

## MIH SYNDROME: PERCEPTIONS AND KNOWLEDGE OF A SAMPLE OF DENTISTS FROM IASI COUNTY

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### ABSTRACT

Molar Incisor Hypomineralisation (MIH) syndrome is considered nowadays to be a clinical problem in many countries. **Aim.** To determine the level of knowledge and the therapeutic attitudes of a group of dental practitioners concerning MIH syndrome. **Material and Methods.** The study was carried on a number of 75 questionnaires. To evaluate the statistical association between the results was applied the Pearson correlation test. **Results.** Around 70% of dental practitioners have dealt with MIH syndrome in their practice, even 64% of the respondents did not know which was the real prevalence of MIH syndrome. 83% of dental practitioners would choose direct reconstructions of the affected teeth with combinations of composite resins, glassionomer cements and modified glassionomer cements. **Conclusions.** The implementation of continuing medical education programs in the field of reference could contribute to the dissemination of the knowledge and to the correct therapeutic and clinical management of MIH syndrome.

**Key words:** MIH syndrome, child, dentists, questionnaire.

### INTRODUCTION

Odontogenesis – teeth formation, development and mineralization – starts in the intrauterine life and continues after birth, until the end of the mineralization all permanent teeth. Molar-Incisor Hypomineralisation Syndrome (MIH syndrome) represents a clinical entity characterized by the existence of demarcated hypomineralisation areas, of systemic origin, affecting one up to four first permanent molars. Frequently, permanent incisors are also affected by this syndrome [1]. Specialty literature has revealed the presence of similar hypomineralisation lesions on the second deciduous molar also, their existence being reported as a predictive factor for subsequent occurrence of MIH syndrome in the permanent dentition [2,3].

As a result of the constant reduction in the prevalence of dental caries in most countries around the world and of the awareness increase among the dental practitioners, MIH syndrome has become much easier to diagnose in the recent years. Therefore, lately, the prevalence of this syndrome had increased in Europe as well as in the entire

world, so that today it is considered a clinical problem in many countries.

In order that the pediatric dentists, school dentists and general practitioners to apply the most accurate and effective treatment methods in MIH syndrome in order to limit and/or stop the sometimes serious effects of this abnormality, the syndrome dynamics need to be reflected in the its evaluation methods and in its clinical and paraclinical diagnostic elements. Thus, specialists from different countries around the world have investigated/analyzed the level of knowledge and issues of the dentists perception – pediatric dentists or other dental specialties - in the field of MIH syndrome [4-11].

**The aim** of this study was to determine the level of knowledge and the therapeutic attitudes of a group of dentists with various specialties from Iasi - Romania, in relation to the MIH syndrome.

### MATERIAL AND METHOD

The study was completed by filling in a number of 75 questionnaires by dentists of different specialties, from urban and rural

areas from Iasi County. Ethical principles of medical research involving human subjects (Helsinki, revised in 2000, Edinburgh) have been respected. Consent forms provided sufficient data for full knowledge of the purpose of the study and the methods used. Consent was free, participation was anonymous and voluntary. Participants were asked to complete the questionnaire in their free time and return it within 3 days.

The questionnaire used in this study was modified and adapted from the questionnaire used by Gambetta-Tessini et al. in 2016 [5] and had three parts. In the second section of the questionnaire, the knowledge variable was built using the DELPHI method for consensus. Three pediatric dentists with experience in the field of reference were invited by e-mail to anonymously note the answers to the ten questions related to the general knowledge regarding the diagnosis, prevalence and etiology of MIH syndrome [12]. For the beginning, each person assigned an individual score for each answer. For an explanation of the answers, a second round of reassessment was required, to which the answers were divided anonymously between the three experts. A total of four such meetings were required to achieve a consensus. Each answer scored 9 points in total. Subsequently, by summing up the answers to the ten questions, a single continuous variable (for example, "*knowledge*") was created. The final score ranged from 20 to 60, with the indication that higher scores represented higher knowledge of MIH syndrome.

The collected data was entered into a Microsoft Office Excel 2007 database. For the data obtained, the SPSS (Statistical Package for Social Sciences) software, version 20.0 (SPSS Inc., Chicago, IL, USA) was used. To evaluate the statistical association between the results and the DELPHI score, the Pearson correlation test was applied. The results were statistically significant for  $p$  value  $<0.05$ .

