



Dentists' Knowledge, Attitude and Practice of Root Canal Treatment Procedure: Survey-based Research

¹Talal Al-Nahlawi, ²Mazen Doumani, ³Hamza AA Alalo, ⁴Adnan Habib

ABSTRACT

Aim: The aim of this survey was to assess the dentists' knowledge, attitude and practice of endodontic treatment procedures and materials in Damascus city (capital of Syria), and the effect of endodontic specialty and years of experience on the survey findings.

Materials and methods: Two hundred direct contacts (25 multiple-choice questions containing) questionnaires were distributed to randomly selected dentists practicing in Damascus city in 11 different areas, and a questionnaire contained questions regarding dentists' knowledge, attitude, and practice of root canal treatment procedure. The collected data were entered into a personal computer and analyzed using the statistical package for the social sciences (SPSS), 25 edition.

Results: One hundred eighty-eight questionnaires were collected with a 94% response rate. About 71.8% were general dental practitioners (GDPs), 25.5% were not practicing molar endodontics, and only 5.3% were referring difficult cases to endodontists. 32.4% and 21.8% of respondents were practicing vital and necrotic single visit root canal treatment, respectively. Only 6.9% were using rubber dam isolation, and more than half of the respondents used the standardized preparation technique. Non-setting calcium hydroxide was used 100% as an intra-canal medicament during necrotic root canal treatment sessions. 96.3% of our respondents prefer delaying final restoration to next visit for symptoms disappearance.

Conclusion: It was evident that more practicing experience does not improve treatment options selections of endodontic treatment. So the continuous educational programs are a very important way to change the old or wrong concepts in dental offices.

Clinical significance: The sample covered a large number of dentists who are working in Damascus; the most developed place in Syria. It is also considered that for carrying out such kind of surveys as long as the dentists are familiar with this type of studies.

Keywords: Calcium hydroxide, General dental practitioners, Questionnaire, Root canal treatment, Rubber dam, Syria.

How to cite this article: Al-Nahlawi T, Doumani M, Alalo HAA, Habib A. Dentists' Knowledge, Attitude and Practice of Root Canal Treatment Procedure: Survey-based Research. *J Contemp Dent Pract* 2019;20(3):347-354.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Effective developments in endodontic specialty took place in the last 15–20 years including the use of the microscope, developments in apex locators, the wide use of nickel-titanium files due to increased rotary root canal preparation systems, ultrasonic units with specially configured tips.¹

The success rate of endodontic treatment has reached high levels up to 90% and even more,^{2,4} this high rate of success is obtained often from universities clinics, controlled studies, and endodontists. However, this rate does not reflect the reality of success for endodontic treatments performed in private clinics. On the other hand, the success rate for general dental practitioners (GDPs) endodontic treatments was found to be 65–75%.³ These results complying with the international quality standards for root canal treatments like standards from the American Association of Endodontics or the European Society of Endodontology.^{5,6} Most of the endodontic treatments are performed by GDPs; therefore continuous endodontic educational programs are essential in updating graduated dentists and for emphasizing correct endodontic guidelines.^{7,8} A lot of studies were performed in many western countries to assess the real situation of

^{1,3}Department of Endodontics and Operative Dentistry, Syrian Private University, Damascus, Syria

^{2,4}Department of Restorative Dental Sciences, Al-Farabi Dental College, Riyadh, Kingdom of Saudi Arabia

Corresponding Author: Mazen Doumani, Department of Restorative Dental Sciences, Al-Farabi dental College, Riyadh, Kingdom of Saudi Arabia, Phone: 00966536171211, e-mail: mazendom@hotmail.com

endodontic treatments in private clinics, as in Denmark,⁹ Germany,¹⁰ Belgium,¹¹ USA,¹² and UK.¹³ Few studies of the same purpose were conducted in developing countries like Kingdom of Saudi Arabia,¹⁴ Jordan,¹⁵ Sudan,¹⁶ Turkey,¹⁷ and Nigeria.¹⁸ Most of these studies find that GDPs were not following academic standards of treatment and established quality guidelines. Other study finds that early graduated dentists were following most of these standards.⁸ This survey aimed to assess the dentists' knowledge, attitude and practice of endodontic treatment procedures and materials in Damascus city (capital of Syria), and the effect of endodontic specialty and years of experience on the survey findings.

