International Journal of Medical Science and Clinical Inventions 4(1): 2620-2623, 2017
DOI:10.18535/ijmsci/ v4i1.21 **ICV 2015: 52.82**
e-ISSN: 2348-991X , p-ISSN: 2454-9576

Research Article

The concepts of minimally invasive dentistry and its impact on clinical practice: a survey with a group of Dentists in Saudi Arabia

Dr. Ahmed Almahdy [1*], Dr. Mohammed AlShamrani [2], Dr. Mohammed Alqahtani [2], Dr. Mohammed Al Kathery [2]

[1]Assistant Professor, Pediatric Dentistry and Orthodontic Department, College of Dentistry, King Saud University, Riyadh, Kingdom of Saudi Arabia.
[2]General Dentist, College of Dentistry, King Saud University, Riyadh, Kingdom of Saudi Arabia.

.**Correspondence address***: **Dr. Ahmed Almahdy,**
Pediatric Dentistry and Orthodontic Department, College of Dentistry, King Saud University, Riyadh, Kingdom of Saudi Arabia.

ABSTRACT: Objectives: the study was conducted to assess the associations between the demographic characteristics of participating dentists in Saudi Arabia and their restorative decisions for occlusal and proximal lesions. Their knowledge regarding caries diagnosis and management was assessed also. Materials and Methods: this is a cross-sectional study directed toward dentists practicing in Saudi Arabia. An online survey consisted of occlusal and proximal caries lesions. Results: For occlusal caries lesion the majority of dentists (48%) recommended removal of carious tissue when it is confined to enamel. A significant difference was found between dentists who are dealing with dental caries and other dentists. They recommend the use of composite resin for their first caries stage that requires treatment. For proximal lesions, females significantly (p=0.003) chose to restore the tooth at more advanced stage than males, composite was the first restorative material to be chosen for proximal lesions. Conclusion: The restorative decision for dentists practicing in Saudi Arabia were similar to other parts of the world. Occlusal caries lesions were easier to detect and to decide when and how to restore them. Female dentists were more towards minimally invasive dentistry than males in their decisions.

Key words: dental caries, minimal invasive dentistry, operative dentistry, restorative materials.

INTRODUCTION

For a long time, caries management was depending on G.V. Black concept of "extension for prevention". This concept involves the removal all caries tissue and the extension of cavity margins to involve all susceptible fissures. According to this concept, healthy tooth structure is destroyed. Following the better understanding of dental caries process and the major advancements in the dental materials, the techniques of caries management evolved over the last 50 years.

Our research includes an online survey to assess the restorative treatment decisions on occlusal and proximal caries lesions. More recently, a similar study was conducted in California in a random sample of 1922 general dental practitioners [1].

These studies suggested that there are changes in operative treatment philosophies, which include the involvement of preventive strategies and remineralization, in caries management. The traditional operative treatments were undesirable unless the carious lesion has reached an advanced stage of cavitation. Current caries management technique has moved towards minimally invasive dentistry (MID), which includes prevention, remineralization and conservative dental treatment with the minimal intervention [2]. The later include the excavation of the infected part of carious tissue and leaving behind the affected tissue as a scaffold for restorative therapy.

Caries is a prevalent disease in Saudi Arabia especially among children; about 90% of children in Saudi Arabia are at high risk for caries [3]. This creates challenges on the practicing dentists as how to tackle the disease. They are usually exposed to clinical cases with different stages of caries progression for which they have to decide when to monitor, apply minimal invasive therapy or restore. The decision to place a primary restoration may affect the prognosis of the tooth and the cost of treatment over the course of the tooth's lifetime [4]. The practicing dentists in Saudi Arabia had their training from different backgrounds. They also exposed to different mandatory continuous education courses. These involve introducing them to clinically applicable and evidence based modern dentistry. Few studies have looked at the effects of such courses on the dentists' knowledge and on their daily practice.

The aims of this study were: (1) to investigate the stage of dental caries at which the participating dentists decided to perform immediate restorative treatment and the required restorative material. (2) To examine associations between demographic factors and restorative treatment decisions.

Materials and Methods:

This is a cross-sectional study directed toward dentists practicing in Saudi Arabia. An online survey was sent through the Saudi Dental Society (SDS) to about 1000 dentist registered in their emailing list. It was designed by General dentists and validated by specialist in cariology and statistical experts. The exclusion criteria were: (1) dentists who refused to participate, (2) responses not from dentists not practicing in Saudi Arabia and (3) responses coming from unqualified dentists and dental auxiliaries (such as students and hygienists and dental assistants).

