

## Dental Interns' Knowledge on Minimal Invasive Dentistry in Management of Dental Caries

Mannaa Aldowsari<sup>1\*</sup>, Mohammed Alturki<sup>2</sup>, Reem Alkhalaf<sup>3</sup>, Saleh Almutlaq<sup>4</sup>, Faisal Alhazmi<sup>4</sup>, Ibrahim Alali<sup>4</sup>

<sup>1</sup>Department of Paediatric and Orthodontic, College of Dentistry, King Saud University, Riyadh, Saudi Arabia

<sup>2</sup>Department of Restorative Dental Sciences, College of Dentistry, King Saud University, Riyadh, Saudi Arabia

<sup>3</sup>Faculty of Dentistry, Oral & Craniofacial Sciences, King's College London, London, UK

<sup>4</sup>College of Dentistry, King Saud University, Riyadh, Saudi Arabia

### ABSTRACT

**Background:** One of the ultimate goals in any dental educational system is to provide the students with updated knowledge and clinical skills. Dental caries management techniques have changed from the removal of the whole caries tissue to be more conservative and tissue preservable. Minimally invasive (MI) techniques are proven to be clinically successful in many years, which is stand on minimizing the deterioration of the tooth tissue by applying the modern and updated cariology and material sciences.

**Aim:** the aim of the study was to assess the knowledge of the MID concepts among dental internship students at college of dentistry, King Saud University, Riyadh, Saudi Arabia. **Materials and Methods:** This was a cross-sectional descriptive study directed towards internship dental students at college of dentistry, King Saud University, Riyadh in Saudi Arabia.

**Results:** A total of 95 dental interns completed the survey which represented a response rate of 74%; of which 54 (56.8%) were male while 41 (43.2%) were female respondents. Nearly more than of half the respondents 56 (58.9%) reported that they had some information about minimal invasive dentistry concept in general. Most respondents 70 (73.7%) gained their knowledge about minimal invasive dentistry during undergraduate studies. More than two third of participants had little or no information about Fluoresce HD, hand-piece, Electrical Caries Monitor (ECM) and Infrared Laser fluorescence (IRLF) 64 (73.6%), 63 (72.4%) and 52 (59.7%) respectively as diagnostic caries methods. Most of the respondents reported that they had never heard about Casein Posphopeptide Amorphous Calcium Phosphate (CPP-ACP) and Stepwise caries removal techniques 66 (75.9%) and 51(58.6%) respectively.

**Conclusions:** More than half of the participants were aware of the MID concept in general. There was a lack of knowledge among most respondents towards some advanced diagnostic and minimal invasive dentistry caries management techniques. The results of the study suggest the need to introduce minimal invasive dentistry concepts as a part of dental school's curriculum to build the solidity of knowledge and the attitude toward minimal invasive dentistry.

**Key words:** Dental student, Dental Intern, Knowledge, Minimal invasive dentistry

**HOW TO CITE THIS ARTICLE:** Mannaa Aldowsari, Mohammed Alturki, Reem Alkhalaf, Saleh Almutlaq, Faisal Alhazmi, Ibrahim Alali, Dental Interns' Knowledge on Minimal Invasive Dentistry in Management of Dental Caries, J Res Med Dent Sci, 2021, 9 (5):372-377.

**Corresponding author:** Mannaa Aldowsari

**e-mail** ✉: drzak786@gmail.com

**Received:** 10/05/2021

**Accepted:** 24/05/2021

### INTRODUCTION

In the last two decades dental carious

managements have been changed to have more preventive measurements and to be more conservative management approach. Conventionally, dental caries management was introduced by G.V. Black who using an engineering principle to improve the cavity designs for placing the tooth structure by using materials available at that time. These classical

principles of cavity preparation were based on the knowledge of the carious lesion and the restorative materials available at that specific time [1,2]. Furthermore, there was no known means of caries prevention at the time. G.V. Black advocated restoration extension as a means of preventing future caries lesions.

Today, with the developments of adhesive restorative materials and with technological progress, this globally accepted principles have been challenged. Additionally, Black's doctrines are considered an aggressive approach by modern dentistry [3].