MATERIALS AND METHODS

A questionnaire concerning endodontic practice was designed and piloted to Syrian Private University faculty council for assessment, as well as distributing to 20 randomized selected dentists to see the clarity and obviousness of the questionnaire questions. Upon delivered remarks, the questionnaire was reworded and modified by changing some phrases and deleting and adding some questions. After Damascus dentists syndicate approval; a 25 multiple-choice questions containing questionnaire were distributed to 200 dentists practicing dentistry in Damascus city randomly by visiting all the available dentists in the randomized selected visited areas in the city (Shallan, Salihea, Shahbandar, Mohajereen, Fahameh, Jeser Abead, Al-Hamra St, Abbaseen, Kassa, Bab Towma, and Baghdad St). At the visit, the purpose of the study was described for all dentists (participants) as well as questionnaire questions emphasizing that the participant has to answer what he is practicing in his private clinic. Participants were not asked

for their names, so anonymity was guaranteed. Most of the visited participants complete the questionnaire at the same visit and others ask for another visit for delivery. A questionnaire contained questions regarding different aspects of endodontic treatment including participant specialty and years of experience, teeth and cases being treated, applied techniques and isolation, number of treating visits and the use of X-ray, irrigation and intra-canal medicaments, obturation techniques and materials, and recall and final restoration. The questionnaire was in Arabic language and accompanied by an explanatory covering letter.

RESULTS

The collected data in this descriptive-analytical cross-sectional study were entered into a personal computer and analyzed using the statistical package, SPSS, 25 edition. Simple descriptive statistics were used together with the Chi-square (χ^2) test to see the effect of specialty and years of experience on the participants' answers. The chosen level of significance was set at $p < 0.05$. There were no unanswered questions of the received questionnaires. Only 188 questionnaires were collected with a response rate of 94%. Participant dentists (respondents) were distributed according to specialty (Table 1) and years of experience (Table 2). The results of the 23 questions included in the questionnaire and related to root canal treatment procedure were as in (Table 3).

Questionnaire Application Results according to Specialty

Comparisons between endodontists (E) answers and GDPs with other specialties (OS) answers were done and the results were as follows with a significant difference

Table 1: Respondents distribution according to specialty

Specialty	N	Percentage (%)
General dental practitioners (GDPs)	135	71.8
Endodontist	47	25.0
Other specialty	6	3.2
Total	188	100

Table 2: Respondents distribution according to years of experience

Years of experience	N	%
10 years or below	85	45.2
More than 10 years	103	54.8
Total	188	100

Table 3: The results of the 23 questions included in the questionnaire and related to root canal treatment procedure

Q. No.	Question Text	Possible answers	N	%
1.	Which teeth do you treat for root canal treatment?	All teeth	140	74.5
		All teeth except molars	48	25.5
2.	What clinical cases do you treat?	Root canal treatment of vital and necrotic pulp cases	130	69.1
		Retreatment and complications	48	25.5
		Referring difficult cases to endodontist	10	5.3
3.	In how many visit do you complete vital root canal treatment?	Single visit	61	32.4
		Multi visits	127	67.6
4.	In how many visit do you complete necrotic root canal treatment?	Single visit	41	21.8
		Multi visits	147	78.2

(Cont...)