The first part of the survey contains the demographic data for the participating dentist. This includes (1) gender, (2) age, (3)

years of experience (4) management of dental caries based on the specialty, (5) place of work and (6) the region. For place of work, the participating dentists were asked to specify if they are working in educational institute, governmental institute, private practice or any other place. To determine the dentist region, the name of the city of practice was obtained. In addition, the participants were asked whether they had any continuous education courses or read any article about minimal invasive dentistry in the last 5 years.

Two clinical cases were included in the second part of the survey. In the first case different occlusal caries stages were included. Similarly, stages of proximal caries lesion were provided in the second case. These stages were discoloration, lesion confined to enamel only and lesion reaching dentin. The dentists were asked to choose the lesion that they think that it requires immediate restorative treatment and the required restorative materials.

Statistical analysis was performed using SPSS 22.0 program (SPSS, Chicago, IL, USA). The associations between the demographic characteristics of the dentists and their caries stage and the restorative decisions for occlusal and proximal lesions were assessed using Pearson's X^2 test. To find the statistical difference within the same groups were found using Z-test with Bonforoni corrections. The α value was set at a level of 0.05.

Results:

The survey was sent randomly to 1000 dentist who are registered with the Saudi Dental Society. A total of 147 dentists agreed to participate in the survey and fit the inclusion criteria. The male dentists were 87 (59.2%) while the females were 60 dentists (40.8%). Fifty-two percent of the respondents was more than 30 years old and 50.3% has more than 5 years of experience. Seventy percent of the female dentists were more than 30 years old while 60% of the male dentists were 30 years old or less. The majority were general practitioner (57.1%) and 86.4% were dentists dealing with caries diagnosis and treatment. Fifty percent of the participants were treating their patients in governmental institute, 34% in educational institute and 16% are treating their patients in private clinics. Regarding to respondents Regions, 59.9% of the respondents were from Riyadh, 20.4% of them were from Makkah, 9.5% were from Eastern Province, 6.8% were from Madinah and northern province and 3.4% were from Aseer. For continuous education in minimally invasive dentistry, 52.4% of the dentists replayed that they had attended courses and read articles about it; 23.1% replayed that they neither had a course or read an article about minimally invasive dentistry; 15.6% they only read articles and 8.8% had only training courses.

A. **Case one:** Among the 147 participants, 48% select to restore occlusal caries lesion immediately when the lesion is confined to enamel structure (Figure 1). For the restorative material choice, most experienced (63.5%) and inexperienced (76.7%) dentists recommend the use of composite resin for their first caries stage that requires treatment. In addition, more experienced dentist significantly (p=0.042) (Table 1) recommend the use of amalgam for restoring their chosen caries stage than the inexperienced dentists. Dentists from Madinah and northern province also chose amalgam significantly (0.004) more than other dentists from other regions (Table 1).

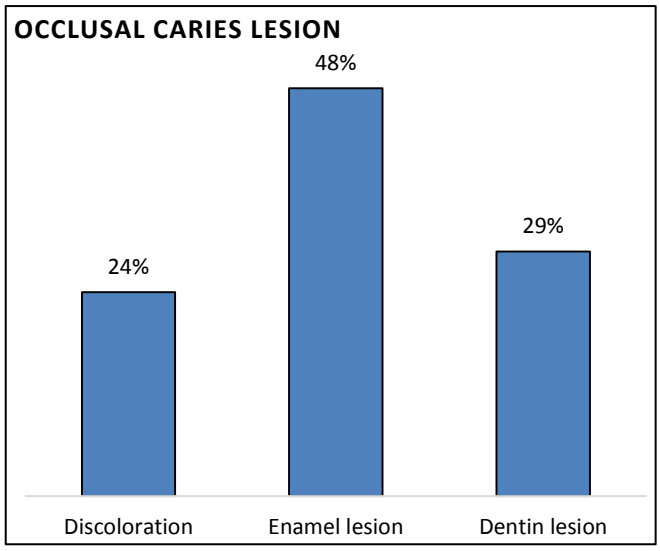

Figure 1 The response obtained from the dentists regarding at which stage they should interfere and perform immediate restorative treatment in an occlusal caries lesion.

Table 1 The results of the Z-test with Bonforoni corrections for the compression of the dentists' demographic characteristics and their responses regarding the occlusal caries stage that they should interfere and perform immediate restorative treatment. The choices of restorative material is also included. Significant differences were founded in the shaded cells.