The Minimally Invasive Dentistry (MID) treatment approach emphasizes caries management based on early identification and diagnosis, which is based on first assessing the site and size of each lesion then determining whether remineralization of the lesion is possible [4]. A reduction of cariogenic bacteria and minimally invasive cavity preparation design through appropriate techniques and restorative material selections are the tenants of MID philosophy [5]. This modern philosophy has allowed to control dental caries through prevention and conservation of tooth structure through conservative cavity preparations, adhesive materials, and evidence-based decision-making, in contrast to traditional methods [6,7]. Thus, MID management should be part of dental school's curriculum to build the solidity of knowledge and the attitude toward MID [8-10].

Several studies have been conducted to assess dental professionals' awareness and knowledge regarding MID concept. Katz et al. [11] showed that more than two third of Brazilian professionals were aware of MID procedures, and almost 65% stated that they performed MID techniques in any patient. However, 23.1% they mentioned that they did not read or attend any MID courses. Furthermore, Shah et al. [12] mentioned in their study that almost 60% of the general practitioner in Saudi Arabia had received no special education regarding minimally invasive procedures [12,13]. In Saudi Arabia, a recent study conducted by Almahdy et al. [13] showed that more than a half of the general practitioner dentists in Saudi Arabia had attended courses in minimal invasive dentistry.

There are few studies conducted to assess the level of knowledge about MID concept among

dental students and dental practitioners in Saudi Arabia. Since the internship year consider to be the final year before being a qualified dentist, the aim of this study was to evaluate the level of knowledge about minimally invasive dentistry among dental internship students at college of dentistry, King Saud University, Saudi Arabia.

#### MATERIAL AND METHOD

This was a cross-sectional study that included all dental internship year students at College of Dentistry, King Saud University in Saudi Arabia n=126. Institutional ethical approval was obtained before the commencement of the study from Institutional Review Board committee, King Saud University, Saudi Arabia (E-20-5279)

The survey questions were formulated by two faculty members at pediatric dentistry and restorative dentistry departments. The survey then validated by a professor in cariology dentistry and statistical expert. The questionnaire was then piloted on a sample of randomly selected dental interns for ease of understanding and reduction of the ambiguity of questions before administration. Dental interns who were involved in piloting the questionnaire was excluded from the main study. An online survey was then designed using Google Forms and sent to all dental interns at college of dentistry at King Saud university via their university emails. Undergraduate students, Dental interns from other colleges, specialists and consultants were excluded from the study. Participants were reassured that their responses would remain anonymous, and the contact email of the main investigator was provided for any comment or queries.

The survey consisted of four parts and the information collected in the questionnaire included the following:

- ✓ The first part of the survey contains the demographic data for the participant.
- ✓ The second part was involving questions to assess the dental interns' knowledge about MID concept in general followed by questions about how they heard about MID and which dental speciality courses they received most of their training about MID.
- ✓ The third part was including general questions to assess the dental interns'

knowledge about different diagnostic methods that are used to assess dental caries.

- ✓ The last part was questions aimed to assess the dental interns' knowledge about different techniques that are used for conservative management of caries in permeant teeth.

Data was collected and entered Microsoft excel spreadsheet. The data was then analyzed using SPSS statistical software package for windows version 22.0. Descriptive statistics was used to describe the categorical and continuous variables.

**RESULTS**

Among 128 dental interns at King Saud University, 95 dental interns completed the online questionnaire which represent a response rate of 74%. The male respondents were 54 (56.8%) while 41 (43.2%) were female respondents.

**Dental interns' knowledge about MID concept**

When asked about how much of knowledge the participants possessed about MID concept in general, nearly more than half the respondents 56 (58.9%) reported that they had (some) information about MID concept, and almost one fifth 18 (18.9%) reported that they knew (much) about MID concept. However only a small percentage 11(11.6%) of the respondents reported that they had (little) information about MID concept.

Participants were then asked about their source of knowledge about MID. Nearly more than two third of respondents 70 (73.7%) gained their knowledge about MID during undergraduate studies (Figure 1). When respondents were asked about in which specialty, they received most of their knowledge about MID, the majority

of respondents 86 (90.6%) reported that they had most of their training and lectures about MID in restorative dentistry courses. This was followed by pediatric dentistry courses 22 (23.2%). Other specialties were also reported by small number of dental interns. (Figure 2).