Dentists' Knowledge, Attitude and Practice of Root Canal Treatment Procedure

Q. No.	Question Text	Possible answers	N	%
5	Isolation technique applied during root canal treatment?	Saliva ejector with cotton rolls	175	93.1
		Rubber dam	13	6.9
6.	Which root canal preparation technique do you use?	Traditional technique	106	56.4
		Step-back technique	37	19.7
		Crown-down technique	45	23.9
7.	Are you using rotary root canal preparation?	No	137	72.9
		Yes	51	27.1
8.	If you are using rotary root canal preparation which system are you using?	K3	2	3.9
		Hero-shaper	3	5.9
		Protaper	45	88
		other	1	1.8
9.	What irrigation solutions are you using?	Sodium Hypochlorite	187	99.5
		More than one solution	1	0.5
10.	Which technique do you employ for working length determination?	Tactile sensation	129	68.6
		X-ray film	24	12.8
		Apex locator	20	10.6
		Both X-ray film and apex locator	15	8.0
11.	Which intra-canal dressing do you use during vital root canal treatment sessions?	Dry dressing	162	86.2
		Eugenol dressing	15	8.0
		Tri-cresol formalin	5	2.7
		Calcium Hydroxide	5	2.7
		Eugenol dressing + Calcium Hydroxide	1	0.5
12.	Which intra-canal dressing do you use during necrotic root canal treatment sessions?	Calcium Hydroxide	188	100
13.	Which root canal obturation technique do you use?	Lateral condensation with Gutta-percha cones	165	87.8
		Warm vertical condensation	14	7.4
		Single cone	1	0.5
		Only sealer	1	0.5
		More than one technique	7	3.7
14.	Do you use pulpotomy as an alternative for root canal treatment?	No	184	97.9
		Yes	4	2.1
15.	If your answer is yes in question 14; what teeth do you treat by doing pulpotomy?	Third molars	4	100
16.	Do you often take X-ray before endodontic treatment?	Yes	50	26.6
		I ask for Panoramic x-ray	138	73.4
17.	Do you often do X-ray after endodontic treatment?	No	1	0.5
		Yes	50	26.6
		I ask for Panoramic x-ray	137	72.9
18.	Do you use digital x-ray?	No	148	78.7
		Yes	40	21.3
19.	Do you recall patients for assessment of root canal treatment outcome?	No	138	73.4
		Yes	50	26.6
20.	Do you do the final restoration for the treated tooth?	In the same appointment of root canal obturation	7	3.7
		Next visit after symptoms disappearance	181	96.3
21.	If you are going to do crown for endodontically treated tooth which restorative material do you often use?	Amalgam	1	0.5
		Composite	79	42.0
		GIC	108	57.4
22.	Do you do intended root canal treatment for intact teeth before tooth preparation in crowns and bridges?	Never	29	15.4
		Sometimes	108	57.4
		Always	51	27.1
23.	Did you do any continuous education training program after graduation in endodontics during the last five years?	No	136	72.3
		Yes	52	27.7

Table 4: Demonstrates questionnaire results according to respondents specialty with *p* value and significant difference according to Chi-square (χ^2) test [significant at (*p* value <0.05)]