## RESULTS

The first part of the analyzed data presented a descriptive profile of the participating dental practitioners and the

studied variables. Thus, in the studied group, the dispersion of the dentists was the following: 76% for females and 24% for males. The Faculty graduated by the dental practitioners from the present study was predominantly (92%) represented by the Faculty of Dental Medicine, U.M.F. "Grigore T. Popa" Iasi. The years of the faculty graduation of our study respondents ranged between 2000 and 2016. A percentage of 46.67 was represented by practitioners that graduated more than 5 years ago.

The analysis of the distribution of respondents on specialties revealed that 34 dental practitioners were dentists with various specializations (Pediatric Dentistry, Orthodontics, Endodontics, Dental Alveolar Surgery), and a number of 14 dentists had both the title of dental practitioner and a PhD in medical sciences.

77.3% of the study participants stated they knew to differentiate the MIH syndrome from fluorosis and hypoplasia.

Regarding the prevalence of MIH syndrome in the community in which the respondent work as a dentist, more than half (64%) stated they did not know the prevalence of MIH syndrome and 8% that the values of the prevalence ranges between 5% and 10%. The syndrome prevalence ranged between 10% and 20% was chosen as the correct answer by 16% of the dentists, while a percentage of 4% of the dental practitioners considered that the prevalence was more than 20%.

Questions 3 to 8 of the second part of the questionnaire were related to the etiology of MIH syndrome. At these, the dentists provided a wide variety of responses, as it is shown in Table I.

**Table I. Answers of dental practitioners vs. the etiology of the MIH syndrome.**

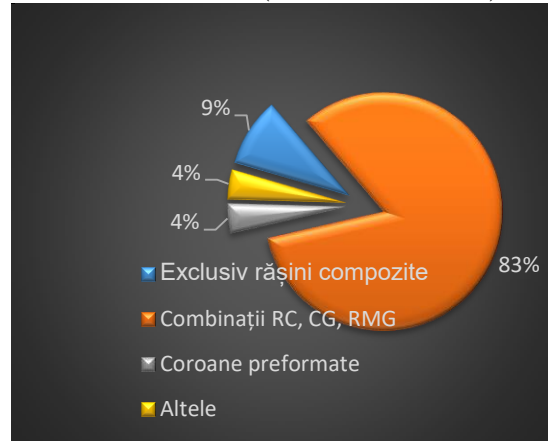
Questions / Answers	YES Frequency (n)	YES Percent (%)	NO Frequency (n)	NO Percent (%)
3. Genetic factors	68	90,7%	7	9,3%
4. Environmental factors	56	74,7%	19	25,3%
5. Mother's or child's chronic general disease	53	70,7%	22	29,3%
6. Mother's or child's acute disease	38	50,7%	36	49,3%
7. Administration of antibiotics / other medicines	63	84%	12	16%
8. Exposure to fluorine / fluoride	40	53,5%	35	46,7%

Around 70% of dental practitioners have dealt with MIH syndrome in their practice, while 30.7% said they did not experience such pathology. Among those who answered "Yes" to the previous question, 86.95 % experienced MIH-specific lesions also at the level of premolars, 73.91% at the level of second permanent molars and 13.04% in the permanent canines.

To the question "Have you encountered this kind of defects (MIH syndrome) also in deciduous teeth?", about 2/3 of respondents answered negatively (77.3%).

Regarding the issue of MIH syndrome treatment, our study only investigated the therapeutic option of dental clinicians. The results are shown in Fig. 1. Thus, in the vast majority (83%), the dental practitioners would choose direct reconstructions of affected teeth with combinations of composite resins, glassionomer cements, and

modified glassionomer cements. 9% would choose for the exclusive use of composite resins, and a rather low percentage of 4% would use the preformed pedodontic crowns, the same percentage as the dental practitioners who would choose the answer comprising: dental extraction, fluorides or indirect restorations (cast metal crowns).



**Figure 1. Dentists' options vs. therapeutic possibilities in MIH syndrome treatment.**

76% of our group of respondents stated they did not receive any information concerning the MIH syndrome. At the last question, the one concerning the desire for receiving further information regarding the MIH syndrome, most dental practitioners surveyed (81.3%) responded affirmatively (Table II).

