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Original article

Dentists' Knowledge and Management Strategies Towards Molar-Incisor-Hypomineralization in Tripoli

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ABSTRACT

To assess the knowledge and clinical experience of dentists in Tripoli concerning MIH. Responses were gathered from Libyan dentists in Tripoli using both online and paper-based surveys. The survey tool collected information on participants' sociodemographic details, clinical experience, perceptions, clinical management, and preferences for further training regarding MIH. The data was collected and analyzed using SPSS version 27. A total of 302 dentists had responded to the questionnaire, (62.6%) reported that they have come across MIH cases during their practice. Yellow/brown demarcations were reported as the most common presentation of MIH (49.7%). Most respondents reported that the best treatment options for treating MIH affected molars with post eruptive breakdown are pre-formed metal crowns (30.9%), followed by composite restorations (23.9%). The main barriers for treatment that were reported included child behavior (56.6%), and insufficient training to treat children with MIH (23.2%). This study showed awareness of the majority of participants of the existence of MIH condition. Nevertheless, variations in estimating MIH prevalence and its proper treatment, as well as factors influencing its treatment and diagnosis, were recorded.

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INTRODUCTION

Molar incisor hypomineralization (MIH) is a prevalent developmental defect affecting from one to four first permanent molars and can also involve permanent incisors. It is a qualitative defect with a systemic origin [1]. Weerheijm initially introduced the MIH terminology in the European Association of Paediatric Dentistry meeting in 2001and has since been adopted worldwide [2]. MIH-like lesions can also appear in primary molars and are considered predictors of MIH in permanent teeth [3]. Although the exact aetiologic factors of MIH are still unclear, it was suggested that MIH has a multifactorial model related to timing, strength, and duration of occurrence of the associated etiological factors [3]. Recent systematic reviews suggest the involvement of genetic and environmental factors, such as acute and chronic illness during pregnancy through to the first three years of a child's life as putative factors of MIH [2,4,5]. Alterations in the function of the ameloblasts during the maturation phase may occur between the end of pregnancy and the age of four, may lead to enamel hypomineralization [2].

Clinical presentation of MIH ranges from mild to severe lesions. Mild lesions manifest as white to brown demarcated opacities [2,6]. The darker color of a lesion represents higher enamel porosity. This type of lesion tends to break down over time, exposing the dentin surface. Post-eruptive enamel breakdown and atypical caries are categorised as severe lesions [7,8]. MIH is marked by asymmetrical lesions in location, size, and severity compared to other collateral teeth in the same patient [6]. Severe cases often exhibit poor oral health due to hypersensitivity, making MIH teeth more

prone to caries [9]. Patients with severe MIH lesions also face difficulties with anaesthesia [10,11]. These conditions result in children with severe MIH tend to have higher anxiety levels, thus making clinical management of MIH teeth a significant challenge for dental practitioners [11,12].

Treating teeth with MIH lesions can be chal¬lenging for the dentist, despite effective preventive and treatment options have been proposed and estab¬lished [13]. In anterior teeth, the issue is mainly cos¬metic, whereas, in molars, extensive caries can develop due to the breakdown of hypomineralized enamel [14]. Therefore, the early identification of the teeth affected by MIH is crucial for treating affected molars since children avoid oral hygiene procedures due to the presence of hypersensitivity. The choice of appropri¬ate treatment depends on the patient's age and the severity of the defects. The European Academy of Paediatric Dentistry recommends using all available treatment options, but in severe cases scheduled extractions should be considered [2].

As early diagnosis, assessment, and treatment of MIH become an emerging oral health problem, studies investigating dentists' knowledge, attitudes, and perceptions of MIH have been conducted in Egypt, Syria, Hongkong, Kuwait, and Australia [15-19]. The results of these surveys help us to assess the dentists' perception of the prevalence, eti¬ology, and experience with MIH lesion, enabling them to use different approaches for patient care at both, the public and private health care settings, they also highlight the need for curricular changes and professional training. However, there is insufficient information on MIH in Libya. One study has adopted in Benghazi assessed dentists' knowledge about MIH [20]. Therefore, the aim of this study is to explore the knowledge, experience, and perception of dentists about the detection, assessment, and treatment of MIH in Tripoli.

METHODS

Study design

This analytical cross-sectional study was carried out in Tripoli, Libya. Data was collected from June 2024 to October 2024. Participants agreed upon participation by completing the questionnaire.