Q. No.	Question text	Answers	N		%		Significant differences with <i>p</i> value
			E	GDPs and OS	E	GDPs and OS	
2.	What clinical cases do you treat?	Root canal treatment of vital and necrotic pulp cases	1	129	2.1	91.5	Yes (0.000)
		Retreatment and complications	46	2	97.9	1.4	
		Referring difficult cases to endodontist	0	10	0	7.1	
3.	In how many visit do you complete vital root canal treatment?	Single visit	45	16	95.7	11.3	Yes (0.000)
		Multi visits	2	125	4.3	88.7	
4.	Number of visits to achieve necrotic root canal treatment?	Single visit	35	6	74.5	4.3	Yes (0.000)
		Multi visits	12	135	25.5	95.7	
5.	Isolation technique applied during root canal treatment?	Saliva ejector with cotton rolls	34	141	72.3	100	Yes (0.000)
		Rubber dam	13	0	27.7	0	
6.	Which root canal preparation technique do you use?	Traditional technique	1	105	2.1	74.5	Yes (0.000)
		Step-back technique	18	19	38.3	13.5	
		Crown-down technique	28	17	59.6	12.1	
7.	Are you using rotary root canal preparation?	No	1	136	2.1	96.5	Yes (0.000)
		Yes	46	5	97.9	3.5	
10.	Which technique do you employ for working length determination?	Tactile sensation	1	128	2.1	90.8	Yes (0.000)
		X-ray film	20	4	42.6	2.8	
		Apex locator	12	8	25.5	5.7	
		Both X-ray film and apex locator	14	1	29.8	0.7	
11.	Which intra-canal dressing do you use during vital root canal treatment sessions?	Dry dressing	34	128	72.3	90.8	Yes (0.000)
		Eugenol dressing	7	8	14.9	5.7	
		Tri-cresol formalin	0	5	0	3.5	
		Calcium Hydroxide	5	0	10.6	0	
		Eugenol dressing + Calcium Hydroxide	1	0	2.1	0	
13.	Which root canal obturation technique do you use?	Lateral condensation with Gutta-percha cones	26	139	55.3	98.6	Yes (0.000)
		Warm vertical condensation	12	2	25.5	1.4	
		Single cone	1	0	2.1	0	
		Only sealer	1	0	2.1	0	
		More than one technique	7	0	14.9	0	
16.	Do you often take X-ray before endodontic treatment?	Yes	46	4	97.9	2.8	Yes (0.000)
		I ask for Panoramic x-ray	1	137	2.1	97.2	
17.	Do you often do X-ray after endodontic treatment?	No	0	1	0	0.7	Yes (0.000)
		Yes	46	4	97.9	2.8	
		I ask for Panoramic x-ray	1	136	2.1	96.5	
18.	Do you use digital x-ray?	No	11	137	23.4	97.2	Yes (0.000)
		Yes	36	4	76.6	2.8	
19.	Do you recall patients for assessment of root canal treatment outcome?	No	1	137	2.1	97.2	Yes (0.000)
		Yes	46	4	97.9	2.8	
20.	Do you do the final restoration for the treated tooth?	In the same appointment of root canal obturation	7	0	14.9	0	Yes (0.000)
		Next visit after symptoms disappearance	40	141	85.1	100	

(Cont...)



Q. No.	Question text	Answers	N		%		Significant differences with <i>p</i> value
			E	GDPs and OS	E	GDPs and OS	
22	Do you do intended root canal treatment for intact teeth before tooth preparation in crowns and bridges?	Never	1	28	2.1	19.9	Yes (0.000)
		Sometimes	32	76	68.1	53.9	
		Always	14	37	29.8	26.2	
23	Did you do any continuous education training program after graduation in endodontics during the last five years?	No	1	135	2.1	95.7	Yes (0.000)
		Yes	46	6	97.9	4.3	

Table 5: Demonstrates questionnaire results according to respondents experience with P value and significant difference according to Chi-square (χ^2) test [significant at (*p* value < 0.05)]

Q. No	Question text	Answers	N		Percent		Significant differences with <i>p</i> value
			<10	>10	<10	>10	
3	In how many visit do you complete vital root canal treatment?	Single visit	20	41	23.5	39.8	Yes (0.000)
		Multi visits	65	62	76.5	60.2	
		Yes	46	5	97.9	3.5	
20	Do you do the final restoration for the treated tooth?	In the same appointment of root canal obturation	0	7	0	6.8	Yes (0.000)
		Next visit after symptoms disappearance	85	96	100	93.2	

according to Chi-square test (*p* value <0.05) (Table 4 contains only cases with significant differences only).

P values were much greater than 0.05 for questions no. 1, 8, 9, 14, and 21, so we conclude, at 95% of confidence level, that there were no significant differences in questions no. 1, 8, 9, 14, and 21 answers between endodontist group and general practitioners with other specialty respondents group. *P* values for both question no. 12 and 15 were not calculated because the according to answers were the same for all respondents in the sample, so we conclude that there were no significant differences in question no. 12 and 15 answers between endodontist group and general practitioners with other specialty respondents group. All other *p* values were lower than 0.05, so we conclude, at 95% of confidence level, that there were significant differences in the according to questions' answers between endodontist group and general practitioners with other specialty respondents group.

Questionnaire Application Results according to Experience

Comparisons between more experienced respondents' answers (> 10 years) with less experienced ones (<10 years) were done and the results were as follows with a significant difference according to Chi-square test (*p* value <0.05) (Table 5, contains only cases with significant differences only).