**Table II. Doctors' responses concerning the information receiving about the MIH syndrome.**

Questions / Answers	YES	NO
Have you received information about MIH syndrome lately?	24% (n=18)	76% (n=57)
Would you like to receive information about MIH syndrome?	81,3% (n=61)	18,7% (n=14)

In the present study, the DELPHI score ranged from 33 to 59, with 48% of the subjects having a higher than average score

of approximately 45.55 ( $\pm 7.525$ ) (Table III). It follows that, in the study, DELPHI scores with higher values were recorded for dental practitioners with a high level of knowledge.

**Table III. DELPHI score in the study group.**

	Number of respondents (N)	Minimum	Maximum	Mean	Standard Deviation (SD)
DE	75	33	59	4	$\pm 7,525$
LP				5	
HI				5	
score				5	

Pearson's correlation statistical test revealed that the DELPHI score was moderately correlated to the year of the dentists' graduation and was also proportional with it, indicating that longer practical experience is correlated with a higher level of knowledge about the MIH syndrome. In the same time, this score was significantly correlated with the post-graduate studies of the participants in our study, suggesting that the level of knowledge related to MIH syndrome is higher for dentists with post-graduated studies (Table IV).

**Table IV. The correlation between the DELPHI score and the graduation year / postgraduate studies.**

	R
Graduation year	0,272
Postgraduate studies	0,528

\*P – of the Pearson correlation test, P < 0,05 statistically significant

## DISCUSSIONS

This study is among the first to investigate the perception and knowledge of dental practitioners of various specialties in Iasi County, regarding the Molar-Incisor Hypomineralisation Syndrome.

A majority of about 70% of respondents stated they had experienced MIH syndrome in their practice. Moreover, 77.3% of the study participants noted that MIH syndrome is a different entity from fluorosis and hypoplasia. These results are in agreement with those of other similar studies (from Europe, Latin America, Australia, New Zealand, Iran, Chile, Malaysia) [6-11] and can be explained by the fact that each of the dentistry specialties existing in our country do within the residency programme a sub-stage of pediatric dentistry/pedodontics with a duration which varies between one month and two years.

In our study, there was no statistically significant difference in terms of familiarity with the MIH syndrome, between the pediatric dentists and the other dental specialists, probably due to the low number of pediatric dentists, this specialty being a newly established one. It can be appreciated that in the years to come, the percent of dentists who will easily identify the lesions characteristic of the MIH syndrome will increase, as the number of pediatric dentists increases from year to year and the pediatric dentists are the specialists which is suppose work exclusively with children, and diagnose and treat on regular bases a large variety of cases.

There was no statistically significant association between the year of faculty graduation (clinical experience) and the perception of the MIH syndrome by the dentists surveyed. Similar results were reported in 2014 by Bagheri et al. [6] in a study carried on a group of Iranian didactic staff. In the literature are also studies that have observed a statistically significant association between the clinical experience (years from the graduation) and the accuracy in diagnosing the MIH syndrome. Among these is the study conducted by Ghanim et al., published in 2011 [8], which found a percentage of 59.3 for MIH syndrome identification for academic staff with less

than 5 years of clinical experience and a percentage of 100 identification for academic staff with more than 20 years of clinical experience.

The variation on a wide range of the MIH prevalence values in the opinion of the dental practitioners that participated in our study, may illustrate the lack of certain knowledge of the actual MIH prevalence in Iasi County or in Romania.

The study carried on by Păsăreanu et al. in 2016 [13] on a group of children from Iasi reported an incidence of MIH syndrome of 14.54%, with an affectation of the permanent incisors of 28% and of the first permanent molars of 4.26%.

Worldwide, there is a wide range of MIH prevalence variation, with published data showing 2.8% for China [14], 13.7% for Kenya [15], of 16% for the North of the United Kingdom [16], of 20% for Iran [8] and up to 40,2% for Brazil [17].

At European level, in a survey conducted in the EAPD member countries [11], the syndrome's prevalence ranged between 3,6% and 25%, with differences between the countries, depending on the age of the children taken into study, local and regional environmental conditions, and/or differences in diagnostic criteria, the majority of the date resulting from the European Nordic countries statistics or from PhD thesis.

Starting from the idea that MIH requires a very careful and competent therapeutic approach, given its multiple short-, medium- and long-term consequences, it is considered that is of the outmost importance to identify as accurately as possible the prevalence of MIH in all European countries, especially in those where the dental caries prevalence is low.