Recruitment of the study participants

The survey was administered using two methods: an online electronic survey and a paper-based survey. An English version questionnaire was created based on existing validated questionnaires [17,19,21]. The questionnaire was first piloted by a group of dentists to ensure that the questions were easy to understand and could be completed quickly. The online form of the questionnaire was designed by the principal investigator using Google Forms with a feature that prevents the same person from submitting responses multiple times. Participants were recruited through professional dental associations, social media groups, and clinics. Participants were also asked to forward the invitation link of the survey to their colleagues in Tripoli. The questionnaire was online for 5 months. The inclusion criteria for this study were: Libyan dentists who practicing dentistry in Tripoli, and willing to participate and complete the survey. Libyan dental practitioners who have practiced dentistry outside Libya were excluded from the study as well as interns and students were excluded from this study.

The participants were asked not to fill the questionnaire again if they had already done before. Printed copies of the questionnaire were used to reach doctors who prefer manual data entry and to contact doctors in various regions of Tripoli who could not be reached through the electronic version. This approach helped to ensure a more inclusive and representative sample.

Questionnaire Instruments

The questionnaire was divided into three sections. The first section gathered sociodemographic data including sex, age, years of practice, and work sector. The second section focused on participants' knowledge about MIH, differential diagnosis, and possible etiological factors. Dentists were also asked about their confidence in diagnosing MIH and their perceptions of MIH prevalence. The third section explored about treatment options, barriers for treating MIH patients, influencing factors, the most noticed clinical appearance, and referral decisions to a specialist. Participants were also asked if they were using a specific index for diagnosis and treatment. In addition, it covered participants' attitudes toward continuous education regarding MIH.

Statistical analysis

Data were entered into an excel sheet (Microsoft Excel, Microsoft Corp, WA, USA) by Google Forms. Statistical analysis was performed using IBM SPSS software v. 27 (IBM Corp., Armonk, USA). Descriptive statistics with chi-squared test was used, and level of statistical significance was set to 5%.

RESULTS

Roughly, a total of 530 questionnaires were distributed, and 308 responses were received, and six respondents were excluded due to incomplete answers, resulting in 302 completed questionnaires. Among these, 261were from general dental practitioners (GDP) and 41 from specialist dental practitioners (SDPs). Of the respondents, 70.2% were females and 29.8% were males. Nearly half (47.7%) had less than 5 years of experience in dentistry, and the majority (65.2%) were aged 25–30-year. Most participants (86.4%) were general dental practitioners (GDP), while (13.6%) were specialists, including (1.7%) who were pediatric dentists (PD). The demographics of the participants are detailed in Table 1.

Table 1. Demographic and work-related characteristics of the study participant

Variables		*No*	*%*
Sex	Male	90	29.8
	Female	212	70.2
Age group	25-35	197	65.2
	35-45	94	31.1
	More than 45	11	3.6
Working experience	Less than 5	144	47.7
	5-10	79	26.2
	11-20	67	22.2
	More than 20	12	4.0
Working place	Private	178	58.9
	Public	84	27.8
	University and Private	28	9.3
	Private and Public	12	4.0
Qualification	Bachelor	268	88.7
	Master	25	8.3
	PHD	9	3.0
Specialty	Conservative	15	5.0
	Orthodontics	11	3.6
	Prosthodontics	1	0.3
	Oral maxillofacial surgery	9	3.0
	Pediatric dentist	5	1.7
	General dentist	261	86.4

Table 2 shows the participants' knowledge regarding MIH diagnosis and prevalence. The majority of the respondents (62.6%) reported that they were familiar with MIH cases while (37.4%) reported that they have not. As reported by dentists, the most common presentation of MIH was yellow/brown demarcations (49.7%). About 12.3% of the participants had noticed MIH cases at weekly basis.