P value was lower than 0.05 for questions no. 3 and 20, so we conclude, at 95% of confidence level, that there

were significant differences in questions no. 3 and 20 answers between respondents with 10 years or below of experience group and respondents with more than 10 years of experience group. Referring to according frequencies and percentage we notify that Single visit to achieve vital root canal treatment occurrence percentage, and doing the final restoration for the treated tooth In the same appointment of root canal obturation occurrence percentage in respondents with 10 years or below of experience group were lower than those in respondents with more than 10 years of experience group. *P* values for both questions numbers 12 and 15 were not calculated because the according to answers were the same for all respondents in the sample, so we conclude that there were no significant differences in question numbers 12 and 15 answers between respondents with 10 years or below of experience group and respondents with more than 10 years of experience group. All other *p* values were greater than 0.05, so we conclude, at 95% of confidence level, that there were no significant differences in the according to questions' answers between respondents with 10 years or below of experience group and respondents with more than 10 years of experience group.

DISCUSSION

Endodontic treatment is a very frequent and essential part of dental services applied for attending patients to dental clinics. The well performed endodontic treatment based upon skillful as well as highly educated and

updated dentists will result in higher success rates. The results show a high percentage of respondents not practicing molar endodontics 25.5% which was higher than Al-Faouzan study 11% in Saudi Arabia.¹³ This could be attributed to low training and less desire toward molars treatment due to more complex root canal morphology comparing with other teeth. Although GDPs and OS were practicing less molar endodontics comparing with endodontists, a considerable percentage 17% of endodontists were not practicing also, the issue which is considered strange and may be due to lack of materials and facilities needed. Experience does not affect the selection of molar endodontics. About 5.3% of the respondents referred difficult cases for endodontists, and 25.5% only do retreatment when indicated, mostly were endodontists. The others 69.1% dealt with root canal treatment of vital and necrotic pulp cases only. These results were in contrast with Flemish GDPs survey results that 80% of them were practicing retreatment.¹⁰ Alafif found that adequate Root canal filled teeth were 18.5% only which was so low.¹⁹ To improve the success rate in general dental practice, it has been emphasized that referral of difficult cases to dentists with advanced knowledge and training in endodontics should be made possible for the benefit of patients. In a survey among Dutch general practitioners, it was found that 34% referred certain patients for specialist treatment.²⁰ The low percentage of referral to endodontists results in the present study indicates the need for more cooperation between GDPs and different specialties with endodontists. Comparing with other studies we found that the decision of single visit therapy is related to a number of canals as 73.8% of Iranian dentists do treat single root canal teeth in one visit.²¹ In a Saudi survey it was found that only 2% were practicing molar single visit root canal treatment.¹³ Most practitioners in North Jordan performed treatment in three visits for teeth with two or more root canals, and two visits for teeth with a single root canal.¹⁴ A study from the US demonstrated a clear inclination to single visit endodontics, especially in cases without apical periodontitis. Single visit treatment appears to have gained more popularity and increased credibility in the pre-clinical endodontic teaching in America and Europe.²² The very low percentage of rubber dam isolation use 6.9% was not different from other studies findings.^{10,14-16} Fifty-nine percent of American GDPs always used rubber dam as well as 57% of general dental practitioners in New Zealand.^{11,23} In this survey the rubber dam applicators were only endodontists. Rubber dam application was related to specialty only and experience does not affect its choice. The additional costs and application time could be of considerable reasons. More than half of the respondents 56.4% used the