	Demographic characteristics of the dentists	Caries stage		Restorative material	
		X^2	p value	X^2	p value
Case 1	Gender	6.6	0.16	1.45	0.84
	Age group	3.2	0.52	8.65	0.07
	Experience	5.4	0.25	9.92	0.04
	Management of caries	4.2	0.37	6.01	0.20
	Place of work	15.2	0.06	14.4	0.07
	Region	18.2	0.31	34.8	0.01
	Continuous education	13.7	0.32	10.3	0.59

B. Case two: For proximal lesions, females significantly (p=0.003) chose to restore the tooth at more advanced stage than males (

Figure 2) and (Table 2). In addition, Resin composite was the first restorative material to be chosen for proximal lesions. No significant difference was found regarding the material chosen among different demographic data.

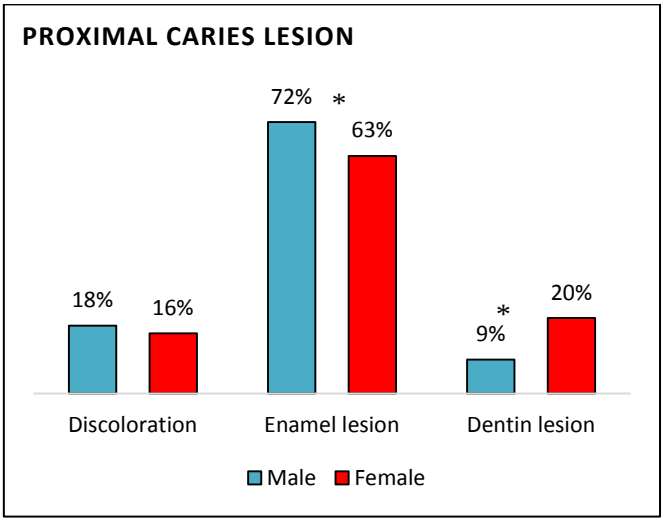

Figure 2 The response obtained from both male and femal dentists regarding at which stage they should interfere and perform immediate restorative treatment in an proximal caries lesion. Significant diffierences were found between the two gender. (* $p<0.05$)

Table 2 The results of the Z-test with Bonforoni corrections for the compression of the dentists' demographic characteristics and their responses regarding the proximal caries stage that they should interfere and perform immediate restorative treatment. The choices of restorative material is also included. Significant difference was founded in the shaded cell.

Case 2	Demographic characteristics of the dentists	Caries stage		Restorative material	
		X^2	p value	X^2	p value
	Gender	18.1	0.003	3.24	0.66
	Age group	9.2	0.100	7.6	0.18
	Experience	8.2	0.146	9.9	0.079
	Management of caries	2.08	0.84	5.63	0.34
	Place of work	10.9	0.359	9.8	0.46
	Region	23.9	0.244	13.1	0.87
	Continuous education	24.5	0.057	16.4	0.35

Discussion:

The response rate for the online survey was 14.7%. This was expected as many similar studies that were based on online survey, sent through the Saudi Dental Society, had similar or lower response rate [5]. This method was chosen instead of the traditional paper-based survey to cover all regions of Saudi Arabia. Initially, 160 dentists agreed to do the online survey. However, thirteen responses were excluded following the exclusion criteria. The majority of these excluded responses were coming from dental students.

The participating male dentists were more than the female dentists. By calculating the median age for the participants, they were divided into 2 groups: more than 30 years old and 30 years old and below. Similarly, the experience was categorized into either 5 years or less or more than 5 years of experience. Both age and experience are important as they gave a hint about the basic knowledge that the dentists

had during their training. On the demographic questions, the dentists were asked to give their specialty. The reported specialties were: general practitioner, Saudi specialty certificate in restorative dentistry (SBARD), advanced education in general dentistry (AEGD), operative dentistry, pediatric dentistry, prosthodontics, oral medicine, periodontics, endodontics, orthodontics, oral and maxillofacial surgery. Based on these specialties, the participants were divided into two groups: dentists who are dealing with caries diagnosis and treatment and those who are not. The place of work was obtained as it influences the dentist decision in caries management due to the differences in the code of practice in each place. The majority of responses were coming from the three main regions in Saudi Arabia: Riyadh, Makkah and Eastern Province. This was reflecting the distribution of population and their treating dentists in Saudi Arabia. A large proportion of the sample had either attended courses or read articles about minimally invasive dentistry. Although 23.1% of the dentists had neither had a course nor read an article about minimally invasive dentistry, the effect of this demographic parameter was not significant on the dentist's decisions for caries management. The limited number of these courses, which target the practicing dentists, could explain this. Efforts should be made to increase the offered courses in different parts of the country.