Table 2. Dentists' awareness about clinical features of MIH

Variables	No	%
Are you familiar with MIH (Encountered MIH in your practice)		
Yes	189	62.6
No	113	37.4
Do you know if there are clinical features to diagnose molar incisor hypomineralisation?		
No	44	14.6
Yes, but I do not know how to implement them	154	51.0
Yes, and I know how to implement them	104	34.4
Diagnosis based on		
Clinical examination	264	87.3
Radiographs	16	5.3
Fluorescence devices	13	4.3
None	9	3.0
What do you most frequently notice in your practice?		
White demarcated opacities	102	33.8
Yellow brown demarcated opacities	150	49.7

Post eruptive breakdown	50	16.6
How confident do you feel when diagnosing MIH		
Not confident	39	12.9
Slightly Confident	149	49.3
Confident	92	30.5
Very confident	22	7.3
How often do you notice hypomineralised teeth in your practice?		
Weekly	37	12.3
Monthly	91	30.1
Annually	121	40.1
Never	53	17.5
Do you perceive that the prevalence of MIH has increased in recent years?		
Yes	125	41.4
No	32	10.6
Not sure	145	48.0
How severe this problem does you think in your community?		
Mild	93	30.8
Moderate	138	45.7
Severe	24	7.9
Not sure	47	15.6
Most common dental problem		
Pain	42	13.9
Hypersensitivity	65	21.5
Loss of tooth structure	125	41.4
Esthetic	70	23.2

When asked about their knowledge of the clinical features to diagnose MIH, 14.6% reported that they did not know the diagnostic criteria, 37.1% were confident in diagnosing MIH, and 42.7% stated that they have difficulties distinguishing MIH from enamel hypoplasia. Only five pediatric dentists participated in this study and they reported their confidence in diagnosing MIH. About 41.4% of the participants noticed the prevalence of MIH increased.

Beliefs About the Etiology of MIH

With regards to the etiology of MIH, 42.1% of the dentists believed that genetics was the cause of MIH, 22.1% believed that acute medical condition that affects the mother during pregnancy, and only one participant (pediatric dentist) mentioned the hypoxia in delivery as the most probable cause. Table 3 shows the Knowledge of dentists in this study about etiology of MIH. Almost one third of respondents (33.1%) thought the insult occurs during intrauterine life. Roughly half of the respondents (45.7%) thought that the severity of MIH in the community to be moderate. A significant number of them considered the condition as distinct from fluorosis but surprisingly, about 9.2% of them believed that fluoride might be an etiologic factor of MIH.

Clinical management strategies for MIH

In terms of managing MIH, the majority of respondents (85.8%) believed that early examination is crucial to treat MIH cases. However, about (37.5%) of GDPs were refusing to provide administrative care for MIH-affected children. Table 4 shows the treatment options and treatment barriers for MIH. Most respondents reported that the best treatment options for treating MIH affected molars with post eruptive breakdown are pre-formed metal crowns (30.9%), followed by composite restorations (23.9%). The most frequent restoration chosen by GPs was pre-formed metal crowns (31.8%). As for molars with opacities, composite resin was the material of choice among all respondents (29.8%), The most frequent restoration chosen by GPs was composite and out of five, three pediatric dentists selected stainless steel crowns as preferable option for molars with opacities. The main barriers for treatment that were reported included child behavior (56.6%), and insufficient training to treat children with MIH (23.2%).

Table 3. Dentists' knowledge regarding MIH etiology

Dentists' knowledge regarding MIH etiology	No	%
⁎In your opinion what etiological factor(s) cause(s) molar incisor hypomineralisation (MIH)?		
Genetic	127	42.1
Acute medical condition that that affects the mother during pregnancy	67	22.1
Acute medical condition that affects the child	46	15.2
Antibiotics taken by mother during pregnancy	40	13.2
Antibiotics taken by the child	16	5.2
Chronic medical condition that affects the mother during pregnancy	25	8.2
Chronic medical condition that affects the child	24	7.9
Environmental	21	6.9
Fluoride exposure	28	9.2
Hypoxia in delivery	1	0.3
Nutritional deficiency	3	0.9
Unknown cause	4	1.3
Precalmpsia	1	0.3
What time period do you think the insult occurred?		
During pregnancy	100	33.1
First year of life	59	19.5
Third year of life	48	15.8
Pregnancy to first year of life	45	14.9
Pregnancy to third year of life	47	15.5
Not sure	3	0.9

Participant may select multiple options for each question about etiology

The most common factor influencing the choice of restorative materials, was remineralization potential (29.1%), followed by adhesion (15.2%) and aesthetics (14.6%). On the contrary, Research findings (3.6%) and sensitivity (2.6%) were the least frequently reported factors affecting the choice of restorative materials