standardized method of root canal preparation. Similar results were found in many studies.^{10,13} A majority of dentists performed root canal preparation using either the step back technique or the crown down technique.²⁴ The more use of the standardized technique in the present study may be due to under-graduation learning protocols utilized previously. Results of the survey showed that 27.1% of the respondents were using rotary root canal preparation which was mostly 88% ProTaper system. There is no doubt that use of rotary systems was significantly associated with shorter instrumentation sessions, as well as less need for many treatments visits.²⁴ Koch et al. reported that GDPs who had undergone educational programs in NiTi rotary instrumentation had successfully integrated the technique into daily clinical practice.²⁵ The results of this study show higher rotary usage than in Saudi survey,¹³ and comparable to Lee et al.,²⁶ and less than Iranian survey 2012.²⁷ The usage of rotary root canal preparation among Damascus dentists' respondents could be considered as good comparing with rotary files prices and the average fees of root canal treatments. Concerning irrigation solution used, it was evident that all the respondents (100%) used sodium hypochlorite as an only irrigation solution except for one endodontist who was using chlorhexidine also. In Saudi survey, normal saline was used in 55%, whereas only 26% used sodium hypochlorite.¹³ In Whitten et al. study 79% of the GDPs used sodium hypochlorite as an irrigant,¹¹ chlorhexidine was used from one respondent only in this survey. About 68.6% of respondents used tactile sensation to determine the working length, and few were using X-ray and electronic apex locators.

Total 8% as the combination was used in the present survey. The majority of the respondents in Saudi survey 93% used radiographs and tactile sensation with some kind of instrument in situ to determine working length.¹³ While 84% percent of the dentists used radiograph for determining the working length, and only 2.7% used Apex-locator in Iranian survey.²¹ Most of the practitioners in Turkey survey 77% preferred radiographs for working-length determination.¹⁶ The high use of tactile sensation in this survey may be due to lack of X-ray and electronic apex locators devices in dental clinics because of high device prices especially with war circumstances. The objectives of inter-appointment medication are to prevent growth and multiplication of microorganisms left in the canal system between visits despite cleaning. This stage is rarely necessary after pulpectomy and root canal preparation of a tooth with a vital pulp.⁶ Non-setting calcium hydroxide is recognized as the standard intracanal medicament for inter-appointment dressing,²⁸ and our results came along with these findings. The formaldehyde-containing dressing is still being used by 5 GDPs and other specialties respondents 2.7% in

this survey despite its toxic effect and mutagenic and carcinogenic potential.²⁹ Having a look over previous studies we notice that 53% of Turkish,¹⁶ and 62% of the Indian survey respondents,²⁴ were using calcium hydroxide dressing, and it was the most commonly used medicament in Iranian survey²¹ as well. 87.8% of this survey respondents used lateral condensation obturation technique with gutta-percha cones; these results were in consistent with many study results.^{1,7,13,16,24} The less usage of warm vertical compaction 7.5% (mostly were endodontists) is an indicator of not following the advanced obturation techniques and could be due to high equipment costs and less training as even GDP were using the lateral technique. Only 3.7% were using more than one technique in filling root canals. More experienced respondents 'choices did not differs from less experienced respondents as only 2.1% (4 GDPs and other specialty respondents) were using pulpotomy on third molars as an alternative to root canal treatment. The results showed that all the respondents use X-ray for diagnosis before root canal treatment, but GDPs and other specialty respondents depend on Panoramic X-rays whereas endodontists perform intraoral X-rays, the issue that is considered better with more accurate X-rays compared with Panoramic ones.³⁰ About 22.9% of North Jordanian dentists took radiograph neither before nor after root canal treatment,¹⁴ while the vast majority of survey respondents in North West of England routinely took postoperative radiographs.¹ In case to see the adoption of digital radiography by respondents in this survey it was found that 21.3% used this technique mostly were endodontists. Digital radiography was reported as being used by 17% among Indian dentists in 2013,²⁴ and 30.9% of general dental practitioners and 46% of endodontists in Iranian Survey in 2012.²⁷ Higher results in 2009 were noticed in the USA as Lee et al.³¹ reported a rate of 72.5%, which might be attributed to the higher economic potential of American dental practitioners and the better education they have received. It was unacceptable to find that 73.4% not recalling patient to assess success and failure of root canal treatment as disappearing of severe pain after treatment does not guarantee success. This could be due to less skillful respondents to perform retreatment in case of failure discovery as the results of less retreatment practicing and low attitude for cases referral in this survey support this. It was stated that Nigerian dentists follow up their patients less than 12 months for success assessment.³¹ 96.3% of recent study' respondents prefer delaying final restoration to next visit for symptoms disappearance, our results were similar to the Saudi survey,¹³ as 88% of their dentists do not perform final restoration immediately after root canal filling and prefer waiting 1 to 2 weeks. and were in contrast with Sudanese 75%,¹⁵ and North