**Dental interns' knowledge about MID diagnostic methods**

Participants were asked about their knowledge regarding different diagnostic techniques that are used for caries detection. About half of the participant responded that they knew (very much or much) about The International Caries Detection and Assessment System (ICDAS) and Fiber optic Transillumination (Diagnodent) 44 (50.5%) and 41 (47.1%) respectively. In addition, nearly third of the participant knew Caries dyes (very much or much) as a diagnostic method for caries 31(35.6%). However, more than two third of participants had little or none information about Fluoresce HD, hand-piece, Electrical Caries Monitor (ECM) and Infrared Laser fluorescence (IRLF) 64 (73.6%), 63 (72.4%) and 52 (59.7%) (Table 1).

**Dental interns' knowledge about MID techniques**

Last part of the questionnaire questions included questions on dental interns' knowledge regarding different techniques that are used for conservative management of caries in permeant teeth. Most respondents were aware (very much or much) about Sandwich technique and remineralization with fluoride varnish or other office fluoride products 80 (91.1%) and 71(81.6%) respectively. However, most of the respondents reported that they had never heard about Casein Posphopeptide Amorphous Calcium Phosphate (CPP-ACP) and Stepwise caries removal techniques 66 (75.9%) and 51(58.6%) respectively (Table 2).

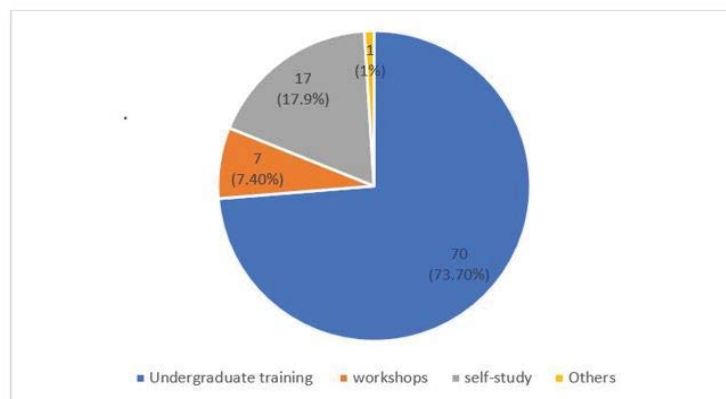


Figure 1: Pie chart showing sources of information and knowledge about the MID for Dental interns who were aware of the concept.

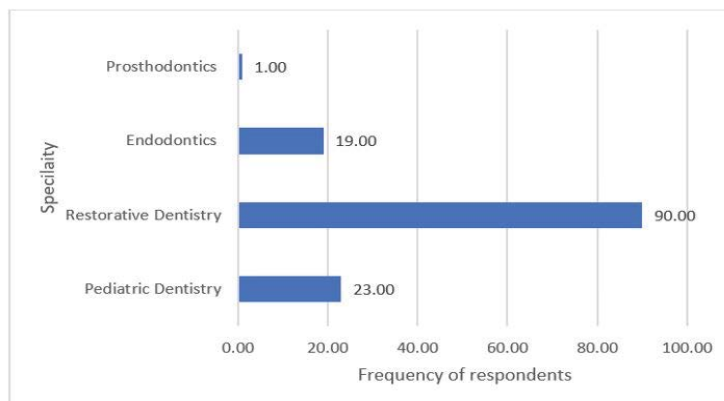


Figure 2: Bar chart showing the dental interns' choices regarding which courses they received most of their training regarding MID.

Table 1: Dental interns' knowledge about different MID caries detection methods.

