than 10% paediatric patients may reflect a selection bias and warrants further investigation in longitudinal studies; the knowledge assessment was limited to nine items, which may not comprehensively capture all dimensions of MIH-related competence.

Conclusion

This study, being amongst the few ones in Eastern European context, maps out how early-career Romanian dentists understand and manage MIH. Knowledge gaps, inconsistent clinical practices and widespread dissatisfaction with undergraduate training were identified, with postgraduate residency emerging as the primary determinant of evidence-based clinical behaviour. The absence of correlation between self-perceived competence and objective knowledge further underscores the need for structured, objective assessment rather than reliance on self-reported confidence. In the Romanian dental field, where residency programmes remain heterogeneous and no national MIH related protocol exists, these findings are more than just academic. They provide a clear direction for embedding standardised MIH curriculum in both undergraduate and postgraduate training pathways.

Author Contributions (CRediT Taxonomy)

Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualisation, Writing – original draft preparation, Writing – review & editing: R-L.G.
Visualisation, Writing – review & editing: L.D.
Writing – review & editing: A.I.
Supervision: C-I.B.

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Conflict of Interest

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References

1. Wu X, Wang J, Y. Heng L, et al. Association of molar incisor hypo-mineralization with premature birth or low birth weight: system-atic review and meta-analysis. J Matern Fetal Neonatal Med.2020;33:1700–1708.
2. Silva MJ, Scurrah KJ, Craig JM, et al. Etiology of molar incisor hypomineralization–a systematic review. Community Dent OralEpidemiol. 2016;44:342–353.
3. Lopes, L. B., Machado, V., Botelho, J., & Haubek, D. Molar-incisor hypomineralization: An umbrella review. Acta Odontologica Scandinavica. 2021, 79(5), 359–369.
4. Mazur M, Corridore D, Ndokaj A, Ardan R, Vozza I, Babajko S, Jedeon K. MIH and Dental Caries in Children: A Systematic Review and Meta-Analysis. Healthcare (Basel). 2023 Jun 18;11(12):1795.
5. Lygidakis NA, Garot E, Somani C, Taylor GD, Rouas P, Wong FSL. Best clinical practice guidance for clinicians dealing with children presenting with molar-incisor-hypomineralisation (MIH): an updated European Academy of Paediatric Dentistry policy document. Eur Arch Paediatr Dent. 2022 Feb;23(1):3-21.
6. Alzahrani AY, Alamoudi NMH, El Meligy OAES. Contemporary Understanding of the Etiology and Management of Molar Incisor Hypomineralization: A Literature Review. Dent J (Basel). 2023 Jun 23;11(7)
7. Rodd, H.D.; Graham, A.; Tajmehr, N.; Timms, L.; Hasmun, N. Molar Incisor Hypomineralisation: Current Knowledge and Practice. Int. Dent. J. 2021, 71, 285–291
8. Kis, E.-É.; Gecse, I.-B.; Bica, C.; Dudás, C.; Dudás, H.; Martha, K. Perinatal Risk Factors and Clinical Correlations in Molar–Incisor Hypomineralization: A Cross-Sectional Epidemiological Study. Epidemiologia 2026, 7, 4
9. Schwendicke F, Elhennawy K, Reda S, Bekes K, Manton DJ, Krois J. Global burden of molar incisor hypomineralization. J Dent. 2018 Jan;68:10-18
10. Lopes, L.B., Machado, V., Mascarenhas, P. et al. The prevalence of molar-incisor hypomineralization: a systematic review and meta-analysis. Sci Rep 11, 22405 (2021)
11. Zhao D, Dong B, Yu D, Ren Q, Sun Y. The prevalence of molar incisor hypomineralization: evidence from 70 studies. Int J Paediatr Dent. 2018 Mar;28(2):170-179.
12. Contac LR, Pop SI, Voidazan S, Bica CI. Molar Incisor Hypomineralization: Etiology, Correlation with Tooth Number Anomalies and Implications for Comprehensive Management Strategies in Children from Transylvania. Diagnostics (Basel). 2024 Oct 24;14(21):2370
13. Laura-Roxana Contac, Silvia Izabella Pop, Cristina Ioana Bica. Enhancing pediatric comfort: a comprehensive approach to managing molar-incisor hypomineralization with preemptive analgesia and behavioral strategies. Journal of Clinical Pediatric Dentistry. 2024. 48(6);123-132.
14. Rhaiem M, Chatti M, Elelmi Y, Ben Haj Khalifa A, Masmoudi F, Baaziz A. Effective anaesthesia when treating teeth affected by molar incisor hypomineralisation (MIH): a systematic review. Eur Arch Paediatr Dent. 2025 Oct;26(5):861-876.
15. Osborne R, Silva M, Taylor GD. Qualitative study exploring general dental practitioners' views of MIH and its management in the UK and Australia. Int J Paediatr Dent. 2024 Jul;34(4):372-382.
16. Marquillier T, Szönyi V, Mwenge-Wambel J, Dursun E, Grosgogeat B. Dentists' Knowledge, Attitudes, and Practices Regarding Molar Incisor Hypomineralization (MIH): A French Survey. Cureus. 2025 Feb 13;17(2):e78943.