Table 4 Participants' practices and clinical experiences on MIH

Participants' practices and clinical experiences on MIH	No	%
Material of choice for molars with post-eruptive fractures		
Compomer	19	6.3
Composite	73	24.2
Flowable composite	9	3.0
Resin modified glass ionomer cement	36	11.9
Glass ionomer cement	15	5.0
Stain less steel crown SSC	99	31.1
Depend on the case	1	0.3
Not sure	35	11.6
Silver diamine fluoride	7	2.3
Cast restoration	12	4.0
Zirconia	1	o.3
Material of choice for molars with opacities		
Compomer	21	7.0
Composite	90	29.8
Flowable composite	11	3.6
Resin modified glass ionomer cement	34	11.3
Glass ionomer cement	8	2.6
Stain less steel crown SSC	57	18.9
Amalgam	13	4.3
Silver diamine fluoride	7	2.3
Sealant	15	5.0
Flouride	18	6.0
Not sure	28	9.3

Material of choice for incisors with opacities		
Compomer	19	6.3
Resin modified glass ionomer cement	26	8.6
glass ionomer cement	13	14.3
Composite resin	180	59.6
Flowable composite	18	6.0
Silver diamine fluoride	6	2.0
ICON	3	1.0
Full coverage	8	2.7
Not sure	29	9.6
Factors in the choice of material		
Adhesion	46	15.2
Durability	43	14.2
Experience	21	7.0
Remineralization potential	88	29.1
Patient/parent preferences	14	4.6
Sensitivity	8	2.6
Research finding	11	3.6
Esthetics	44	14.6
Not sure	27	8.9
Would you refer a child who has MIH to a specialist?		
Yes	216	71.5
No	46	15.2
I am working as a pediatric dentist	40	13.2
Do you use a specific index for MIH? Yes	96	31.8
No	206	68.2
Are you comfortable providing management care for children with MIH		
Yes	188	62.3
No	114	37.7

Aspects of continued education and improvement

About 57% of participants in this study received information about MIH. Among those who received information on MIH, the main knowledge source was internet (35.6%), followed by the continuous education (24.2%) and journals7.3%. All respondents believed that they need to improve their dental knowledge regarding MIH, especially regarding diagnosis (36.4%) (Table 5).

Table 5. Aspects of continuing education

	No	**%**
Have you received any information on molar incisor hypomineralisation?		
Yes	172	57.0
No	130	43.0
Which is/are your source(s) of information?		
Internet	78	35.6
Continuing education	53	24.2
Books	36	16.4
Journals	16	7.3
Brochures	5	2.3
Other	31	14.2
Where do you think more information is necessary?		
Etiology	72	23.8
Diagnosis	110	36.4
Treatment	94	31.1
All	26	8.6

DISCUSSION

As the prevalence of MIH is perceived to be increased in communities, there has been a growing focus on this dental issue. Many studies have been conducted to assess the awareness and perception of this condition among dentists in various countries (18, 29, 19, 20,22,25 17,30). However, this study is the first to assess the knowledge and treatment practices of MIH among Libyan dentists in Tripoli. The importance of this research lies in identifying the knowledge gaps in the diagnosis and management of MIH, which are crucial to improve the care delivery level.

Although many participants reported an increase in MIH condition, 48% of the participants were unaware of this rise about this increasing in prevalence of MIH cases in Libya. This lack of awareness could be due to the fact that most of the participants were GDPs who, unlike pediatric dentists, treat patients of all ages and hence are less likely to encounter children with MIH and have less experience in dealing with such a difficult condition and may misdiagnose these cases. The most common presentation of MIH was yellow/brown demarcations (45.6%). These findings were consistent with previous studies [17-20,25,31], and similar reports in a study conducted in Jordan by Hussein et al., [22] and in Benghazi [20].

The precise etiology and pathogenesis of MIH is still unclear, and it had been suggested to result from a combination of systemic factors, including genetic factors. The participants in this study have chosen multiple causes, which gives indication that respondents believe the cause is multifactorial, which was in consistency with previous research [22, 19, 20,29,30]. Almost one third of respondents (33.1%) thought the insult occurs during intrauterine life, while 36% of the surveyed dentists in Iraq considered that the alteration that leads to MIH occurs during pregnancy [32]. In contrast, a study conducted in Mexico [33], found that 71% of participants reported that the alteration occurs during the gestation period.