Regarding the possible etiology of this disorder, a large number of dental practitioners participating in our study (n = 68) indicated as etiologic factors the genetic factors, fact that led us to the idea that we should not underestimate the existence of a genetic component in the onset of the MIH syndrome, and to the idea that are necessary studies for genetic susceptibility, especially due to the fact that at the same conclusion came also authors as Ghanim et al. in the 2011 [8] or Brook et al. in 1998 [18]. The

idea that genetic factors would not play an important role would also lie on the fact that not all the teeth would be vulnerable to MIH syndrome, the most affected by a vast clinical variety of enamel defects being the first permanent molar.

It is important to emphasize that for 74.4% of study participants, pollutants from the environment would play an important role in causing the MIH syndrome; in the specialty literature there were studies that related - following clinical investigations - the two variables: environmental toxins and enamel development defects [19-22].

Acute/chronic disorders of the mother or child were identify by the dentists who participated in our study as factors that could play an important role in the occurrence of MIH syndrome, with percentages of 50.7 and 70.7 respectively. Noteworthy is that practitioners consider mother's chronic diseases during the pregnancy or one of the baby during early childhood as having a more important role in inducing changes (hypomineralisations) in molars and incisors than the acute conditions. The results are in agreement with those of Gambetta-Tessini et al. [5], Bagheri et al. [6], Ghanim et al. [8], Crombie et al. [10].

In the issue of treatment in MIH syndrome, our study only investigated the therapeutic option of dental practitioners. Thus, in their vast majority (83%), therapists would choose the coronary reconstructions with combinations of composite resins, glassionomer cements, and resins modified with glassionomer cements. The choose of composite resins as tooth restoration material in cases of teeth affected by MIH syndrome by only 4% of the dentists (percent very close to that found by Gambetta-Tessini et al. [5] in their study) it could be explained by the fact that the composite resin restoration was evaluated in previous scientific studies [23-25] that reported controversial results.

Therefore, the study from 2003 of Lygidakis et al. concluded that restorations with composite resins of the teeth affected by MIH syndrome may last for at most 4 years, in that period of time there is a need for careful monitoring [25]. On the other hand, the studies conducted by Kotsanos et al. and Majare et al. reported in 2005 revealed a

failure rate between 15% and 25% for a period of 5 years [23,24]. These authors observed the appearance of breakdowns of the unsustained enamel, atypical caries lesions and loss of composite resin fillings. Despite of these arguments, there are studies from countries as Malaysia [7], Iran [6], Australia and New Zealand [10], in which the percentage of dental practitioners that would use composite resins for restoring the teeth affected by MIH syndrome reach values of 48,5%, 61,9%, respectively 73%.

The wide variety of materials that can be used in tooth restorations affected by MIH syndrome may also reflect the lack of a comprehensive guide that treats clear lines of therapeutic management. We can also state that a fairly large number of practitioners base their choices of restoration materials on their own personal experience or colleagues experience rather than on scientifically documented studies.

The use of preformed crowns in the treatment of MIH syndrome represented an option for only 4% of our study participants. This relatively low percentage can be explained by the reduced number of pediatric dentists who participated in the study. Pediatric dentists are probably more concerned about the duration of the dental restoration than with the aesthetic appearance, and this motivates the choice of preformed crown restorations. There are studies in the literature that certify that these preformed (zirconium, ceramic or metal) crowns are predominantly used by pediatric dentists [26,27] that prior to take a therapeutic decision, carry out a more in-depth research on the topic.

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A majority of 81.3% of our study participants stated that they would like to receive further information about the MIH syndrome. This could lead in time inclusively to lower spending on oral health budgets in our area and country due to a better information and training of the dental practitioners. It is very important that this type of information to be disseminated not only among pediatric dentists or dentists in general, but also among other medical specialties dealing with children such as: dental nurses, pediatricians, ENT pediatricians, because they could be in the position to diagnose this type of affection in an incipient stage.

#### CONCLUSIONS

It is necessary to conceive a more elaborate questionnaire that offers also the possibility of realizing future directions of training (clinical, etiological and therapeutic) in MIH syndrome.

Further studies on a bigger number of pediatric dentists (although their number is currently limited), school dentists and residents in pediatric dentistry should be carried on, in order to establish a basic level of knowledge in MIH syndrome. Integrating and disseminating this results/date are essential to remove any ambiguity about MIH syndrome.

The implementation of continuing medical education programs, of post-graduate courses in the field of reference could contribute to the dissemination of the knowledge and to the correct therapeutic and clinical management of MIH syndrome.

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