How much have you heard about each of the following techniques for caries detection?	Very much N (%)	Much N (%)	Some N (%)	Little N (%)	None N (%)
Electrical caries Monitor (ECM)	3 (3.4%)	4 (4.6%)	17 (19.5%)	41 (41.4%)	31 (31%)
Infrared Laser fluorescence (IRLF)	2 (2.3%)	8 (9.2%)	25 (28.7%)	25 (28.7%)	27 (31%)
Fiber optic Transillumination (Diagnodent)	12 (13.8%)	29 (33.3%)	27 (31%)	17 (19.5%)	2 (2.3%)
Caries dyes	13 (14.9%)	18 (20.7%)	28 (32.2%)	20 (23%)	8 (9.2%)
Fluoresce HD, hand-piece	4 (4.6%)	6 (9.2%)	13 (14.9%)	18 (20.7%)	46 (52.9%)
The International Caries Detection and Assessment System (ICDAS)	19 (21.8%)	25 (28.7%)	21 (24.1%)	12 (13.8%)	10 (11.8%)

Table 2: Dental interns' knowledge about MID caries management techniques.

How much do you know about the following techniques for the management of caries in permanent teeth?	Very much N (%)	Much N (%)	Some N (%)	Little N (%)	None N (%)
Atraumatic Restorative Treatment (ART)	14	29	30	11	3
Sandwich technique	59	21	6	1	0
Remineralization with fluoride varnish or other office fluoride products	40	31	13	3	0
Remineralization with topical high concentration fluoride products at home	16	27	29	10	5
Casein Posphopeptide Amorphous Calcium Phosphate (CPP-ACP)	3	8	10	18	40
Stepwise technique	11	17	8	11	40
Resin infiltration	24	23	25	13	2

**DISCUSSION**

The present study aimed to assess the level of knowledge among dental interns at King Saud University regarding the use minimal invasive dentistry for management of dental caries. The study used an online based questionnaire. The use of online based questionnaires offers several advantages as it is easy to be designed using available online platforms and is time and cost effective. Another advantage is that this method was the preferred on this study due the Covid-19 pandemic, and the implementation of distant socialization protective measures in Saudi Arabia.

A minimally invasive dentistry approach for carious lesion management had shown a

successful outcome during the last decade [14]. This modern concept stands on assessing the caries lesions, prevention and control of further disease and conservative cavity preparation using a biocompatible restorative material [2]. Preserving and maintaining the mineralizable tooth structure is a driven engine of MID. Applying these concepts sometimes reflects what dentists been learned during their undergraduate studies. In the present study, Internship year students been chosen because it considered a final year before they start practicing as a qualified dentist.

The present study shows that more than half of the respondents 56 (58.9%) mentioned that they had some information about MID. This is in agreement with a study published by Almahdy



et al. [13] which showed that almost 50% of the general practitioner dentists in Saudi Arabia had attended courses in MID [13]. This survey results illustrated also that nearly two-thirds of the participants had some training and lectures about MID in undergraduate dental courses mainly in restorative and paediatric undergraduate dental courses (90.6% and 23.2 %, respectively), which is in correspondence with Alrasheedi et al 2020 study that showed that lectures during the undergraduate study were reported as a major source of MID in Saudi Arabia [15]. In contrast, a study conducted by Shah et al 2016 showed that almost 60% did not get education about MID in their dental school curriculum [12].

The assessment of dental interns' knowledge about caries detection methods was assessed in the present study and it showed that 50 % of the internship year students knew (very much or much) about the International Caries Detection and Assessment System (ICDAS). However, just nearly third of the participant knew Caries dyes (very much or much). Moreover, lack of knowledge was reported by majority of the respondents about advanced caries detection methods such as Fluoresce HD, hand-piece devise, Electrical Caries Monitor (ECM) and Infrared Laser fluorescence (IRLF). These finding are in line with a study conducted by Radwan et al 2020 who assessed the knowledge and use of caries detection methods among dental students and dental practitioners in Riyadh, Saudi Arabia. They found almost half of the respondents had little or no knowledge about Electrical Caries Monitor (ECM) and Infrared Laser fluorescence (IRLF) [16].

In the last part of the questionnaire, dental interns were asked several questions to assess their knowledge regarding treatment approaches that are used for conservative management of caries in permanent teeth. It was observed that the most known techniques (very much or much) among most of the respondents were sandwich technique and remineralization with fluoride varnish or other office fluoride products, 80 (91.1%) and 71(81.6%) respectively. These findings support the results that published [12] which showed most of the general dental practitioners in Riyadh and AlKharj cities are aware and received training about sandwich

technique and remineralization with fluoride varnish or other office fluoride products. Correspondingly, in a study conducted by Alrasheedi et al 2020, it was found that 91% of Saudi dentist found that sandwich technique and remineralization with fluoride varnish or other office fluoride products are effective [15]. On the other hand, the present study found that most of the respondents have never heard about Casein Pospheptide Amorphous Calcium Phosphate (CPP-ACP) and Stepwise technique 66 (75.9%) and 51(58.6%) respectively.