17. Skaare AB, Houlihan C, Nybø CJ, Brusevold IJ. Knowledge, experience and perception regarding molar incisor hypomineralisation (MIH) among dentists and dental hygienists in Oslo, Norway. Eur Arch Paediatr Dent. 2021 Oct;22(5):851-860.
18. Mondal, H., Mondal, S., Ghosal, T., & Mondal, S. (2019). Using Google Forms for Medical Survey: A Technical Note. International Journal of Clinical and Experimental Physiology, 5(4), 216-218.
19. Karkoutly M, Hamza B, Al Batal S, Al Barazi A, Bshara N. Knowledge, perceptions, attitudes, and clinical experiences on molar incisor hypomineralization among Syrian pediatric dentists and general dental practitioners: a cross-sectional study. BMC Oral Health. 2022 Dec 1;22(1):561.
20. Serna-Muñoz C, Martínez-Beneyto Y, Pérez-Silva A, Poza-Pascual A, Ibáñez-López FJ, Ortiz-Ruiz AJ. Perception, knowledge, and attitudes towards molar incisor hypomineralization among Spanish dentists: a cross-sectional study. BMC Oral Health. 2020 Sep 18;20(1):260.
21. Yehia, A.M., Abdelaziz, A.M. & Badran, A. Knowledge, perceptions, and clinical experience regarding Molar-Incisor Hypomineralization among a group of general dental practitioners, pediatric dentists, and other dental specialists in Egypt: a cross-sectional study. Bull Natl Res Cent 45, 206 (2021).
22. Ostermann C, Splieth C, Alkilzy M. Knowledge, assessment and treatment of molar incisor hypomineralisation (MIH) among German dentists. Clin Oral Investig. 2025 Mar 7;29(3):171.
23. Hussein A, Bataineh M, Khader Y, Al-Batayneh OB. Knowledge, and treatment of molar incisor hypomineralisation (MIH) among dentists in Jordan: a cross-sectional questionnaire based study. Eur Arch Paediatr Dent. 2025 Apr;26(2):247-254.
24. Ghanim A, Silva MJ, Elfrink MEC, et al. Molar incisor hypomineralisation (MIH) training manual for clinical field surveys and practice. Eur Arch Paediatr Dent. 2017;18(4):225–242.
25. Schmid M, et al. Prevalence of Dunning-Kruger effect in first semester medical students. BMC Med Educ. 2024.
26. Surdilovic D, Adtani P, Fuoad SA, Abdelaal HM, D'souza J. Evaluation of the Dunning-Kruger Effects among Dental Students at an Academic Training Institution in UAE. Acta Stomatol Croat. 2022 Sep;56(3):299-310.
27. Somani C, Taylor GD, Garot E, Rouas P, Lygidakis NA, Wong FSL. An update of treatment modalities in children and adolescents with teeth affected by molar incisor hypomineralisation (MIH): a systematic review. Eur Arch Paediatr Dent. 2022 Feb;23(1):39-64.
28. Cavalcante BGN, Mlinkó É, Szabó B, Teutsch B, Hegyi P, Vág J, Németh O, Gerber G, Varga G. Non-Invasive Strategies for Remineralization and Hypersensitivity Management in Molar-Incisor Hypomineralization-A Systematic Review and Meta-Analysis. J Clin Med. 2024 Nov 26;13(23):7154.
29. Olgen IC, Sonmez H, Bezgin T. Effects of different remineralization agents on MIH defects: a randomized clinical study. Clin Oral Investig. 2022 Mar;26(3):3227-3238.
30. Wall A, Leith R. A questionnaire study on perception and clinical management of molar incisor hypomineralisation (MIH) by Irish dentists. Eur Arch Paediatr Dent. 2020 Dec;21(6):703-710.

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