As for MIH management, various treatment options are available depending on the severity and the stage at which the patient visits the dentist. Regarding the restorative treatment, it has been shown in a systematic review that highest success rates are achieved with indirect restorations, preformed stainless steel crowns (SSC) and composite restorations [23]. In contrast, amalgam and glass ionomer restorations have high failure rates. According to recent EAPD guidelines, glass ionomer cement restoration can be placed in the interim, when a child is uncooperative or unable to access routine dental care, until a suitable restoration can be placed, or before an age-scheduled extraction, to protect the tooth from post eruptive breakdown and hypersensitivity. In severe cases, where breakdown has already occurred or a cavity is present due to caries, vital pulp therapy may be considered, and other high -success treatment options include composite restorations, preformed stainless steel crowns and indirect restorations should be considered [2].

In this study, slightly more than half of the participants reported using preformed metal crowns and composite restorations for the management of MIH affected molar teeth with post eruptive fracture. this preference aligns with choice of dentists in other studies conducted in Saudi Arabia, Kuwait, Portuguese, Australia, Hong Kong and Jordan [21,18, 24, 19,17,22]. However, the use of SSC was reported to be low in a study conducted in Spain by Serna-Muñoz et al. in 2020 [25]. In a study conducted in Benghazi, Preformed metal crowns and glass ionomer cement were the most commonly reported materials [20]. For molars with enamel opacity, the most chosen material was composite, followed by preformed metal crowns. However, in incisor lesions, composite was the material of choice (59.6%), due to aesthetic concerns, followed by RMGIC (8.6%). Resin infiltrations were chosen by only 3 dentists (1.0 %). Unfortunately, 9.6% of dentists reported being not sure which material is preferable for MIH teeth with opacities.

The most common influencing factor was the remineralization potential, which concerned general dental practitioners (GDPs) (30.2%) more than specialists (22.0%), followed by adhesion and aesthetics. This finding in accordance with results of a study in Spain [25]. Adhesion, durability and potential for remineralization were also decisive factors in choice of restorative material for most dentists from other countries [17,27,28].

Managing children with MIH carries several challenges to the treating dentists. These include but not restricted to hyper sensitive first permanent molars, difficulty achieving proper local anesthesia, behavioral management issues due to dental anxiety and fear, aesthetic problems in anterior teeth and the longevity of restorations [6,13]. In this study, children's behavior was the main challenge in treating MIH cases (56.6%), followed by insufficient training to treat children with MIH (23.2%). Similarly, in a study from Norway, Children's behavior was also reported as the main barrier of MIH management (84.1%) followed by difficulty in achieving local anesthesia (71.4%) (30). In Kuwait study, after child behavior as the main barrier of treatment (60.9% GDP, 48.8% PD), general dentists cited long treatment time (38.3%) and insufficient training to treat MIH patients (31.3%) as barriers for treatment, while pediatric dentists identified difficulty in achieving local anesthesia as the second most common barrier (22%) [18].In Jordan, patient cooperation was the main challenge in treating MIH cases (56.2%), followed by the late acknowledgment of the defect by the child or parents (46.1%) [22]. In study conducted in Mexico, the most frequently reported problem in the management of teeth with MIH was insufficient training for treating children with MIH followed by child behavior [33].

The results indicate a gap in the training and received information regarding MIH. Similarly, to this study, dentists from Hong Kong and Portugal and Malaysia also reported not receiving information about MIH [17,24,26]. General dental practitioners (GDPs)in Spain and Hong Kong received less training than pediatric dentists (PDs). However, dentists in Australia and Chile reported receiving more information about MIH, which increased their awareness and knowledge [25,27, 17]. Access to information is essential for the early diagnosis of MIH and adequate patient monitoring. This not only allows for the application of preventive measures to minimize post eruptive sensitivity and fractures, but also allows a strict control of the affected teeth [17]. Therefore, the availability of information on MIH is essential to a future coordinated public health response involving multidisciplinary engagement from all specialties in Dentistry.