The limitation of this current study was using a sample population that only represents one dental school. This might limit the reliability and generalisability of the data. Our findings suggest that future studies should include more comprehensive sample size from multiple dental school to have a broader idea about level of knowledge across the country regarding the MID concepts.

#### CONCLUSION

Despite the limitations of this study, it can be concluded that there is some knowledge among the participants about the MID concepts in general. However, there is a lack of knowledge among most respondents towards advanced caries detection methods and MID caries management techniques. The results of the study suggest the need to introduce MID concepts as a part of dental school's curriculum to build the solidity of knowledge and the attitude toward MID.

#### REFERENCES

1. Ericson D, Zimmerman M, Raber H, et al. Clinical evaluation of efficacy and safety of a new method for chemo-mechanical removal of caries. A multi-centre studies. *Caries Res* 1999; 33:171-177.
2. Banerjee A. The art and science of minimal intervention dentistry and atraumatic restorative treatment. *Br Dent J* 2018; 224:922.
3. Banerjee A, Kidd EA, Watson TF. In vitro evaluation of five alternative methods of carious dentine excavation. *Caries Res* 2000; 34:144-50.
4. Ericson D, Kidd E, McComb D, et al. Minimally invasive dentistry--concepts and techniques in cariology. *Oral Health Prev Dent* 2003; 1:59-72.
5. Banerjee A. Minimal intervention dentistry: Part 7. Minimally invasive operative caries management: Rationale and techniques. *Br Dent J* 2013; 214:107-111.

6. Assery H, Levallois B, Terror E, et al. Use of new minimum intervention dentistry technologies in caries management. *Aust Dent J* 2013; 58:40-59.
7. Tyas MJ, Anusavice KJ, Frencken JE, et al. Minimal intervention dentistry-A review. FDI commission project 1-97. *Int Dent J* 2000; 50:1-12.
8. Pitts NB, Huysmans MC, Splieth C, et al. European core curriculum in cariology for undergraduate dental students. *Eur J Dent Educ* 2011; 15:9-17.
9. Pitts NB, Mazevet ME, Mayne C. Shaping the future of dental education cariology group. Shaping the future of dental education: Caries as a case-study. *Eur J Dent Educ* 2018; 22:30-37.
10. Mirsiaghi F, Leung A, Fine P, et al. An investigation of general dental practitioners' understanding and perceptions of minimally invasive dentistry. *Br Dent J* 2018; 225:420-424.
11. Katz CR, de Andrade Mdo R, Lira SS, et al. The concepts of minimally invasive dentistry and its impact on clinical practice: A survey with a group of Brazilian professionals. *Int Dent J* 2013; 63:85-90.
12. Shah AH, Sheddi FM, Alharqan MS, et al. Knowledge and attitude among general dental practitioners towards minimally invasive dentistry in Riyadh and AlKharij. *J Clin Diagn Res* 2016; 10:ZC90-4.
13. Almahdy A, Alqahtani D, Alshamrani M, et al. The concepts of minimally invasive dentistry and its impact on clinical practice: A survey with a group of dentists in Saudi Arabia. *Int J Med Sci Clin Invent* 2017; 2620-2623.
14. Banerjee A. 'Minimum intervention' - MI inspiring future oral healthcare? *Br Dent J* 2017; 223:133-135.
15. Mian RI, Hassan I, Alrashidi S, et al. Knowledge, attitude, and practice of minimally invasive dentistry among dental graduates: A cross-sectional survey from Saudi Arabia. *Int J Pharm Sci Rev Res* 2020; 62:192-198.
16. Radwan W, AlNasser AA, Aloqab H, et al. Knowledge and use of caries detection methods among dental students and dental practitioners in Riyadh, Saudi Arabia. *Int J Dent* 2020; 2020:8825890.