For the occlusal caries lesion, the majority selected to restore when there is moderate loss of tooth substance and/or caries in the outer 1/3 of the dentin according to the radiograph. This was in agreement to what was found in Sweden [6], France [7] and Scandinavia [8]. However, they represented only 48% of the sample that was lower than the other studies. About 20% of the sample chose to start to restore the occlusal caries at more advanced stage. This was more than the results reported in Sweden [6] and France [7]. Composite was the first material of choice for the Saudi dentists that is, again, in agreement with different countries. Restoring the occlusal cavity with amalgam restorative material still recommended by the more expert dentists and dentists in rural areas. The cause for this might be the less continuous education courses they are exposed to. No significant differences were found in the gender, age group or place of work in the management of occlusal caries. This reflects an agreement in the occlusal caries management among the participating dentists.

For proximal caries lesion, the majority of responses were either restoring the tooth when the lesion reaches the enamel-dentin junction or progressed to the dentin outer third. Similar results were obtained from Swedish dentists [6], the French teachers [7] and the Californian dentists [1]. In our study, female dentists tend to wait until the caries lesion progressed before restoring the tooth in comparison to males. Khalaf and the authors [9] found the same difference in the gender for dentist practicing in Kuwait. The difference between genders could be due to the dentist's age as the majority of the female

dentists were above 30 years old while the majority of male dentist were 30 years old or less. However, the effect of the age was not significant on the selection of the caries lesion stage. The choice of resin composite as the first restorative material for proximal lesions was in agreement with all previous studies [1, 7-10].

Overall, the majority of participants showed the tendency of not to fill sound teeth unnecessarily with the acceptance of not restoring some carious lesions. They showed that the lesions will be followed up at a maximum of 12 month intervals before making the decision of restoring them.

Conclusion:

The restorative decision for dentists practicing in Saudi Arabia were similar to other parts of the world. Occlusal caries lesions were easier to detect and to decide when and how to restore them. Female dentists were more towards minimally invasive dentistry than males in their decisions.

ACKNOWLEDGEMENTS:

The Authors would like to thank the Saudi Dental Society (SDS) for their support and sending the survey through their email system. Also, we would like to thank Mr. Nassr AL-Maflehi for his help in the statistical analysis and to all dentists participated in this survey.

References:

[1] Rechmann P, Doméjean S, Rechmann BM, Kinsel R, Featherstone JD. Approximal and occlusal carious lesions: Restorative treatment decisions by California dentists. The Journal of the American Dental Association. 2016;147(5):328-38.

[2] Holmgren C, Gaucher C, Decerle N, Domejean S. Minimal intervention dentistry II: part 3. Management of non-cavitated (initial) occlusal caries lesions - non-invasive approaches through remineralisation and therapeutic sealants. Br Dent J. 2014;216(5):237-43.

[3] Farsi N, Merdad L, Mirdad S. Caries risk assessment in preschool children in Saudi Arabia. Oral health & preventive dentistry. 2013;11(3):271-80. Epub 2013/08/21.

[4] Dennison JB, Hamilton JC. Treatment decisions and conservation of tooth structure. Dent Clin North Am. 2005;49(4):825-45, vii. Epub 2005/09/10.

[5] Aldrees AM, Tashkandi NE, AlWanis AA, AlSanouni MS, Al-Hamlan NH. Orthodontic treatment and referral patterns: A survey of pediatric dentists, general practitioners, and orthodontists. The Saudi dental journal. 2015;27(1):30-9. Epub 2014/12/30.

[6] Mejare I, Sundberg H, Espelid I, Tveit B. Caries assessment and restorative treatment thresholds reported by Swedish dentists. Acta Odontol Scand. 1999;57(3):149-54. Epub 1999/09/10.

[7] Tubert-Jeannin S, Domejean-Orliaguet S, Riordan PJ, Espelid I, Tveit AB. Restorative treatment strategies reported by French university teachers. J Dent Educ. 2004;68(10):1096-103. Epub 2004/10/07.

[8] Espelid I, Tveit AB, Mejare I, Sundberg H, Hallonsten AL. Restorative treatment decisions on occlusal caries in Scandinavia. Acta Odontol Scand. 2001;59(1):21-7. Epub 2001/04/25.

[9] Khalaf ME, Alomari QD, Ngo H, Domejean S. Restorative treatment thresholds: factors influencing the treatment thresholds and modalities of general dentists in Kuwait. Medical principles and practice : international journal of the Kuwait University, Health Science Centre. 2014;23(4):357-62. Epub 2014/06/20.

[10] Baraba A, Domejean-Orliaguet S, Espelid I, Tveit AB, Miletic I. Survey of Croatian dentists' restorative treatment decisions on approximal caries lesions. Croat Med J. 2010;51(6):509-14. Epub 2010/12/17.