West of England,¹ 66.6% dentists who prefer doing final restoration in the same root canal filling visit. Glass ionomer cement (GIC) was selected mostly for restoring teeth after root canal treatment and before crowning 57.4%, and composite material was selected in less frequency 42%, whereas amalgam was not the material of choice with very poor usage from one respondent only 0.5%. The preference of GIC may be due to its properties as fluoride releasing material and chemical bonding with tooth structure which helps to prevent microleakage and recurrent caries. In addition, amalgam was less used, and this could be explained due to amalgam dust spreading during core preparation and the possible tattoo staining of surrounding soft tissue especially when injured. In an Indian survey,²⁴ composites was used mostly with 46%. In this survey, it was found that 27.1% were always scarifying intact dental pulps for the sake of crowns and bridges, and 57.4% were practicing that sometimes. This high percentage of devitalization procedures may be due to the desire of getting rid of post preparation sensitivity the issue which is considered unethical when not indicated especially with the previously found findings in this survey which indicate the poor following of most quality guidelines for endodontics. The strange finding was that endodontists were scarifying dental pulps more than GDPs and other specialty respondents; this could be explained by more experience and knowledge in practicing root canal treatment. With the continuous advances for materials and techniques in endodontics, depending on under graduations education and techniques only will limit advances and updating of the practicing dentists. This raises an important role for continuous education in dentistry. 72.3% of our respondents did not follow post graduation endodontics continuous educational programs for the last 5 years; this could be due to a few endodontics activities in Damascus due to crisis and war in Syria. Endodontists were following continuous educational programs more, and more experienced respondents were following in a higher percentage than less experienced with no statistical difference. Only 25% on the North West of England survey;¹ respondent were not updating their knowledge and skills in endodontics within two years. This contrasting result may be due to more continuous endodontic programs being conducted in the UK.

CONCLUSION

It was evident that more practicing experience does not improve treatment options selections of endodontic treatment. Regarding the facts of rubber dam application and intact teeth devitalization procedures for crowning sake, endodontists in Damascus were able to introduce better endodontic services comparing with GDPs and other

dental specialties who were not complying with the most quality established endodontic guidelines. The previous findings indicate the high need for continuous endodontic education programs as it is medium where dentists especially GDP can update on the newest developments on technology related to dentistry and also provides a platform in discussing various case-related queries.

ACKNOWLEDGMENTS

Authors would like to thank Damascus dentists syndicate for allowing collecting information from dentists in Damascus.