Aspects of continuing education and improvement in the survey, 78 dentists (35.6%) reported using the Internet, 53 (24.2%) continuing education, and 16 (17.3%) relied on dental magazines or journals as their sources of information on MIH. Remarkably, all participants expressed a strong interest in obtaining more knowledge about MIH. In Saudi Arabia, the responding dentists mentioned that 40% of dentists with less than 5 years of experience obtained information from Saudi journals [21]. In the case of dentists from Kuwait, the main source of information for general dentists (37%) was found to be the Inter net, while PDs (63%) used magazines or journals [18]. Alanzi et al. in 2018 [18] also confirmed that the internet was the most used source for retrieving information in general dentists.

These differences may be due to the nature of the Libyan healthcare system, where the majority of preventive and curative services are offered by the private sector. That a high prevalence of MIH has been reported underscores the need for a national study to determine the actual prevalence of MIH in Libya, which is still underestimated. There is also an urgent need to review and update the current dental curriculum and develop continuous professional development courses to prepare dentists for the diagnosis and clinical management of MIH.

This study has some limitations that need to be considered. The study sample included only Libyan dentists from Tripoli, which may affect the results generalizability. Other sources of uncertainty in the study could be social desirability or random responses, which are inherent drawbacks of self- reporting questionnaires. Nevertheless, to minimize the social desirability and non- response bias, the participants were informed that there was no response bias at the individual level, and identifying information was not requested.

CONCLUSION

In conclusion, the present study suggests that MIH is an increasingly diagnosed problem in Libya, with most dentists aware of its existence. Although a multifactorial etiology was suggested, participants most frequently reported genetic causes The restorative materials most commonly used by the dentists surveyed were preformed metal crowns for molars and composite for incisors, while child behavior and insufficient training were the most challenging aspects of treatment. There was variation in views regarding the proper treatment of MIH and factors influencing diagnosis and treatment. Updating dental curricula and continuing education courses on MIH conditions are required to ensure high -quality care for children with MIH- affected teeth

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Conflicts of Interest. Nil.

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دراسة معرفة أطباء الأسنان واستراتيجياتهم فى علاج نقص التمعدن فى الأضراس والقواطع فى طرابلس

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المستخلص

تقييم المعرفة والخبرة السريرية لأطباء الاسنان فى طرابلس حول نقص التمعدن فى القواطع والاضراس. تم استخدام طرق إدارة الاستبيانات عبر الإنترنت وعلى الورق لجمع الردود من أطباء الأسنان الليبيين في طرابلس. ركزت أداة الاستبيان على الخصائص الاجتماعية والديموغرافية للمشاركين ومعرفتهم وتصوراتهم حول أسباب نقص التمعدن فى القواطع والاضراس وكذلك طرق علاج هذه الظاهرة، والتصورات حول انتشار هده الظاهرة، وكيفية معالجتها، والتفضيلات للتدريب الإضافي. تم جمع البيانات وتحليلها باستخدام برنامج التحليل الاحصائى نوع 27. استجاب 302 طبيب اسنان للاستبيان حيت افاد62.6% منهم بانهم واجهو حالات نقص التمعدن فى الاضراس والقواطع خلال ممارستهم .تم الابلاغ عن العلامات الصفراء البنية كاكثر العروض شيوعا لنقص التمعدن فى الاضراس والقواطع بنسبة 49.7%. افاد معظم المستجيبين بان افضل خيارات العلاج للاضراس المتاثرة بنقص التمعدن مع انهيار فى تاج السن بعد البزوغ هى التيجان المعدنية الجاهزة بنسبة 30.9%، تليها الترميمات المركبة بنسبة 23.9 % تم الابلاغ عن سلوك الطفل غير المتعاون 56.6% والتدريب غير الكافى لعلاج الاطفال المصابين بنقص التمعدن فى الاضراس والقواطع (23.2%) كأهم العوائق للعلاج. أظهرت هده الدراسة وعى غالبية المشاركين بوجود حالة نقص التمعدن فى الاضراس والقواطع, ومع ذلك تم تسجيل تباينات فى تقدير انتشار نقص التمعدن وعلاجه المناسب بالاضافة الى العوامل الموترة فى علاجه وتشخيصه .يوصى بمراجعة المنهج الدراسى الحالى لطب الاسنان وتوزيع الادلة العلمية التى توفر لأطباء الأسنان معلومات محدثة حول تشخيص وعلاج نقص التمعدن فى الاضراس والقواطع.

الكلمات المفتاحية: نقص تمعدن الأضراس والقواطع, المعرفة, أطباء أسنان العامون ,استبيان.