REFERENCES

- Palmer NO, Ahmed M, Grieveson B. An investigation of current endodontic practice and training needs in primary care in the north west of England. *Br Dent J*. 2009 Jun 13; 206(11):E22; discussion 584-585.
- Sjogren U, Haggglund B, Sundqvist G, et al. Factors affecting the long-term results of endodontic treatment. *Journal of Endodontics*. 1990;10:498-503.
- Eriksen HM. Endodontology – epidemiologic considerations. *Endodontics and Dental Traumatology*. 1991; 7, 189-195.
- Sánchez-Torres A, Sánchez-Garcés MA, Gay-Escoda C. Materials and prognostic factors of bone regeneration in periapical surgery: A systematic review. *Med Oral Patol Oral Cir Bucal*. 2014 Mar 8. (Epub ahead of print).
- American Association of Endodontics. Appropriateness of Care and Quality Assurance Guidelines. 1994.
- European Society of Endodontology. Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology. *International Endodontic Journal*, *Int Endod J*. 2006 Dec;39(12):921-930.
- Peciuliene V, Maneliene R, Drukteinis S, et al. Attitudes of general dental practitioners towards endodontic standards and adoption of new technology: literature review. *Stomatologija*. 2009;11(1):11-14.
- Bjørndal L, Reit C. The adoption of new endodontic technology amongst Danish general dental practitioners. *Int Endod J* 2005;38:52-58.
- Weiger R, Axmann-Kremer D, Lost C. Prognosis of conventional root canal treatment reconsidered. *Endod Dent Traumatol*. 1998;14:1-9.
- Slaus G, Bottengerg P. A survey of endodontic practice amongst Flemish dentists. *Int Endod J*. 2002;35:759-767.
- Whitten BH, Gardiner DL, Jeansonne BG, Lemon RR. Current trends in endodontic treatment: report of a national survey. *J Am Dent Assoc*. 1996;127:133-141.
- Jenkins SM, Hayes SJ, Dummer PM. A study of endodontic treatment carried out in dental practice within the UK. *Int Endod J*. 2001;34:16-22.
- Al-Fouzan KS. A survey of root canal treatment of molar teeth by general dental practitioners in private practice in Saudi Arabia. *Saudi Dent J*. 2010 Jul;22(3):113-117.
- Al-Omari WM. Survey of attitudes, materials and methods employed in endodontic treatment by general dental practitioners in North Jordan. *BMC Oral Health*. 2004 Sep 10;4(1):1.
- Ahmed MF, Elseed AI, Ibrahim YE. Root canal treatment in general practice in Sudan. *Int Endod J*. 2000 Jul;33(4):316-319.
- Unal GC, Kaya BU, Tac AG, et al. Survey of attitudes, materials and methods preferred in root canal therapy by general dental practice in Turkey: Part 1. *Eur J Dent*. 2012 Oct;6(4):376-384.
- Udoye CI, Sede MA, Jafarzadeh H, et al. A survey of endodontic practices among dentists in Nigeria. *J Contemp Dent Pract*. 2013 Mar 1;14(2):293-298.
- Peciuliene V, Rimkuvieni J, Aleksejuniene J, et al. Technical aspects of endodontic treatment procedures among Lithuanian general dental practitioners. *Stomatologija*. 2010;12(2):42-50.
- Alafif H, Impact of the quality of coronal restoration and root canal filling on the periapical health in adult Syrian subpopulation, *Indian Journal of Dentistry*. 2014; Apr-Jun; 5(2):75-80.
- De Cleen MJH, Schuur AHB, Wesselink PR, et al. Periapical status and prevalence of endodontic treatment in an adult Dutch population. *International Endodontic Journal*. 1993;26,112-119.
- Ravanshad S, Sahraei S, Khayat A. Survey of Endodontic Practice amongst Iranian Dentists Participating Restorative Dentistry Congress in Shiraz, Iran *Endod J*. November 2007. 2008 Winter;2(4):135-142.
- Gatewood RS, Himel VT, Dorn SO. Treatment of the endodontic emergency: a decade later. *J Endod* 1990, 16:284-291.
- Koshy S, Chandler NP. Use of rubber dam and its association with other endodontic procedures in New Zealand. *N Z Dent J*. 2002;98:12-16.
- Gupta R, Rai R. The adoption of new endodontic technology by Indian dental practitioners: a questionnaire survey. *J Clin Diagn Res*. 2013 Nov;7(11):2610-2614.
- Koch M, Eriksson HG, Axelsson S, et al. Effect of educational intervention on adoption of new endodontic technology by general dental practitioners: a questionnaire survey. *Int Endod J* 2009;42:313-321.
- Lee M, Winkler J, Hartwell G, et al. Current trends in endodontic practice: emergency treatments and technological armamentarium. *J Endod*. 2009;35(1):35-39.
- Elham FG, Sedigheh Z. The use of instruments by Iranian endodontics and general practitioners. *Open Dent J*. 2012; 6: 105-110.
- Chong BS, Pitt Ford TR. The role of intra-canal medication in root canal treatment. *Int Endod J* 1992, 25:97-106.
- Spangberg I. Intracanal medication. In *Endodontics 4th edition*. Edited by: Malvern PA. USA: Williams and Wilkins; 1994:627-640.
- Molander B. Panoramic radiography in dental diagnostics. *Swed Dent J Suppl*. 1996;119:1-26.
- Udoye CI, Sede MA, Jafarzadeh H, et al. A survey of endodontic practices among dentists in Nigeria. *J Contemp Dent Pract*. 2013 Mar 1;14(2):293-298.